VINH UNIVERSITY
TRƯỜNG ĐẠI HỌC VINH

COLLEGE OF ECONOMICS
TRƯỜNG KINH TẾ

PROCEEDINGS OF THE 2ND COEC INTERNATIONAL SCIENTIFIC CONFERENCE:

SUSTAINABLE ECONOMIC DEVELOPMENT OF VIETNAM IN THE NEW CONTEXT

KỶ YẾU HỘI THẢO KHOA HỌC QUỐC TẾ COEC LẦN THỨ 2:

PHÁT TRIỂN BỀN VỮNG KINH TẾ VIỆT NAM TRONG BỐI CẢNH MỚI

NHÀ XUẤT BẢN TÀI CHÍNH

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CONTENT

PROGRAM

07:30 – 08:00	**Registration**	**Main Hall 8th floor**
08:00 – 08:15	**Welcome and Opening Remarks** *Leaders of Vinh University (Vietnam)*	**8th floor**
08:15 – 08:45	**Policies and Implementation of Circular Economy: How Taiwan's experience can benefit Vietnam** *Mr. Lin Yi Min, Taipei Economic and Cultural Office in Ha Noi, Vietnam (TECO)*	**8th floor**
08:45 – 09:15	**Conceptualising conversion of farm wastes to poultry feed** *Mr.Vincent BoonSeng LIM, Singapore Institute of Technology*	**8th floor**
09:15 – 09:35	**Tea Break**	**Main Hall 8th floor**
09:40 – 11:40	**Section 1 - Economics**	**8th floor**
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10:40 – 11:10	**The impact of institutional quality on CO2 emissions: A comparative study** *Nguyen Thi Hong Ngan, Le Thi Men, Nguyen Thi Tra My, Nguyen Hong Nhung, Trinh Hoai Nam (Thuongmai University)*	**8th floor**
11:10 – 11:40	**Application of technology in sustainable tourism development in Nghe An province** *Tran Thi Hong Lam, Luong Thi Quynh Mai (Vinh University)*	**8th floor**
09:30 – 11:40	**Section 2 - Accounting, Business Administration, Banking and Finance**	**6th floor**

Chairman: Assoc. Prof., Dr. Ho Thi Dieu Anh (Vinh University) **Secretary: MA. Nguyen Vu Minh Thuy (Vinh University)**		
09:40 – 10:10	**The role of market competition and macroeconomics in shaping financial stability of Commercial banks in Asia** *Khuc The Anh, Nguyen Xuan Dung, Nguyen Khanh Chi, Vu Thi Anh Ngoc, Nguyen Ngoc Mai, Ninh Thi Ngoc Thu (National Economics University)*	**6th floor**
10:10 – 10:40	**Impact of knowledge management on innovation efficiency: A case study of small and medium enterprises in the North central region** *Tran Quang Bach, Ho Thi Dieu Anh, Hoang Thi Cam Thuong, Duong Duc Anh, Nguyen Vu Minh Thuy, Tran Dieu Linh ,Nguyen Thi Thanh Hoai, Pham Thi Ngoc (Vinh University)*	**6th floor**
10:40 – 11:10	**The impact of cash holdings on firm value in listed electrical industry companies on the Vietnamese stock market** *Nguyen Thi Thu Thao, Le Van Luyen, Nguyen Trong Than, Dinh Ha Vy, Cao Thi Dieu Huong (University of Labor and Social Affairs)*	**6th floor**
11:10 – 11:40	**The quality of green credit services at commercial banks in Nghe An province** *Dang Thanh Cuong, Banh Thi Thao, Nguyen Thi Yen (Vinh University)*	**6th floor**
11:40 – 12:00	**Closing Remarks** **https://coec2024.vinhuni.edu.vn/ban-noi-dung.html**	**8th floor**

INTRODUCTION

Through crises, difficulties and challenges, we have become increasingly aware of the importance and decisive role of internal strength and autonomy in economic development. Strengthening internal capacity and creating growth momentum is an objective, inevitable and urgent requirement to ensure continuity, stability and sustainability, helping the country take advantage of opportunities, overcome challenges, unleash resources, withstand external shocks and crises, and at the same time help the economy grow towards sustainable development.

From the reality of rising up during the pandemic when facing the harsh difficulties and challenges in the recent past, one of the most important lessons is to build and promote strong internal strength to respond to the challenges and uncertainty of external factors. We need to strengthen and promote "internal strength", effectively apply and exploit "external strength" to adapt and develop, this is considered the top and continuous task, especially in the new context and situation with many fluctuations and increasing risks. Vietnam needs to focus on solving internal challenges both in the immediate, medium and long term.

Implementing the approved plan for 2024, the School of Economics is organizing the 2nd International Scientific Conference "Sustainable economic development of Vietnam in the new context" to create a high-quality, highly connected professional forum for scientists, post-doctoral researchers, and doctoral students at home and abroad in the field of Economics. This is an opportunity to affirm the prestige and position in scientific research of the School of Economics in particular and Vinh University in general.

The Conference Proceedings is a selective collection of research articles contributed by professors, scientists, lecturers, postgraduates, etc. from universities across the country. The articles have been forwarded by the Editorial Board to independent reviewers and have been returned to the author group for editing. The Editorial Board would like to express its sincere thanks to all author groups and reviewers for their valuable contributions to the Conference. Although the Editorial Board has made every effort in editing and reviewing the Proceedings, we acknowledge that there may still be some shortcomings. We sincerely welcome constructive feedback from the scientific community and our esteemed readers.

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THE EFFECT OF ECONOMIC OPENNESS ON ECONOMIC GROWTH AND SUSTAINABLE DEVELOPMENT: THE VIEW FROM POLICY PERSPECTIVES IN VIETNAM

Pham Xuan Bach[1], Phan The Cong[2]

Abstract: Integration has an important role in the country's development strategies of countries, especially for developing economies. However, concerning sustainable development as an inevitable trend, countries focus not only on economic growth but also aim for long-term sustainability. This paper investigates the impact of economic openness on growth and sustainable development in Vietnam, considering the "openness" of trade policy and financial policy. Applying the ARDL and FMOLS methods to data from 1996 to 2022, the results show that the "openness" of trade and financial policies plays a critical role in stimulating economic growth, especially in pursuing sustainable development. In addition, the study also points out the two-way causal relationship between the openness of financial policies and institutional quality, the use of natural resources, or the one-way causal relationship between the openness of trade policies and technological innovation. Based on the research results, several implications and policy recommendations are proposed for the goal of economic growth, towards long-term sustainability.

Keywords: *Economic openness; Trade policy; Financial policy; Sustainable development.*

1. Introduction

Integration has an important role in the country's development strategies. Economic openness could be considered a highway that helps countries develop, based on the many benefits it contributes to the economy. Indeed, it could have major impacts such as more efficient resource allocation (Helpman & Krugman, 1987; Rodrik, 1988), market expansion puts the economy in a more dynamic state from competitiveness (Paus & Robinson, 1997), undeniable benefits from effective foreign investment flows or transferred technologies or facilitating the development of the industrial sector (Campoamor, 2021). Accordingly, many scholars support the important role of economic openness in promoting economic growth, emphasizing two aspects trade and foreign investment flows. Although there are still opposing views that economic openness can have negative effects on the economy as some studies by (Aitken & Harrison, 1999; Kim & Lin, 2009; Marc, 2011) have shown, it is admitted that openness could influence the economy and especially on economic growth.

However, more than just economic growth, many countries nowadays aim at a larger issue: sustainable and long-term development. It is the simultaneous development of all three aspects: economic growth, human development, and environmental preservation

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(Duran et al., 2015), which has been defined in the Brandtland report (WCED, 1987). t is the development that meets the needs of the present without affecting future generations. Economic openness does not only affect the economic aspect, its spillover effects can also affect issues in the other two aspects of sustainable development: social and environmental. The perspective from many studies shows the influence of openness on these two aspects such as (Barros & Martínez-Zarzoso, 2022; Gourdon et al., 2008; Jabeen et al., 2023; Meschi et al., 2016; Winters et al., 2004; Yamarik & Ghosh, 2011). However, the relationship between economic openness and sustainable development is still ambiguous, as studies show different views and results, depending on the scope area and the period of the research, or the issue of concern about sustainable development (Barros & Martínez-Zarzoso, 2022). Furthermore, economic openness should be considered in both "de facto" and "de jure" aspects, which emphasize openness in institutional perspectives, such as barriers and regulations, such as barriers and regulations (Gräbner et al., 2021). Indeed, the openness of trade policy or financial policy can affect economic growth and also sustainable development. Accordingly, studying the impact of this issue on economic growth and sustainable development is significantly meaningful, when most studies only focus on the de-facto aspect.

As a developing country, integration with other economies in the world is a critical strategy in Vietnam's development path. This could be illustrated by the increasing number of free trade agreements from 1996 to the present, or the continuous growth in import and export turnover, along with investment capital flows into Vietnam. If in 1996 export-import turnover only reached 2.4 billion, in 2022 it increased 7.5 times, trade openness also increased from 92.7% to 183.8% according to data from the World Bank, the contribution from the FDI sector to the growth of the economy has leaped forward, now accounting for more than 20% of the total GDP of the economy. Through this information, it can depict the important role of openness in the economy and also emphasizes the important influence of "openness" in trade policy and investment attraction policy. In addition, Vietnam is a country actively pursuing sustainable development, focusing not only on the economic aspect but also on social and environmental issues. Accordingly, investigating the impact of economic openness on policy on sustainable development in Vietnam is extremely practical. Therefore, the article applies the ARDL and FMOLS models to analyze data for the period 1996-2022 in Vietnam. The results show that trade policy openness and financial policy openness have a positive impact on economic growth and sustainable development. However, the paper also emphasizes several implications that should orient these policies towards green technology, minimizing natural resource intensity in import-export trade activities, and encouraging investment in the renewable energy sector. The paper is divided into 5 parts: Section 1 is Introduction, Section 2 is Literature review, Section 3 is Data and Research Methodology, Section 4 is Results and Discussion, and Section 5 is Conclusion and Policy Recommendations.

2. Literature Review

The emergence of the concept of "economic openness" in academic literature can be traced back to the early 1970s, with the research of (Whitman, 1969). According to (Gräbner et al., 2021) his concept is used to measure the "degree of integration" of the economy. Accordingly, economic openness should not only consider the de-facto aspects

of international import-export trade and foreign investment flows. Indeed, economic openness could be considered through the "de jure" with law implies, emphasizing the openness of international trade policies and investment attraction. In addition, sustainable development is a broad topic, which is not only achieving economic goals but also social and environmental aspects (Baker, 2015; Elliott, 2012).

The relationship between economic openness and sustainable development is still unclear, especially when considering the influence of openness on trade policy and financial policy on this issue. However, based on previous studies, economic openness can affect this sustainable development goal. On the economic aspect, (Merz et al., 2017) emphasized that the openness of financial policies can directly affect inward FDI through legal regulations or tax systems. (Goldberg & Pavcnik, 2016) emphasized that trade policies can affect export-import turnover by affecting prices, quantities, and performance of firms, or import and export products, through tariff barriers, non-tariff barriers, and legal regulations. Accordingly, while the impact of FDI and trade on economic growth has been mentioned in many studies (De Mello Jr, 1997; Seker et al., 2015; Siddique & Majeed, 2015; Sokang, 2018), trade policy openness and financial policy openness can have impacts on the growth of the economy.

In terms of social and environmental aspects, trade policy openness and financial policy openness also play an important role. Trade and FDI have an impact on many social issues, while the openness of trade policy and financial policy could affect these trade and investment activities. Economic openness through trade and FDI can affect employment and poverty (Grossman & Helpman, 1991; Porto, 2006), improving skills and labor qualifications (Hamid & Amin, 2013), influencing wages and income inequality (Verhoogen, 2008)… Indeed, trade and foreign investment activities can be regulated by policy regulations, barriers, thereby affecting the investment sector, labor use, investment technology, production efficiency, consumer markets, thereby affecting social issues. Concerning the environmental aspect, the openness of trade policy and financial policy has an important influence as mentioned by the Pollution Haven Hypothesis (Grossman & Krueger, 1995). This hypothesis indicates the situation that focusing only on the economic benefits of trade openness or foreign investment flows, combined with the lax legal system, weak restrictions, and the removal of barriers, will lead to environmental degradation. On the other hand, the Pollution Halo Hypothesis indicates the positive effects of openness on the environment, but the role of the legal system and regulations is the key factor.

In the practical view, there have been studies focusing on the impact of economic openness on specific aspects of sustainable development. However, the results are different depending on the period, country, and research region. (Fiorini & Hoekman, 2018) research on 92 countries in the period 2007-2011 showed that barriers to trade in services do not affect economic growth. (Asfaw, 2017) research on 47 Sub-Saharan African countries in the period 2000-2008 showed that the openness of trade policy will promote economic growth, emphasizing that tariff barriers will affect this issue. (Yanikkaya, 2003) also has a similar viewpoint with research on 100 developed and developing countries in the period 1970-1997. However, (DeJong & Ripoll, 2006) showed that the openness of these two policy has a negative impact on economic growth, emphasizing that protecting the domestic production sector reduces the negative effects

of competition. (Fowowe, 2008) showed a positive impact of financial policy openness when studying 19 countries in the Sub-Saharan Africa region on growth. Financial policy openness showed adverse results with economic growth in countries where FDI showed negative effects on the economy. (Forte & Moura, 2013) pointed out that these reasons could come from inappropriate policies, hindering technology transfer, or creating competition that affects the domestic sector.

Besides, (Le Goff & Singh, 2014) found that economic openness stimulated poverty reduction in a study of some African countries during the period 1981-2020. Meanwhile, (Ravallion, 2006) found that economic openness does not have a significant impact on poverty reduction in China and Morocco. (Huang et al., 2010) found that FDI hinders poverty reduction in 12 countries in the East Asian and Latin American regions. Regarding the impact of openness on income inequality, (Rojas-Vallejos & Turnovsky, 2017) found that economic openness increases income inequality through tax cuts in a study of 34 different countries during the period 1984-2010. (Huang et al., 2020) argue that FDI reduces income inequality in some high-income countries. (Gorus & Aslan, 2019) support the "pollution haven" hypothesis by showing the negative impact of economic openness on environmental quality in Central Asian and North African countries. (Destek & Okumus, 2019) study several industrialized countries in OECD countries and show a positive relationship between openness and environmental improvement. (Nassani et al., 2021) show that FDI has a positive relationship with environmental pollution, while the influence of trade openness is unclear when studying 24 LIC countries. (Lin & Fu, 2016) indicates that institution aspect is related with trade and inward FDI. Accordingly, the institutional influence of economic openness, such as taxes, laws, or other legal barriers, can affect trade activities and foreign investment. To be clearer, the "openness" in trade policy and investment attraction can also affect these issue.

3. Data and Research Methodology

3.1 Data

The data used in this paper is the secondary data, which is taken from the World Development Indicators Database Online supplied by the World Bank, about Vietnam data in the period 1996-2022. In detail, the "openness" of trade policy is measured by trade openness de-jure from KOF Swiss Economic Institute. The "institutional openness" of financial policy to attract foreign direct investment is measured by financial openness de-jure from KOF Swiss Economic Institute. These two data are based on the research of (Dreher, 2006; Gygli et al., 2019). Besides, Sustainable development (SD) is measured by adjusted net savings, supplied by World Bank (Bolt et al., 2002). GDP per capita is used to measure per capita income, INSQ is used to measure institutional quality by an average of six indexes from World Development Indicators, TEC is measured by technological innovation, REC is measured by renewable energy consumption, and NR is measured by natural resource rents. The detail is shown at ***Table 1***.

Table 1. Data Descriptions

Order	Variable	Name	Index	Source
1	SD	Sustainable development	Adjusted net savings, excluding particulate emission damage	(Solt, 2020)

			(current US$)	
2	GDP	Economic growth	GDP (constant 2015)	World Development Indicators
3	FP	The "openness" of financial policy	Financial openness de-jure	KOF Swiss Economic Institute
4	TRP	The "openness" of trade policy	Trade openness de-jure	KOF Swiss Economic Institute
5	INSQ	Institutional quality	Calculated from 5 index about institutional quality	World Development Indicators
6	TEC	Technological Innovations	The proportion of medium and high-tech industry value added in total value added of manufacturing	World Development Indicators
7	REC	Renewable Energy	Renewable energy consumption (% of total final energy consumption)	World Development Indicators
8	NR	Natural resources	Natural resource rents (% GDP)	World Development Indicators

3.2 Research Model

The model is constructed to investigate the effect of economic openness on economic growth and sustainable development in Vietnam in the period 1996 - 2022. For details, the main aspects considered are the "openness" of trade policy and trade openness and the "openness" of financial policy. Besides technological innovations, renewable energy, natural resources, and institutional quality are used as control variables. Therefore, the initial model was constructed as follows:

$$SD_{it} = f(FP_{it}, TRP_{it}, INSQ_{it}, REC_{it}, TEC_{it}, NR_{it}) \quad (1)$$

Where SD is sustainable development, FP represents the "openness" of financial policy, TRP represents the "openness" of trade policy, INSQ is institutional quality, REC is renewable energy, TEC is technological innovations, NR is natural resources rents.

The second model was constructed as follows:

$$GDP_{it} = f(FP_{it}, TRP_{it}, INSQ_{it}, REC_{it}, TEC_{it}, NR_{it}) \quad (2)$$

Where GDP is economic growth, FP represents the "openness" of financial policy, TRP represents the "openness" of trade policy, INSQ is institutional quality, REC is renewable energy, TEC is technological innovations, NR is natural resources rents.

3.3 Research Methodology

This paper uses the quantitative research method to investigate the impact of economic openness on economic growth and sustainable development in Vietnam in the period 1996 to 2022. To be more specific, our study applies the ARDL model (Pesaran et al., 2001) for the research's purpose. In addition, the general ARDL model for the study is built in log form as follows:

$$LSD_t = \chi_0 + \sum_{i=1}^{\chi 1} \chi_{1i} \Delta LSD_{t-i} + \sum_{i=0}^{\chi 2} \chi_{2i} \Delta LFP_{t-i} + \sum_{i=0}^{\chi 3} \chi_{3i} \Delta LTRP_{t-i} +$$

$\sum_{i=0}^{\chi 4} \chi_{4i} \Delta LINSQ_{t-i} + \sum_{i=0}^{\chi 5} \chi_{5i} \Delta LREC_{t-i} + \sum_{i=0}^{\chi 6} \chi_{6i} \Delta LTEC_{t-i} + \sum_{i=0}^{\chi 7} \chi_{7i} \Delta LNR_{t-i} + \kappa_1 LSD_{t-1} + \kappa_2 LFP_{t-1} + \kappa_3 LTRP_{t-1} + \kappa_4 LINSQ_{t-1} + \kappa_5 LREC_{t-1} + \kappa_6 LTEC_{t-1} + \kappa_7 LNR_{t-1} + \varepsilon_t$ (3)

$LGDP_t = \sigma_0 + \sum_{i=1}^{\sigma 1} \sigma_{1i} \Delta LGDP_{t-i} + \sum_{i=0}^{\sigma 2} \sigma_{2i} \Delta LFP_{t-i} + \sum_{i=0}^{\sigma 3} \sigma_{3i} \Delta LTRP_{t-i} + \sum_{i=0}^{\sigma 4} \sigma_{4i} \Delta LINSQ_{t-i} + \sum_{i=0}^{\sigma 5} \sigma_{5i} \Delta LREC_{t-i} + \sum_{i=0}^{\sigma 6} \sigma_{6i} \Delta LTEC_{t-i} + \sum_{i=0}^{\sigma 7} \sigma_{7i} \Delta LNR_{t-i} + \lambda_1 LGDP_{t-1} + \lambda_2 LFP_{t-1} + \lambda_3 LTRP_{t-1} + \lambda_4 LINSQ_{t-1} + \lambda_5 LREC_{t-1} + \lambda_6 LTEC_{t-1} + \lambda_7 LNR_{t-1} + \varepsilon_t$ (4)

According to Pesaran et al. (2001), applying ARDL method has some advantages, especially in analyzing the time series data. The ARDL method is efficient and consistent even with the small datasets. The ARDL method does not require the condition that variables has the same order, so that it can apply for the variables in the order I(0) or I(1) (Ullah et al., 2021). Moreover, the ARDL method can estimate both long-run and short-run term. Besides, the ARDL method can manage the situation of serial correlation and endogeneity issue.

The ARDL method is implemented with the following steps, according to (Pesaran et al., 2001). At first, the Bound test is used to find the cointegration relationship between the variables, thereby determining the long-run relationship between the variables. Then, the next step is determining the optimal lag, by running the VAR (vector autoregression) model and the AIC (Akaike Information Criterion) criterion. After that, the ARDL model is estimated with the optimal lag, which has been found, to test the long-term relationship between the variables in the model, followed by evaluating the short-term effects of the variables with the error correction model ECM. We also apply the FMOLS method (fully modified OLS) to confirm long-run findings. The FMOLS method has better advantages with small sample, making the model dynamic by introducing lags in the system that further help to overcome serial correlation. Finally, diagnostic tests are conducted to exemplify the model's reliability and make sure it does not have the serial correlation or Heteroskedasticity issue.

Examining the spillover effect of economic openness in policy perspectives, we apply the Granger causality test in this study. The purpose of this test is to find the existence and direction of the causality relationship in the variables (Granger, 1980). Typically, these tests are run for every pair of variables, and the results are produced as test statistics. The general model is as follows:

$Y_t = \sum_{i=1}^{n} \alpha_i \ Y_{t-i} + \sum_{i=1}^{n} \beta_i \ X_{t-i} + u_{1t}$ (5)

$X_t = \sum_{i=1}^{n} \varphi_i \ X_{t-i} + \sum_{i=1}^{n} \omega_i \ Y_{t-i} + u_{2t}$ (6)

4. Results and Discussion

4.1 Results

Based on the collected data as described in Section 3.1, we apply the ARDL model with the mentioned steps in Section 3.3. The results are presented according to the order of implemented steps, respectively as follows: the unit root test result, the bound test result, the result of optimal lag, the long-run, and short-run estimated results, and the diagnostic test result. In detail, the result is illustrated below:

❖ **Unit root test**

Before applying the ARDL model, it is necessary to ensure the stationarity of the

variables in the model. The Dickey-Fuller (ADF) test (Dickey & Fuller, 1979), is used to check the stationarity of the variables and obtained the results as in ***Table 2***.

Table 2. The Unit root test results

Agumented Dickey - Fuller			
Variables	**Level Stationary**	**1st difference**	**Order**
LSD	-0.5858	-4.2817***	I(1)
LGDP	-0.9293	-5.6983***	I(1)
LFP	-0.9426	-3.5289**	I(1)
LTRP	-3.1267**	-5.1726	I(0)
LINSQ	-0.1823	-7.0554***	I(1)
LREC	-0.819	-4.9805***	I(1)
LTEC	-0.5877	-4.0661***	I(1)
LNR	-0.9942	-4.5841***	I(1)

Note: *** indicates 1%, ** indicates 5% and * indicates a 10% level of significance.
Source: Calculation based on Eviews software

❖ **The Bound Test**

Before implementing the Bound test, we determined the optimal lag length by running the VAR (vector autoregression) model. Based on the criterion, the optimal lag length is 1, which will be applied in two model for the next estimation steps.

The next step is investigating the cointegration relationship between variables, the Bound test is used with the following hypothesis:

- H0: $\kappa_1 = \kappa_2 = \kappa_3 = \kappa_4 = \kappa_5 = \kappa_6 = \kappa_7 = 0$. No cointegration among the variables
- H1: $\kappa_1 \neq \kappa_2 \neq \kappa_3 \neq \kappa_4 \neq \kappa_5 \neq \kappa_6 \neq \kappa_7 \neq 0$. Existing the cointegration among the variables

Table 3. The Bound test result

Model	F-statistic	Bounds critical values					
		1%		5%		10%	
		I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
F_{SD}	4.3899	1.92	2.89	2.17	3.21	2.73	3.9
F_{GDP}	45.1322	1.92	2.89	2.17	3.21	2.73	3.9

Source: Calculation based on Eviews software

As is shown in ***Table 3***, the F-statistic value is higher than the upper and the lower bound values at the level of 5 percent significance, so the alternative hypothesis that the existence of cointegration is accepted, claiming the long-run relationship among the variables.

❖ **Estimating the long-run and short-run coefficients**

In the next step, we estimated the coefficients of the variables with ARDL method in the long run, then continue to use the ECM model to estimate the coefficients in the short run. The long run coefficients are robust checked with FMOLS because the FMOLS method has better advantages with small sample further help to overcome serial

correlation. The final result of this step shown in ***Table 4*** and ***Table 5***, will be used to exemplify the relationship between variables in Section 4.2.

Table 4. The result of estimating the short and long run coefficient - F_{SD} model

	The Short-run results (ARDL)	The long-run results (FMOLS)
Variables	Coefficient	Coefficient
LFP	1.809*** (0.551)	1.825*** (0.393)
LTRP	0.617 (0.41)	2.402*** (0.68)
LINSQ	0.084 (0.736)	-0.191 (1.451)
LREC	-0.194 (0.348)	-0.112 (0.411)
LTEC	-0.446 (0.327)	0.512 (0.443)
LNR	-0.329** (0.142)	-0.615*** (0.193)
COINTEQ(-1)	-0.537*** (0.082)	

*Note: ***, ** and * indicates the 1%, 5% và 10% level of significance, respectively. Standard errors in parentheses.*
Source: Calculation based on Eviews software

As can be seen at ***Table 4***, economic openness has a positive impact on sustainable development. The "openness" of financial policy raises by 1 percent, and sustainable development will increase by 1.8% percent in the short and long run. Whereas, sustainable development will increase by 2.4% for each percent improving the "openness" of trade policy. However, renewable energy, technological innovation, and institutional quality do not show their impact on sustainable development. Meanwhile, natural resource rents have a negative effect on sustainable development. For each percent raise of nature resource rents, sustainable development will decrease by 0.32% in the short run and 0.61% in the long run. Furthermore, to guarantee that the system converges, the error correction term (ECT) coefficient range should be between 0 and -2. The ECT value for the current study was -0.537, meaning that the exposed system is convergent.

Table 5. The result of estimating the short and long run coefficient - F_{GDP} model

	The Short-run results (ARDL)	The long-run results (FMOLS)
Variables	Coefficient	Coefficient
LFP	0.107** (0.039)	0.397*** (0.078)
LTRP	0.036 (0.027)	0.629*** (0.134)
LINSQ	-0.036 (0.044)	0.501 (0.286)
LREC	-0.069*** (0.024)	-0.731*** (0.081)
LTEC	-0.028 (0.02)	0.402*** (0.087)
LNR	0.003 (0.009)	0.08** (0.038)
COINTEQ(-1)	-0.546*** (0.127)	

*Note: ***, ** and * indicates the 1%, 5% và 10% level of significance, respectively. Standard errors in parentheses.*
Source: Calculation based on Eviews software

The results of this model are shown in ***Table 5***. Thus, economic openness has a positive impact on economic growth. The "openness" of financial policy rises by 1 percent, the economic growth will increase by 0.1 percent and 0.3 percent in the short and long run, respectively, followed by 0.69 percent for each percent of the "openness" of

trade policy growth. Renewable energy has a negative impact on economic growth, while it grows by 1 percent the economic growth slows by 0.06 and 0,73 percent in the short and long run. Technological innovations and natural resource rent stimulate economic growth in the long run, whereas institutional quality does not impact significantly economic growth.

❖ **Diagnostic tests**

Several diagnostic tests are used to ensure the reliability of the model. More specifically, we use 4 tests: The normality Test, Ramsey Reset Test, Breuch- Godfrey Serial Correlation LM Test, and Heteroskedasticity Test: Breusch-Pagan-Godfrey. The obtained results are presented in ***Table 6***. Accordingly, the model has a normal distribution, and serial correlation or Heteroskedasticity issues do not exist in this model.

Table 6. Results of several diagnostic tests

Model	Normality Test	Ramsey Reset Test	Breusch-Godfrey Serial Correlation LM Test	Heteroskedasticity Test
F_{SD}	1.758 (0.415)	0.282(0.606)	0.018 (0.894)	1.37 (0.303)
F_{GDP}	1.425 (0.490)	0.02 (0.888)	0.025 (0.869)	0.61 (0.809)

Note: the p-value is in parentheses. Source: Calculation based on Eviews software

To check the stability of the model, we use the CUSUM test. The results show in ***Figure 1*** and ***Figure 2*** that variables are stability in these two models

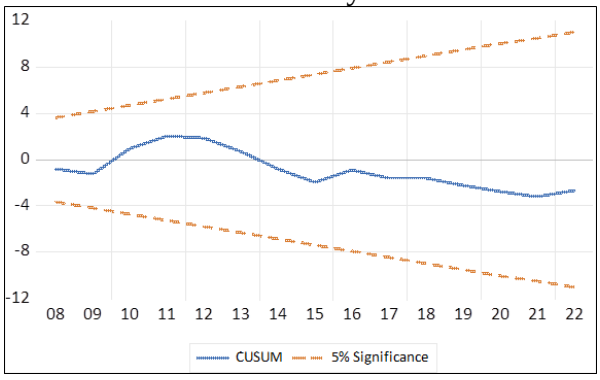

Figure 1. The result CUSUM test result - F_{SD} model

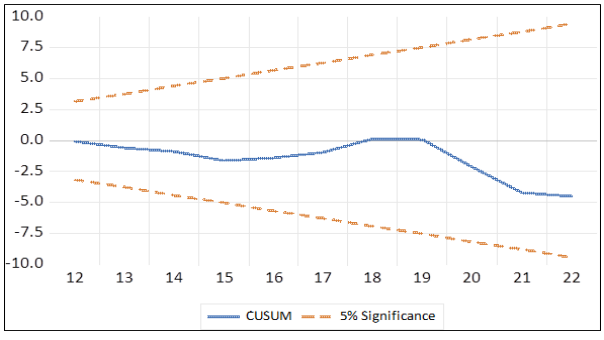

Figure 2. The result CUSUM test result - F_{GDP} model

❖ **The Granger causality test**

To examine the causal relationship between variables, especially to investigate the spillover effect of FDI, the Granger causality test is applied. Several causal relationships are founded. The result is shown at ***Table 7***. Accordingly, there is a bidirectional causality relationship between nature resource and the "openness" of financial policy, which means a raising in one factor could predict the same situation with the remaining. Another bidirectional causality relationship is existed between institutional quality and the "openness" of financial policy. Meanwhile, a growing the "openness" of trade policy could predict the increasing of technological innovations. However, the increasing of technological innovations could lead to the growing in nature resource rents.

Table 7. Results of the Granger causality test

Null Hypothesis	F-Statistic
LNR → LFPL**	4.447
LFPL → LNR**	4.804
LINSQ → LFPL*	3.253
LFPL → LINSQ*	3.263
LTEC → LTRPL	0.045
LTRPL → LTEC*	2.973
LNR → LTEC	0.137
LTEC → LNR*	3.325

*Note: ***, ** and * indicates the 1%, 5% và 10% level of significance, respectively.*

Source: Calculation based on Eviews software

4.2 Discussion

This paper studies the impact of economic openness, focusing on the openness of trade and financial policies on growth and sustainable development in Vietnam from 1996 to 2022. In general, the openness of trade and financial policies has positive effects on economic growth and sustainable development. This result is similar to some studies (Asfaw, 2017; Fowowe, 2008). In addition, the study contributes evidence to clarify the relationship between economic openness and sustainable development, especially from the perspective of openness in terms of policy. Accordingly, improving the openness of trade and investment policies plays a very important role, helping to create a driving force to promote economic growth, especially in the process of pursuing sustainable development.

However, the research results also indicate several essential implications. There is a two-way causality relationship between the openness of financial policies and institutional quality. This shows the close relationship between these two issues. Improving the institutional quality will be the foundation to support the increase in openness of financial policies, thereby attracting capital flows, and formulating the driving force to promote growth and sustainable development. Meanwhile, institutional quality has not yet shown a significant impact on economic growth and sustainable development. Therefore, the role of improving institutional quality is extremely necessary to promote the positive effects of economic openness.

Furthermore, openness in trade policy will lead to an increase in technological innovation. This is a positive sign, as the results show that technological innovation promotes economic growth. However, the impact of technological innovation does not show a significant impact on sustainable development. In particular, increased technological innovation can lead to an increase in the use of natural resources. Moreover, increased openness in financial policy also leads to an increase in the use of natural resources. Although natural resource rents show an impact on promoting economic growth, they hinder sustainable development. Accordingly, it can be seen that the openness of trade policies and financial policy need to focus on encouraging "green" products, high value, and minimizing resource-intensive technologies and products.

Moreover, renewable energy has not shown its role in sustainable development. This can be explained by the fact that renewable energy slows down economic growth. This situation could be that renewable energy has not met the needs of the economy, especially for an economy that depends largely on fossil energy, switching to green energy can have negative impacts on growth. However, this result does not mean that renewable energy should not be developed, but rather raises the issue of investing more in developing this energy, focusing on both economic benefits and environmental purposes.

5. Conclusion and Policy Recommendations

Integration is an important strategy for countries on the path of development, especially developing countries. The article focuses on clarifying the impact of economic openness on economic growth and sustainable development, from the perspective of openness in terms of trade and financial policies. Accordingly, promoting openness of trade and investment policies plays a critical role, formulating the driving force to promote economic growth, especially in the process of pursuing sustainable development. The results from the study provide empirical evidence on the relationship between economic openness on economic growth and sustainable development, in policy viewpoints. Clarifying this relationship is meaningful to support policymakers, thereby serving to make appropriate policies. From the research results, some policy recommendations are proposed for economic growth and long-term sustainability. Firstly, it is necessary to promote research and development of trade and financial policies, reduce and eliminate barriers, and legal regulations insufficient, and streamline administrative procedures to encourage trade activities and foreign investment, stimulating the driving force for economic development. Secondly, improving institutional quality is an essential issue, the basis for promoting financial policies, and creating a favorable investment environment to promote growth. Accordingly, the work of perfecting and improving the quality of institutions should be promoted and should be considered as core factors towards sustainable growth and development. Thirdly, trade policies should focus on orienting the export of green products, bringing high-added value, less intensive in natural resources, and applying advanced technologies. Fourthly, investment attraction policies should focus on less resource-intensive fields, bringing high-added value to the economy. Fifth, the renewable energy sector should be invested in a way that balances both economic benefits and environmental issues, thereby aiming for long-term sustainability.

Although the paper contributes to clarifying the relationship between economic openness from a policy perspective for growth and sustainable development, the study only focuses on the macro perspective of data research in a developing country. This may affect the conclusions of the study. Accordingly, future studies should expand in the direction of cross-countries and regions, thereby clarifying more thoroughly the relationship between these important issues of the economy.

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THE IMPACT OF COMPETITIVE ADVERTISING EFFECTIVENESS ON CONVERSION BEHAVIOR IN THE USAGE OF PERSONAL SERVICES AMONG CUSTOMERS AT VIETNAMESE COMMERCIAL BANKS

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Thi Bich Thuy Nguyen[3], Thi Thuy Van Hoang[4]

Abstract: Service quality plays a crucial role in the development of banks, particularly in attracting and retaining customers. This research aims to develop a model and test the direct and indirect relationships between competitive advertising effectiveness and conversion behavior in the use of personal banking services among customers of Vietnamese commercial banks. A quantitative research approach was employed, utilizing structural equation modeling (SEM) for data analysis. Research data were collected through a survey involving 494 individual customers of commercial banks. The findings indicate that the effectiveness of competitive advertising has both a direct and inverse impact, as well as an indirect effect on conversion behavior through intermediary factors such as the bank's reputation and customer loyalty. Furthermore, the research reveals gender differences in conversion behavior, in which male customers exhibiting significantly higher conversion behavior compared to female customers. Based on these results, the authors propose recommendations to minimize customer conversion behavior and enhance customer retention in personal banking services for commercial banks.

Keywords: *Competitive advertising effectiveness; Reputation; Loyalty; Risks in conversion; Conversion behavior.*

1. Introduction

Service quality plays a crucial role in the development of banks, particularly in attracting and retaining customers (Nguyen, 2021). In the current competitive environment, customers are the determining factor for the survival and long-term development of commercial banks. Competition in business operations requires banks to adjust their business strategies, focus on the personal customer segment, restructure income sources, and manage risks with a focus on safety and efficiency. With the diversification of credit institution activities and the increasing demands of consumers, competitive pressure on commercial banks has intensified, accompanied by a rise in the risk of customer conversion in the use of banking services.

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In the banking sector, conversion behavior refers to customers transitioning from using the services of one bank to those of another (Garland, 2002). According to Boote (1998); Bolton and Bronkhorst (1995), conversion behavior reflects a customer's decision to stop purchasing a specific service or to cease using the services of a particular company. Research by Keaveney and Parthasarathy (2001) and Reichheld (1996) highlights that customer conversion behavior reduces company revenue and profit, as companies invest in initial and ongoing costs to acquire new customers. Intense competition in the banking industry has caused conversion behavior to significantly impact market share and profitability (Binks & Ennew, 1996).

Beckett et al. (2000) argued that customers' service usage behavior is more susceptible to change when similar financial products are offered by different commercial banks. Chakravarty et al. (2004) suggested that a decline in a bank's competitiveness, combined with the similarity of products and services, may lead to changes in customer conversion behavior. As a result, service or product quality is no longer the sole factor banks need to emphasize; greater attention must be directed toward their customers. Aligning with this perspective, Cengiz et al. (2007) asserted that the effectiveness of advertising could foster loyalty and help maintain the customer base for commercial banks. When customers can access nearly identical financial products and services offered by various retail banks, they are more inclined to alter their banking behavior (Beckett et al., 2000).

Commercial banks are credit intermediaries that play a crucial role in mobilizing temporary idle monetary resources within the economy, transforming them into credit capital to meet the capital needs of businesses and investment sectors, as well as the consumption demands of society. In practice, the commercial banking system in Vietnam has made significant progress over the years, offering a wide range of products and services, deeply engaging in various economic sectors, and making substantial contributions to the country’s economic development. Commercial banks have become indispensable financial institutions for the functioning of the economy, serving as the primary providers of capital, driving the growth of productive forces, and acting as a bridge between businesses and markets. However, the credit operations and customer service of several banks have not met expectations, with persistent complaints from customers regarding the quality of banking services provided. In the context of globalization and trade liberalization, combined with the rapid transformations of the market economy and business environment, commercial banks face considerable pressures on the financial market, along with potential risks and challenges for the banking system.

This research aims to develop a model and examine the direct and indirect relationships of competitive advertising effectiveness on conversion behavior in the use of personal services among customers of Vietnamese commercial banks. The findings provide valuable contributions to both theoretical and practical aspects. The article demonstrates that the effectiveness of competitive advertising by banks has both a direct and inverse impact, as well as an indirect impact, on conversion behavior in service usage among individual customers. These indirect effects are mediated through factors such as the bank's reputation and customer loyalty. Additionally, conversion behavior in service usage among individual customers is shown to differ by gender, with male customers

exhibiting significantly higher conversion behavior compared to female customers. Based on the research findings, the authors propose several recommendations to reduce customer conversion behavior and improve customer retention in personal banking services for commercial banks.

2. Theoretical basis and hypotheses

2.1. Theoretical basis

2.1.1. Theories of competition

Some traditional competition theories suggest that competitive advantage within the same industry is created through differentiation among firms; however, this differentiation does not rely on the internal resources of the firms and, therefore, often cannot sustain over time as it can be easily imitated (Barney, 1991). According to Barney (1991), a firm's resources are the key determinant that drives competitive advantage and business performance. Hence, this theory posits that analyzing competitive advantage must be grounded in resource analysis. Grant (1991) divides resources into tangible and intangible resources. Tangible resources include financial resources and physical assets, while intangible resources comprise technology, reputation, and human capital.

According to the theory of Cengiz et al. (2007), competitive advertising by banks involves activities aimed at increasing sales or enhancing the image of services, financial institutions, or business operations.

2.1.2. Theories of conversion behavior

Ajzen and Fishbein's Theory of Reasoned Action (1980) suggested that individuals consider the consequences of a behavior before engaging in a specific action. Consequently, intention is a critical factor in determining behavior and changing behavior. According to Ajzen and Fishbein (1980), intention develops from an individual's perception of a behavior as positive or negative, along with their impression of how their social environment views the same behavior. Thus, personal attitudes and social pressure shape intention, which is essential for engaging in a behavior and, consequently, for changing behavior.

In 1985, Ajzen extended the Theory of Reasoned Action to develop the Theory of Planned Behavior. This theory also emphasizes the role of intention in executing behavior but aims to account for situations in which an individual does not have full control over all factors influencing the actual execution of the behavior. The new theory posits that the likelihood of actual behavior execution is proportional to the level of control an individual has over the behavior and the strength of their intention to perform it. In his paper, Ajzen further hypothesizes that self-efficacy is critical in determining the strength of an individual's intention to carry out a behavior. Research of Fishbein and Ajzen (2010) introduced the reasoned action approach, a successor to the Theory of Planned Behavior.

According to the theoretical model of conversion behavior proposed by Prochaska and Velicer (1997), there are five stages toward conversion behavior. These stages, which individuals transition through before achieving complete conversion, include pre-contemplation, contemplation, preparation, action, and maintenance. In the pre-contemplation stage, an individual may or may not be aware of the issue but has no intention of changing their behavior. Transitioning from pre-contemplation to contemplation, the individual begins to consider changing a specific behavior. During the preparation stage, the individual starts planning for the change, and in the action stage,

they consistently exhibit the new behavior. Finally, the individual enters the maintenance stage after demonstrating the new behavior consistently for more than six months. One challenge with conversion model is that individuals in the maintenance stage can easily regress to earlier stages. The factors contributed to this regression include external influences such as weather or seasonal changes and/or personal issues that the individual is facing.

Customer conversion behavior refers to the act of abandoning a current service provider and adopting a different provider, and this behavior has become a central focus of research in the service industry (Garland, 2002).

2.1.3. Reputation of the bank

The research of Zhang et al. (2009) demonstrates that factors such as price, reputation, service quality, effective advertising, involuntary conversion, conversion barriers, and conversion costs influence customers' decisions to converse banks. According to Shenkar and Yuchtman-Yaar (1997), reputation is a broad concept that can be applied in marketing, accounting, or economics. This concept reflects a solid image, prestige, and goodwill. An organization's reputation can be assessed based on the shared experiences of stakeholders with the organization and through any media coverage of the company's activities compared to its competitors (Gotsi & Wilson, 2001; Wartick, 2002). Accordingly, an organization's reputation can be measured across various dimensions. Wang et al. (2003) suggests that reputation is one of the most commonly used metrics to evaluate corporate reputation. It encompasses six aspects: emotional appeal, products and services, vision and leadership, workplace environment, social and environmental responsibility, and financial performance. In many researches, these dimensions serve as the foundation for measuring a company's overall reputation. Within the context of the banking industry's development, this measurement approach has been expanded to include customer care and overall banking services (Igbudu et al., 2018).

2.1.4. Loyalty

According to Duncan and Elliot (2002), customer loyalty is a crucial factor contributing to a business's revenue and profitability. When customers switch due to unmet expectations from their bank, they often lose interest in their previous bank (Lees, 2007). The research of Nguyen et al. (2011) indicates that two components of service quality—core services and the physical environment—affect customer satisfaction. The research also highlights that customer satisfaction and conversion barriers both influence customer loyalty. Customers are considered loyal to a brand when they tend to purchase and use multiple products from that brand (Chaudhuri, 1999). In the context of banking, customer loyalty is demonstrated when customers choose to conduct transactions with a bank, continue their relationship with the bank, recommend its services to others, and consider the bank as their first choice when needing additional services (Kathleen, 2005). As the demand for a more sustainable society grows, adopting a sustainable approach by focusing on achieving customer loyalty becomes a competitive advantage for banks (Igbudu et al., 2018).

2.1.5. Risks in conversion

Dick and Basu (1994) describe risks in conversion as encompassing risks related to time, money, and psychological factors. Risks in conversion also include perceived risks, which are defined as the customer's perception of uncertainty or even the anticipation of

negative consequences when purchasing a product or service (Downling & Staelin, 1994). In alignment with this perspective, Murray (1991) identifies six dimensions of risk: financial, performance, social, psychological, safety, and the loss of time or convenience.

2.2. Research hypothesis

2.2.1. The Effectiveness of Competitive Advertising and Conversion behavior in the Use of Personal Banking Services

According to Balmer and Stovig (1997), the effectiveness of competitive advertising can lead to conversion behavior because informed customers have more opportunities to explore their choices. However, studies by Gotsi and Wilson (2001); Kathleen (2005) suggest that advertising plays a role in enhancing brand value and reputation for banks, thereby helping them retain customers and reducing conversion behavior in the use of banking products and services. Thus, it is evident that research findings on the impact of competitive advertising on conversion behavior in personal banking services are not entirely consistent. Given the context of Vietnamese commercial banks, this research poses the hypothesis:

H1: The effectiveness of competitive advertising negatively impacts conversion behavior in the use of personal banking services at Vietnamese commercial banks.

2.2.2. The Effectiveness of Competitive Advertising and Bank Reputation

A strong reputation can enhance a company's value and competitiveness, significantly influencing service evaluation, increasing future profitability, and fostering customer demand for goods and services (Barney, 1991). High competitiveness in terms of technology, finance, capital, and human resources serves as a key factor enabling banks to accelerate capital turnover, improve the efficiency of credit activities, and consequently build their brand and reputation. To measure and evaluate the impact of competitive advertising effectiveness on the reputation of Vietnamese commercial banks, the research proposed the following hypothesis for testing:

H2: The effectiveness of competitive advertising positively impacts the reputation of Vietnamese commercial banks.

2.2.3. Bank Reputation and Conversion behavior in the Use of Personal Banking Services

The research of Gerrard and Cunningham (2004) concluded that a bank’s reputation is one of the factors influencing customers' decisions to converse their use of banking services. Reputation is perceived as the integrity and financial stability of a bank. Similarly, Barr (2009) asserted that a bank’s reputation significantly affects customer choices. A bank with a strong reputation has a greater ability to retain customers, thereby limiting conversion behavior to other banks. Bank reputation plays a crucial role in determining customers' purchasing and usage behavior for banking services (Wang et al., 2003). Given this context, the research explores how bank reputation impacts conversion behavior in the use of personal banking services at Vietnamese commercial banks. The authors propose the following hypothesis for testing:

H3: Bank reputation negatively impacts conversion behavior in the use of personal banking services at Vietnamese commercial banks.

2.2.4. The Effectiveness of Competitive Advertising and Customer Loyalty in Personal customers

Dunn (1995) suggested that advertising plays a crucial role in attracting customers to a business's operations and maintaining customer density during the growth phase. Competitive advertising serves as a lever in expanding networks and effectively implementing an organization's business strategies (Wartick, 2002). For commercial banks, enhancing the effectiveness of competitive advertising has become even more critical in the current context of intense competition among banks. Effective competitive advertising enables banks to build trust and foster stable, long-term customer loyalty in the use of their products and services. To explore the relationship between competitive advertising effectiveness and customer loyalty in personal banking at Vietnamese commercial banks, the research proposed the following hypothesis:

H4: The effectiveness of competitive advertising positively impacts customer loyalty in personal banking at Vietnamese commercial banks.

2.2.5. Customer Loyalty and Conversion behavior in the Use of Personal Banking Services

Customer loyalty is not merely a transactional relationship but a deep emotional connection that encourages customers to return and support an organization's brand. The research of Mittal and Lasser (1998) demonstrated a correlation between customer loyalty and conversion behavior in banking services, indicating that increased customer loyalty leads to a lower conversion rate. Within the context of Vietnamese commercial banks, to clarify the impact of customer loyalty on conversion behavior in using personal banking services, the research proposed the following hypothesis:

H5: Customer loyalty negatively impacts conversion behavior in the use of personal banking services at Vietnamese commercial banks.

2.2.6. The Effectiveness of Competitive Advertising and Risks in conversion to use Banking Services by Personal Customers

According to Matthews and Murray (2007), risks in conversion refer to the risks that customers face when transferring part or all of their banking transactions to another financial institution. These risks are influenced by various factors and need to be minimized to enhance customers' long-term engagement with a bank's products and services. Based on this understanding, the research proposed the following hypothesis:

H6: The effectiveness of competitive advertising positively impacts risks in conversion to use banking services by personal customers at Vietnamese commercial banks.

2.2.7. Risks and Conversion behavior in the Use of Banking Services by Personal Customers

Stewart (1998) suggested that risks have an impact on conversion behavior in the use of banking services. Conversion behavior occurs not only due to customers' proactive decisions but also as a result of involuntary factors unrelated to their deliberate choices (Roos, 1999). Risks in conversion act as barriers that limit the increase in individual conversion behavior when using banking services. Therefore, the research formulates the following hypothesis:

H7: Risks in conversion negatively impact conversion behavior in the use of banking services by personal customers at Vietnamese commercial banks.

2.2.8. Bank Reputation and Customer Loyalty in Personal customer

Loyal customers are invaluable assets to any brand, as they not only continue purchasing but also tend to increase their spending over time. Reputation can enhance customer loyalty to a bank, particularly in the retail banking sector, where the quality of services cannot be accurately assessed before purchase (Nguyen & LeBlanc, 1998). A detailed understanding of customer conversion behavior can positively impact banks and improve their effectiveness in building long-term relationships with customers (Lees et al., 2007). To explore the relationship between bank reputation and customer loyalty in personal banking at Vietnamese commercial banks, the research proposed the following hypothesis:

H8: Bank reputation positively impacts customer loyalty in personal banking at Vietnamese commercial banks.

2.2.9. Risks in conversion in Banking Services and Customer Loyalty of Personal Customer

Several researches have found a positive relationship between risks in conversion and customer loyalty (Mittal & Lasser, 1998; Burnham et al., 2003; Nguyen, 2021). When customers perceive higher risks associated with services - conversion from one bank to another, it creates invisible barriers and reduces their willingness to undergo the conversion process. This serves as a strategic tool for banks to retain customers longer and foster loyalty by offering them more attractive value through existing and future services. To investigate this relationship, the research proposed the following hypothesis:

H9: Risks in conversion positively impact customer loyalty in personal banking at Vietnamese commercial banks.

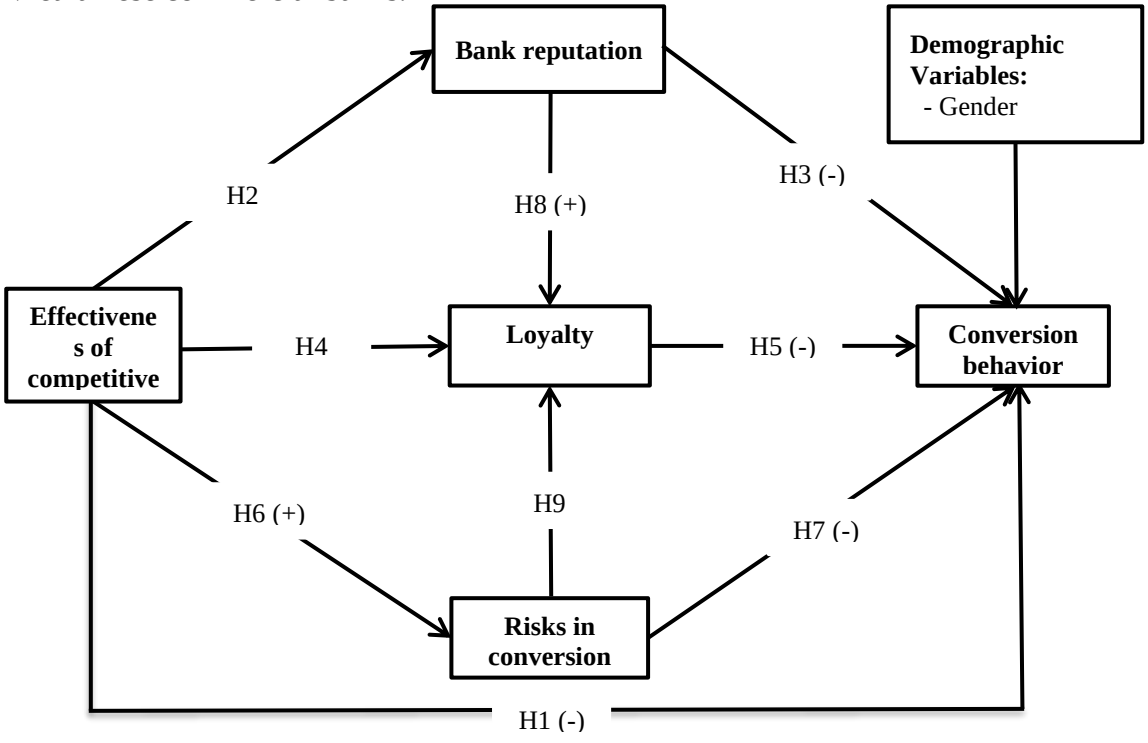

Figure 1. The proposed research model

3. Research methodology

3.1. Research scale

Based on the theoretical overview and related researches, this article proposed a research model in which the independent variable - Effectiveness of Competitive Advertising. The mediating variables include Bank Reputation, Customer Loyalty, and Risks in conversion, while the dependent variable is Conversion behavior in the Use of Personal Banking Services. The research used Likert scale with five levels: Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree. The indicators for measuring the variables are adapted and adjusted to suit the characteristics of the research sample, based on prior research.

Table 1. Origin of the scale of variables

No.	*Variable*	*Symbol*	*Number of observations*	*Origin of scale*
1	Effectiveness of competitive advertising	CAE	6	Zhang et al. (2009)
2	Bank reputation	REP	5	Gerrard and Cunningham (2004)
3	Loyalty	LOY	6	De Matos et al. (2009)
4	Risks in conversion	RIS	6	Lees (2007)
5	Conversion behavior	COB	5	Boote (1998)

3.2. Research sample's characteristics

The research sample was selected by using a non-probability sampling method, specifically convenience sampling. Data were collected through stratified sampling conducted at Vietnamese commercial banks, such as the Vietnam Bank for Agriculture and Rural Development, Joint Stock Commercial Bank for Investment and Development, Joint Stock Commercial Bank for Industry and Trade, and Ho Chi Minh City Development Joint Stock Commercial Bank, among others. The survey units in the research were individual customers of these commercial banks. The sample size for data collection was 494. Data collection was carried out through two methods: offline and online surveys. For offline surveys, 500 questionnaires were distributed, of which 295 were returned and 267 were valid. For online surveys, data were collected via the Google Form tool, with 400 questionnaires distributed, 246 responses received, and 227 valid responses. The total number of valid questionnaires used for analysis was 494.

Based on the sample size proposed by Hair et al. (2010), the minimum sample size should be five times the total number of observed variables. With 28 observed variables in this research, the required sample size was 140. Thus, the achieved sample size of 494 exceeds the minimum requirement for analysis. The data collection period was from April 2024 to November 2024. Among the 494 valid responses, 225 were from male customers (45.55%), and 269 were from female customers (54.45%).

3.3. Data processing methodology

The research employs a quantitative research method. After data collection and cleaning, the data were processed using SPSS and AMOS 22.0 software.

First, the reliability of the measurement scales was evaluated, requiring a Cronbach's Alpha value > 0.7 and item-total correlation coefficients > 0.3. Additionally, if the Cronbach's Alpha If Item Deleted value for any indicator is higher than the overall Cronbach's Alpha, that indicator should be considered for removal.

Next, an exploratory factor analysis (EFA) was conducted to determine the convergent validity and discriminant validity of the scales. The analysis required a factor loading > 0.5, a Kaiser-Meyer-Olkin (KMO) measure between 0.5 and 1, a significance value (Sig.) < 0.05, and an extracted variance percentage > 50%.

Subsequently, AMOS software was used to assess the fit of the research model through confirmatory factor analysis (CFA). Finally, the hypotheses were tested using structural equation modeling (SEM), adhering to the following criteria: chi-square/df < 3 (Hair et al., 2010); P < 0.05; GFI, TLI, and CFI > 0.9 (Segars & Grover, 1993); and RMSEA < 0.05 (Taylor et al., 1993).

Additionally, to examine whether there are differences in conversion behavior in the use of personal banking services based on demographic variables (e.g., customer gender), the research applied an ANOVA test using SPSS.

4. Research results and discussion

4.1. Testing the reliability of the scale

The results of the Cronbach's Alpha reliability analysis indicate that the measurement scales and input data values are reliable. The Cronbach's Alpha coefficients for all variables were greater than 0.7, and the item-total correlation coefficients exceeded 0.3. Furthermore, the Cronbach's Alpha If Item Deleted values for all items were lower than the overall Cronbach's Alpha of their respective variables.

Table 2. Evaluate the reliability of the scale through Cronbach's alpha coefficient

No.	*Variable*	*Symbol*	*Cronbach's alpha*
1	Effectiveness of competitive advertising	CAE	0.915
2	Bank reputation	REP	0.914
3	Loyalty	LOY	0.886
4	Risks in conversion	RIS	0,906
5	Conversion behavior	COB	0.883

4.2. Exploratory factor analysis (EFA)

After testing the suitability of the measurement scales, the research conducted exploratory factor analysis (EFA) for the independent, mediating, and dependent variables. The results indicated that the data met the requirements for analysis, as the factor loadings were greater than 0.5 and satisfied two conditions: "Convergent Validity" (observed variables converge on the same factor) and "Discriminant Validity" (observed variables within a factor are distinct from those in other factors).

Table 3. Exploratory Factor Analysis Results

EFA analysis	*KMO coefficient*	*P-value*	*Variance extracted*	*Factor loading*	*Conclusion*
Independent and mediating variables	0.936	0.000	69.953	All coefficients > 0.5	Meet requirements
Dependent variable	0.868	0,000	68.305	All coefficients > 0.5	Meet requirements

4.3. Structural Equation Modeling (SEM) Analysis

The SEM analysis for the research model indicates that all composite fit indices meet the required thresholds. Specifically, the results are as follows: Chi-square = 686.722; df = 341; Chi-square/df = 2.014 (< 3); P = 0.000; GFI = 0.910 (> 0.9); TLI = 0.959 (> 0.9); CFI = 0.963 (> 0.9); RMSEA = 0.045 (< 0.05).

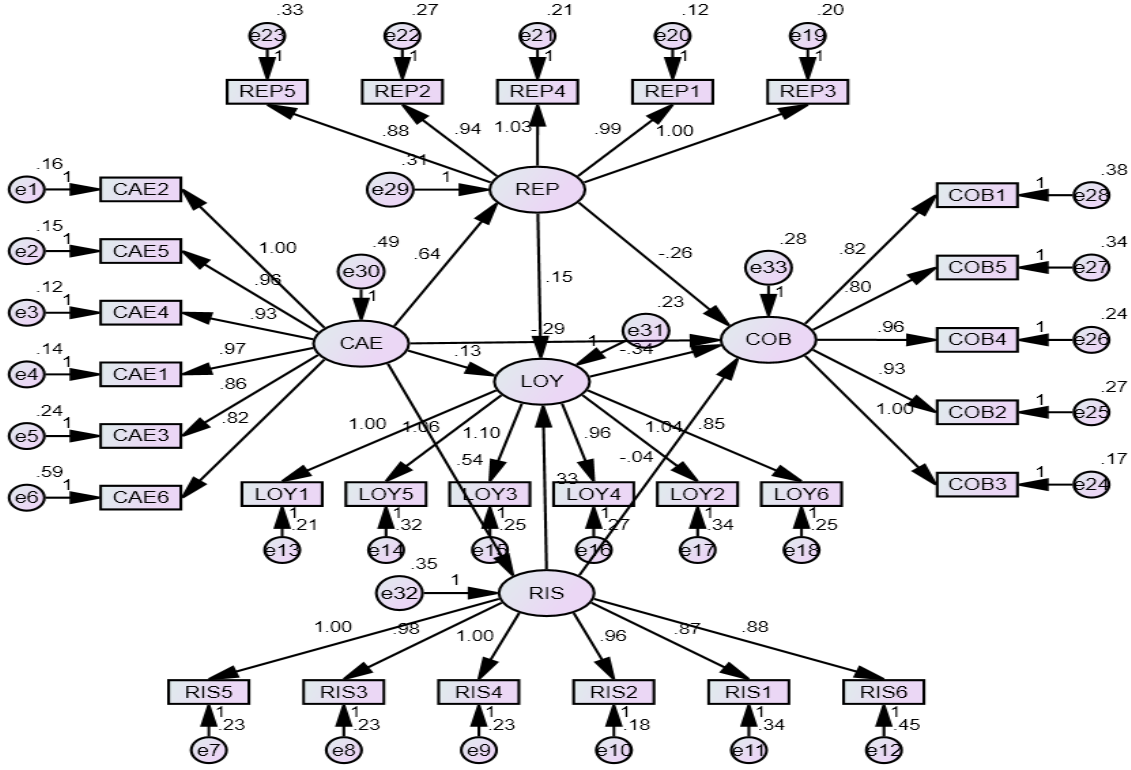

Figure 2. SEM model analysis

The estimation results for the relationships within the model indicate that the research model is well-fitted. Except for hypothesis H7, all other hypotheses are supported at a significance level of P < 0.05.

Specifically, hypothesis H1 is supported with a significance level of P < 0.05 and a regression weight of -0.287 (< 0). This result allows the conclusion that the effectiveness of competitive advertising negatively impacts conversion behavior in the use of personal banking services at Vietnamese commercial banks. This finding aligns with the studies of Balmer and Stovig (1997); Gotsi and Wilson (2001); Kathleen (2005).

Hypotheses H2 and H3 are both supported at a significance level of P < 0.05. With a regression weight of 0.640 (> 0), the results indicate that the effectiveness of competitive advertising positively impacts the reputation of commercial banks. Meanwhile, with a regression weight of -0.263, it can be concluded that bank reputation negatively impacts conversion behavior in the use of personal banking services at Vietnamese commercial banks. These findings are consistent with the studies of Wang et al. (2003); Gerrard and Cunningham (2004); Barr (2009).

Similarly, with a significance level of P < 0.05 and regression weights of 0.133 (> 0) and -0.339 (< 0), hypotheses H4 and H5 are also supported. This leads to the conclusion that the effectiveness of competitive advertising positively impacts customer loyalty at

commercial banks. Meanwhile, customer loyalty negatively impacts conversion behavior in the use of personal banking services at Vietnamese commercial banks. These findings are also in line with the studies of Dunn (1995); Mittal and Lasser (1998); Wartick (2002).

The hypotheses H6 and H7 examine the impact of the effectiveness of competitive advertising on risks in conversion and the effect of risks in conversion on conversion behavior to use personal banking services at Vietnamese commercial banks. The results show that hypothesis H6 is accepted with a significance level of $P < 0.05$ and a positive regression weight. Therefore, it can be concluded that the effectiveness of competitive advertising positively impacts risks in conversion in the use of personal banking services at commercial banks. This finding is consistent with the studies of Matthews and Murray (2007). On the other hand, hypothesis H7 is rejected with a significance level of 0.450 (> 0.05). This indicates that risks in conversion do not significantly impact conversion behavior in the use of personal banking services at Vietnamese commercial banks. This finding suggests that, for the majority of individual customers, their decisions to converse banking services are rarely influenced by risks in conversion. Many customers do not fully recognize the extent of risks in conversion and their implications for various aspects, such as financial security and overall safety.

By rejecting hypothesis H7 while accepting all the other hypotheses, the research demonstrates that the effectiveness of competitive advertising negatively impacts conversion behavior in the use of personal banking services. Additionally, the findings highlight the contribution of this research while confirming the mediating roles of bank reputation and customer loyalty in the relationship between the effectiveness of competitive advertising and conversion behavior in personal banking services.

Furthermore, hypotheses H8 and H9, which examine the impacts of bank reputation and risks in conversion on customer loyalty in personal banking at Vietnamese commercial banks, are both accepted with significance levels of $P < 0.05$ and positive regression weights. These findings indicate that both bank reputation and risks in conversion positively impact customer loyalty in personal banking. These results are consistent with the studies of Mittal and Lasser (1998); Nguyen and LeBlanc (1998); Lees et al. (2007); Burnham et al. (2003); Nguyen (2021).

Table 4. Results of SEM analysis for relationships in the model

Hypothesis	*Relationship*	*Weightage*	*S.E.*	*C.R.*	*P*	*Conclusion*
H1	COB <--- CAE	-0.287	0.061	-4.706	0.000	Accepted
H2	REP <--- CAE	0.640	0.046	13.916	0.000	Accepted
H3	COB <--- REP	-0.263	0.054	-4.908	0.000	Accepted
H4	LOY <--- CAE	0.133	0.054	2.488	0.013	Accepted
H5	COB <--- LOY	-0.339	0.063	-5.346	0.000	Accepted
H6	RIS <--- CAE	0.544	0.047	11.611	0.000	Accepted
H7	COB <--- RIS	-0.040	0.053	-0.756	0.450	Rejected
H8	LOY <--- REP	0.148	0.047	3.175	0.001	Accepted
H9	LOY <--- RIS	0.325	0.045	7.149	0.000	Accepted

4.5. Difference Testing

To assess whether there are differences in conversion behavior in the use of personal banking services based on customer gender, the research employed an ANOVA test. The

results indicate that the sig value from the ANOVA test is 0.003 (< 0.05). Therefore, it can be concluded that there is a statistically significant difference in conversion behavior of personal banking services using in 2 groups: male and female.

After ANOVA, the research conducted another test to evaluate the average levels and differences in conversion behavior by gender. The results show that the average conversion behavior score for male customers is 2.2338, which is significantly higher than that of female customers (2.0498). This finding demonstrates that male customers exhibit higher conversion behavior in the use of banking services compared to female customers. This is a valuable contribution of the research and an important conclusion for Vietnamese commercial banks. It provides insights for managers to develop strategies and implement appropriate solutions to improve service quality, thereby reducing conversion behavior among personal banking customers at commercial banks.

Table 5. The mean value of the ANOVA test on conversion behavior in the use of personal banking services by customer gender.

Gender	*N*	*Mean*	*Std. Deviation*
Male	269	2.0498	0.62989
Female	225	2.2338	0.76129
Total	494	2.1336	0.69816

5. Conclusions and recommendations

The research aims to develop a model and test the direct and indirect relationships between the effectiveness of competitive advertising and conversion behavior in the use of personal banking services at Vietnamese commercial banks. The results indicate that the effectiveness of competitive advertising by banks negatively impacts conversion behavior in the use of personal banking services. Additionally, the research demonstrates the mediating roles of bank reputation and customer loyalty in the relationship between the effectiveness of competitive advertising and conversion behavior in personal banking services. Furthermore, the research confirms the existence of differences in conversion behavior based on customer gender, with male customers exhibiting significantly higher conversion behavior in comparison with female customers. Based on the research findings, the authors propose several recommendations to reduce customer conversion in personal banking services at commercial banks:

First, regarding the Effectiveness of Competitive Advertising, banks should diversify advertising channels and effectively implement marketing tools. There is a need to raise awareness of the role of marketing, enhance brand development, and introduce modern strategies for marketing new products and services to the market.

Second, regarding Bank Reputation, banks should adopt effective solutions to build a sustainable and long-term reputation while expanding relationships with partners within and beyond the banking and finance sectors. Additionally, employees should be encouraged to promote the bank's brand to their family and friends. Efforts should be focused on strengthening the bank's image and reputation by communicating positive, modern cultural values.

Third, regarding Customer Loyalty, banks should enhance customer care activities, building and maintaining positive and long-term relationships with each customer. Banks should develop and expand their inherent capabilities to build trust and gain a competitive advantage in the market by leveraging their strengths. Additionally, banks need to

strengthen customer research and surveys to understand customer preferences and the products or services they use. This will enable banks to formulate and implement effective customer policies and organize service activities effectively in commercial banking.

In addition, regarding Risks in Conversion, banks should raise awareness among staff and customers about the risks involved in the process of service conversion. Banks should continue to improve and upgrade websites and smartphone applications for their products and services. Emphasis on recruiting and training digital talent. Furthermore, banks need to implement policies that encourage employees to enhance their capabilities to adapt to new technologies and digital skills, foster corporate culture, and improve the modern working environment.

Despite its findings, the research has certain limitations. Firstly, the use of a non-probability sampling method, specifically convenience sampling, was employed. While this method simplifies the sampling process and saves time, effort, and cost for researchers, it makes it difficult to determine sampling errors and limits the generalizability of the sample to the broader population. Secondly, the research context was limited to Vietnamese commercial banks. As a developing country, Vietnam has notable differences in political institutions and socio-cultural aspects compared to other nations. Therefore, this paper opens avenues for future research on related topics in different contexts, particularly in developed countries, which operate under institutional frameworks distinct from those of a developing country like Vietnam.

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FACTORS AFFECTING THE PERFORMANCE OF COOPERATIVES IN NGHE AN PROVINCE

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Abstract: This study aims to identify factors influencing the performance of cooperatives in Nghe An province. Using exploratory factor analysis (EFA) on data collected from 394 cooperatives, the study identified five main factors affecting investment decisions: (1) structural capital, (2) relational capital of the cooperatives, (3) human capital of the cooperatives, (4) member participation, and (5) support policies for cooperative development. The findings demonstrate that these factors are closely associated with the performance outcomes of cooperatives and provide a scientific basis for policymakers to refine cooperative development policies through 2030. Additionally, the study offers valuable insights for active cooperatives in Nghe An province.

Keywords: *cooperatives, performance, influencing factors, Nghe An*

1. Introduction:

In many developed and developing countries, cooperatives are a model of production and business organization receiving significant attention and state support through various preferential policies. In Vietnam, realizing the current and potential roles of the collective economy, including cooperatives, several legal frameworks have been issued and implemented to facilitate cooperative development. In line with central strategies and policies, the authorities of Nghe An province has issued many documents to specify and institutionalize the documents of the Central Government; develop policies, projects, plans for innovation and development of collective economy and cooperatives, especially in the agricultural sector; apply the policies and guidelines of the state on collective economy development in accordance with the actual conditions of the province in building and implementing policies for cooperatives in the area. However, in reality, cooperatives in Nghe An province still encounter many difficulties: most cooperatives have limited operating capital, constrained ability to mobilize funds from members, and difficulty accessing bank loans;... The question is whether the policy to support the development of cooperatives in Nghe An province in recent years has not been in the right orientation, has not really had the right approach and solutions in creating the environment and conditions for cooperative development? If so, in the coming time, how will the state's support policy be innovated and adjusted to develop cooperatives, in order to enhance the valuable contributions of the cooperative sector, collective economy to socio-economic development? This necessitates a deeper investigation into the factors influencing cooperative performance in Nghe An province.

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2. Literature Review

The concept of cooperatives has been defined by researchers and policy makers from many distinct perspectives. According to Novkovic. S (2008), Novkovic, S., Puusa, A., & Miner, K. (2022), “cooperatives are democratic organizations owned and operated by their members”. Zamagni (2012) has found that “cooperatives are democratic organizations owned and operated by their members, the members are also the workers, producers or customers of the organization”. For Voigt, L., & von der Oelsnitz, D. (2024), “cooperatives represent a form of organization characterized by democratic structure, diverse member interests and commitment to multiple goals”. Extensive reseach from National Assembly's Economic Committee and UNDP (2012) has suggest that "A cooperative is a socio-economic organization that differs from other types of enterprises in terms of its establishment objectives (cooperatives meet the economic, cultural and social needs of their members) and its organization of activities (cooperatives are democratic and highly supportive)". In addition, a cooperative is defined by ILO (2002) as "an autonomous association of people voluntarily united to meet their common economic, social and cultural needs and aspirations through jointly owned and democratically controlled enterprises".

Cooperatives is a key element of the local economic development. According to the study on “ *The Role of Cooperative Organizations in Rural Community Development in Nigeria: Prospects and Challenges* ” by Hussain (2014). Or two authors, Majee and Hoyt (2011), in the study on “ *Cooperatives and Community Development: A Perspective on the Use of Cooperatives in Development* ”, emphasized that: cooperatives have been repeatedly proven to be useful in promoting the interests of less powerful members in society. The study “ *The role of cooperatives in achieving the sustainable development goals - the economic dimension* ” by the International Labor Organization (2014) also followed the research goal on the role of cooperatives, emphasizing the approach from the millennium goals, to sustainable economic goals, to the contribution of society to economic goals, to the contribution of the cooperative sector in comparison with other contributions in society and finally towards the greatest contribution of the cooperative sector to economic goals in implementing the sustainable development goals.

Additionally, many studies also pay attention to cooperative development such as Gertler, M. (2001) in the document on " *Rural co-operatives and sustainable development"* studying the sustainable development of cooperatives in rural areas ; Henehan, BM, & Anderson, BL (2001) in the document " *Considering cooperation: A guide for new cooperative development* " discussing the guidelines for cooperative development ; Woolcock, M., & Narayan, D. (2000) in *"Social capital: Implications for development theory, research and policy* " studying the theoretical basis of social capital of cooperative development.vvv; Nguyen Thi Thuy Linh (2020) in "Developing new-style agricultural cooperatives in Son La according to the 2012 Law on Cooperatives" studies solutions for developing cooperatives in Son La province such as promoting and mobilizing farmers to participate in cooperatives; policies to support cooperatives to

access preferential loans; continuing activities to promote the expansion of agricultural product consumption markets for cooperatives; Nguyen Thi Hai Ninh (2021) in "Policies supporting *for agricultural cooperatives in Vietnam: An experience from agricultural cooperatives in the Red River Delta "* summarizes the development process of agricultural cooperatives in Vietnam since the 1950s, the contribution of agricultural cooperatives to the growth of the agricultural sector and improving the income of farmers who are members of cooperatives ;

Studies on factors affecting the development of cooperatives according to Dao Anh Xuan and Tran Huu Tuan (2023) include 7 factors: commitment of cooperative members; management capacity of cooperative leaders; ability of cooperative leaders to access finance; support policies of the State; attention and assistance of localities; benefits of cooperative members and scale of cooperatives all have a positive impact on the efficiency of production and business activities of cooperatives.

Movsisyan (2013) in his research of "The Role of Cooperatives in the Development of Agriculture in Armenia" studied the role of the future development of the cooperative model in agriculture in Armenia during the economic transition. The study analyzed the barriers leading to the failure of the cooperative model as two factors: (1) farmers' psychology and their limited awareness of the benefits of cooperatives; (2) shortcomings in state support policies for the activities of cooperatives. Efendiev and Sorokin (2013) in their study of the development of farmer cooperatives in Russia and some emerging countries argued that the factors affecting cooperative development include: (1) characteristics of local social organizations; (2) traditions of rural social organizations; and (3) government assistance. In addition, when studying the case of China, Elena et al. (2011) showed that the development of farmer cooperatives in Northwest China was strongly influenced by the external environment and political approaches to promoting cooperation. Khan et al. (2016) in their study on " *Factors affecting performance of co-operatives in Malaysia"* analyzed four groups of factors affecting the performance of cooperatives. The four groups of factors include: structural capital, social capital, human capital and the participation of cooperative members. In this context, the element of social capital indicates that cooperatives need relational capital to address the competitive challenges posed by other rivals. Relational capital suggests that if cooperatives can develop feedback channels from their partners and consider this information to devise innovative solutions aligned with customer needs, they will achieve success.

Thus, it can be observed that the activities of cooperatives can be understood through various processes, namely: the process of market entry for cooperatives; the operational process of cooperatives; and the process of transitioning to a cooperative union model or a business entity. These issues faced by cooperatives require supportive policies from the government, and such policies must be closely aligned with the practical development of cooperatives.

Research methods

Based on the aforementioned studies, the authors propose a model regarding the factors influencing performance outcomes—an aspect of cooperative development—as follows:

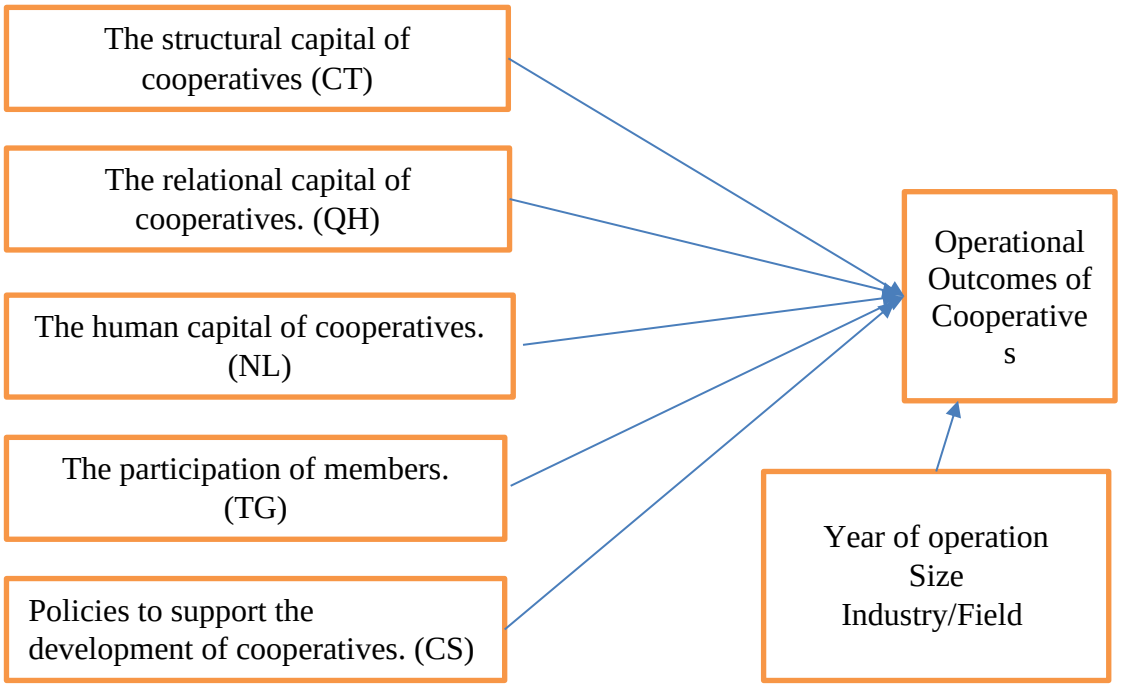

Diagram 1. Research model of factors affecting the operational outcomes of cooperatives.

Source: Model inheritance by Khan et al. (2016), Efendiev and Sorokin (2013)

Research hypotheses of the topic:

H1: *The structural capital of the cooperative has a positive impact on the operational results of the cooperative. (CT)*

H2: *The relational capital of the cooperative has a positive impact on the operational results of the cooperative. (QH)*

H3: *The human capital of the cooperative has a positive impact on the operational results of the cooperative. (NL)*

H4: *The participation of members has a positive impact on the operational results of the cooperative. (TG)*

H5: *Supportive policies for the development of cooperatives have a positive impact on the operational results of the cooperative.(CS)*

In quantitative research, after synthesizing and processing the data, the study evaluates the reliability of the measurement scale using Cronbach's Alpha coefficient to eliminate unsuitable variables and minimize the presence of noise variables during the research process. Exploratory Factor Analysis (EFA) is then conducted to reduce the set of interrelated observed variables into a smaller set of variables that are more meaningful. Finally, the study proceeds to construct a regression model, testing the model's adequacy to draw conclusions about the hypotheses of the model, as well as to assess the impact of various factors on investment attraction.

The linear regression equation has the form:

$$QD = \beta 0 * CT + \beta 1 * QH + \beta 2 * NL + \beta 3 * TG + \beta 4 * CS + e$$

Given that the research model includes one dependent variable and five independent

variables, the authors apply Multiple Regression Analysis (MRA) to analyze the impact of these factors. Statistical analysis was performed using SPSS software (version 22).

Table 1. Explanation of Variable Symbols in the Model

Variable Type	Variable name	Symbol
Dependent variable	Operational Outcomes of Cooperatives	QD
Independent variables	Structural capital	CT
	Relational capital	QH
	Human capital	NL
	Participation of members	TG
	Supportive policies for the development	CS

3. Findings:

Research context:

In Nghe An, the number of cooperatives has significantly increased during the period from 2018 to 2023. However, compared to the national average, the growth rate of cooperatives in Nghe An has been lower in recent years, particularly in 2022 and 2023. This indicates challenges in the development of the number of cooperatives in Nghe An province. The fluctuations in the number of cooperatives throughout the year suggest that a certain number of new cooperatives have been established, while some cooperatives have ceased operations during the year (either temporarily suspended, dissolved, or converted into business models). The positive fluctuations in the number of newly established cooperatives and the relatively stable number of cooperatives converting to business models, although not large, are noteworthy. On the other hand, negative fluctuations, such as the number of cooperatives temporarily suspending operations or dissolving, have gradually decreased and did not occur in 2022 and 2023.

In the context of economic difficulties and recession, cooperatives in Nghe An have overcome numerous challenges to establish new entities and maintain their production and business activities. The network of cooperatives in Nghe An province has expanded. The percentage of communes, wards, and towns with cooperatives in 2023 is 65%, an increase of 25% compared to 2018.

Table 2: Number of cooperatives in Nghe An province

No.	Criteria	Unit	2018	2019	2020	2021	2022	2023
1	Total number of cooperatives	cooperative	699	769	793	853	866	902
1.1	Number of active cooperatives	cooperative	685	763	786	851	864	900
	In which, newly established cooperatives	cooperative	93	55	85	58	71	40
1.2	Cooperative ceases operations	cooperative	14	6	7	2	2	2
A	Pause	cooperative	12	0	1	0	0	0
B	Dissolution	cooperative	0	4	4	0	0	0

C	Business formation	cooperative	2	2	2	2	2	2
2	Growth in the number of cooperatives in Nghe An province	%	6.2%	10.0%	3.1%	7.6%	1.5%	4.2%
3	Growth in the number of cooperatives nationwide	%	-	5.9	-36.8	79	7.2	5.3
4	Percentage of communes, wards and towns with cooperatives	%	40	40	46	55	57	65

Source: Nghe An Provincial People's Committee, Vietnam Cooperative White Book

Cooperatives in Nghe An are quite diverse, operating in various sectors such as agriculture, trade, handicraft production, agricultural processing, and providing services to their members. This diversity of cooperative types is comprehensively reinforced across economic fields and is widespread throughout the province. Agricultural, forestry, fishery, and salt production cooperatives account for the largest proportion of the total number of cooperatives currently recorded in Nghe An province. This proportion has shown an increasing trend: in 2018, the percentage of cooperatives in this group was 74.58%; by 2023, it had risen to 76.9%, indicating that agricultural, forestry, fishery, and salt production cooperatives continue to play a significant role in the collective economy of Nghe An province. The scale of cooperatives in Nghe An is primarily very small and small-scale, with approximately 73% of operating cooperatives having fewer than 10 employees; 26.3% of operating cooperatives have between 10 and 49 employees; only about 2 cooperatives (0.3%) have between 50 and 99 employees; and 3 cooperatives (0.5%) have 100 employees or more. The annual fluctuations in the proportion of cooperatives by scale also indicate that the aforementioned structure has changed very little during the period from 2018 to 2023.

The number of cooperatives in Nghe An has seen significant growth in recent times, with a stable number of newly established cooperatives and those converting to business models, while the number of cooperatives temporarily suspending operations or dissolving has gradually decreased and did not occur in 2022 and 2023. However, this growth rate has been slowing down in recent years. Compared to the national average, the growth rate of cooperatives in Nghe An has been lower in recent years, particularly in 2022 and 2023. This indicates challenges in the development of the number of cooperatives in Nghe An province.

Research results

Descriptive statistics

The results of the descriptive statistical analysis for the variables, including mean values, standard deviations, minimum values, and maximum values, indicate that the dataset comprises 394 observations, with no missing data. The mean values range from

3.39 to 3.77, suggesting that the responses are predominantly in agreement with the statements. A standard deviation of less than 1 demonstrates that the responses are highly concentrated. In summary, the survey results indicate positive feedback across most aspects, with "KQ" being a notable highlight and "NL" identified as an area requiring attention and improvement. The differences in standard deviations also provide useful information regarding the level of consensus or diversity in evaluations for each aspect.

Assessing the reliability of the scale using Cronbach's Alpha coefficient

The reliability analysis of the measurement scale using Cronbach's Alpha was conducted to eliminate unsuitable variables, focusing on six variables in the model, which include one dependent variable and five independent variables. The results of the Cronbach's Alpha test for the groups of variables all exceeded the threshold of 0.7, indicating that the variables within each group effectively measure a common concept. Overall, the measurement scale demonstrates good reliability and is suitable for the research, while also providing valuable insights into the role of each variable within the scale.

Table 3. Cronbach's Alpha coefficient results of the scales

No.	Factor	Scale	Cronbach's Alpha
1	CT	CT1, CT2, CT3, CT4	0.767
2	QH	QH1, QH2, QH3	0.821
3	NL	NL1, NL2, NL3, NL4, NL5, NL6, NL7	0.847
4	TG	TG1,TG2, TG3, TG4, TG5, TG6, TG7	0.84
5	CS	CS1, CS2, CS3, CS4, CS5	0.84
6	Result	KQ1, KQ2, KQ3, KQ4, KQ5, KQ6, KQ7	0.849

Source: Analysis results of the authors

Exploratory factor analysis EFA

Conducting exploratory factor analysis (EFA) with observed variables in the model, the EFA test results are presented in the following table.

Table 4. KMO and Bartlett test results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.901
	Approx. Chi-Square	894,763
	Df	21
Bartlett's Test of Sphericity	Sig.	.000

Source: Author's analysis

The results table indicates that the KMO coefficient is 0.901, which is greater than 0.5, and the significance value of the Bartlett's test is 0.000, which is less than 0.05. This suggests that the null hypothesis (H0): "There is no correlation among the observed variables in the model" can be rejected. This means that the observed variables are correlated with one another and that factor analysis techniques can be employed to assess the convergence of the indicators within the measurement scale. The cumulative variance extracted is 52.554%, which is greater than 50%, indicating that 52.554% of the variability in the data is explained by the 5 factors.

Regression analysis results: Standardized regression equation:

QD = 0.174*CT + 0.239*QH + 0.197*NL + 0.292*TG + 0.266*CS + e

Table 5. Results of research model estimation

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.031	.140		-.223	.823
		.164	.032	.174	5.124	.000
	QH	.211	.030	.239	6,992	.000
	NL	.193	.033	.197	5,881	.000
	TG	.290	.034	.292	8,660	.000
	CS	.236	.030	.266	7,858	.000

Source: Analysis results of the authors

The results of the model testing indicate the following:

- The structural capital of the cooperative has a positive impact on the operational results of the cooperative: $\beta = 0.164$, P-value < 0.001. Therefore, hypothesis H1 is supported.
- The relational capital of the cooperative has a positive impact on the operational results of the cooperative: $\beta = 0.211$, P-value < 0.001. Therefore, hypothesis H2 is supported.
- The human capital of the cooperative has a positive impact on the operational results of the cooperative: $\beta = 0.193$, P-value < 0.001. Therefore, hypothesis H3 is supported.
- Member participation has a positive impact on the operational results of the cooperative: $\beta = 0.290$, P-value < 0.001. Therefore, hypothesis H4 is supported.
- Support policies for cooperative development have a positive impact on the operational results of the cooperative: $\beta = 0.236$, P-value < 0.001. Therefore, hypothesis H5 is supported.
- The policy of supporting cooperative development has a positive impact on the performance of cooperatives: $\beta = 0.236$, P-value < 0.001. Therefore, hypothesis H5 is supported.

The purpose of this linear regression model is to explore and quantify the relationship between a dependent variable (the operational results of the cooperative) and five independent variables: CT (Structural Capital), QH (Social and Relational Capital), NL (Human Capital), TG (Member Participation), and CS (Support Policies for Development). In other words, this model aims to predict or explain changes in the dependent variable based on changes in the independent variables. The regression analysis indicates that all independent variables have a statistically significant impact on the dependent variable. Among these, "Member Participation" (TG) and "Support Policies for Development" (CS) stand out with the highest Beta coefficients of 0.292 and 0.266, respectively, indicating that they are the two factors with the most substantial influence on the dependent variable. This implies that for every one-unit increase in TG or CS, the dependent variable will increase by 0.290 and 0.236 units, respectively, assuming all other factors remain constant.

Conclusion and recommendations

This study indicates that support policies for the development of cooperatives are a crucial factor influencing the operational results of cooperatives. A thorough

investigation into the content of the support policies for cooperative development in Nghe An Province, including an analysis of their strengths and limitations, is necessary to identify the barriers posed by these support policies that affect the operations of cooperatives in the province. Therefore, the authors propose recommendations aimed at improving the content of support policies to enhance their positive impacts on the operational results of cooperatives.

Recommendations to the government and ministries

The government has issued a decree guiding the Cooperative Law of 2013, providing a more specific legal basis for local authorities to refine support policies for cooperatives in their respective areas. The government is also developing a comprehensive program for the development of collective economy for the period 2026-2030, which will serve as a foundation for localities to formulate support policies for cooperative development.

The Ministry of Agriculture and Rural Development, the Ministry of Natural Resources and Environment, the Ministry of Industry and Trade, the State Bank of Vietnam, the Ministry of Planning and Investment, and the Ministry of Finance are working to finalize sector-specific guidelines and enhance support policies for cooperatives in each sector. This will create a solid foundation for local authorities to reference and compare when issuing local policies. Additionally, a national information system on cooperatives will be established to facilitate the creation, provision, transmission, collection, processing, storage, and exchange of information related to cooperative groups, cooperatives, and cooperative unions in the online environment. This information system will assist in the formulation and implementation of support policies for cooperative development in Nghe An Province specifically and across the country in general.

Recommendations to cooperatives

Cooperatives should proactively study the support policies for cooperative development issued by the central and local governments; identify the support measures stipulated in these policies; analyze the benefits provided by the policies; and identify any disadvantages, inequities, ambiguities, or impracticalities within the policies. They should provide feedback through the Cooperative Alliance of Nghe An Province to compile and propose recommendations to the provincial government, thereby creating a basis for refining support policies for cooperative development.

Cooperatives need to enhance their governance capacity, implement innovative practices, and promote the application of modern technology to create products with high commercial value that can compete in the market and meet the increasingly sophisticated preferences of consumers. They should establish a transparent internal accounting system within the cooperatives, along with audited financial reports to demonstrate their financial capacity. Additionally, cooperatives should develop a comprehensive, transparent internal information system and engage in communication efforts that encourage regular participation in cooperative labor, not only for financial goals but also encompassing social and environmental objectives.

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DIGITAL TRANSFORMATION: OPPORTUNITIES AND CHALLENGES FOR GROWTH, SUSTAINABLE DEVELOPMENT, AND SOCIAL EQUITY

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Abstract: Digital transformation (DT) has emerged as a key driver of global economic development, with digital technologies expected to accelerate growth, promote sustainable development, and advance social equity. DT enhances labor productivity through automation and artificial intelligence, boosts the growth of e-commerce and the digital economy, and improves public service efficiency via e-government initiatives. Small and medium-sized enterprises (SMEs) also benefit significantly from digitizing business processes, enabling them to expand markets and enhance competitiveness.

However, Vietnam faces numerous challenges during the DT process, such as digital inequality, limited technological infrastructure and internet connectivity in rural areas, underdeveloped cybersecurity measures, and incomplete legal frameworks for data protection and technology-related policies. The shortage of high-quality digital talent and the need for corporate cultural adaptation also present obstacles that must be addressed to ensure successful DT implementation in Vietnam.

This article provides a comprehensive overview of the opportunities and challenges brought by DT to growth, development, and social equity on a global scale, with a particular focus on Vietnam.

Keywords: *Digital Transformation; Artificial Intelligence; Opportunities and Challenges of Digital Transformation; Sustainable Development*

1. Introduction

Digital Transformation has become a global trend, profoundly influencing all aspects of economic, social, and cultural life. With the advancement of modern technologies such as Artificial Intelligence (AI), the Internet of Things (IoT), Big Data analytics, and blockchain, DT not only presents significant opportunities to drive economic growth but also opens new avenues for addressing challenges related to sustainable development and social equity (Brynjolfsson & McAfee, 2014). According to the World Economic Forum (2020), the DT process has become a core determinant of the success of economies in the 21st century. Countries and organizations that effectively leverage digital technologies can overcome challenges related to productivity and growth. Notably, in the context of the economic crisis caused by the COVID-19 pandemic, DT emerged as a critical factor enabling many businesses to maintain operations and adapt to the "new normal" (Klein & Todesco, 2021).

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Alongside these opportunities, DT also poses new challenges for sustainable development. The United Nations' Sustainable Development Goals (SDGs) highlight the importance of balancing economic growth and environmental protection. DT can help minimize resource wastage and improve energy management. However, it also increases energy consumption and generates various types of technological waste, negatively impacting the environment (Geissdoerfer et al., 2017). Therefore, it is crucial to study these challenges to identify appropriate solutions that maximize the benefits of DT without compromising sustainable development goals. Another pressing issue is social equity. DT creates new job opportunities and improves quality of life but also introduces new disparities in income and technological access among different social groups. The digital divide has become a prominent issue as billions of people worldwide, particularly in developing countries, lack access to the internet and digital services. This exclusion could leave these groups behind in economic and social development (Hargittai, 2018).

Research on DT and its impact on economic growth, sustainable development, and social equity plays a vital role in shaping national and global development policies. Firstly, such studies clarify the relationship between DT and labor productivity, thereby providing a scientific basis for devising technology-driven economic development strategies (Autor, 2015). Identifying factors affecting productivity in the digital context enables nations and businesses to harness technology for long-term economic growth. Policies should focus on expanding digital access for all citizens while protecting workers' rights in rapidly evolving labor markets (Zuboff, 2019). Research on DT and its implications for economic growth, sustainable development, and social equity is not only urgent but also essential in shaping development policies in the digital era. By deeply analyzing the opportunities and challenges of DT, this study aims to provide critical scientific foundations for building more sustainable and equitable development strategies in the future.

2. Overview of digital transformation

Digital Transformation is the process of integrating digital technologies into all aspects of an organization or society, fundamentally altering how organizations operate and deliver value to customers (Fitzgerald et al., 2014). DT is not merely about adopting technology; it involves a shift in mindset, culture, and business models, creating opportunities for innovation and enhancing competitiveness.

2.1. Definition of digital transformation

DT refers to the utilization of technology to improve processes, products, and services, thereby enhancing operational efficiency, improving customer experience, and creating new value. Core technologies such as Artificial Intelligence (AI), the Internet of Things (IoT), Big Data, cloud computing, and blockchain form the pillars of DT. These technologies enable organizations to collect and analyze real-time data, optimize supply chains, and personalize customer experiences (Schallmo et al., 2017). According to Kane et al. (2015), DT is a continuous process without a definitive endpoint. Instead, it involves ongoing adaptation and improvement driven by technological advancements and the evolving demands of the market.

2.2. Factors driving digital transformation

DT is unfolding rapidly on a global scale, transforming how organizations, governments, and societies function. Several factors drive this process, ranging from

technological advancements to market competition pressures and shifting consumer demands. Organizations must embrace digital tools not only to maintain competitiveness but also to meet the evolving expectations of consumers for seamless, technology-enhanced experiences. Governments are leveraging DT to improve public service delivery through e-governance, while societal shifts necessitate the use of technology to address challenges in education, healthcare, and social equity. The intersection of these factors underscores the urgency and importance of DT in shaping the future of economies and societies worldwide.

2.2.1. Technological advancements

Artificial Intelligence (AI) and Machine Learning (ML): AI and ML are key drivers accelerating the digital transformation process. AI enables the real-time analysis of massive datasets, supporting intelligent decision-making and automating processes. AI also facilitates innovative applications such as chatbots, recommendation systems, and predictive analytics, helping organizations boost productivity, enhance customer experiences, and reduce operational costs (Brynjolfsson & McAfee, 2014). For instance, financial enterprises use AI to optimize credit approval processes and detect fraud, while manufacturers leverage it to automate production lines and minimize machinery downtime (McKinsey & Company, 2020).

Internet of Things (IoT): IoT connects billions of devices, sensors, and systems worldwide, enabling organizations to collect and analyze data from diverse resources. IoT plays a critical role in optimizing production processes and delivering smart services. For example, in Industry 4.0, IoT is used to monitor and adjust production processes in real-time, reducing waste, saving energy, and enhancing production efficiency (Kagermann et al., 2013). Furthermore, in smart cities, IoT is deployed to efficiently manage urban infrastructure, from energy management to traffic control, contributing to greenhouse gas emission reduction and improving residents' quality of life (United Nations, 2019).

Big Data and Data Analytics: Big Data is a cornerstone of digital transformation, enabling organizations to analyze vast amounts of data to make informed decisions. Real-time data analytics not only improves business processes but also helps organizations better understand their customers, enabling personalized services and optimal customer experiences (Schallmo et al., 2017). In the retail sector, Big Data analytics helps businesses track customer purchasing behavior and predict market demands, optimizing supply chains and ensuring timely product delivery. In healthcare, Big Data supports health systems in predicting and managing disease outbreaks, improving patient care quality through the analysis of electronic health records (EHR) (Schneider et al., 2020).

Cloud Computing: Cloud computing has fundamentally transformed how businesses and organizations operate. Instead of investing in complex and costly in-house IT infrastructures, organizations can leverage cloud services for storage expansion, data analysis, and application development. Cloud solutions not only reduce costs but also enhance organizational flexibility and scalability, improving remote collaboration capabilities (Westerman et al., 2014). Moreover, cloud computing enables businesses to rapidly deploy digital solutions while ensuring data security and regulatory compliance, which is particularly crucial in sectors such as finance, healthcare, and public services.

2.2.2. Market competition pressures

Intense Competition in the Global Market: In an increasingly interconnected and

globalized world, businesses face fierce competition from both domestic and international rivals. To maintain their position and expand market share, businesses must adopt digital technologies to optimize production processes, reduce costs, and quickly adapt to market changes. Digital transformation enables companies to develop new business models, leveraging the agility and speed of technology to access markets faster and respond effectively to customer demands. Companies like Amazon, Netflix, and Tesla have successfully implemented digital transformation, creating advanced digital business models that outcompete traditional players (Brynjolfsson & McAfee, 2014). The Need for Supply Chain and Service Optimization: In the context of fluctuating supply and demand, digital transformation helps businesses manage supply chains more efficiently by tracking inventory, forecasting demand, and optimizing product distribution. Digital technologies also enhance delivery capabilities and after-sales services, improving customer experiences and building loyalty (Schallmo et al., 2017). The Rise of Digital Enterprises: The emergence of digital-first companies like Uber, Airbnb, and Alibaba has transformed the operations of traditional industries such as transportation, tourism, and retail. These companies use technology to provide fast, convenient, and affordable services, creating significant pressure for traditional businesses to undergo rapid transformation to remain competitive.

2.2.3. Changing consumer behavior and needs

Today's consumers have higher expectations for services and experiences offered by businesses. They demand fast, convenient, and seamless services across digital platforms. According to McKinsey & Company (2020), 80% of consumers expect businesses to provide effective online customer services, and over 70% would switch to another brand if their digital experience does not meet expectations. As a result, organizations are heavily investing in technologies such as artificial intelligence, customer data analytics, and customer relationship management (CRM) systems to enhance user experiences, personalize services, and deliver seamless omnichannel experiences. The rapid growth of e-commerce and online shopping has fundamentally changed consumer behavior. Platforms like Amazon, Alibaba, and Lazada have popularized online shopping models, making it easier for customers to access products and services. This trend pressures traditional retail businesses to embrace digital transformation and develop online sales channels to meet market demand (Westerman et al., 2014).

2.2.4. Government Policies and Regulations Support

Governments in many countries are promoting digital transformation through supportive policies and programs. Recognizing that digital transformation can improve economic efficiency, create new jobs, and enhance international competitiveness, governments have introduced national digital transformation strategies. These initiatives focus on developing digital infrastructure, enhancing the digital skills of the workforce, and supporting businesses in digitizing production processes (Schneider et al., 2020). For example, the Singaporean government has implemented its National Strategy for a Digital Economy to encourage businesses and citizens to leverage technology for productivity improvement and quality-of-life enhancement (Government of Singapore, 2019). The drivers of digital transformation stem not only from technological advancements but also from market competition pressures, changing consumer behavior, and government support. The convergence of these factors is accelerating global digitization, creating new

opportunities while simultaneously demanding that organizations and businesses quickly adapt to seize opportunities and tackle the challenges posed by digital transformation.

2.3. Benefits of Digital Transformation

DT is fundamentally reshaping the way businesses, governments, and societies operate. The integration of digital technologies across various fields not only optimizes processes but also opens new opportunities for growth, enhances performance, and improves quality of life. The key benefits of DT can be categorized into four main areas: productivity, customer experience, innovation, and sustainable development.

2.3.1. Enhancing Productivity and Operational Efficiency

One of the greatest benefits of DT is the ability to automate processes, reducing human intervention and minimizing errors in operations. Automation through AI, robotics, and intelligent software accelerates task execution and improves operational efficiency. For example, in manufacturing, Industry 4.0 employs the Internet of Things (IoT) and AI to monitor and control production processes in real-time. This reduces material waste, optimizes resource utilization, and increases production efficiency (Kagermann et al., 2013). McKinsey & Company (2020) estimates that automation can boost labor productivity by 20-30% in heavy industries. DT enables businesses to optimize operations by digitizing activities and eliminating complex manual processes. Big Data analytics and advanced tools provide deep insights into operational performance, allowing businesses to make timely adjustments and enhance efficiency. Data-driven decision-making, as opposed to intuition-based strategies, helps managers make more accurate strategic choices (Schallmo et al., 2017). For instance, in logistics, digital technologies streamline inventory management, vehicle coordination, and real-time supply chain monitoring. These advancements allow companies to reduce operational costs and quickly meet customer demands.

2.3.2. Improving customer experience

DT has revolutionized how businesses interact with customers, particularly through personalized services based on customer data. Businesses increasingly rely on customer insights to understand needs and behaviors, tailoring products and services for individual preferences. This approach not only enhances customer satisfaction but also fosters long-term loyalty. For example, e-commerce platforms like Amazon and Netflix use AI algorithms to recommend products and content based on users' previous behavior, delivering a personalized experience that traditional services struggle to match (Brynjolfsson & McAfee, 2014). Digital technologies like chatbots, virtual assistants, and automated customer service systems enable businesses to engage with customers quickly and efficiently. This responsiveness is especially critical in today's market, where customers expect instant feedback. Many businesses utilize AI to manage customer interactions across various channels, from social media to email and live chats. This not only reduces labor costs but also ensures immediate responses, enhancing customer satisfaction and increasing sales opportunities (Westerman et al., 2014).

2.3.3. Driving Innovation and Creativity

DT enables businesses to develop new business models, creating products, services, and customer experiences fundamentally different from traditional ones. The combination of information technology and data analytics allows businesses to design innovative digital products and services, expand markets, and increase profitability. Companies like

Uber and Airbnb leverage digital technologies to create platform-based business models, directly connecting consumers with services without traditional intermediaries. This approach reduces operational costs and delivers significant benefits to users, fostering new industries and intensifying market competition (McKinsey & Company, 2020). DT also shortens product development cycles, enabling businesses to quickly introduce new products and services to the market. Cloud computing and Agile methodologies provide flexibility for businesses to test new features and rapidly respond to market changes (Westerman et al., 2014). This agility is a competitive advantage in today's rapidly changing market, where speed to market and adaptability to consumer trends are critical.

2.3.4. Supporting sustainable development

DT optimizes resource and energy usage through technologies like IoT and Big Data in supply chain, production, and consumption management. With real-time data monitoring and analysis, organizations can minimize waste, improve resource efficiency, and reduce environmental impacts. For instance, in the energy sector, smart grids use digital technologies to monitor and manage energy consumption more efficiently, reducing waste and increasing the adoption of renewable energy. This not only helps businesses save costs but also contributes to sustainable development goals (IEA, 2021). DT also supports the development of the circular economy, where resources are used and reused optimally, minimizing waste and environmental harm. Digital platforms enable the tracking of product lifecycles, from production to consumption and recycling, thanks to traceability and data analytics capabilities (Geissdoerfer et al., 2017). For example, businesses use blockchain and IoT to effectively manage supply chains and product recycling, reducing emissions and conserving natural resources. This approach aligns with global sustainability goals and ensures long-term environmental responsibility.

3. Opportunities and Challenges of Digital Transformation for Economic Growth, Sustainable Development, and Social Equity

3.1. Opportunities and Challenges for Economic Growth

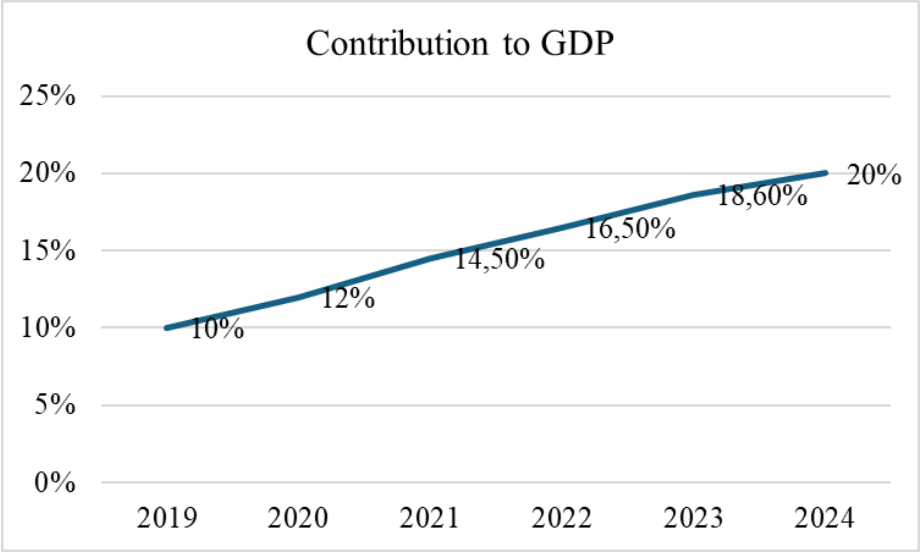
DT not only provides benefits for technological development but also plays a crucial role in driving economic growth. However, it also presents challenges such as economic inequality, labor polarization, and the ability to respond to the rapid changes in technology.

3.1.1. Opportunities for Economic Growth

- DT has significantly transformed how businesses operate, enhancing labor productivity through the adoption of modern technologies such as AI, automation, Big Data, and IoT: DT has brought significant changes to how businesses operate, boosting labor productivity through the adoption of advanced technologies such as AI, automation, Big Data, and IoT. According to a report by McKinsey & Company (2017), businesses can achieve productivity increases of 5% to 20% when digital technologies are integrated into production and service processes. For instance, in the manufacturing sector, Industry 4.0 enables businesses to use sensors and data for real-time monitoring, optimizing supply chains, and minimizing waste. This not only enhances productivity but also reduces production costs and increases profitability (Kagermann et al., 2013). Automated systems in manufacturing have also proven their ability to reduce human intervention, improve product quality, and shorten production times. According to the Ministry of Information and Communications, the digital economy's contribution to GDP has risen steadily,

reaching 16.5% in 2023, with a forecast of 20% by 2025 in Vietnam (Figure 1).

Figure 1: Contribution of Digital Economy to GDP in Vietnam during 2019 - 2023



Source: Ministry of Information and Communications, Vietnam (2024)

- *DT fosters innovation in sectors such as e-commerce, digital finance, and public services: Digital transformation has spurred innovation in areas such as e-commerce, digital finance, and public services*. Businesses have rapidly embraced digital platforms to experiment with new business models, create personalized products and services, and better meet consumer demands. In the financial sector, the growth of Fintech has revolutionized traditional banking services by providing faster, more convenient, and cost-effective financial solutions. For example, Fintech companies like PayPal, Square, and Stripe have made it easier for small businesses to access international payment services at low costs, thereby expanding markets and boosting profits (Gomber et al., 2017).

- *DT has reduced geographical barriers, enabling businesses to easily access global markets through e-commerce platforms and cloud-based technologies.* DT has minimized geographical barriers, enabling businesses to access global markets more easily through e-commerce platforms and cloud-based technologies. This is particularly beneficial for small and medium-sized enterprises (SMEs), allowing them to participate in global value chains without significant infrastructure investments (Giones & Brem, 2017). A report by the World Economic Forum (2020) highlights that businesses involved in the digital economy are twice as likely to achieve revenue growth compared to traditional enterprises. This is especially crucial for developing economies, where SMEs play a significant role in driving economic growth.

- *In the public service sector, DT has improved service quality and enhanced access to government services, thereby increasing the efficiency of public administration.* In the realm of public services, DT has enhanced service quality and increased accessibility to government services, thereby improving public administration efficiency. E-government initiatives are flourishing in many countries, offering administrative services online, which helps reduce time and costs for both citizens and businesses (Gil-Garcia et al., 2007).

3.1.2. Challenges for Economic Growth

One of the most significant challenges of DT is labor polarization, where automation and AI replace low-skilled jobs while increasing demand for highly skilled labor. The adoption of automation technologies may result in job losses in industries that require minimal skills, exacerbating income inequality among workers. Research by the OECD (2019) indicates that approximately 14% of jobs globally are at high risk of being fully automated, and 32% will undergo significant changes due to technology. Jobs in sectors such as manufacturing, transportation, and retail are more vulnerable compared to roles requiring complex skills. This poses a major challenge for education and training systems, which must adapt to equip the workforce with new skills.

DT necessitates substantial investment in digital infrastructure, including 5G technology, data centers, and IoT networks. Such investments require significant financial resources, particularly in developing countries or small businesses with limited budgets (World Bank, 2021). The disparity in access to and implementation of digital infrastructure across nations and regions could lead to digital inequality, leaving certain areas unable to keep pace with technological advancements. According to a report by the International Telecommunications Union (ITU) (2020), only about 53% of the global population has Internet access, highlighting significant disparities in digital technology access between developed and developing countries.

Another critical challenge of DT is cybersecurity. As businesses and governments increasingly rely on digital technologies, the risk of cyberattacks, data breaches, and privacy violations also rises. According to IBM (2021), the average cost of a data breach is $4.24 million, causing not only financial losses but also a decline in customer trust. Organizations and businesses must invest in robust security measures and risk management systems to safeguard data and develop effective information security management processes to counter cyber threats (Schneider et al., 2020).

3.2. Opportunities and Challenges of Digital Transformation for Sustainable Development

DT is fundamentally changing how people live, work, and interact with their environment. It offers vast opportunities to promote sustainable development by optimizing resource use, reducing emissions, and creating sustainable economic models. However, significant challenges remain, including increasing resource consumption and addressing inequality.

3.2.1. Opportunities of DT for Sustainable Development

Digital transformation offers transformative opportunities to achieve sustainable development goals by improving resource efficiency, fostering inclusivity, enabling innovation, and addressing environmental challenges. Leveraging these opportunities requires investments in technology, skill development, and robust policies to ensure equitable and sustainable growth.

- *Firstly*, DT has the potential to optimize resource utilization by enabling better management and coordination of resources. DT enables better management and coordination of resources through technologies like the Internet of Things (IoT), artificial intelligence (AI), and Big Data. These technologies help manage production and consumption processes more efficiently, minimizing waste and conserving resources. For instance, Industry 4.0 employs sensors and real-time data analytics to optimize production

processes, reducing energy and material consumption. Research by Kagermann et al. (2013) indicates that Industry 4.0 can reduce energy use by up to 30% and material use by 25% in certain industries.

- *Secondly,* digital technology is playing a crucial role in the development and deployment of renewable energy. Smart energy systems (smart grids) utilize data to balance energy supply and demand, regulate electricity consumption, and enhance the efficiency of renewable energy usage, such as solar, wind, and hydroelectric power. A study by the International Energy Agency (IEA) (2021) indicates that smart grid systems improve energy management efficiency and reduce greenhouse gas emissions, with the potential to cut CO2 emissions by up to 15% by 2030 through optimizing energy usage processes.

- *Thirdly,* DT helps promote the development of the circular economy, where resources are utilized and reused to the fullest extent, minimizing waste. Digital platforms facilitate tracking the lifecycle of products, from production to consumption and recycling, through traceability enabled by blockchain or IoT technologies. According to research by Geissdoerfer et al. (2017), the circular economy not only reduces environmental impact but also offers significant economic benefits by reusing and recycling materials, reducing production costs, and creating new business models.

- *Fourthly,* DT also facilitates the development of smart cities, where technological solutions are applied to efficiently manage infrastructure, energy, water, and transportation. Smart cities can utilize sensors to monitor and manage air quality, reduce traffic congestion, and optimize energy consumption. According to the United Nations (2019), smart cities have the potential to reduce CO2 emissions by up to 20% through the implementation of digital solutions for urban management.

3.2.2. Challenges of Digital Transformation for Sustainable Development

Digital transformation offers numerous opportunities to foster sustainable development but also poses significant challenges. Below are some key challenges of digital transformation in relation to sustainable development:

Firstly, DT creates digital inequality, as not all countries, regions, or population groups have equal access to digital technologies. This disparity can exacerbate social and economic inequalities. In many areas, the workforce is not adequately trained to use and leverage digital technologies, leading to imbalances in capacity. Small and medium-sized enterprises (SMEs) or developing countries may struggle to keep pace with digital transformation compared to large corporations and developed nations.

Secondly, while digital transformation can optimize resource utilization, the deployment of digital infrastructure such as data centers, 5G networks, and IoT devices requires substantial amounts of energy and resources to operate. Data centers, a critical component of the digital economy, consume a significant amount of electricity. According to the IEA (2021), data centers account for approximately 1% of global electricity demand, and this figure continues to rise. Additionally, the production of digital devices like smartphones, tablets, and laptops demands considerable natural resources, including rare metals and energy for extraction and manufacturing. This increases pressure on natural environments and can lead to challenges related to electronic waste (e-waste).

Thirdly, the rapid advancement of digital technology and the frequent replacement of electronic devices have led to a significant increase in electronic waste (e-waste).

According to the Global E-Waste Monitor (2020), the world generated 53.6 million tons of e-waste in 2019, and this figure is projected to rise to 74.7 million tons by 2030. Managing e-waste requires complex and costly recycling processes. Furthermore, e-waste contains numerous hazardous chemicals, such as lead, cadmium, and mercury, which can pollute the environment and pose serious health risks if not properly handled.

Fourthly, DT does not always deliver benefits equally to all nations and communities. Digital inequality remains a significant challenge, particularly for developing countries and minority groups, where digital infrastructure is underdeveloped, and access to technology is limited. According to the International Telecommunication Union (ITU) (2020), nearly 47% of the world's population still lacks internet connectivity, with most of these individuals residing in developing countries. The disparity in access to technology can widen the development gap between nations and among population groups, negatively impacting the achievement of sustainable development goals.

Fifthly, the rise of digital technology has led to an explosion of big data, increasing the demand for data protection and cybersecurity management. The rapid development of digital technologies raises issues of information security and privacy, impacting user and community trust. The application of AI and data mining poses ethical concerns, including algorithmic bias, privacy infringement, and lack of transparency. The growing demand for technology devices necessitates the extraction of natural resources, potentially harming the environment and local communities. The collection and processing of vast amounts of data from IoT devices, smart sensors, and digital systems require robust security infrastructures. According to research by Schneider et al. (2020), cybersecurity breaches and data loss not only undermine public trust in digital technologies but also result in severe legal and financial consequences. Additionally, managing and processing data within sustainable development models must comply with regulations on privacy and data security.

3.3. Digital Transformation and Social Equity

3.3.1. Opportunities of Digital Transformation for Social Equity

Digital transformation presents significant opportunities to promote social equity, particularly in reducing disparities in service access, fostering equal development, and improving quality of life.

- *Firstly, enhancing access to education and training:* DT creates opportunities for broad access to education and digital skill training, thereby promoting social equity. Educational technology (EdTech) is helping students, workers, and learners worldwide access educational resources more easily, ranging from online courses to digital books and learning tools. Platforms like Coursera, edX, and Khan Academy have enabled access to high-quality courses from prestigious universities for individuals previously unable to pursue education due to geographic or financial barriers (Kizilcec et al., 2020). According to the World Bank (2021), the growth of online education has contributed to narrowing educational gaps among different population groups. In particular, developing countries can leverage digital technology to improve the quality of education and workforce training, helping citizens enhance their skills and employment opportunities.

- *Secondly, improving access to healthcare services:* In the healthcare sector, DT has enhanced access to medical care. Telemedicine and Electronic Health Records (EHRs) are enabling people in rural and remote areas to access quality healthcare services that

were previously unavailable to them. With the support of technologies such as AI and big data analytics, healthcare systems can better predict and manage diseases, particularly in the context of global pandemics (Whitelaw et al., 2020). For instance, during the COVID-19 pandemic, digital technologies were used to manage information, track the spread of the virus, and deliver remote healthcare services. This helped alleviate pressure on healthcare systems while improving access to care for individuals who were unable to visit hospitals (Cohen et al., 2021).

- *Thirdly*, creating new job opportunities and enabling remote work. DT generates new employment opportunities in fields such as IT, data analytics, e-commerce, and financial technology (Fintech). These emerging industries provide jobs for many individuals, especially those with technological skills. Additionally, the rise of remote work has opened up job opportunities for people living in areas with limited access to high-quality jobs or who are unable to commute to urban centers. According to the McKinsey Global Institute (2021), DT has the potential to enhance social equity by creating more flexible employment models. Remote work removes geographical barriers and allows workers in developing countries or rural areas to participate in the global labor market. This can help reduce income inequality and create more opportunities for previously marginalized labor groups.

- *Fourthly, enhancing transparency and citizen engagement:* DT also improves transparency in public administration and creates opportunities for citizens to participate in decision-making processes. E-government enables countries to provide online public services, reducing corruption and strengthening citizens' ability to monitor government activities (Khan et al., 2020). E-government not only enhances the efficiency of public service delivery but also expands citizens' access to information and administrative services, thereby promoting equity in access to public resources.

3.3.2. Challenges of Digital Transformation for Social Equity

While DT creates numerous opportunities to promote social equity, it also presents significant challenges, particularly for vulnerable groups and less developed regions. The key challenges of DT for social equity include:

- *Firstly*, increasing digital inequality. One of the greatest challenges of DT in achieving social equity is the issue of digital inequality. The gap between those who have and those who lack access to digital technology - such as internet connectivity, digital devices, and technological skills—is widening. According to the ITU (2020), nearly 3.7 billion people worldwide remain unconnected to the internet, particularly in developing countries and rural areas. The lack of internet access and digital skills not only limits people's ability to access public services, education, and healthcare but also makes those in underdeveloped regions more likely to fall behind in the digital labor market. This issue disproportionately affects vulnerable groups such as women, the elderly, and ethnic minority communities (Hargittai, 2018).

- *Secondly*, the risk of polarization in the labor market. While DT creates many new job opportunities, it also increases the risk of labor market polarization. Workers with high technological skills are more likely to secure better job opportunities and higher wages, while those lacking digital skills are at greater risk of job displacement due to automation and AI (Autor, 2015). Research by Autor (2015) indicates that repetitive, low-skilled jobs are highly susceptible to automation through digital technologies, whereas

jobs requiring high - level skills and creativity remain valuable. This leads to a widening income gap among different labor groups, exacerbating social inequality.

- *Thirdly,* increased social control and surveillance. While DT offers numerous benefits in terms of management and efficiency, it also carries the risk of heightened social control and surveillance. Digital technologies, particularly AI and big data analytics, enable the collection and monitoring of vast amounts of personal data. This can lead to violations of privacy and individual freedoms, especially in countries where citizens' rights are not adequately protected (Zuboff, 2019).

- *Fourthly,* cybersecurity risks and personal data protection: Cyberattacks, data breaches, and privacy violations are becoming serious threats to safety and fairness in the digital environment. According to Schneider et al. (2020), protecting personal data and ensuring cybersecurity is a significant challenge for nations, especially as an increasing amount of personal information is stored and utilized by organizations, businesses, and governments. The lack of robust privacy protections can lead to data misuse, eroding public trust in digital technologies and creating inequalities in safeguarding individual rights within society.

4. Digital Transformation in Vietnam - Opportunities and Challenges

According to a report by Google, Vietnam has been the fastest-growing digital economy in Southeast Asia for two consecutive years (28% growth in 2022 and 19% in 2023), approximately three times the GDP growth rate. Vietnam's national digital transformation index increased by 48% from 2020 to 2022, rising from 0.48 to 0.71, and it is projected to reach 0.75 in 2023. The Ministry of Information and Communications estimates that the digital economy's contribution to Vietnam's GDP in 2023 will be 16.5%, with projections of 18.6% in 2024 and 20% by 2025.

Digital transformation has become a strategic priority in the development of nations worldwide, and Vietnam is no exception. With a vision to build a digital economy and digital society, Vietnam has set the ambitious goal of becoming one of the leading countries in digital transformation in the region by 2030. The Vietnamese government views digital transformation as a strategic choice - a pathway to national prosperity and strength, aiming to achieve the goal of a "New Era of Development - An Era of National Ascension". However, this process brings both significant opportunities and formidable challenges.

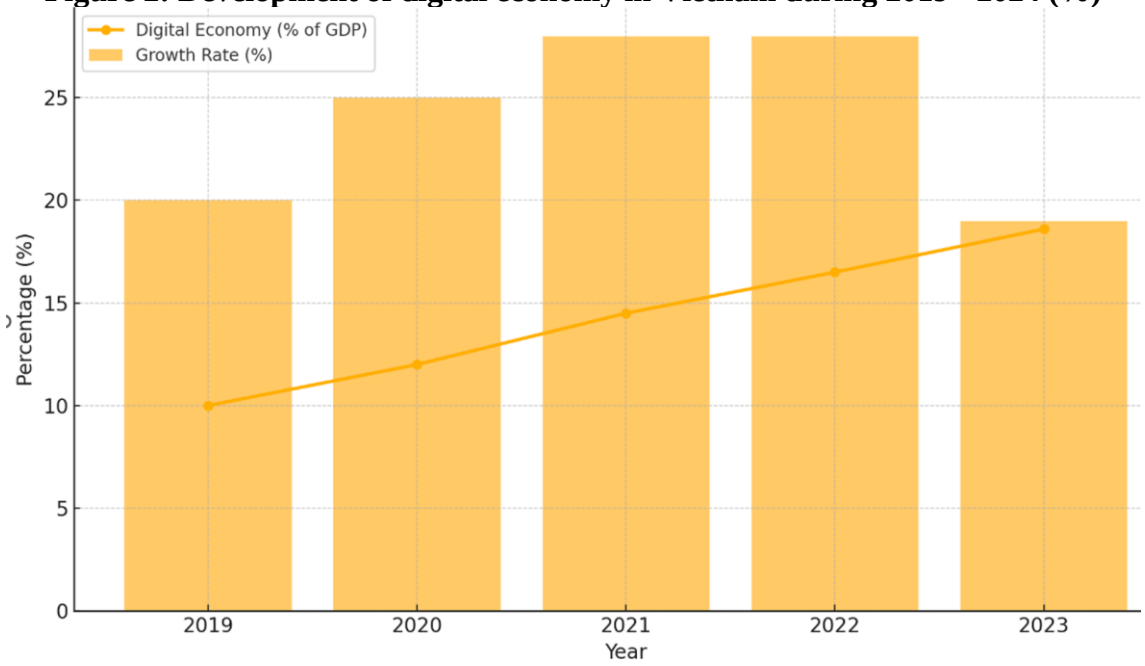
4.1. Opportunities of Digital Transformation in Vietnam

Digital transformation provides Vietnam with numerous opportunities to foster economic growth, enhance public services, and develop innovative business models.

Firstly, driving economic growth. Digital transformation is expected to play a pivotal role in driving Vietnam's economic growth by enhancing labor productivity and expanding markets through digital platforms. According to the World Bank (2020), accelerating the digitalization of the economy could boost Vietnam’s GDP by an additional 1 - 2% annually until 2030, thanks to improvements in production efficiency and strengthened connectivity with international markets. Specifically, sectors such as agriculture, manufacturing, and financial services hold significant potential for improvement through the adoption of digital technologies. For instance, in agriculture, applications of the Internet of Things (IoT) and Artificial Intelligence (AI) can optimize resource management, reduce waste, and increase yields (Nguyen, 2021).

Vietnam's digital economy has experienced rapid growth during the 2019-2024 period, positioning the country as one of Southeast Asia's most dynamic digital markets (Figure 2 and Figure 3). Key trends include significant increases in internet penetration, e-commerce adoption, and digital service integration. According to the Ministry of Information and Communications, the digital economy's contribution to GDP has risen steadily, reaching 16.5% in 2023, with a forecast of 20% by 2025. With over 70 million internet users in 2023, accounting for approximately 70% of the population, Vietnam boasts one of the highest internet adoption rates in the region (We Are Social, 2023). The deployment of 4G and 5G networks, as well as the expansion of broadband infrastructure, has accelerated digital adoption across both urban and rural areas. Vietnam's young and tech-savvy population has driven a surge in e-commerce activity. Major platforms like Shopee, Tiki, and Lazada have gained prominence, enabling the economy to thrive amidst changing consumer behaviors. According to Google and Temasek (2020), the value of Vietnam's digital economy increased from $14 billion in 2020 to an estimated $52 billion by 2025.

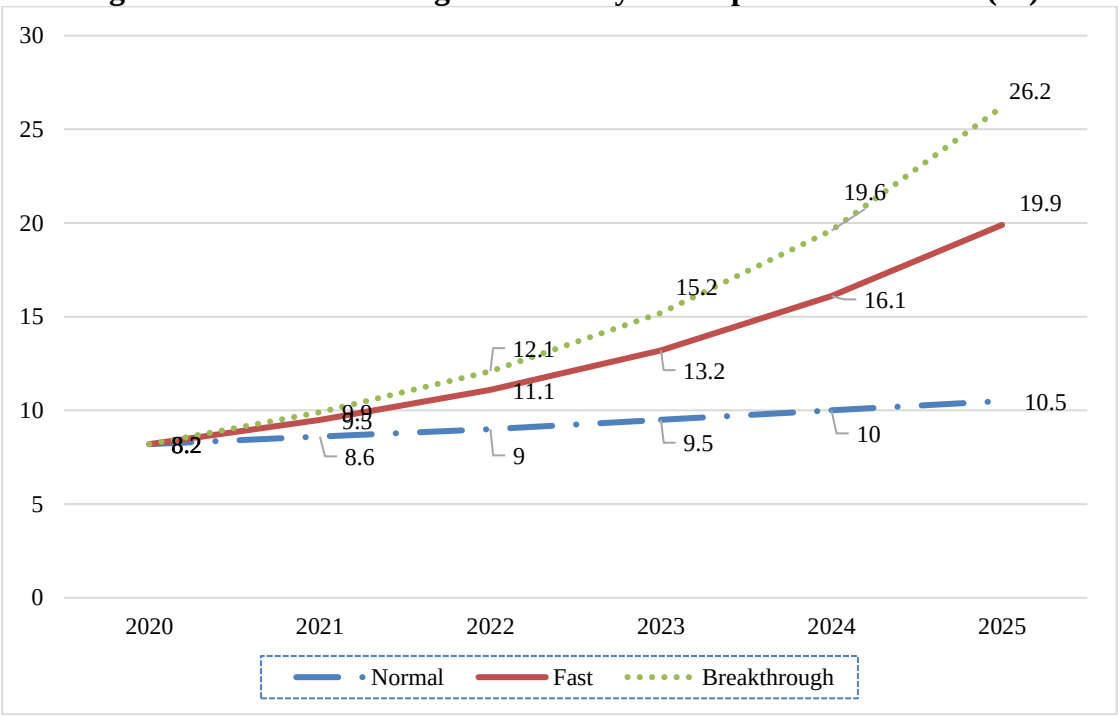
Figure 2: Development of digital economy in Vietnam during 2019 - 2024 (%)



Source: Ministry of Information and Communications, Vietnam (2024)

Secondly, developing the digital economy and e-commerce. Vietnam's young population and high internet penetration, with over 70 million internet users in 2023 (accounting for approximately 70% of the population), provide a solid foundation for the growth of e-commerce and the digital economy (We Are Social, 2023). According to a report by Google and Temasek (2020), Vietnam's digital economy was valued at around $14 billion in 2020 and is projected to reach $52 billion by 2025. E-commerce platforms like Shopee, Tiki, and Lazada are thriving, attracting a large number of online consumers. This not only enables businesses to scale up but also allows SMEs to participate in the online marketplace without requiring significant investment in physical infrastructure.

Figure 3: Scenarios for Digital Economy Development in Vietnam (%)



Source: Ministry of Information and Communications, Vietnam (2024)

Thirdly, enhancing public services and e-government. The Vietnamese government has been actively promoting e-government and online public services to enhance transparency, reduce administrative procedures, and improve management efficiency. Vietnam's national online public service portal enables citizens and businesses to perform various administrative tasks online, such as business registration and tax filing, saving time and costs (Vietnam Government, 2022). According to the United Nations E-Government Development Index (2020), Vietnam improved its ranking from 88th in 2018 to 86th in 2020, reflecting progress in the implementation of e-government services and improving citizen access to online public services.

Fourthly, advancing digital finance and banking. Digital transformation presents significant opportunities to reform Vietnam's financial and banking sectors through the emergence of digital banking, financial technology (Fintech), and electronic payment systems. The financial industry is rapidly shifting from traditional transaction methods to highly secure and easily accessible digital services. According to the State Bank of Vietnam (2021), the adoption of electronic payment services has grown substantially in recent years. Services such as e-wallets like Momo and ZaloPay, along with digital banks like TPBank and MB Bank, have transformed how people access and use financial services. These platforms are not only convenient and fast but also enhance transparency and reduce risks associated with cash usage. Moreover, Fintech has expanded financial access for individuals and small businesses, particularly those in rural areas without bank accounts. With the application of technologies like blockchain, AI, and big data analytics, Fintech services can offer innovative and cost-effective financial solutions, thereby promoting inclusive development in the digital economy (Nguyen & Tran, 2021).

Fifthly, supporting the digitalization of SMEs. One of the sectors benefiting

significantly from digital transformation is SMEs, which constitute the majority of Vietnam's economy. According to the Ministry of Planning and Investment (2020), SMEs account for over 98% of all businesses nationwide and contribute approximately 45% of the GDP. Digital transformation provides opportunities for these enterprises to enhance their competitiveness by integrating technology into their production and business processes. Implementing digital solutions allows SMEs to optimize operating costs, expand markets, and adapt quickly to market changes. Tools such as Customer Relationship Management (CRM) systems, Enterprise Resource Planning (ERP) systems, and data analytics are becoming increasingly popular, helping SMEs automate key business processes (Schallmo et al., 2017). Furthermore, e-commerce platforms enable SMEs to reach customers not only domestically but also internationally without requiring substantial investment in physical infrastructure. This helps expand markets, increase revenue, and create growth opportunities for small businesses.

4.2. Challenges of Digital Transformation in Vietnam

4.2.1. Digital divide and access to technology

Digital inequality is one of the most significant challenges facing DT in Vietnam. Despite robust development in urban areas, rural, mountainous, and island regions still face considerable difficulties in accessing the internet and digital services. According to the International Telecommunication Union (ITU) (2021), approximately 40% of Vietnam's population still lacks stable internet connectivity, posing a major barrier to expanding digital services nationwide. The inability to access technology is not limited to connectivity infrastructure but also extends to the lack of digital skills among the population, particularly in low-skilled labor groups and the elderly. UNESCO (2020) emphasizes that the development of digital education and digital skills training is crucial to ensuring the success of DT in Vietnam. However, current technology and digital skills training programs have not been uniformly implemented.

4.2.2. Insufficient digital infrastructure and technology investment

Digital infrastructure in Vietnam, especially in rural and remote areas, remains underdeveloped. Although 4G and 5G networks are being rolled out extensively, investment in systems such as broadband networks, data centers, and cloud computing technologies requires greater attention and funding. According to the Asian Development Bank (ADB) (2021), Vietnam needs to significantly enhance its investment in digital infrastructure to meet the growing demands of the digital economy. Expanding and upgrading telecommunications infrastructure, improving internet connectivity in remote areas, and investing in new technologies are essential to bridging the development gap between regions.

4.2.3. Information security and cybersecurity issues

The growth of DT means that increasing amounts of personal and business data are digitized, leading to heightened risks of cybersecurity threats and data breaches. According to a report by Bkav (2022), Vietnam faced over 100 million cyberattacks in 2021, and many businesses still lack effective security measures. The lack of strong policies and regulations on information security, along with insufficient capacity and security technology, can result in significant risks for Vietnam's digital systems. Although the government has issued various decrees and laws related to information security, challenges remain in enforcement and raising public awareness about cybersecurity.

4.2.4. Adaptability to digital transformation and shortage of high-quality technology talent

The current Vietnamese workforce has yet to fully adapt to the rapid changes brought about by DT. A significant skills gap is a major obstacle in adopting new technologies, particularly in traditional industries such as manufacturing, agriculture, and services. According to the World Bank (2020), approximately 70% of Vietnam's labor force is currently employed in low-skilled sectors, posing a significant challenge to upskilling workers for the digital age. Additionally, technological advancements risk labor polarization, where low-skilled jobs may be replaced by automation and artificial intelligence, while demand for highly skilled technical workers increases. This necessitates policies focused on reskilling and upskilling the workforce to meet the new demands of the digital labor market (Nguyen & Tran, 2021). Many businesses in Vietnam struggle to shift away from traditional mindsets and adapt to new working models introduced by DT. A Deloitte (2021) report highlights that a lack of digital leadership and resistance to cultural change within organizations is one of the biggest barriers to DT in Southeast Asia, including Vietnam. Businesses need to create an open work environment that fosters creativity and promotes the adoption of new technologies. This requires strong commitment from senior leadership, enabling employees to participate in the transformation process and equipping them with the necessary skills to succeed in a digitalized environment.

The shortage of high-quality talent in the information technology sector is a significant challenge for DT in Vietnam. According to the Ministry of Information and Communications (2021), Vietnam needs approximately 1 million highly skilled IT workers but currently faces a shortfall of nearly 400,000. Domestic companies struggle to retain and attract tech talent, as many skilled professionals prefer working for foreign companies offering higher salaries and better development opportunities. This urgent situation calls for robust policies to develop digital human resources, including training, skill development, and talent retention strategies. Addressing this challenge is critical for Vietnam to achieve its digital transformation goals and strengthen its position in the global digital economy.

4.2.5. Legal and policy framework inadequacies

Despite significant progress by the Vietnamese government in developing policies to support digital transformation (DT), the legal framework remains incomplete in addressing the full needs of the digital economy. Issues such as data security, privacy, and the regulation of digital platforms are still inadequately covered, posing risks to businesses and users. According to McKinsey & Company (2020), Vietnam needs to establish a clearer and more robust policy framework to foster the development of digital industries, particularly in areas such as Fintech, e-commerce, and blockchain technology. The lack of comprehensive legal regulations not only slows the growth of businesses in emerging sectors but also increases risks related to information security and privacy violations. Furthermore, regulations on personal data protection must be updated to align with global trends, as consumer data is increasingly collected and processed via digital platforms. The Personal Data Protection Law is a necessary step forward; however, enforcement and raising awareness about data privacy among businesses and users remain limited. Strengthening legal safeguards and improving compliance mechanisms

will be crucial for Vietnam to ensure a secure and sustainable digital transformation.

4.2.6. Competitiveness of domestic enterprises compared to international players

The rapid growth of digital businesses and international technology platforms such as Google, Facebook, and Alibaba has created fierce competition for domestic enterprises. While Vietnam has major tech companies like VNG, FPT, and VinGroup that have made significant progress, their international competitiveness remains limited. Vietnam needs to encourage greater investment in research and development (R&D) and foster innovation in fields such as AI, blockchain, and IoT to avoid lagging in the global competition. Domestic enterprises, particularly SMEs, face challenges in accessing investment capital for technology adoption and improving the digital skills of their workforce (Schneider et al., 2020). Enhancing the competitiveness of local businesses requires a strategic focus on innovation, collaboration, and the creation of an enabling ecosystem that supports technology-driven growth. This will enable Vietnamese companies to compete more effectively on the international stage while contributing to the country's digital economy.

5. Conclusion and policy recommendation

Digital transformation offers immense opportunities for economic growth, including enhanced labor productivity, innovation, and expanded global market access. However, it also presents significant challenges, such as digital inequality, inadequate infrastructure, information security issues, workforce adaptability, labor disparities, high investment costs, and cybersecurity threats. To maximize benefits and address these challenges, nations and businesses must invest in digital infrastructure, enhance workforce capabilities, and develop robust security policies.

In Vietnam, DT presents substantial opportunities to improve economic efficiency, enhance public services, and foster new business models. The country requires a comprehensive strategy that includes investment in digital infrastructure, improving digital skills for the population, and ensuring cybersecurity in an increasingly digitized landscape. To fully capitalize on these opportunities, Vietnam must address challenges such as digital inequality, the shortage of high-quality talent, and an incomplete legal framework. Crucial to this effort is the close collaboration between the government, businesses, and educational institutions to promote a comprehensive and sustainable digital transformation.

In order to maximize the benefits and address the challenges of DT for growth, sustainable development, and social equity, policymakers should consider the following recommendations: To build robust digital infrastructure, the government should **e**nsure universal access to high-speed internet, particularly in rural, remote, and underserved areas; promote the adoption of AI, IoT, blockchain, and cloud computing to support innovation and productivity; Leverage partnerships to finance and deploy infrastructure like data centers, broadband networks, and 5G technology; Implement nationwide programs to improve digital skills for all citizens, especially marginalized groups like women, older workers, and rural populations; Develop targeted training initiatives to prepare workers for jobs in the digital economy, focusing on AI, data analytics, and cybersecurity; Integrate technology-focused curricula in schools and universities to create a future-ready workforce; Provide affordable devices and internet services for low-income households; Invest in cybersecurity infrastructure and train experts to monitor and

respond to threats effectively; Provide tax benefits and grants for research and development in digital technologies like AI, IoT, and green tech; Align with international standards and frameworks to attract foreign investments and enhance global competitiveness; Implement technologies to improve urban planning, transportation, and energy management, reducing emissions and waste; Invest in data analytics and IoT solutions for monitoring and managing natural resources and environmental risks.

In summary, in order to harness the transformative potential of digital transformation for economic growth, sustainable development, and social equity, governments must adopt a balanced and forward-thinking approach. By investing in infrastructure, fostering innovation, addressing inequalities, and safeguarding privacy, digital transformation can become a powerful tool for creating a prosperous, inclusive, and sustainable future.

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THE ROLE OF TRANSFORMATIONAL LEADERSHIP IN KNOWLEDGE CREATION: THE MEDIATION EFFECT OF WORK ENGAGEMENT OF VIETNAMESE GEN Z EMPLOYEES

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Abstract: This study examines the impact of transformational leadership on knowledge creation in the Vietnamese company context, on which there has not been much research despite of its worldwide popularity. Work engagement is added to the model as a mediator to explain this influence. A total of 294 validated responses of Gen Z employees mainly living and working in Hanoi and Ho Chi Minh City, which were analyzed with SPSS 20 and AMOS 24. Descriptive results show that the perception of Gen Z employees about the current knowledge creation process of their companies is good. The mediation effect of work engagement on the relationship between the four dimensions of transformational leadership and knowledge creation has been confirmed. More specifically, three of them are partially mediated by work engagement, while idealized influence is fully mediated. Also, four dimensions of transformational leadership have strong positive effects on work engagement and work engagement also strongly affects knowledge creation directly. From the findings, some recommendations and future research directions are made.

Keywords: *transformational leadership, knowledge creation, work engagement, gen Z, mediation effect*

1. Introduction

Knowledge has always played a crucial role in any organization since it is a fundamental factor in building a sustainable competitive advantage for companies (Nonaka & Takeuchi, 1995, Yu et al., 2017), which then definitely contributes to long-term success, which is even more strenuous to achieve in this turbulent situation. As Alvin Toffler (1990) said, we are now living in a 'knowledge-based society', where knowledge is the source of the highest quality power. Knowledge management is regarded as the key to the success of world leaders in science and technology in many fields (i.e., Japan, Israel). The application of appropriate leadership styles can help managers create a difference in management effectiveness and lead the business to success (de Vries et al., 2009; Huang et al., 2011; Le Ba Phong et al., 2018). Among different leadership styles, transformational leadership emerges as one of the most superior leadership styles, helping managers unleash and leverage the potential of employees, effectively use resources, and enhance the competitive advantages of the business (Le & Lei, 2019). Besides leadership, employees are another essential factor, one of the most important stakeholders,

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contributing to the success of any organization. According to Drucker (1998), employees' control and own the means of any process in an organization. Nonaka and Takeuchi (1995) claimed that organizational knowledge creation should be based on the individual's knowledge, which is facilitated through the employee's commitment, autonomy, and enthusiasm. Therefore, the authors want to select work engagement as a mediator in the relationship between transformational leadership and organizational knowledge creation.

These days, Gen Z, particularly in Vietnam, is well known for a high turnover rate. Anphabe, a Vietnamese recruitment company, conducted a survey with nearly 14,000 students nationwide, up to 62% of young people change jobs in the first year of working. This can be considered as one of the most serious problems that managers have to figure out solutions to since Gen Z soon become the main workforce in the future, more specifically, Gen Z is expected to account for 25% of the total workforce in Vietnam by 2025. Therefore, the participants of this study would be Gen Z so that the authors can assess how work engagement of Gen Z employees influences the relationship between transformational leadership and knowledge creation in an organization, then make some recommendations to managers.

All in all, the topic of knowledge creation, to the best of our knowledge, has been hardly found in Vietnam despite its urgency. Acting Deputy Director of the OECD's Economic Country Studies Branch, Vincent Koen, said "Vietnam's strong economic growth has led to remarkable social progress over recent years, and its economy has been resilient to shock", hence "further reforms to improve the business climate, spur competition, and expand the pension and welfare system are necessary for Viet Nam to continue on its path of economic and social progress and to fully benefit from its deep integration in global trade". Accordingly, I want to do more research on it, particularly in the relationship with two core factors in a business which are transformational leadership as an independent variable and work engagement of Gen Z employees as a mediator. Another original point in this study is that the impact of the transformational leadership variable is not evaluated as a whole, but rather under its four separate sub-dimensions. By that, this study is supposed to expand the current literature, especially in Vietnam, as well as offer some useful points for businesses and intrigue further research.

2. Literature review

2.1 Transformational leadership

James V. Downton, the first person to use the term "transforming leadership," proposed this leadership style in 1973, and the idea was further researched by Burns (1978) and House (1976). Based on this model of Burns (1978) and House (1976), Bass (1985, 1999) developed this definition further by paying more attention to followers' needs instead of those of leaders. Additionally, he regarded transformational and transactional leadership as "a single continuum" rather than two extremes (Yammarino, 1993). The core idea in Bass's theory of transformational leadership is transformational leaders have a superior capability of motivating their followers to strive more and gain more than their expectations. Avolio & Bass (2004) described transformational leadership under four sub-dimensions: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. Idealized influence or charisma is regarded as an emotional aspect of leadership (Antonakis, 2012), which entails leaders serving as

role models by exhibiting positive behavior that inspires followers to respect, trust, and identify with them. Inspirational motivation relates to activities that motivate and inspire followers to become enthusiastic, upbeat, assertive, and self-confident by sharing the vision of desired future states, promoting greater performance expectations, and expressing commitment to the set goals and shared vision. Intellectual stimulation emphasizes a leader's behaviors that act as stimuli to followers' capability of creativity and innovation, such as encouraging and pushing them to challenge assumptions, reevaluate issues, and approach stale circumstances in fresh ways. Individualized consideration refers to the leader's role in coaching or mentoring and recognizing their needs for achievement and growth by presenting various learning opportunities along with a supportive environment, accepting individual differences, nurturing frequent interpersonal interaction, and delegating tasks.

2.2 Knowledge creation

Nonaka first proposed the theory of organizational knowledge creation originated by Nonaka (1994) and advanced by Nonaka and Takeuchi (1995), Nonaka and Toyama (2003), and Nonaka and Toyama (2007). This is one of the most prominent theories in the knowledge-based view and perhaps the most widely accepted theory of knowledge creation (von Krogh et al., 2011). According to Nonaka & Takeuchi (1995), new knowledge is created through the four phases of the SECI process with four modes of knowledge conversion of tacit and explicit knowledge: socialization, externalization, combination, internalization. This process expands horizontally and vertically along epistemological and ontological dimensions. Socialization is the process of collecting knowledge from the outside, storing it, and sharing it so that tacit knowledge (i.e., individual experience) can be converted. Externalization is when tacit knowledge is articulated into explicit knowledge for application. If socialization happens among individuals, externalization is when knowledge is sharable among groups and becomes the basis of new knowledge. To do this, common methods of communication or language needs to be agreed upon, so that each individual can absorb and reflect on it (Nonaka & Takeuchi, 1995; von Krogh, 1998). Combination is when explicit knowledge can be converted into more complex and systematic sets of explicit knowledge (Nonaka et al., 2000). After being shared and discussed among groups, new concepts and insights are combined into the knowledge system of the organization, which is then disseminated among the others. Intranets, team platforms, and databases are good examples of facilitators in this mode. Internalization is when knowledge is received by every member of the organization and converted into tacit knowledge once again. Some activities promote this mode including "learning by doing", and ''when experiences through socialization, externalization, and combination are internalized into individuals' tacit knowledge bases in the form of shared mental models or technical know-how, they become valuable assets at organizational levels'' (Nonaka & Takeuchi, 1995).

2.3 Work engagement

Kahn (1990) first introduced the concept of engagement as "the harnessing of organization members' selves to their work role; in engagement, people employ and express themselves physically, cognitively, and emotionally during role performances". According to Kahn (1990), there are three psychological conditions associated with work engagement, including psychological meaningfulness, safety and availability that can be

considered physical, cognitive, and emotional aspects. Work engagement tends to have some points in common with job satisfaction and organizational commitment. It is believed that when employees commit and enthusiastically work together, they are reported to play a crucial part in creating new knowledge and more practical field-oriented applicable knowledge creation (Dixon, 2000; Yoon et al., 2009).

In this paper, the authors decided to use the concept of work engagement developed by Schaufeli & Bakker (2003) due to its popularity in previous literature, which consists of three components: vigor, dedication, and absorption. Vigor refers to a strong sense of energy and mental resilience during work, in other words, a willingness to exert effort in one's tasks, and the ability to persevere even in challenging circumstances. Dedication could be found in people who are so dedicated that are able to derive meaning from their work, feeling passionate and proud of their position, and are motivated and challenged by it. The last one, absorption, refers to the state of being completely focused and contentedly absorbed in one's job, in which, time flies fast and it is impossible to separate oneself from one's work.

3. Hypothesis development and theoretical framework

3.1 Direct impact of transformational leadership on knowledge creation

Yukl (1989) claimed that transformational leadership refers to a process where outcomes, as well as significant changes in the culture, missions, objectives, and strategies, are acknowledged. And as mentioned above, knowledge creation, if well applied, can build up the organization's sustainable competitive advantages. Therefore, transformational leadership acts as an essential enabler for the process of organizational knowledge creation (Bryant, 2003; Yoo et. al., 2020). von Krogh et. al (2011) did a research of literature review of previous empirical studies that are relevant for the examination of leaders' effect on organizational knowledge. Nonaka & Takeuchi (1995), Nonaka et al. (2000) have claimed some knowledge enablers, among which is the role of managers or "knowledge creators" including articulating visions, inspiration, love, trust, commitment, … These are clearly found in characteristics of a transformational leaders.

There have been a number of papers that confirmed the positive relationship of transformational leadership and activities of knowledge management or knowledge creation such as (Bryant, 2003; Lakshman, 2005, 2007; Politis, 2001, 2002; Srivastava et al., 2006; Zárraga and Bonache, 2003). In Vietnam, there have not much studies on the topic of knowledge management nor knowledge creation in general. Phong (2021) did research on the impact of transformational leadership on frugal innovation capabilities of Vietnamese firms. The results show that transformational leadership is correlated with knowledge management capability at standardized path coefficient = 0.61. Meanwhile, it also directly and indirectly affects firm's aspects frugal innovation via mediating role of firm's knowledge management capability, more specifically, direct effects are a bit stronger than indirect effects.

In this paper, we argue that there is the relationship between each dimension of transformational leadership and knowledge creation. More specifically, idealized influence makes leaders admired, respected and become a role model for others, which then raise mutual trust among employees, which and inspirational motivation can make employees more engaged in knowledge creation since trust and commitment are listed as facilitators in creating knowledge (Nonaka et al., 2000). Besides, intellectual stimulation

means leaders encourage followers to be more "outside the box" and "go out of their comfort zone", which is aligned with the characteristics of knowledge creation as "a continuous, self-transcending process through which one transcends the boundary of the old self into a new self by acquiring a new context, a new view of the world, and new knowledge" (Nonaka and Takeuchi, 1995). Individualized consideration emphasizes leaders' focus on each employee's needs for growth and achievement. Leaders tend to treat them as individuals rather than just members of a team. This not only fosters two-way communication but also nurtures trust, care, and love. Therefore, the following hypotheses are proposed:

H1: Idealized influence has a positive influence on knowledge creation

H2: Inspirational motivation has a positive influence on knowledge creation

H3: Intellectual stimulus has a positive influence on knowledge creation

H4: Individualized consideration has a positive influence on knowledge creation

3.2 Indirect impact of transformational leadership on knowledge creation via work engagement

Organizational knowledge creation is considered as a performance-oriented construct, leading to the competitive advantage of the organizations and helps them sustainably develop in such a fierce competitive market. Besides, theory of transformational leadership is proven to have a significant impact on organizational performance, especially task-related role performance (Bass and Riggio, 2006; Northhouse, 2013). Also, the importance of transformational leadership in any activity in an organization, not to mention strategic ones like knowledge creation, leaders and followers are closely linked in the transformation process, notwithstanding the essential role the transformational leader plays in igniting change. They also show that transformational leadership has a positive influence on organizational innovation as measured by empowerment and task-oriented commitment of team members.

Especially, employees' work engagement was positively found to predict organizational commitment and job satisfaction while negatively predicting desire to quit, which was examined within a research framework through the perspective of social exchange theory (Saks, 2006). This, to some extent, supports the selection of Gen Z with a high rate of leaving jobs, as the sample for this study. In the theory of organizational knowledge creation, Nonaka and Takeuchi (1995) assert that efficient knowledge creation practices and active knowledge sharing need the role of leadership. All in all, transformational leadership's core characteristic are aspects of intrinsic member motivation, follower development, and emotional caring in the workplace, which is clearly strongly correlated with work engagement, a kind of intrinsic motivation towards duties. And for performance-oriented and strategic activity like knowledge creation or knowledge management, work engagement of employees plays as an essential factor facilitating the process transformational leaders transform the knowledge creation process.

3.2.1 The impact of transformational leadership on work engagement

There have been quite a number of studies about the influence of transformational leadership on employee engagement. The relationship between transformational leadership and notions connected to employee engagement, such as employees' involvement in their jobs and work-related flow in the workplace has been studied a lot.

The direct relationship between transformational leadership and engagement was also confirmed in the Netherlands (Schmitt et al., 2016; Tims et al., 2011), Germany (Vincent-Höper et al., 2012), Norway (Breevaart et al., 2013), South Africa (Zhu et al., 2009), China (Aryee et al., 2012; Ding et al., 2017), South Korea (Song et al., 2012), and Australia (Ghadi et al., 2013), Vietnam (Nguyen Hai Thanh and Nguyen Van Quang, 2022). Especially, Manning (2016)'s study on the influence of leadership styles including transformational leadership of nurse manager on their staff's work engagement found that all the four dimensions of transformational leadership show the most positive impacts on staff nurses' work engagement, which should be explained by supportive and relational leadership behaviors.

In most of those previous studies, transformational leadership tends to be examined as a whole and not separated into sub-dimensions. However, based on the theory of transformational leadership and a literature review of work engagement, the authors want to go deeper into the impact of each dimension. More specifically, idealized influence and inspirational motivation help shared or aligned goals and values be stilled in followers, who then feel a sense of significance from their work. Also, intellectual stimulation makes employees feel challenged and inspired by tasks. Employees will engage in work much more if they have a chance to grow up day by day through the process of breaking old ways of thinking and solving problems. Individualized consideration is shown through mindful listening and sympathy with each individual, figuring out specific demands for growth. According to Bass and Riggio (2006), the overall result of personalized consideration and other transformational leadership characteristics is the empowerment of followers. In the end, transformational leaders can become highly effective in influencing their followers. From this reasoning, the authors developed the following hypotheses:

H5: Idealized influence has a positive influence on work engagement

H6: Inspirational motivation has a positive influence on work engagement

H7: Intellectual stimulus has a positive influence on work engagement

H8: Individualized consideration has a positive influence on work engagement

3.2.2 The impact of work engagement on knowledge creation.

The key idea of a successful SECI process is continuous interaction, not only among individuals but also between individuals and their surroundings. On the ontological aspect, employees or their knowledge are the foundation for the spiral process of organizational knowledge creation to gradually develop from individuals through groups to organizations (Nonaka et al., 2000; Sabherwal & Becerra-Fernandez, 2003). Therefore, it is seen that for knowledge creation to take place effectively and efficiently, work engagement is fundamental. However, there is not much research on this direct relationship, which is clearly a gap needing to be filled. Knowledge creation, as aforementioned, can be regarded as a performance-oriented process, of which the outcome is continuous innovation and ultimately sustaining competitive advantage; hence, the authors have composed research on the impact of engagement and factors related to performance.

Bakker, Demerouti, and Schaufeli (2005, p. 663) claimed that "Employees who are burned out lack the energy to work adequately and poorly identify with their work", which then leads to poor performance. The key solution to this issue is increasing work engagement. Yoo et al. (2020) examined a comprehensive model including

transformational leadership, individual and, organizational-level knowledge assets including work engagement, and knowledge creation practices with a cultural comparison between South Korean and US schools. They also found that there is a positive relationship between work engagement and knowledge creation practices. The ultimate results indicated that a principal's transformational directly and indirectly fosters knowledge creation practices via knowledge assets at the organizational level (supportive learning culture) and individual level (work engagement). Hart, Schmidt, and Hayes (2002) did a meta-analysis of the relationship between employee satisfaction, employee engagement, and business outcomes (i.e., customer satisfaction, productivity, profit, employee turnover, and accidents). The findings were that employee engagement was strongly correlated with customer satisfaction-loyalty, profitability, productivity, and safety. Enhancing this view, Xanthopoulou et al. (2008) also found that work engagement plays as a mediator in the impact of supportive environment and self-efficacy on job performance. The research of Zigarmi et al. (2009) proved that in order to foster a collaborative and engaged environment at work and achieve the objective of long-term organizational performance, it is crucial for employees to be involved in their work.

All in all, work engagement plays a role as a core factor of input in the knowledge creation process, leading to better performance, in this case, continuous innovation and competitive advantage through self-oriented involvement combined with an internal supportive environment. Based on this, the following hypothesis is posited:

H9: Work engagement has a positive influence on knowledge creation

4. Research methodology

4.1 Research model

Based on the hypothesis development and theoretical framework discussed in the previous chapter, the proposed research model is presented in Figure 4.1. The model shows the direct relationship between idealized influence (II), inspirational motivation (IM), intellectual stimulation (IS), individualized consideration (IC) and knowledge creation (KC), which are H1, H2, H3, H4, respectively. Besides, H5, H6, H7, H8 present the direct impacts of II, IM, IS, IC on work engagement (WE). Last but not least, the direct influence of WE on KC is shown in H9.

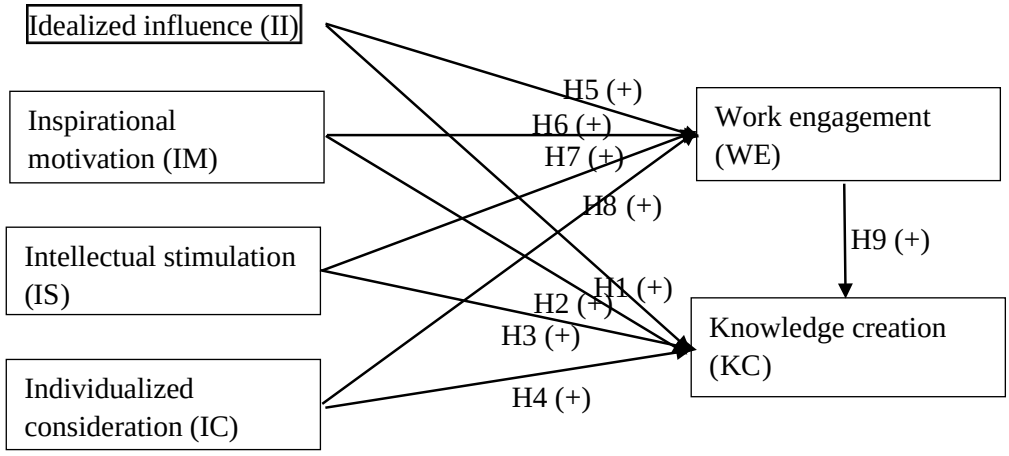

Figure 4.1: Research model

(Source: By the authors)

4.2 Questionnaire development

In order to measure the four dimensions of transformational leadership, the "Multi-Factor Leadership Questionnaire" (MLQ 5-x short form) by Bass and Avolio (1995) was developed and used for this study. 8 items for idealized influence (e.g. "My leader instills pride in me for being associated with him/ her"), 4 items for inspirational motivation (e.g. "My leader articulates a compelling vision of the future), 4 items for intellectual stimulation (e.g. "My leader suggests new ways of looking at how to complete assignments), and 4 items for individualized consideration (e.g "My leader considers me as having different needs, abilities, and aspirations to others").

The short version of Utretch Work Engagement Scale (UWES-9, Schaufeli, Baker, and Salanova, 2006), which was shortened based on the original UWES-17 with 17 items, which was developed from the Maslach Burnout Inventory (MBI; Maslach, Jackson & Leiter, 1996) since it was proven that burnout and engagement are the two opposite concepts. They should be measured by two distinct scales, which led the authors to develop UWES. UWES-9 includes the three constituting aspects of work engagement: vigor, dedication, and absorption, and 3 items for each dimension. Some example items include "At my work, I feel bursting with energy", "I am proud of the work that I do", and "I am immersed in my work".

The scale that is used to measure knowledge creation in this paper was developed by Sabherwal & Becerra-Fernandez (2003). This scale was based on the SECI process of Nonaka including four modes: socialization, externalization, combination, internalization. Some example items include "My firm usually adopts cooperative projects across directorates", "My firm usually captures and transfers experts' knowledge", and "My firm usually adopts on-the-job training".

4.3 Data collection and data cleaning

The questionnaire is developed by Google Form, and then distributed to social groups on social media like Facebook, Zalo, and Instagram, whose users are mainly Gen Z living and working in Hanoi and Ho Chi Minh City, so that the authors can receive a wide range of responses. This took place over a period of one month. After that, the authors gathered 320 responses. Responses with missing values or invalid and inappropriate answers (i.e., the participants have not had a job yet) are eliminated. Finally, there were 294 valid responses remained for data analysis with SPSS and AMOS.

5. Research findings and discussion

5.1 Descriptive statistics results of the sample Table 5.1 provides a big picture of the sample's demographic characteristics which are age, gender, city, and working experience.

Table 5.1: Descriptive statistics results of the sample

Demographic category & variable		Frequency	Percent
Gender	Male	86	29.3
	Female	208	70.7
Age	18 - 20	71	24.1
	21 - 23	155	52.7
	24 - 26	68	23.1

City	Hanoi	138	46.9
	Ho Chi Minh	149	50.7
	Others	7	2.4
Working experience	< 6 months	155	52.7
	6 months - 1 year	72	24.5
	1 year - 3 years	63	21.4
	> 3 years	4	1.4

(Source: SPSS results by the authors)

5.2 Descriptive statistics results of variables, reliability, construct validity tests, and Pearson correlation analysis

As can be seen from Table 5.2, the mean values of constructs are quite high, ranging from 3.8 to 3.9, implying that participants' perceptions of their leaders' transformational leadership, work engagement, and knowledge creation are great. The standard deviations of items are relatively consistent at the value of about 1, which shows that all the observed items do not fluctuate significantly and tend to distribute around the mean value. Besides, Cronbach's alphas of all the scales are significantly greater than the threshold of 0.6, which proves the scales used in this study are reliable and have a high internal consistency (Hair et al., 2010). According to Andy Field (2009), Pearson correlation coefficients among variables are approximately 0.5, which indicates that there are strong positive correlations among variables. All the sig values below the values of Pearson coefficient are much smaller than 0.05, which makes sure that there is no collinearity between the observed variables (Carsten F. Dormann et al., 2013).

Table 5.2: Descriptive results of variables, Cronbach's alpha, Pearson correlations

Variables	Mean	SD	α	II	IM	IS	IC	WE	KC
II	3.845	0.800	0.911	1					
IM	3.807	0.811	0.910	,680**.000	1				
IS	3.853	0.724	0.862	,555**.000	,556**.000	1			
IC	3.919	0.666	0.877	,534**.000	,591**.000	,485**.000	1		
WE	3.952	0.655	0.932	,712**.000	,733**.000	,614**.000	,646**.000	1	
KC	3.891	0.714	0.947	,658** .000	,720** .000	,612** .000	,613** .000	,739** .000	1

***. Correlation is significant at the 0.01 level.*

(Source: SPSS results by the authors)

5.3 EFA results

The authors gradually eliminated bad variables one by one through 7 tests. At the final test, KMO coefficient = 0.968 > 0.5, sig Barlett's Test = 0.000 < 0.05, so EFA is appropriate (Kaiser, 1974; Hoang Trong and Chu Nguyen Mong Ngoc, 2008). There are

6 factors extracted based on the criterion of eigenvalue greater than 1 (Kaiser, 1960), so these 6 factors summarize the information of 37 observed variables included in EFA in the best way. The total variance extracted by these 6 factors is 64,644% > 50% (Hair et al., 2010), thus, the 6 extracted factors explain 64.644% of the data variation of 37 observed variables participating in EFA (Table 5.3).

The results of the pattern matrix concluded that 37 observed variables are classified into 6 factors, all of which have loading factors greater than 0.5 and there are no bad variables anymore.

Table 5.3: EFA results of the final test

		Extrac
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,968
Bartlett's Test of Sphericity	Approx. Chi-Square	8388,457
	df	666
	Sig.	,000

Factor	Initial Eigenvalues			Rotation Sums of Squared Loadings[a]			Rotation Sums of
Total		% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	**18,591**	50,246	50,246	18,244	49,309	49,309	15,420
2	**1,990**	5,378	55,623	1,613	4,360	53,669	13,222
3	**1,633**	4,414	60,037	1,274	3,443	57,112	14,792
4	**1,506**	4,070	64,107	1,140	3,080	60,193	10,816
5	**1,219**	3,294	67,401	,895	2,420	62,613	10,578
6	**1,042**	2,816	70,218	,752	2,031	**64,644**	12,807

(Source: SPSS results by the authors)

5.5 CFA results

Table 5.4 presents fundamental model fit indices. Based on the paper of Hu and Bentler (1999), the model fit indices can be assessed.

Table 5.4: Model fit indices results

df	CMIN	CMIN/df	GFI	CFI	RMSEA	TLI	PCLOSE
614	801.271	1.305	0.873	0.977	0.032	0.975	1

(Source: AMOS results by the authors)

The degree of freedom is 614, chi-square is 801.271 with p-value = 0 (< 0.5) that meets the condition; CMIN/ df = 1.305 (< 3) is good fit, GFI = 0.873 (> 0.8) is acceptable (Baumgartner and Homburg, 1995; Doll, Xia, and Torkzadeh, 1994); CFI = 0.977 (> 0.95) is excellent fit, RMSEA = 0.032 (< 0.06) is a good fit, TLI = 0.975 (> 0.9) is a good fit; PCLOSE = 1 (> 0.05) is a good fit. Therefore, the research model shows good fit indices, which is ready for path analysis.

After testing the overall fit of the CFA model, the quality of the observed variables (evaluating the measurement model) should be looked into to see which observed variables should be removed. The findings show that all p-values are 0.000 which is smaller than 0.05, so all the observed variables that remained after the EFA test are

significant to their latent construct.

The last test in CFA is convergent and discriminant validity to ensure the reliability of the scales, which is assessed using the Composite Reliability (CR), Average Variance Extracted (AVE), and Fornell and Larcker table (Hair et al, 2010).

Table 5.5: Fornell and Larcker table

	CR	AVE	MSV	MaxR(H)	KC	II	WE	IC	IS	IM
KC	0,95	0,62	0,62	0,95	**0,788**					
II	0,91	0,59	0,59	0,91	0,706***	**0,769**				
WE	0,94	0,68	0,63	0,94	0,786***	0,767***	**0,823**			
IC	0,88	0,64	0,50	0,88	0,671***	0,599***	0,703***	**0,802**		
IS	0,86	0,61	0,47	0,88	0,673***	0,627***	0,687***	0,551***	**0,783**	
IM	0,91	0,72	0,63	0,91	0,771***	0,743***	0,793***	0,657***	0,630***	**0,848**

(Source: AMOS results by the authors)

From the Fornell and Larcker table (Table 5.5), AVEs of KC, II, WE, IC, IS, IM are greater than 0.5, which shows that they explain about 60% - 70% of the variance of its observed variables. Furthermore, C.R of them are much greater than 0.7. Therefore, the convergent validity of items is strongly ensured. In terms of assessing discriminant validity, MSVs met the condition that must be smaller than their according AVEs. In addition, the values of the square root of AVE of each variable are greater than its inter-construct correlation values with the others. Hence, latent variables of the research do not violate discriminant validity (Fornell & Larcker, 1981)

5.6 SEM results

Evaluation of the hypotheses of the research model

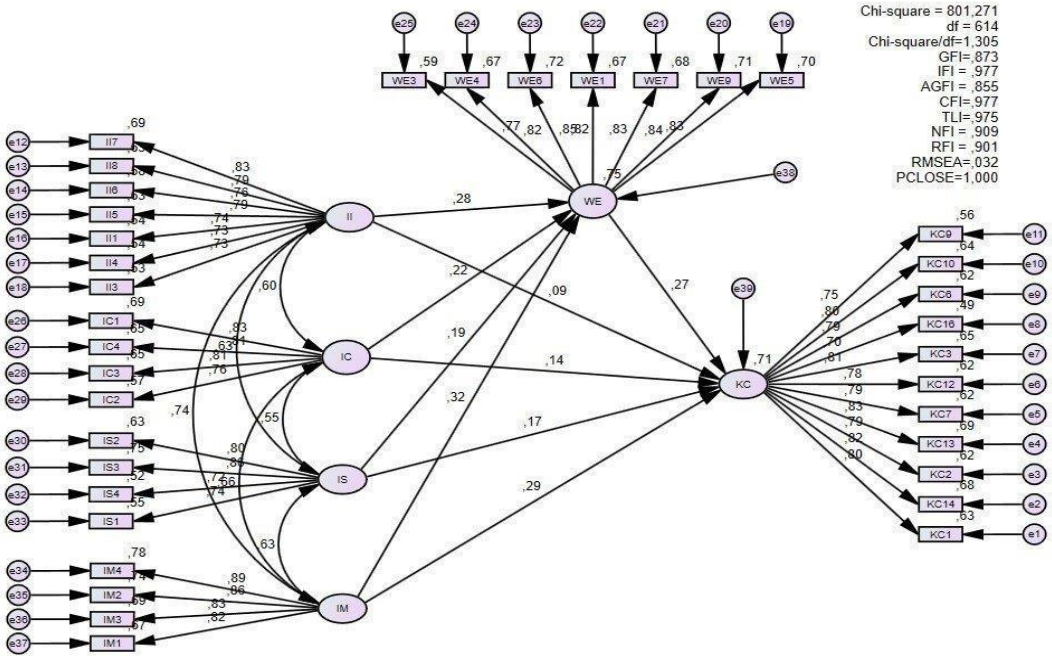

Figure 5.1: SEM results

(Source: AMOS results by the authors)

The results of the relationships among latent and observed variables are described in Figure 5.1 and Table 5.6 of the SEM analysis. As it can be seen, three dimensions of transformational leadership (IM, IS, and IC) have a positive impact on knowledge creation ($p = 0.000, 0.004, 0.016 < 0.05$; $t > 1.96$). Among those, the impact of inspirational motivation on knowledge creation is the strongest (SPC = 0.286), followed by the impacts of IS and IC. In terms of the direct relationships between those subdimensions and work engagement, they are positive with $p = 0.000 < 0.05$. Work engagement is also positively related to knowledge creation with $p = 0.002 < 0.05$, $t = 3.174 > 1.96$, and SPC = 0.27, 0.215, 0.175). Work engagement is also positively related to knowledge creation with $p = 0.002 < 0.05$, $t = 3.174 > 1.96$, and SPC = 0.27. All in all, only H1 is rejected.

This result is beyond the authors's expectations. First, IM and IS were expected to have the same effect size on knowledge creation since these two dimensions are usually combined into charismatic inspirational leadership (Bass & Riggio, 2006), but according to some researchers, they are not exactly two distinct constructs (Avolio et al., 1999). However, idealized influence is strongly correlated with work engagement, which can be understood that for idealized influence to really contribute to knowledge creation practices, it should stimulate work engagement from employees. There are possible reasons why the study did not find a direct effect of idealized influence on knowledge creation. Srivastava et al. (2006) claimed that empowering leadership is not enough and should involve the results of that impact, like followers' motivation or, in this case, work engagement. That is the reason why idealized influence shows a positive impact on work engagement but no direct correlation with knowledge creation.

Table 5.6: Regression weights of SEM

			Estimate coefficient	Standardized coefficient	S.E.	C.R.	P	Result
WE	<--	IC	0,22	0,22 (3)	0,06	4,02	***	Accept
WE	<--	IS	0,18	0,19 (4)	0,05	3,42	***	Accept
WE	<--	IM	0,25	0,33 (1)	0,05	4,74	***	Accept
WE	<--	II	0,22	0,28 (2)	0,05	4,29	***	Accept
KC	<--	IC	0,15	0,14 (3)	0,06	2,42	0,02	Accept
KC	<--	IS	0,16	0,17 (2)	0,06	2,87	0,00	Accept
KC	<--	IM	0,22	0,29 (1)	0,06	3,77	***	Accept
KC	<--	II	0,07	0,10	0,05	**1,38**	**0,17**	**Reject**
KC	<--	WE	0,27	0,27	0,09	3,17	0,00	Accept

(Source: AMOS results by the authors)

Evaluation of the mediation effect of Work Engagement

The shortened results of running Bootstrap for indirect effects are presented in Table 5.7.

Contrary to the direct relationship's results above, all four sub-dimensions of transformational leadership have positive indirect effects on knowledge creation, with a two-tail significance smaller than 0.05 ($p = 0.02, 0.03$). Furthermore, 0 is not included in the interval between the bias-correlated upper and lower bounds ([0.03; 0.183]; [0.025; 0.169]; [0.018; 0.111]; [0.017; 0.141]), so these indirect effects are significant (Preacher

and Hayes, 2008). Therefore, work engagement has a partial mediation effect on the relationships between inspirational motivation, intellectual stimulation, individualized consideration, and knowledge creation, but a full mediation effect on the relationship between idealized influence and knowledge creation.

Table 5.7: Results of indirect effects

	Standardized path coefficient	P (2-tailed significance)	Bootstrap bias-corrected Upper bound	Bootstrap bias-corrected Lower bound	Result
IM --> KC	0,088	0,002	0,183	0,03	Accept
II --> KC	0,074	0,003	0,169	0,025	Accept
IS --> KC	0,051	0,002	0,111	0,018	Accept
IC --> KC	0,060	0,003	0,141	0,017	Accept

(Source: AMOS results by the authors)

Table 5.8 summarizes the influential path decomposition along with direct, indirect, and total effect levels among the constructs clearly.

Table 5.8: Decomposition of effects

Path			Standardized path coefficients		
			Direct	**Indirect**	**Total**
IM	-->	WE	0.325	__	0.325
		KC	0.286	0.088	0.374
IS	-->	WE	0.187	__	0.187
		KC	0.168	0.051	0.219
IC	-->	WE	0.222	__	0.222
		KC	0.144	0.06	0.204
II	-->	WE	0.275	__	0.275
		KC	__	0.074	0.169
WE	-->	KC	0.27	__	0.27

(Source: AMOS results by the authors)

Overall, the direct effect of sub-dimensions of transformational leadership on knowledge creation are greater than their indirect influences. Among them, inspirational motivation tends to affect knowledge creation most strongly (SPC = 0.286 and 0.088, respectively). Besides, the partial mediating effect of working engagement in these relationships is still significant, since to the impact of inspirational motivation on knowledge creation, work engagement contributes about 23.5%, to that of intellectual stimulation about 23.3%, and to that of individualized consideration up to 29.4%. Since work engagement has a full mediating effect in the relationship between idealized influence and knowledge creation, it contributes up to about 44%. One point that needs to be noticed is that the direct effect of work engagement on knowledge creation is quite

strong with SPC = 0.27, and so are the direct effects of the four dimensions on work engagement.

The findings of the paper are partly in line with Song et al. (2012) and Yoo et al. (2020), which also proved the mediating effect of work engagement in the relationship between transformational leadership and knowledge creation, but this paper goes into clarifying the impact of separate dimensions of transformational leadership. As a result, the idealized influence was found to only have an indirect impact on knowledge creation via work engagement, the reason for which is likely that it is a strong initiator of work engagement with SPC = 0.275. Inspirational motivation affects work engagement most strongly; it still directly affects knowledge creation, though. This complication should be investigated more in future research.

The result also echoed the importance of transformational leadership in particular and leadership in general in enabling knowledge creation, which is found in previous work by Nonaka & Takeuchi (1995), Nonaka, Toyama, and Konno (2000), and von Krogh (2011). Besides, once again, the result enhances the strong positive impact of transformational leadership on work engagement, which has been proven in a number of previous studies (Manning, 2016; Vincent-Höper et al., 2012; Zhu et al., 2009; Tims et al., 2011; Nguyen Hai Thanh and Nguyen Van Quang, 2022). Overall, dimensions of transformational leadership have great impacts on work engagement and knowledge creation.

6. Conclusions, recommendations, and limitations

6.1 Conclusions

This paper examines the relationship among transformational leadership, work engagement, and knowledge creation, of which work engagement plays a mediating role. The result has answered some research questions to some extent. First, descriptive statistics show that participants' perceptions of knowledge creation in their companies are good (the mean of knowledge creation is around 3.9), which implies that so far managers seem to have managed knowledge quite well, although this was only based on the assessment of employees who may not have a deep understanding. Second, the mediation effect of work engagement on the relationship between the four dimensions of transformational leadership and knowledge creation has been confirmed. More specifically, three of them are partially mediated by work engagement in the relationship with knowledge creation, while idealized influence is found to be fully mediated. In addition, inspirational motivation has the strongest impact on work engagement and direct and indirect relationship with knowledge creation.

6.2 Recommendations

Firstly, transformational leaders, companies, as well as HRD practitioners, are expected to pay more attention to leadership factors in recruitment and selection as well as training and development. Based on implications from previous research by Nonaka & Takeuchi (1995) and von Krogh et al. (2000), the input of the knowledge creation process - knowledge assets should be well managed to form a strong basis. Besides, middle-up-down and bottom-up should be applied instead of the traditional one-way top-down management. Finally, to nurture "ba" as well as energize the SECI process, leaders need to take into account such factors as autonomy, creative chaos (encouraging curiosity), redundancy (accumulating knowledge from different areas and sharpening management skills), requisite variety (access to the broadest variety of information), love, care, trust, and commitment.

Secondly, to improve work engagement of Gen Z employees, business strategies must be developed that go beyond straightforward reward-oriented human resource assistance and include caring workplace cultures, collaborative work environments, and helpful resource systems (Song et al., 2012). Xanthopoulou et al. (2008) found that organizations in any occupational setting are supposed to improve a positive working environment where giving and receiving enthusiastic support becomes the culture so that work-related self-efficacy is enhanced. Also, self-efficacy enhancement programs/ activities (instructive modeling, coaching, and delivering training through self-directed success) should be conducted consistently and thoroughly controlled since self-efficacy has been proven to highly fluctuate day by day. Besides, based on the work of Schaufeli et al. (2003, 2006) that followed Maslach, Schaufeli, and Leiter's (2001) burnout-antithesis approach, six areas of work life: workload, control, rewards and recognition, community and social support, perceived fairness, and values need to be addressed to minimize burnout and maximize work engagement.

6.3 Limitations and future research directions

Firstly, collecting answers by online Google Form is likely to involve some common-method biases. Besides, to ensure generalizability, the sample should include upper management, since transformational leadership and knowledge creation are more strongly correlated with them, which would be a reason for the nonsignificant direct relationship between idealized leadership and knowledge creation, so future studies should reexamine this nonsignificant finding. Secondly, a comparative study between companies that have foreign factors and 100% Vietnamese ones to see whether there is any difference in the knowledge creation process.

The following studies can examine the impact of transformational leadership on each knowledge conversion mode or add other leadership styles (i.e., transactional leadership, laissez-faire leadership) in the model. And the direct impact of work engagement on knowledge creation should be dug deeper. Additionally, in the knowledge creation process of Nonaka, Toyama, and Konno (2000), there are also two other elements (ba and knowledge assets), so later studies can investigate the impact of transformational leadership on them as well.

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THE INFLUENCE OF ETHICAL LEADERSHIP ON EMPLOYEE OUTSPEAK AT VIETNAMESE BUSINESSES IN THE NEW CONTEXT

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Summary: This article carries out a study of the impact of ethical leadership on the outspeak of the employees in Vietnamese businesses in the new setting, in order to help leaders in businesses gain a better insight of the impact of ethical leadership, and how it affects the voice of the employees, which will help leaders truly grasp the existing problems of the organization to have solutions to make some enhancements, thereby businesses can achieve better results in the future. Employee outspeak depends on the employee's level of trust in the leader (Rousseau et al., 1998). The authors have used qualitative research methods through consulting experts and in-depth interviews, as well as quantitative methods through testing survey samples of 325 questionnaires of employees at businesses within 6 years, from May 2024 to November 2024. From these quantitative research results, it has been shown that ethical leadership positively affects the voice of employees in Vietnamese businesses, in which employers treating people fairly (DXCB) has a strong impact. ($\beta = 0.358$) on employee voice, followed by employers proactively managing ethics (QLDD) has the second impact with $\beta = 0.277$, and ultimately employers become role models for morality (HMĐD) with $\beta = 0.132$.

Key Words: *Ethical leadership, employee outspeak.*

1. Introduction

Leadership theories have contributed to gradually solving two big questions in leadership: Who is a leader? And how effective is leadership? A clear trend is to shift the focus of research and expand the scope of leadership research from individual leaders to the relationship between them and employees and the contextual and situational factors that make an impact on the leader's effectiveness. The role of leaders is extremely important in organizations, a decisive factor in the success, survival and development of an organization or a business (Olesia, Namusonge, & Iravo, 2014; Staats, 2015).

In Vietnamese enterprises, the silence and indifference of employees at work is still a difficult problem that needs to be solved by their managers. The survey results in Alphabe's Best Workplaces 2023 report (Alphabe, 2024) show that out of 32,000 people working in Vietnam, only 13.8% of employees are truly committed to the company; 46.9% of employees are committed to the company, 36.8% are indifferent and 2.5% are very disengaged. Notably, out of the 39.3% of employees who are silent and indifferent to the company, up to 67% of employees still stay with the company. They are the ones who still go to work every day but are indifferent and silent about the problems of the business. They may still recognize problems that need to be changed in the business (waste, abuse, embezzlement, bribery, mistreatment, etc.) or the employees themselves

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have initiatives and solutions to the problems of the business but they choose to remain silent because they are afraid of losing their job position, being negatively evaluated, being assigned with inappropriate work, affecting their promotion opportunities, or they feel they have no responsibility to speak up.

In the new context of development, there will be problems occurring in the enterprise that affect the long-term development, so how to make employees realize that they have the responsibility to speak up to improve the unsatisfactory problems in the enterprise. To answer this question, leaders need to clearly understand their roles and responsibilities in the enterprise. Leaders with appropriate leadership behavior will create trust for employees, from which they will boldly speak up about the existing problems of the enterprise

Currently, there have been many studies in the world researching on the impact of Ethical Leadership on the performance of organizations and employees. Research by (Potipiroon, W., & Fearman, S., 2016; Wright, B.E., Hassan, S., & Park, J., 2016, Hassan, S., 2015; Hassan, S., Wright, B.E., & Yukl, G, 2014; Thaler, J., & Helmig, B., 2016). However, there has been no specific study analyzing the impact of ethical leadership on employee voice for the business. Voice is a special form of employee extra-role behavior, bringing many important contributions to the business, because employee suggestions can make business decisions better (Detert, Burris, Harrison and Martin, 2013). Conversely, employee silence can lead to business inertia and resistance to change (Morrison, 2014)..

As a result, it is necessary to deepen the research and analyze the influence of ethical leadership on employee voice in Vietnamese enterprises, contributing to boosting leadership effectiveness and employees trust in their leaders, therefore assisting enterprises to grow more and more.

2. Theoretical basis and research model

2.1. Research concepts

2.1.1. Ethical leadership

Brown, Trevino, and Harrison (2005) were the first to study ethical leadership, implying that ethical leaders are those who engage in beneficial behaviors while avoiding behaviors that may harm others. Khuntia and Suar (2004) also suggested that ethical leaders are those who incorporate ethical principles into their values, beliefs, and actions. According to these authors, ethical leadership is defined as the demonstration of appropriate normative behaviors through personal actions and interpersonal relationships that promote such behaviors through two-way communication.

According to Brown, Trevino and Harrison (2005), there are three basic attributes of ethical leaders:

- Leaders become ethical role models for employees.
- Leaders treat everyone fairly.
- Leaders actively manage ethics in the organization.

Ethical leadership emphasizes leadership with respect for the rights and dignity of others (Ciulla, 2004), when referring to an ethical leader, it is referring to an ethical person and an ethical manager (Trevino, Hartman and Brown, 2000). With ethical leadership, the leader will apply ethics to the activities of the organization and is also an essential feature of the organization's ethical culture.

2.2.1. Employee’s voice.

The employee's outspeak is an effort to change the practices, policies, and outcomes of the unit in which one belongs or the organization of which one is a member (Hirschman, 1970). In this view, speaking out their opinions is an employee's constructive effort to enhance those unsatisfactory conditions. Boldly giving out suggestions is an extra-role behavior because it is often not required in the employee's job description (Van Dyne and LePine, 1998). The content of voice can be to provide information about aspects of the job (improvement-focused voice) or to address important organizational issues (problem-focused voice) (Mirrison, 2014). Researching factors that may encourage employees to speak up about organizational problems (such as abuse, embezzlement, bribery, or mistreatment) is important both for employee confidence in doing the ethical right thing and to prevent similar problems in the future.

Speaking up, whether problem-focused or improvement-focused, carries risks for the implementor. When employees point out shortcomings, offer a different opinion than others, or make a suggestion that goes against existing norms, they may lose their job, receive a negative evaluation, be assigned inappropriate work, or even have their chances of promotion affected (Detert and Trevino, 2010, Grant, 2013). These safety concerns may be heightened, especially when employees speak directly to their leaders, due to the difference in status between employees and leaders (Edmondson, 2003). Morrison 2014 suggests that even when leaders are receptive to employee suggestions, power differentials between the parties can still impede honest and open communication. Therefore, employee's trust in the leader is crucial in whether employees will speak up or remain silent (Rousseau et al., 1998).

2.2. Foundational Theories

2.2.1. Social Exchange Theory (Exchange and power in social life)

Social exchange theory views social life as a series of transactions between two or more parties (Michell, Cropanzano, and Quisenberry, 2012). Resources are exchanged through a reciprocal process, in which one party will tend to reciprocate the good (or bad) deeds of the other (Gergen, 1969, Gouldner, 1960). The social exchange process begins when ethical leaders demonstrate fairness and concern for their subordinates. In turn, subordinates feel obligated to reciprocate and act according to the ethical leader's expectations (Brown et al., 2005; Brown & Trevino, 2006). Conversely, when subordinates are treated poorly, they will have little or no interest in forming this relationship. Based on the above idea, social exchange theory has become a widely used theoretical framework (Cropanzano and Mitchell, 2005).

In modern management research, one of the aspects of social exchange theory that has attracted much attention is the concept of relationships in the workplace. Social relationships develop when leaders care about employees, and smooth, fair exchanges between relationships will create effective work behavior and positive attitudes of employees.

2.2.2 Social Learning Theory

Social learning theory (Bandura, 1963, 1978) is the combination of both behavioral and cognitive theories of learning to provide a model that can explain many learning experiences. In addition to direct experience, individuals can learn by observing the others and thereby building the formation of how new behaviors are performed.

Applying social learning theory to organizations, the role model of the leader is the central process by which social influence occurs in the workplace due to the leader's position and power over followers. Followers will learn the leader's behavior when they perceive the leader as competent and trustworthy.

2.3. Related studies and proposed research model

2.3.1. Related studies

Up to now, there have been many studies in the world on the influence of Ethical Leadership on the performance of organizations and employees. The study of (Potipiroon, W., & Fearman, S., 2016) used employee data to examine how and when ethical leadership affects employee's performances. The research results showed that ethical leadership is positively correlated with job performance, employee behavior towards the organization and employee behavior toward the individual.

Wright, B.E., Hassan, S., & Park, J., (2016) also conducted a survey on the relationship between public service motivation and ethical behaviors by testing the extent to which public service motivation can predict employees' ethical behavior or behavioral intentions. The results of the study showed that leaders who demonstrate high ethical leadership will have employees with high service motivation and employees with high service motivation will show a willingness to report ethical violations in the organization.

Research by Hassan, S., Wright, B.E., & Yukl, G, (2014) shows that ethical leadership escalates employees' willingness to report ethical issues to management, which also means escalates employees' organizational commitment, and reduces employee absenteeism.

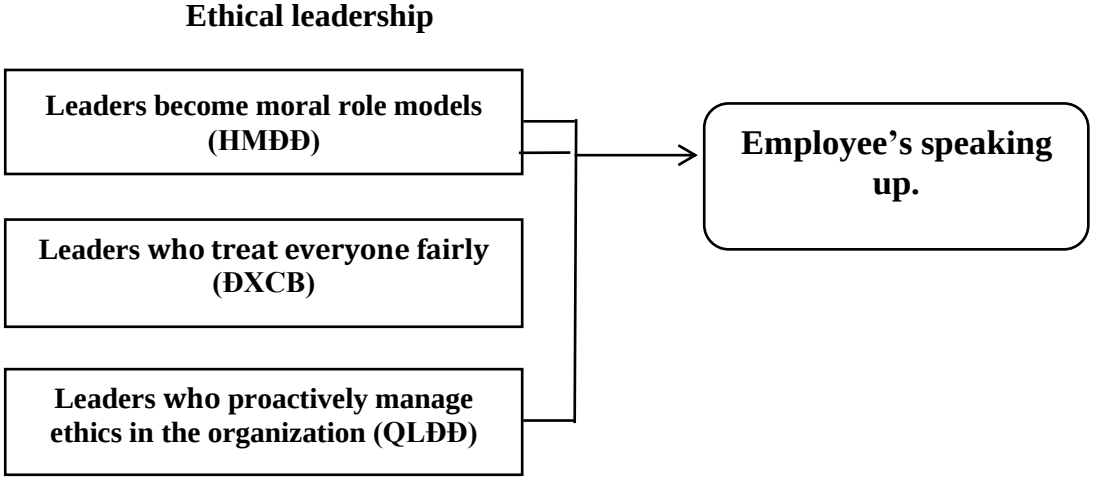
The study by Theler, J., & Helmig, B. (2016) also shows that at the organizational level, ethical management is vital due to the fact that ethical leadership and codes of conduct are constantly promoted. The research results also show that ethical leadership has a positive impact on ethical attitudes and behavioral intentions, on organizational-related attitudes and behavioral intentions.

Thus, many studies have shown the relationship between ethical leadership and employees, but the studies have not yet specified the level of influence of each element of ethical leadership on employees speaking up, besides, the studies are mainly focused on public organizations. Through this study, the author wishes to analyze the level of impact of each element of ethical leadership on employee speaking up in enterprises in Vietnam. Analyzing each element of ethical leadership on employee speaking up gives leaders a clearer perspective, providing specific and most effective directions and solutions for leaders to increase leadership effectiveness and employee speaking up, which will help enterprises in Vietnam thrive more and more steadily.

2.3.2. Proposed research model and hypothesis

After establishing the theoretical basis and synthesizing previous studies, the author proposes a research model based on the original research of author Hassan, S. (2015) as follows

Figure 1: Proposed research model:



Source: Proposed by the author group.

Based on the theoretical foundation and previous studies presented above, the authors propose the following research hypotheses:

Hypothesis H1: Employers who become ethical role models (HMĐĐ) have a positive influence on employees speaking up (LTNV)

Hypothesis H2: Employers who treat everyone fairly (ĐXCB) have a positive influence on employees speaking up (LTNV)

Hypothesis H3: Employers who proactively manage ethics (QLĐĐ) in the organization have a positive influence on employees speaking up (LTNV)

3. Research method

3.1. Research scale

Based on the results of summarizing previous theories on ethical leadership, the author inherited from the scale of Brown, Trevino and Harrison (2005), Hassan, S., Wright, B.E., & Yukl, G, (2014) with 16 observed variables and conducted group discussions with 5 experts in management and long-term work interested in ethical leadership and employees with seniority working at enterprises to adjust and build an official scale to suit the research context in Vietnam. A 5-point Likert scale was used for the concepts in the study. The employee voice scale was inherited by the author from the scale of Van Dyne and LePine (1998) with 4 observed variables, the author eliminated 1 observed variable and adjusted the language of 5 observed variables to be clearer and easier to comprehend after conducting the qualitative research step.

3.2. Research sample

The study used non-probability sampling and convenience sampling. Regarding the survey form: the author simultaneously used the form of distributing survey forms directly to the survey subjects focusing on employees with long-term working experience at enterprises and surveying on the internet through the Google form tool via the link. Of the 335 returned forms, 10 were invalid, 325 qualified forms were included in the quantitative analysis by the author.

4. Results and discussion

4.1. Research results

4.1.1. Description of the research sample

The statistical analysis results showed that: the number of respondents was female with a rate of 53.85%, compared to male at 46.15%; The age range was mainly from 25 to 40 years old, accounting for 90%; In terms of education level, respondents mainly have university degrees or higher, accounting for 95%, and have 5 years or more of working experience, accounting for 96%. Detailed results are as follows:

Table 2: Research sample statistics

Number	Survey form information		Frequency	Ratio (%)
1	Genders	Male	150	46,15
		Female	175	53,85
2	Age	Under 25	10	3,07
		From 25-40	218	67,08
		Over 45	97	29,85
3	Trình độ học vấn	Pre-college	0	0
		College	30	9,24
		University	212	65,23
		Post-graduate	83	25,53
4	Experience	Under 5 years	20	6,16
		From 5 - 15 years	200	61,54
		Over 15 years	105	32,30

Source: SPSS analysis provided by the author team

4.1.2. ***Cronbach's Alpha Reliability Test***

The results of the reliability test for the scales of ethical leadership and employee voice show that:

Ethical leadership consists of three latent variables with 16 observations. The Cronbach's Alpha coefficients for these latent variables range from 0.827 to 0.894, meeting the requirements. No observed variable was excluded, as all variables have an Item-Total Correlation greater than 0.4.

Table 3: Preliminary Results of the Ethical Leadership Scale Reliability Test

No.	Code	Variable Name	Corrected Item-Total Correlation
		1. Leaders as Ethical Symbols (HMĐĐ) α =.0.827	
1	HMĐĐ1	Leader establishes ethical behavioral models in decisions/actions	.853
2	HMĐĐ2	Leader values honesty and integrity as key personal values	.775
3	HMĐĐ3	Leader demonstrates trustworthiness and truthfulness	.706
4	HMĐĐ4	Leader manages personal life with high standards	.814
5	HMĐĐ5	Leader's actions align with stated values	.854
		2. Fair Treatment of Employees (ĐXCB) α =0.894	
6	ĐXCB1	Leader actively listens to employees	.772
7	ĐXCB2	Leader prioritizes employee interests	.851

8	ĐXCB3	Leader considers ethical implications in decision-making	.726
9	ĐXCB4	Leader makes fair and equitable decisions	.769
10	ĐXCB5	Leader maintains employee trust	.857
		3. Proactive Ethics Management (QLĐĐ) α =.0.843	
11	QLĐĐ1	Leader demonstrates strong commitment to ethical values	.818
12	QLĐĐ2	Leader clearly communicates ethical standards	.796
13	QLĐĐ3	Leader regularly discusses workplace ethics	.785
14	QLĐĐ4	Leader emphasizes ethical conduct despite challenges	.782
15	QLĐĐ5	Leader opposes unethical performance enhancement	.854
16	QLĐĐ6	Leader holds employees accountable for ethical conduct	.843

Source: Research data from the group of authors

Table 4: Preliminary Scale Testing Results for Employee Voice

No	Code	Variable Name	Corrected Item-Total Correlation
		1. Employee Voice Measures **(LTNV)** α =0. 857	
1	LTNV1	Proactive voices and encourages others' participation in organizational issues	.809
2	LTNV2	Expresses opinions even without peer support	.798
3	LTNV3	Generates and promotes suggestions for organizational improvement	.884
4	LTNV4	Engages in workplace quality improvement initiatives	.876

Source: Research data from the group of authors

Employee voice consists of 4 observed variables. The analysis yielded a Cronbach's Alpha coefficient of 0.857, which exceeds the threshold requirement of 0.7. All four observed variables demonstrated Item-Total Correlation coefficients greater than 0.4; therefore, the authors retained all four observed variables in their original form

4.1.3. *Exploratory Factor Analysis (EFA)*

The EFA (Exploratory Factor Analysis) was conducted on 3 independent variables with 16 observable scales. The EFA results revealed: The Bartlett's test was significant (Sig = 0.000 < 0.05), while the KMO coefficient = 0.815 > 0.5, ensuring reliability. The Eigenvalue of the three factor equals 1.005, confirming that three factors were extracted from the analysis. The total variance explained by these three factors equals 78.779, indicating that the variation of the factors derived from the analysis can explain 78.78% of the variation in the initial survey data. All observed variables demonstrated factor loadings > 0.5, therefore no variables needed to be eliminated from the analysis. We identified three factor groups to be used in the analytical model, including: Leaders becoming ethical symbols (HMĐĐ), Leaders treating everyone fairly (ĐXCB), and Leaders play proactive ethics management (QLĐĐ)

Table 5: KMO Analysis Results for Ethical Leadership

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.815
Bartlett's Test of Sphericity	Approx. Chi-Square	9054.623
	df	300
	Sig.	.000

Source: Compilation of the author's survey and research results

Table 6: Rotated Component Matrix - Ethical Leadership

	Component		
	1	2	3
HMĐĐ1	.823		
HMĐĐ2	.745		
HMĐĐ3	.826		
HMĐĐ4	.787		
HMĐĐ5	.833		
ĐXCB1		.878	
ĐXCB2		.793	
ĐXCB3		.787	
ĐXCB4		.812	
ĐXCB5		.848	
QLĐĐ1			.767
QLĐĐ2			.784
QLĐĐ3			.792
QLĐĐ4			.783
QLĐĐ5			.683
QLĐĐ6	.		.759
	Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.[a]		
	a. Rotation converged in 3 iterations		

Source: Compilation of the author's survey and research results

Similarly, EFA was conducted for the dependent variable using four observable scales. After a single round of testing, the results indicated the following: Bartlett's Test of Sphericity yielded a significance level of 0.000 (Sig = 0.000 < 0.05), and the Kaiser-Meyer-Olkin (KMO) measure was 0.832 (> 0.5), ensuring reliability. All observed variables had factor loadings greater than 0.5, so no variables were excluded from the analysis.

4.1.4. Regression Analysis

The authors examined the relationship between independent variables and dependent variables through a linear regression model, focusing on the impact of ethical leadership on employee voice. Based on the authors' calculations, the adjusted R^2 coefficient = 0.659 indicates that the linear regression model fits the dataset at a level of 65.9%. The ANOVA analysis of the regression model produced an F-value of 78.457 and a significance level (Sig) of 0.000 < 0.05, demonstrating the overall suitability of the regression model.

The results are presented in Table 7.

Table 7: The results of the linear regression model analysis.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Multicollinearity	
		B	Standard Error	Beta			Tolerance	VIF
1	(Constant)	.815	.176		4.754	.000		
	HMĐĐ	.109	.067	.132	3.706	.050	.545	2.392
	ĐXCB	.236	.043	.358	3.586	.000	.687	2.523
	QLĐĐ	.213	.045	.277	3.793	.000	.705	2.176
Dependent Variable: LTNV								

Source: Compilation of the author's survey and research results

4.2. Discussion of Research Findings

The regression analysis revealed significant positive correlations between all three ethical leadership dimensions and employee voice behaviors. Based on standardized Beta coefficients:

1. Fair Treatment of Employees showed strongest impact (β = 0.358)
2. Proactive Ethics Management demonstrated second-strongest influence (β = 0.277)
3. Leaders as Ethical Role Models exhibited meaningful impact (β = 0.132)

These findings align with previous research as Hassan (2015), confirming that ethical leadership positively influences employee voice through multiple mechanisms including fair treatment, ethical decision-making, and consistent modeling of ethical behavior. This behavior will make a positive impact to employees and promote the voice of employees in the organisation.

Additionally, the study identifies the extent of the influence of each factor within ethical leadership, providing management implications for leaders. However, the research does not analyze or test the effects of control variables such as age, gender, and work experience. Therefore, future studies should examine and clarify the role of these factors. Furthermore, as the analysis focuses on Vietnamese businesses with a relatively broad sample scope, it would be beneficial to divide the sample into different industries and regions to better highlight the characteristics of various types of businesses.

5. Management Implications

The research highlights how important ethical leadership is for encouraging employees to voice up. It's crucial for managers to enhance their ethical leadership skills so that employees recognize and feel this commitment within the organization. When employees perceive strong ethical leadership, they are more likely to feel safe and confident in sharing their concerns about any issues.

A key factor influencing employee voice is how fairly leaders treat everyone. Leaders should actively listen to their team and maintain open lines of communication. However, not all leaders find this easy. The most effective leaders consistently listen, engage, and build positive relationships with their employees, creating an environment where feedback flows freely. Regular conversations can break down barriers between managers and staff, allowing employees to express their views, ideas, and suggestions.

Leaders need to be fair, but fairness shouldn't be mistaken for treating everyone the same. Rather, it means that systems for rewards and consequences should be clear, specific, and impartial. When leaders act fairly, employees will see them as trustworthy,

which encourages them to speak up about issues that could lead to positive changes in the organization.

Furthermore, leaders must actively uphold ethical standards by creating a clear framework that guides all employees in aligning their actions with the organization's values and legal obligations. It's important to communicate these ethical standards clearly, highlighting their significance. Leaders should hold employees accountable for acting ethically, especially in tasks that carry ethical weight, even when those tasks are challenging. They should also promote responsibility toward stakeholders and the community while opposing unethical practices.

Leaders need to keep employees informed about changes in policies and objectives, involve them in decision-making, seek their input on important matters, listen to their perspectives, and empower competent individuals. By doing so, employees will understand their role and influence within the organization, making them more responsible and willing to voice concerns, thus reducing silence around organizational issues.

Finally, leaders should act as ethical role models. This means maintaining a consistent ethical approach in their decisions and actions across all situations. Ethical leaders are characterized by their honesty and trustworthiness, as well as their efforts to promote ethical behavior among employees. They do this by clearly communicating ethical standards, setting expectations, offering guidance, and fostering a sense of responsibility regarding ethical conduct. When issues arise that could harm the organization, employees will feel encouraged to speak up, motivated by the ethical values their leaders uphold.

While this study contributes valuable insights to both theory and practice, it has some limitations. First, the sample size was relatively small. Although we surveyed employees from various businesses in major cities in Vietnam, including a range of ages, business types, and work experiences, resource constraints limited the survey's reach to other areas. This may affect how representative and generalizable the findings are across Vietnam. Second, the measurement scale used to evaluate the research variables relied on subjective perceptions, which could influence the results.

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THE EFFECTS OF DIGITAL TRANSFORMATION ON FIRM PERFORMANCE: A REVIEW AND MANAGERIAL IMPLICATIONS

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Abstract: There is no surprise that research on digital transformation has attracted significant interest from researchers in recent decades. Countries, cities, industries, businesses, and citizens all face the same challenge of adapting to the digital world. Digital transformation has become an inevitable trend of the era, from the national level to the organizational level. Companies aim to achieve greater profits through digital transformation. However, the mechanism by which digital transformation affects firm performance remains unclear. Furthermore, existing empirical evidence indicates varying outcomes regarding the impact of digital transformation on the performance of firms in general and of SMEs in particular. Therefore, the objective of this study is to provide insights into the current status quo of research on the impact of digital transformation on business performance, identify several research gaps, and subsequently propose future research directions. This study also offers managerial implications for businesses to achieve successful digital transformation.

1. Introduction

Humans are living in the digital age. Digital transformation has brought about significant changes in social and economic life. The enormous benefits that digital transformation offers, along with the expectations surrounding it, have made it a topic of great interest to both researchers and managers. Empirical evidence shows that businesses that have successfully implemented digital transformation are capable of generating superior revenue using their existing resources (Westerman et al., 2014). The adoption of digital technology has accelerated in recent years and has had a significant impact on the performance of companies (Magnusson et al., 2021). Digital transformation can enhance operational efficiency. By automating processes and leveraging data analytics, companies can identify and eliminate bottlenecks, reduce manual errors, and streamline workflows. For instance, companies can use machine learning algorithms to optimize supply chain management, reduce inventory costs, and increase order fulfillment rates. This can lead to increased productivity, cost savings, and shorter time-to-market for new products and services (Bhatti et al., 2021). Additionally, digital transformation can improve a company's agility and responsiveness to changing market conditions. Based on data and analysis, businesses can gain real-time insights into market trends, customer preferences, and competitive landscapes. This approach allows companies to quickly adapt to changing market conditions and adjust their strategies accordingly (Vo et al., 2024).

Although there is evidence supporting the role of digital transformation in improving company performance, many companies still struggle with successfully implementing

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digital transformation. Companies such as Kodak, Blockbuster, Nokia, BlackBerry, Target Canada, and Toys 'R' Us have faced failures despite significant investments in digital transformation (Zareie et al., 2024). From previous studies, we find out that any change is difficult to implement within organizations (Deline, 2018), and up to 70% of major organizational changes fail (Barrett & Stephens, 2016). The slow response of companies to change (Wright et al., 2004) reduces their ability to adopt digital transformation and execute digital strategies. A survey published in 2021, conducted by the Ministry of Planning and Investment in collaboration with USAID on the digital transformation of 1,300 enterprises, reflected the difficulties that they face in the process of carrying out digital transformation. Specifically, the biggest concern for businesses is the application of digital technology and the high investment costs. This is followed by barriers related to changing habits and business customs, a lack of internal personnel to apply digital technology, insufficient digital infrastructure, a lack of information about digital technology, difficulties in integrating digital technology solutions, a lack of commitment and understanding from leadership and management teams, a lack of commitment and understanding from employees, and fears of personal/business data leakage.

Despite inconsistent empirical results, digital transformation is still an inevitable trend of national development in general and of enterprises in particular. Therefore, this research paper aims to provide insights into the studies that have been conducted on the impact of digital transformation on firm performance, identifying several research gaps and thereby proposing future research, as well as managerial implications for enterprises to successfully implement digital transformation.

2. Literature review

2.1. Digital transformation

Today, digital technologies such as analytics, big data, cloud computing, social media, mobile platforms, and smart solutions are driving innovations by changing business models and how organizations operate (Markus & Loebbecke, 2013). Digital transformation refers to the changes and transformations driven by and built upon digital technologies, leading to unique alterations in business processes, operations, and value creation (Libert et al., 2016). Libert et al. (2016) introduced and distinguished between two terms: digital upgrade and digital transformation. According to these scholars, the changes brought about by digital transformation are broader and at a higher level than those of a digital upgrade. Digital transformation involves a complete change in business operations, creating value and even new digital products, rather than merely improving the efficiency and effectiveness of business processes. Thus, digital transformation refers to the integration of digital technology into every aspect of a business, fundamentally changing how the company operates and delivers value to customers (Gil-Gomez et al., 2020).

In recent years, digital transformation activities have increased (Hanelt et al., 2021). Digital transformation strategically impacts various industries, particularly manufacturing, automotive, healthcare, banking, telecommunications, and other sectors. Digital transformation is a strategic asset for all companies, whether in terms of data, functionality, resources, or capabilities (Pereira et al., 2022). Therefore, it is a company-wide process with organizational implications. Digital transformation is an important

strategic topic for companies worldwide (Hess et al., 2016). Notably, today, the concept of digital transformation is intertwined with issues related to sustainability (Camodeca & Almici, 2021).

2.2. Firm performance

The main objective of any company is to achieve superior performance compared to its competitors (Felipe et al., 2020). Various factors influence a company's performance in a volatile environment. In a business context, companies compare their own plans and expected outcomes with actual results (Gun et al., 2024). Therefore, a company's performance is defined as its ability to achieve its goals by effectively utilizing resources (Muthuveloo et al., 2017). According to Cao & Zhang (2011), a company's performance is a measure of how well the company can achieve its objectives and goals compared to its main competitors.

The attention of the academic community has focused on understanding the causal structure related to business performance and why performances vary among different companies (March & Sutton, 1997). There are various techniques to measure business performance, such as market performance and return on investment (Mehralian et al., 2018). Generally, superior company performance is characterized by profitability, growth, and market value (Nwankpa & Roumani, 2016). While return on investment, return on sales, and return on equity are used as indicators of financial performance, customer satisfaction is utilized as an indicator of non-financial performance (Pang & Lu, 2018).

In terms of firm performance, some scholars focus on financial performance, characterized by return on assets (ROA), return on equity (ROE), return on investment (ROI), return on sales (ROS), sales growth, revenue growth, market share growth, profitability, and Tobin's Q (Zareie et al., 2024; Liu et al., 2023; Ren et al., 2023; Nwankpa & Roumani, 2016). Meanwhile, others combine both financial and non-financial performance to represent firm performance (Barba-Sánchez et al., 2024; Gun et al., 2024; Masoud & Basahel, 2023; Shee & Kaswi, 2023; Nwankpa & Roumani, 2016). Another research trend is to separate non-financial and financial performance to examine the impact of various factors on firm performance (Wu et al., 2023; Guo & Xu, 2021).

2.3. Impact of digital transformation on firm performance

Digitization has revolutionized human behavior. Humanity has witnessed a shift in social interactions towards a digital direction (Barba-Sánchez & al., 2024). This technology-driven revolution presents both opportunities and challenges for organizations, requiring them to undergo profound changes in structure, processes, and services to not only survive but also thrive in the new context (Melo et al., 2023). Accordingly, the trend of digital transformation in businesses has garnered significant research interest. This concept is recognized as a key factor for competitive capability (Bharadwaj et al., 2013). Similar to information technology, firms expect that digital transformation can reduce costs and improve firm performance (Björkdahl et al., 2020). Several researchers, such as Lehrer et al. (2018), Yeow et al. (2018), and Lee & Berente (2012), have indicated that digital transformation helps enhance business processes in areas such as services, sales, and supply chains. Moreover, digital transformation also fosters innovation in products, services, business models, and even stimulates the formation of new enterprises (Hanelt et al., 2021). The strategic goal of digital transformation is innovation and growth. Businesses expect to improve profitability based

on digital transformation.

Much effort has been made to explore and test the mechanisms by which digital transformation impacts firm performance. However, the empirical results obtained have not been consistent.

According to Zareie et al. (2024), the majority of existing empirical results regarding the economic impact of digital transformation have concentrated on China and indicate that digital transformation has a positive correlation with various outcomes such as: total factor productivity - TFP (Guo et al., 2023), firm performance (Zhai et al., 2022), financial performance (Li et al., 2023), ESG performance (Zhao & Cai, 2023), investment efficiency (Xu et al., 2023), stock liquidity (Liu & Liu, 2023), and reduced financial distress (Cui & Wang, 2023).

Some studies often link digital transformation to an organization's IT capabilities and affirm the positive impact of digital transformation on firm performance (Brynjolfsson & Lorin, 2000). Digital transformation is particularly emphasized as a mediating variable in the relationship between IT capabilities and firm performance (Nwankpa & Roumani, 2016; Barba-Sánchez et al., 2024). In addition to IT capabilities, researchers have also sought to explore other prerequisites for digital transformation, such as transformational leadership and employee self-efficacy (Gun et al., 2024), digital orientation (Barba-Sánchez et al., 2024; Shee & Kaswi, 2023), digital capability (Shee & Kaswi, 2023), and competitive pressure (Wu et al., 2023).

Some other studies affirm the positive impact of digital transformation on business performance, but this effect needs to be mediated by variables such as organizational capital (Zareie et al., 2024), ESG levels (Han & Lee, 2024), environmental uncertainty (Gun et al., 2024), digital leadership (Hung et al., 2024), and absorptive, innovative, andadaptive capability (Wu et al., 2023).

The positive impact of digital transformation on firm performance has been tested across various fields such as: manufacturing (Gun et al., 2024), renewable energy (Ren et al., 2023), services (Masoud & Basahel, 2023; Wu et al., 2023), and commercial banking (Alrawashedh & Shubita, 2024).

Regarding the company size, Zhou et al. (2021) explain that a company's digital transformation is built upon its digital technologies and examines the impact of digital transformation on the performance of companies in China's financial services sector. The results indicate that the smaller the company, the more positively digital transformation affects its performance by integrating resources across different departments to increase operational efficiency and reduce production costs. Shee & Kaswi (2023) also conclude that digital transformation and digital innovation positively influence the performance of SMEs during the COVID-19 pandemic. Supporting this view, the empirical results of Roman & Rusu (2022) show that the level of digitalization has a positive impact on the performance of SMEs in 27 European Union (EU) countries.

Nerverthless, not all existing studies are consistent regarding the positive impact of digital transformation on firm performance, and further research is needed to better understand how digital transformation operates (Reis & Melão, 2023). Indeed, companies are reaping the benefits from the intergration of digital technologies (Bharadwaj et al., 2013), while also incurring the costs associated with the organizational changes supported by these technologies. This explains why the impact of digital transformation on firm

performance is inconsistent across studies. In fact, many companies have failed despite significant investments in digital transformation processes. Once-prominent mobile phone brands like Nokia and BlackBerry have gradually lost market share and are no longer competitive in the smartphone market. Based on a survey conducted by Wipro Digital in 2017 in the U.S., 50% of senior executives interviewed reveal that their companies have failed in the digital transformation process. Furthermore, McKinsey & Company (2019) emphasizes the failure of a large number of companies in their digital transformation efforts.

In the academic community, Fitzgerald et al. (2014) report a paradox of digital technology. Specifically, managers believe in the benefits of adopting digital transformation but are disappointed with the progress of digital transformation and the results obtained from it within their companies. When companies implement digital transformation, about 70 percent will fail (Saldanha, 2019). This has been partially evidenced by empirical research. Using panel data from 2010 to 2020 of 2,254 manufacturing companies in China, Guo & Xu (2021) conclude that the level of digital transformation has a positive correlation with process-based performance and a U-shaped correlation with financial performance. Jardak & Ben Hamad (2022) empirically examined the impact of digital maturity on corporate financial performance measured by ROA, ROE, and Tobin's Q. The results show that digital maturity negatively impacts ROA and ROE but positively affects Tobin's Q. Furthermore, Zareie et al. (2024) also point out the weak and inconsistent impact of digital transformation on ROA while demonstrating a positive relationship between digital transformation and Tobin's Q. Guo et al. (2023) argue that digital transformation can reduce firm performance by increasing operating costs, reducing total asset turnover, and increasing management costs. Additionally, a non-linear relationship between the core business performance of energy companies and the digital transformation has been affirmed by Yu et al. (2024) based on empirical evidence.

3. Research gaps and future research directions

Theoretically, digital transformation offers benefits to businesses, but in practice, implementing digital transformation is very complex due to significant costs, learning time, and adjustments. Many companies still struggle with successfully undergoing digital transformation. Therefore, the question arises as to whether a company's adoption of digital transformation genuinely improves its performance. Currently, there is no unified theoretical model regarding the prerequisites of digital transformation or the mechanisms by which digital transformation affects business performance. Thus, developing a coherent and widely accepted theoretical framework in the future is necessary. Additionally, random factors that may influence the relationship between digital transformation and company performance are often overlooked in current literature. Future research could investigate their moderating roles.

Empirical evidence also indicates varying outcomes regarding the impact of digital transformation on the performance of firms in general and of SMEs in particular. One explanation for these inconsistent results may be the lack of a unified definition of digital transformation. This makes digital transformation a variable that is very difficult to measure. Some studies focus on specific digital transformation technologies, such as IoT and blockchain, that companies possess. Specifically, some research concentrates on the

impact of a particular digital technology on a company's financial performance (Dalenogare et al., 2018; Scott et al., 2017). Other research combines technologies such as IoT, big data, cyber-physical systems, and interoperability to represent digital transformation (Mubarak et al., 2019). However, digital transformation leads to company-wide changes driven by a combination of digital technologies. Relying on just one or a few technologies is insufficient to represent digital transformation. Additionally, various measures are used by researchers to assess a company's level of digital transformation. One of the most common methods is to use the frequency of keywords related to digital transformation to gauge the extent of companies' digital transformation (Vo et al., 2024; Zareie et al., 2024; Yu et al., 2024; Liu et al., 2023; Wu et al., 2023; Ren et al., 2023; Guo et al., 2021). Another way to measure digital transformation is through multi-item scales that capture key aspects of digital transformation, such as: (1) integration of digital technologies, (2) promotion of new business processes built on these technologies, and (3) building a digital transformation strategy (Aral & Weill, 2007; Singh et al., 2021; Barba-Sánchez et al., 2024). Thus, further research is needed to develop appropriate measures that accurately represent the level of a company's digital transformation and fully reflect the nature of the digital transformation process.

Not only digital transformation but also firm performance can be measured in various ways. The use of different metrics to represent firm performance is also a reason why the impact of digital transformation on firm performance is inconsistent across the aforementioned studies. In some research papers, when authors test the robustness of the model using different performance measures, they lead to contradictory results. Zareie et al. (2024) found a weak and inconsistent impact of digital transformation on firm performance measured by ROA, but observed a positive relationship between digital transformation and Tobin's q. Jardak & Ben Hamad (2022) empirically examined the impact of digital maturity on corporate financial performance measured by ROA, ROE, and Tobin's q. The results showed that digital maturity negatively affected ROA and ROE but had a positive impact on Tobin's q. When discussing firm performance, current studies primarily focus on operational and financial performance. Many other performances could be included in future models, such as innovation performance, market performance, competitiveness, environmental performance, social performance, and sustainability.

The sample of existing studies is often limited to a single country. Future research could consider an international sample or samples from different countries to compare results and identify potential regional biases.

Table 1: Overview of Research on the Impact of Digital Transformation on Firm Performance

Authors	Sample size	Sample stage	Measures		Findings
			Digital transformation	Firm performance	
Duc Hong Vo et al. (2024)	118 Vietnamese listed firms with unbalanced sample size of 1,251 observations	2011-2021	The natural logarithm of the total frequency of words relating to digital transformation is used as an index to evaluate the digital transformation performance of listed firms.	Return on Assets - ROA	• Digital transformation negatively affects firm performance. • Corporate restructuring implemented in conjunction with digital transformation improves the performance of Vietnamese listed firms.
Barba-Sánchez et al. (2024)	246 firms (the survey was open on the Google Forms platform)	April 8-28, 2022	Using the scale of Singh et al. (2021) which comprises three items addressing their organisation's digital transformation level: • The new business processes are built on technologies such as big data, analytics, cloud, mobile and social media platforms. • Digital technologies such as social media, big data, analytics, cloud and mobile technologies are integrated to drive change. • The business operations are shifting toward making	Using the scale of Lee et al. (2011), which comprises seven items addressing their organisations' financial and non-financial results. A 5-point scale measured all items (1 = strongly disagree, 5 = strongly agree): • The non-financial performance (increased customer satisfaction, enhanced brand image, improved brand value, increased staff productivity) • The financial	Results confirm a positive effect of IT capabilities on firm performance through the development of a digital orientation and the digital transformation of the organisation.

			use of digital technologies such as big data, analytics, cloud, mobile and social media platforms.	performance (sales growth, market share extension, production cost saving, process improvement)	
Nwankpa & Roumani (2016)	a stratified random sample of 1000 CIOs in firms across the United States	2015	Using the scale of Aral & Weill (2007), which comprises three items addressing their organisation's digital transformation level: • Our firm is driving new business processes built on technologies such as big data, analytics, cloud, mobile and social media platform. • Our firm is integrating digital technologies such as social media, big data, analytics, cloud and mobile technologies to drive change. • Our business operations are shifting toward making use of digital technologies such as big data, analytics, cloud, mobile and social media platform.	Using the scale of Tippins & Sohi (2003), including four items • profitability • customer retention • return on investment - ROI • sales growth	• Digital transformation positively influences innovation and firm performance while innovation is reaffirmed as having a positive implication on firm performance. • Although IT capability positively influences firm performance, it is mediated by digital transformation.
Zareie et al.	a final sample of	2011-2020	The frequency of digital	• Tobin's q according to	The results show a weak

(2024)	21,913 non-tech-firm-year observations		terms is the proxy for a firm's digital transformation score.	McLean et al. (2012), Rauh (2006), Baker et al. (2003) • ROA	and inconsistent effect of corporate digital transformation on ROA, but a positive link between digital transformation score and Tobin's q.
Gun et al. (2024)	305 participants who are managers in the manufacturing sector in Kocaeli and Istanbul (Turkey)	2023	12 expressions in the digital transformation scale adapted from Nadeem et al. (2018), including: use of technology, value creation, structural changes, financial aspects, digital leadership, agile and scalable digital operations, digitally enabled CEX, digital artefacts, executing business strategy digitally, external collaboration of ecosystem of digital platform, enterprise platform integration, flexible and humanized workplace.	Based on the scale of Wang & al. (2014), firm performance includes: • Operational performance (customer satisfaction, quality development, cost management, responsiveness and productivity) • Financial performance (return on investment, return on assets, return on sales, average profitability, profit growth, sales growth)	• Digital transformation is positively associated with operational and financial performance. Environmental uncertainty strengthens its relationship with financial performance. • Both transformational leadership and employee self-efficacy are positively related to digital transformation.
Yu et al. (2024)	A-share listed energy firms in Shanghai and Shenzhen	2010-2021	Energy companies' digital transformation is measured by the total number of keywords for digital transformation of energy	Return on Assets - ROA	• The digital development of energy enterprises significantly improves the performance of their core businesses but this effect

			enterprises.		exhibits heterogeneity of enterprise type and location. • There is a nonlinear relationship between the performance of energy enterprises' core businesses and their digital transformation, meaning there is just one threshold consequence that diminishes after crossing the threshold.
Masoud & Basahel (2023)	164 representatives of service sector firms in Saudi Arabia, namely chief information officers, chief transformation officers, and IT managers	February 2020	Digital transformation was measured using a 6-item scale by Ukko et al. (2019), including: (1) Our organization's management is familiar with digital transformation tools; (2) Our organization's management has a clear vision for utilizing digital transformation in the future; (3) Our organization's management supports the utilization of digital transformation; (4) Digital transformation	Using the scale of Zhu & Nakata (2007), Raguseo & Vitari (2018), Khin & Ho (2019) to measure firm performance, which contains four items: (1) Our productor service is competitive compared with major competitors; (2) Our customer retention rate is competitive compared with major competitors; (3) Our profitability increase is competitive	• Digital transformation positively impacts firm performance. • Digital transformation positively affects customer experience. • Digital transformation has a positive impact on IT innovation. • Customer experience positively influences firm performance. • IT innovation positively affects firm performance.

			has become an important part of our business operation; (5) Digital transformation is a natural part of our business; (6) Digital transformation enhances our business.	compared with major competitors; (4) Our market share is competitive compared with major competitors.	
Hung et al. (2023)	252 large-sized Vietnamese firms	2022 (The interval between the two phases was three months)	Digital transformation was assessed using a five-item scale adapted from Nasiri et al. (2020), including five items: 1. We aim to digitalize everything that can be digitized 2. We collect massive volumes of data from different sources 3. We aim to create stronger networking between the different business processes with digital technologies 4. We aim to enhance an efficient customer interface with digitality 5. We aim to achieve information exchange with digitality	A subjective performance scale was adapted from Liang & Gao (2020) to measure firm performance, including six items: 1. Customer satisfaction 2. Market share 3. New customer acquisition 4. Return on investment 5. Sales revenue 6. Overall profitability	• Digital transformation positively affects cloud-based accounting effectiveness (CBAE), which affects decision-making quality (DMQ) and firm performance • When digital leadership is strong, the effects of digital transformation on CBAE and CBAE on DMQ are amplified.

Wu et al. (2023)	Survey 1: 544 owners or senior managers from SMEs (with less than 500 employees) via social media, including WeChat and E-mail	April 2022	Using the scale of Singh et al. (2021), Chu et al. (2019), Zhang et al. (2021), which includes five items: 1. After the Covid-19 pandemic outbreak, many new business processes built on technologies such as big data, cloud, mobile and social media platform. 2. After the Covid-19 pandemic outbreak, the digital technologies such as social media, big data, cloud and mobile technologies are integrated to drive change. 3. After the Covid-19 pandemic outbreak, the business operations are shifting toward making use of digital technologies such as big data, cloud, mobile and social media platform. 4. After the Covid-19 pandemic outbreak, your firm develops digital products and services. 5. After the Covid-19 pandemic outbreak, supporting communication	Using the scale of Singh et al. (2021), Wang & Liang (2014), which contains four items: 1. After the Covid-19 pandemic outbreak, the growth is more as compared to competitors. 2. After the Covid-19 pandemic outbreak, customer satisfaction of your company is better than that of key competitors. 3. After the Covid-19 pandemic outbreak, quality development of your company is better than that of key competitors. 4. After the Covid-19 pandemic outbreak, responsiveness of your company is better than that of key competitors.	• Digital transformation is positively related to SMEs' performance during the COVID-19 pandemic. • Digital transformation mediates the relationship between competitive pressure and firm performance among Chinese SMEs after the outbreak of COVID 19.

			of commercial and business information through digital echnologies (such as big data, cloud computing, mobile and social platforms).		
Wu et al. (2023)	Study 2: a sample of 31.859 firm-year observations from 4.341 Chinese listed large companies (more than 500 employees) in the service sector on the Shanghai and Shenzhen Stock Exchanges	2007-2020	The study attempts to construct the digital transformation index of listed firms by text mining	Tobin's q	• Digital transformation is positively related to large firms' performance during the COVID-19 pandemic. • Digital transformation mediates the relationship between competitive pressure and large firms' performance during the COVID-19 pandemic. • Absorptive, innovative and adaptive capability capability, moderate the relationship between digital transformation and large firm performance during the COVID-19 pandemic.
Liu et al. (2023)	2566 of China's A-share listed companies	2012-2021	This study assesses the frequency of terms associated with financial digital transformation in the sample firms' annual	• Tobin's q • ROA	• Financial digital transformation significantly boosts corporate financial performance for A-share

			financial reports. The degree of financial digitalization is indicated by the size of the indicator. If the indicator reads 0, the organization has not begun the shift to financial digitalization.		listed companies, and this enhancement is sustainable over time. • In comparison to enterprises in eastern provinces, businesses located in central and western provinces are better positioned to improve their financial performance by undertaking a financial digital transformation • Information symmetry and operational expenses function as intermediaries in the financial digital transformation process that affects firm financial performance.
Ren et al. (2023)	69 A-share listed renewable energy companies and 966 observations in China	2008-2021	Referring to the research of Gal et al. (2019), the natural logarithm of one plus the number of times "digital technologies" and "business model innovations" is used to proxy for a renewable energy company's digital transformation level.	• Return on assets - ROA • Return on equity - ROE	• Digital transformation enhances a renewable energy enterprise's performance. • Further, the promotion effect of digital transformation is greater among state-owned enterprises and large firms and is only helpful

					for firms in the eastern area.
Shee & Kaswi (2023)	247 SMEs managers in Indonesia	July-December 2021	Using the scale of Rupeika-Apoga et al. (2022), Priyono et al. (2020), Ziółkowska (2021), which contains 5 items: • I actively utilize digital technology such as websites, social media, or business applications in my business operations. • I have an online store or participate in e-commerce platforms to sell my products or services. • I engage with customers and promote products or services through social media. • My employees possess relevant digital skills and contribute to the business's digital transformation. • I maintain a responsive online presence and continuously adapt to evolving technological developments.	Adjusting the scales of Wang et al. (2022), Hogan & Coote (2014) to measure firm performance, which contains five items: • After adopting digital technology, I have experienced a significant increase in sales. • I feel that my business operates more efficiently since implementing digital technology. • I have observed an improvement in profitability and profit margins after adopting digital technology. • My customers provide positive feedback and are satisfied with the services after digital technology adoption. • Digital technology adoption has enabled	• The findings demonstrate the significant and positive influence of digital capability and orientation on SMEs' digital transformation and innovation during the pandemic. • Digital transformation and innovation positively affect SMEs' performance during the pandemic. • Digital transformation and innovation mediate the relationship between digital orientation and capability on SMEs' performance during the pandemic. However, digital innovation was not found to significantly mediate the link between digital capability and SMEs' performance.

				me to create new products or services or enhance the existing ones.	
Dai & Tan (2023)	245 managers and IT staff across 49 commercial enterprises in the Mekong Delta region of Vietnam	2022	Using the scale of Nwankpa và Roumani (2016)	Using the scale of Nwankpa và Roumani (2016)	Digital transformation has a positive impact on firm performance
Guo & Xu (2021)	2254 manufacturing companies in China	2010-2020	The intensity of digital transformation is measured by counting the word frequency of digital transformation keywords in an annual report and dividing the frequency by the total number of words in the annual report. In order to avoid too large a regression coefficient resulting from the excessively small variable value and to visualize the results, the values are all normalized	Organizational performance is classified into operating performance and financial performance: • The operating performance is calculated with the formula: (operating cost + sales expense)/operating income (i.e., cost of obtaining unit revenues). • The return on assets (ROA) is taken as the proxy variable of financial performance.	• The intensity of digital transformation is in positive correlation with the process-based operating performance, and in the U-shaped correlation with the profit-oriented financial performance. • Digital transformation has a much more lasting impact on operating performance than on financial performance. • Digital transformation generates a less positive impact on business operations under

				The regression results do not change significantly when testing the robustness of the model by altering the dependent variable as follows: • Operational efficiency is measured by operating costs/operating income. • Financial performance is measured by earnings per share (EPS).	favorable macroeconomic policies. • In the high-tech industry, the effects of digital transformation on the improvement of operating performance are much weaker. • The conditions required (i.e., policy and innovation environment) to improve the operating performance via digital transformation are more easing.
Jardak & Ben Hamad (2022)	a panel data sample of 92 observations collected from 23 listed firms on Sweden's stock exchange	2015-2018	Using the measure provided by Wroblewski (2018) for the digital maturity levels	• ROA • ROE • Tobin's q	Digital maturity has a negative effect on ROA and ROE but a positive effect on Tobin's q.
Phan Thị Hằng Nga et al. (2023)	100 private enterprises listed on the Vietnamese stock exchange	2018-2022	Measuring digital transformation through 7 components: company strategy, customer experience, supply chain, management operations, data governance systems, risk management, people	ROE	Digital transformation has a negative impact on firm performance, and the level of impact of each component of digital transformation on the business performance also varies.

			and organization.		
Nguyễn Thị Thảo Nhi et al. (2022)	100 vietnamese enterprises	2012-2021	Digital transformation is a dummy variable with the following convention: • Digital transformation = 0 if at that time Vietnam has not undergone digital transformation. • Digital transformation = 1 if digital transformation has been and is being implemented.	ROA	Digital transformation has a significant positive impact on firm performance.

4. Managerial implications

Managerial implications have emerged based on the findings from the research overview above. First, digital transformation has the potential to drive growth and innovation. However, it can also negatively impact firm performance. The digital divide, skills gap, upfront costs, technological changes, and shifts in customer behavior present significant challenges that companies must overcome to fully leverage the potential benefits of digital transformation. Particularly in emerging markets like Vietnam, businesses must carefully weigh the costs and benefits of digital transformation and develop a comprehensive strategy that considers the unique challenges and opportunities within their context.

Second, digital technology is a necessary condition but not sufficient to ensure the success of a company's digital transformation process. Some studies have highlighted the importance of digital capabilities and digital orientation in the digital transformation process (Han & Lee, 2024; Barba-Sánchez et al., 2024). This aligns with the findings reported by McKinsey & Company (2019). The report explains why digital transformations often go off the rails. Common reasons include: (1) the CEO failing to build trust within the team regarding the importance of digital transformation or to convince everyone that they need to undergo the transformation. (2) the CEO or the leadership team not addressing the skills in their organization. (3) missing all sorts of procedural elements that make a transformation thrive (such as setting regular performance-management discussions to track progress). If businesses can address these issues, they may eliminate the root causes that lead to the failure of the digital transformation process.

Finally, the Vietnamese government should implement specific policies to encourage the digital transformation of businesses in the digital age. Unique policies should be introduced to address issues such as financial challenges, a lack of digital talent, and inadequate planning for digital strategies. By doing so, businesses can succeed in digital transformation, keep up with contemporary trends, and then improve their performance.

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TOURISM DEVELOPMENT PROJECTS IN THE DISTRICT LEVEL: THE CASE OF LAC SON DISTRICT, HOA BINH PROVINCE AND POLICIES RECOMMENDATIONS FOR TOURISM DEVELOPMENT

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Abstract: The Tourism Development Project of Lac Son district, Hoa Binh province for the period 2016- 2020, vision to 2030, was approved with a focus on exploiting local potentials, attracting investment, building infrastructure, promoting the local tourist image, thereby contributing to exploiting the province's advantages, preserving and promoting natural, cultural resources and traditional values, contributing to job creation, increasing income for people and promoting local socio-economic development in an effective and sustainable way. However, in addition to the achieved results, there are still some limitations affecting the development of district tourism. This article aims to determine the research framework for tourism development projects at the district level; analyze the current status of the tourism development project of Lac Son district, Hoa Binh province for the period 2016- 2023; identify the strengths and limitations of the project; and propose some policy recommendations for tourism development of localities.

Keywords: *Policy; Tourism Development; Lac Son District.*

1. Introduction

Tourism is an important economic sector of many countries including Vietnam in the current context of globalization. Decision No. 147/QD-TTg of the Prime Minister approving the Vietnam Tourism Development Strategy to by 2030 has the viewpoint of developing tourism to become a key economic sector, creating a driving force to push the development of other sectors and fields, contributing significantly to the formation of a modern economic structure.

Lac Son is a mountainous district of Hoa Binh province, with over 140,000 people, in which ethnic minorities account for over 91%. Lac Son district has a fresh climate along with many beautiful landscapes, historical and cultural relics with long-standing and unique cultural significance, imbued with national identity, which are strengths and potentials for tourism development. Lac Son district has been active in implementing Resolution No. 08-NQ/TW of the Politburo on Developing tourism into a spearhead economic sector, Decision No. 201/QD-TTg of the Prime Minister dated January 22, 2013 approving the Master Plan for Vietnam's tourism development to 2020, vision to 2030, and Decision No. 509/QD-TTg of the Prime Minister dated June 13, 2024 approving the Tourism Master Plan for the period 2021-2030, vision to 2045.

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The tourism development project in Lac Son district, Hoa Binh province for the period 2016- 2020, vision to 2030, contributes to attracting investment, building infrastructure, promoting the image of local tourist destinations; thereby contributing to optimally exploiting the province's advantages, preserving and promoting natural resources, cultural resources and traditional values; contributing to creating jobs, increasing income for people and promoting local socio-economic development in an effective and sustainable direction... However, in addition to the achieved results, there are still some limitations in tourism development in the district. The project was developed for the period 2016 - 2020, with a vision to 2030. From 2021 - 2023, Lac Son district issued Resolution No. 06/NQ-HU dated July 26, 2021 of the District Party Committee on Tourism Development in Lac Son district, and at the same time, the goals and tasks of the project were included in the annual development plan. This article studies the tourism development project in Lac Son district then gives policy recommendations on tourism development for localities.

2. Methods

2.1. Data sources

Secondary data on Tourism development project in Lac Son district, Hoa Binh province for the period 2016- 2023 is collected from the officially published and credible documents of Provincial and District Public Agencies such as reports, projects, plans, statistics of the Provincial People's Committee, the Department of Culture, Sports and Tourism, the District People's Committee, the District Department of Culture and Information, the Department of Agriculture and Rural Development, Department of Economy-infrustructure. The data is collected for the period from 2016 to 2023. Besides, information and data are also collected from published research papers and articles.

2.2. Data processing and analysis method

In this study, the authors use table data where secondary data is arranged and classified by time, geography and tourist projects to facilitate the use of these data in analysis.

The author classified, analyzed and compared the data collected from 2016-2023 to assess the current status of the Project, the results achieved, the limitations and causes of limitations

3. Results

3.1. Research framework of the tourism development project in the district

3.1.1. Tourism development in the district

There are many definitions of tourism. According to Law on Tourism (2017), " Tourism is activities related to human trips outside their usual place of residence for a period of no more than 01 consecutive year to meet the needs of sightseeing, relaxation, entertainment, learning, exploring tourism resources or for other legal purposes".

Tourism development in the district is the interference of district-level authorities on tourism activities to support organizations and individuals in tourism sector to increase in the scale, the number of units, revenue, income of workers, the district as well as the tourism sector.

Tourism development in the district aims at economic development, satisfying the needs of tourists and profits for businesses, creating jobs, increasing income of local people, preserving and promoting traditional cultural values, protecting the environment in the district.

3.1.2. Tourism development project in the district

According to the Government (2020), a project is a form of administrative document formed in the activities of agencies and organizations. A tourism development project in a district is an administrative document issued by a district-level administrative agency to provide viewpoints, goals, directions, measure to develop local tourism activities in a certain period.

- Basis for developing tourism development project in the district: The tourism development project in the district is built on legal basis (central level documents, provincial level documents, district level documents), real situation (actual situation and needs of the locality) and scientific basis (scientific arguments on tourism development).

- Objectives of tourism development project in the district: The general objective is to implement the goals in the plans, resolutions or documents of higher authorities and district-level agencies on tourism development in the area.

- Subjects and objects of tourism development project in the district: The subject of the tourism development project in the district is the District People's Committee and the local government level. The subjects include specialized agencies; People's Committees of communes and towns; Tourism businesses; Local people.

- Solutions to implement tourism development project in the district: In order for the tourism development project in the district to achieve its set goals, the main solutions include: capital mobilization; human resources; promotion and advertising; planning management; science and technology application; protecting tourism resources and environment; coping with the climate change.

- Resources to implement tourism development projects: To implement the tourism development project effectively, it is necessary to mobilize all resources and exploit available potentials. The basic resources for tourism development include: Human resources; Natural resources; Science and technology.

- Criteria for evaluating tourism development projects in the district: Effectiveness is to evaluate the results achieved compared to the original goals, assessed by the indicators “Actual results achieved compared to planned targets”. Efficiency is the measure of the results achieved relative to the costs incurred to achieve those results, assessed by the indicators “output, results and impacts related to the project costs”. Suitability is to assess the rationality and compatibility of the project compared to higher-level plans, the compatibility between the activities and objectives of the project, assessed by the indicators “compatibility index of the project compared to the overall plan for socio-economic development of the district”. Sustainability shows whether the results are stable in the long term or not, the balance between economic, social and environmental factors, assessed by the indicators “stable project results over time, the level of impact on the environment and society”.

3.2. Current status of the Tourism Development Project in Lac Son district, Hoa Binh province for the period 2016-2020, vision to 2030

3.2.1. Objectives of the Tourism Development Project in Lac Son District

The overall objective of the Project is to develop tourism in Lac Son district to become an attractive tourist destination as a key location of Hoa Binh province.

The specific objectives of the Project are: Prioritizing investment and development of sports and entertainment tourism products such as paragliding, eco-tourism, resorts,

community tourism associated with learning about ethnic culture; Exploitating the international tourist market, especially the traditional market and the market with high spending capacity, long-term stay. Prioritizing the domestic tourist market from Hanoi, the Red River Delta and Northwestern provinces; Linking and developing tourist routes connecting Lac Son with tourist destinations in the region; Improving the quality of tourism infrastructure and services such as accommodation facilities, commercial and entertainment service facilities wwith 3,000 international tourists and 110,000 domestic tourists, 42 billion VND of total revenue; Creating jobs for over 300 direct workers, the accommodation facilities having 210 rooms.

3.2.2. Subjects and objects of the Tourism Development Project in Lac Son district

The People's Committee of Lac Son district is in charge of approving the Tourism Development Project while the People's Committee of the District, communes and towns are in charge of implementing the Project.

The subjects and beneficiaries of the Project are enterprises, organizations and individuals doing tourism and travel business in the district.

3.2.3. Solutions of the Tourism Development Project in Lac Son district, Hoa Binh province

The Project has 9 groups of measures including management, investment capital attraction, infrastructure development, technical facilities development, tourism product development, tourism promotion, human resource training, preserving and exploiting natural tourism resources, environmental protection and climate change response

It can be seen that the solutions of the Project have covered the necessary activities for tourism development such as capital, human resources, infrastructure - technology, promotion, tourism product development..., which direct agencies, units, and localities in consulting with authorities at all levels. However, the measure on tourism types and products are not diverse, their attractiveness is not high, and their brands have not been built; entertainment, cultural, and sports services of tourist areas and spots in localities are not synchronous, and the landscape and environment at some tourist spots have not been given due attention.

3.2.4. Resources for implementing the Tourism Development Project in Lac Son district, Hoa Binh province

The total investment capital for implementing the Project on tourism development in Lac Son district until 2020, vision to 2030, is 1,518.0 billion VND; of which, the State budget capital is 134.3 billion VND, accounting for 8.85% of the total investment capital; non-State budget capital is 1,383.7 billion VND, accounting for 91.15% of the total investment capital.

The Tourism Development Project in Lac Son district has identified capital resources including both domestic and non-state budget capital, divided into specific stages. Human resources are reflected in the implementation organization, with the participation of district-level agencies, units and People's Committees of communes and towns in the district. However, the annual financial resources allocated for tourism development are still low compared to investment needs, and other necessary resources such as science, technology and infrastructure have not been identified. Human resources implementing the project have not been trained in-depth in tourism, only a few have participated in

training courses organized by the provincial level.

3.3. Results of implementing the Tourism Development Project in Lac Son district, Hoa Binh province

3.3.1. Tourist market

- International tourist market: Mainly traditional tourists such as France, Netherlands, Spain, Australia, Korea, Japan, India, regonal countries such as SouthEast Asia, Taiwan, China and high paying markets such as UK, Germany.

- Domestic tourist market: local tourists and tourist market from the capital Hanoi capital, Thanh Hoa province, Northwestern provinces for the purpose of weekend vacation, sightseeing, historical relics, famous places Win, Eco, Festival. Expand customer market from distribution centers big customers like Ho Chi Minh City, Da Nang, Can Tho for tourism purposes public service, sightseeing, ecology

3.3.2. Tourist products

- Featured products: Ideal terrain and natural landscape at Mu Waterfall, Cao Waterfall, Khai Cai hamlet; Bai Bui in Ngoc Lau commune, terraced fields in Mien Doi commune, caves, traditional stilt houses, historical and cultural relics, and new year festivals.

- Key products: Community ecotourism in hamlets of Tu Do commune, Khai Cai hamlet of Quyet Thang commune.

- Supplementary products: Experiential learning tourism such as Monuments History of Muong Khoi War Zone of An Nghia commune, Lang Vanh stone roof of Yen Phu commune, Trai cave in Tan Lap commune.

In the 2016-2023 period, Lac Son authorities have restored many festivals, recognized provincial-level relics, and proposed for recognition of special national relics for Trai cave in Tan Lap commune and Lang Vanh stone roof in Yen Phu commune, recognition of special provincial relics for the complex of stone with ancient carvings at Co stream, My Thanh commune.

3.3.3. Spatial organization within the destination

- Tourist destination: There are potential destinations such as Mu Waterfall (Mu Khuong hamlet), Cao Waterfall (Coi Cao hamlet), Dong Be (Ry hamlet), and other relics in Lac Son district.

- Tourist routes: Muong Khu walking route connecting Cuc Phuong National Park with the Conservation Area Ngoc Son Ngo Luong - Pu Luong Nature Reserve; Tu Do commune walking route connecting to Pu Luong (Thanh Hoa Province).

3.3.4. Investment in tourist infrastructure and technical facilities

Vu Ban-Quy Hoa road project and belt roads have been under construction, which are expected to be convenient for tourists. Some routes have been completed such as the route to Thung Hill of Quy Hoa Commune, inter-hamlet and inter-commune roads have been constructed and concretized.

Organizations and individuals operating in the tourism sector have increasingly favorable conditions to invest in infrastructure and technical facilities for tourism such as hotels Phuong Bac, Riverside, community guesthouses in Tu Do and Quyet Thang commune. Local agencies have deployed signs to relics, scenic spots in the district as well as billboards promoting the tourist area Mu Waterfall, Tu Do Commune; Developed and digitalized information and documents promoting cultural and historal relics associated

with rural tourism in the Rural Tourism Development Program in new rural construction in Lac Son district; Supported communes in region III in cultural preservation (Project 6- Preservation and promotion of good traditional cultural values of ethnic minorities associated with development tourism" in Lac Son district.

3.3.5. Tourism infrastructure

The district has mobilized billions of dong to invest in tourism infrastructure, built new and upgraded Coi Communal House in Vu Binh commune, Khoi Communal House in An Nghia commune, constructed and restored 3 relics namely Bang Communal House in Ngoc Lau Commune, Khu Dung Cave in Nhan Nghia Commune, Truong Son anti-Japanese guerrilla relic of in Tan My commune.

3.3.6. Tourism investment projects in the period 2016-2023

The District People's Committee has invested in the following projects: Construction and upgrading of some works at Mu Waterfall, Tu Do commune; Construction and upgrading of Khoi Communal House, An Nghia commune, Coi Communal House, Vu Binh commune, Khenh Communal House, Van Son commune; Detailed planning project at scale 1/500 of Mu Waterfall tourist area, Tu Do commune; Investment in Thung Hill ecological, resort and entertainment urban area project in Quy Hoa commune; Investment in eco-tourism project at Kha Lake, Quay Hoa commune. 02 projects are in approval process namely Mu Waterfall Happy Land Eco-tourism Project (Mu Waterfall Tourism Joint Stock Company) in Tu Do commune, and Wonderland amusement park project in Ngoc Lau commune.

3.4. Evaluation of the Tourism Development Project in Lac Son district, Hoa Binh province for the period 2016-2020, vision to 2030

a. Effectiveness

The effectiveness of the Tourism Development Project in Lac Son district, Hoa Binh province for the Project time is assessed through the level of fufilling the main objectives of the Project, shown in Table 2.1. All targets have been achieved equal or higher than plan.

Table 2.1. The Project results compared to the plan

No	Indicator	Unit	Plan	Implementation	Level of completion (%)
1	Total number of visitors	Visitor	113.000	135.550	120
2	Number of international visitors	Visitor	3.000	5.850	195
3	Number of domestic visitors	Visitor	110.000	129.700	118
4	Accommodation facilities	Room	210	214	107
5	Revenue from tourism	Billion VND	42	42	100
6	Dirrect jobs creation	Worker	300	310	103,3

Source: Lac Son District People's Committee

b. Efficiency

The effectiveness of the Tourism Development Project in Lac Son district, Hoa Binh province is shown in the following aspects and indicators: Output, results and impact

compared to the input costs of the Project.

Although the results achieved were higher than the planned target, the actual budget was lower than the planned budget, showing that the Project was implemented efficiently (Table 2.2).

Table 2.2. Project budget

No	Indicator	Planned budget (Billion VND)	Implemented budget (Billion VND)	Level of completion (%)
1	State budget	44,0	36,0	81,8
2	Non-State budget	443,0	384,0	86,7
3	Total budget	487,0	420	86,24

Source: Lac Son District People's Committee

c. Suitability

The Tourism Development Project in Lac Son district, Hoa Binh province for the period 2016-2020, vision to 2030 is consistent with the Master plan for tourism development in Hoa Binh province for the period 2014-2020, vision to 2030 regarding policies, goals and solutions.

The tourism development perspective of the Project is consistent with the Strategy and Master Plan for tourism development in the Northern Midlands and Mountains region; socio-economic and tourism development plans of Hoa Binh province; socio-economic development plans of Lac Son district; consistent with development plans of related sectors and fields.

The issuance of the Project on tourism development in Lac Son district, Hoa Binh province is in accordance with the tasks and powers assigned according to the provisions of the Law.

The Tourism Development Project in Lac Son district, Hoa Binh province for the period 2016-2020, vision to 2030 was built based on the real situation, meeting the urgent requirements of the district, creating favorable conditions for attracting investment, mobilizing resources to effectively exploit the district's tourism potential, outlining a roadmap to continue developing tourism sustainably in the period 2016- 2020 and to 2030, contributing to the overall socio-economic development of the locality.

The orientation of developing the transportation system for tourism in Lac Son district complies with the construction plan of Hoa Binh province, the master plan for socio-economic development of Hoa Binh province, and the master plan for socio-economic development of Lac Son district. The electricity, water supply, drainage and environmental sanitation systems in the Project comply with the construction plan of Hoa Binh province, the master plan for socio-economic development of Hoa Binh province, and the master plan for socio-economic development of Lac Son district.

d. Sustainability

As analyzed in the effectiveness criteria above, the results of implementing the main objectives of the Tourism Development Project in Lac Son district, Hoa Binh province in the period of 2016-2020 and 2021-2023 remain high and stable. In addition, the sustainability of the tourism development project in the district is also reflected in the level of impact on the environment and society. Temporary residence registration in tourist accommodation establishments, especially temporary residence for foreign visitors, security in tourist areas, destinations, tourist business establishments, and

festivals are ensured. Organizations and individuals investing in tourist establishments have registered to meet environmental standards. However, tourism development still lacks sustainability, many issues related to the tourism environment have not been resolved such as the situation of selling goods, littering directly, irregular garbage collection leading to environmental pollution, affecting the landscape and tourism image; the construction of tents and camps right at the downstream of Mu Waterfall tourist area affects the natural landscape, encroaching on the waterfall area; The exploitation of local specialties (such as rock snails and rock crabs) to serve the needs of tourists is a threat to animals; activities that gather large numbers of people such as campfires and camping in beautiful, potential landscape areas of the district have a negative impact on natural vegetation. With the characteristics of ecotourism and community tourism, communes and towns in the district often welcome large groups of visitors, resulting in noise from vehicles and tourists that can affect local residents.

3.5. Some suggestions for local tourism development policies

- Regarding the Project's objectives: The objectives need to be based on the real situation and results of implementing the Project's objectives in the previous phase, comparing the Project's objectives in the phases to ensure that the Project's objectives are reasonable and feasible. Carefully review the challenges and risk forecasts to determine appropriate objectives.

- Regarding the subject and objects of the Project: The subject issuing the Project on tourism development in the district is the District People's Committee. The subjects organizing the implementation of the Project include specialized agencies of the District People's Committee and the People's Committees of communes and towns in the district. The objects are enterprises, organizations, individuals doing tourism and travel business in the district, domestic and foreign organizations and enterprises investing in the tourism sector.

- Regarding the Project's measures and activities: Projects should focus on solutions for developing the tourist market, developing tourism products, organizing tourist space, developing tourist attractions, building and developing tourist routes, building a system of technical facilities serving tourism, building infrastructure serving tourism.

- Regarding resources for implementing the Project: Increase financial resources through the annual state budget combined with projects under the National Target Program, public-private partnership investment and socialized sources. Human resources for implementing the Project need to have the participation of cadres and civil servants managed by the District People's Committee and the People's Committees of communes and towns. At the district level, there should be leaders and civil servants of specialized departments with the task of advising and coordinating to direct tasks. At the commune level, it includes leaders of the People's Committee, cultural and social civil servants and leaders of organizations and unions.

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SUSTAINABLE DEVELOPMENT OF VIETNAM'S COFFEE EXPORT INDUSTRY

MA. Luong Thi Quynh Mai[1]

Abstract: This article delves into the sustainable development of Vietnam's coffee export industry, a cornerstone of the nation's economy and global coffee market. Vietnam has rapidly risen to become one of the world's largest coffee exporters, but this growth has brought along challenges related to environmental sustainability, social responsibility, and economic viability. The article examines the strategies and initiatives employed by Vietnam to ensure the long-term viability of its coffee industry. It explores the adoption of sustainable farming practices, certification programs, and the promotion of fair trade principles. Additionally, the article discusses the role of government policies, industry collaborations, and technological advancements in fostering sustainability within the coffee supply chain. Through a comprehensive analysis, the article underscores the importance of balancing economic growth with environmental and social considerations to achieve truly sustainable development in Vietnam's coffee export sector.

Keywords: *sustainable development, export, coffee, Vietnam*

1. Introduction

Vietnam, renowned for its rich coffee culture and robust export industry, stands as one of the leading coffee producers and exporters globally. As the global demand for coffee continues to rise, Vietnam's position in the international coffee market becomes increasingly pivotal.

Coffee is among the key agricultural export commodities, holding a significant share in Vietnam's total agricultural export turnover. As the second-largest coffee exporter in the world, following Brazil, and the largest Robusta coffee exporter globally, Vietnam's annual export volume reaches approximately 1.6 - 1.8 million tons, with an export value of around 2.6 - 2.8 billion USD. Despite these impressive figures, the full potential of Vietnam's coffee export sector has yet to be realized.

Decision No. 1392/QĐ-BNN-TT issued in 2021 approving the Project on Vietnam's Specialty Coffee Development for the 2021- 2030 period sets forth goals aligned with the international economic integration process, catering to the increasing domestic and international market demand. The aim is to enhance the value and competitiveness of Vietnamese coffee worldwide.

However, with growth come challenges, particularly in ensuring sustainability across the entire coffee value chain. As the world shifts towards more sustainable and responsible practices, Vietnam's coffee industry must adapt and innovate to meet these evolving demands while safeguarding its natural resources and supporting the well-being of its communities.

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This article delves into the sustainable development strategies and initiatives undertaken by Vietnam's coffee export industry. We will explore the efforts to enhance productivity, improve quality, promote environmentally friendly farming practices, ensure fair trade, and foster inclusive growth.

2. Overview of research and research methodology

2.1. Coffee - The Coffee Market

2.1.1. Coffee

Coffee is a beverage made from the roasted seeds of the coffee plant, possessing a distinct aroma, color and caffeine content. Coffee aficionados often prefer pure coffee, which can be consumed with added sugar, ice, or milk. Additionally, various coffee brewing methods cater to the preferences of international visitors and the younger generation in Vietnam, including Espresso, Cappuccino, Cafe Latte, and Cafe Mocha, among others.

Coffee in Vietnam is more than just a beverage; it's deeply ingrained in the country's culture, history, and economy. Vietnam is the second-largest coffee producer in the world, primarily known for its robusta beans, which thrive in the country's Central Highlands region. Coffee cultivation in Vietnam started during the French colonial period in the 19th century but has since grown exponentially, making coffee an integral part of Vietnamese agriculture and trade. Vietnam boasts a diverse range of coffee varieties, including Arabica, Robusta, Culi, Cherry, Moka, and Catimor. Consequently, Vietnamese coffee products vary significantly in taste, depending on the blending and processing methods employed.

2.1.2. Overview of the Coffee Market

According to a recent report from the United States Department of Agriculture (USDA), global coffee production for the 2023 - 2024 crop year is forecasted to reach 171.4 million bags (each bag weighing 60 kg), representing a 4.2% increase or an additional 6.9 million bags compared to the previous crop year. Concurrently, global coffee consumption is projected to reach a record-high of 169.5 million bags in the 2023 - 2024 crop year. Inventory levels at the end of the crop year are expected to remain tight, decreasing to only 26.5 million bags, marking the lowest level in the past 12 years.

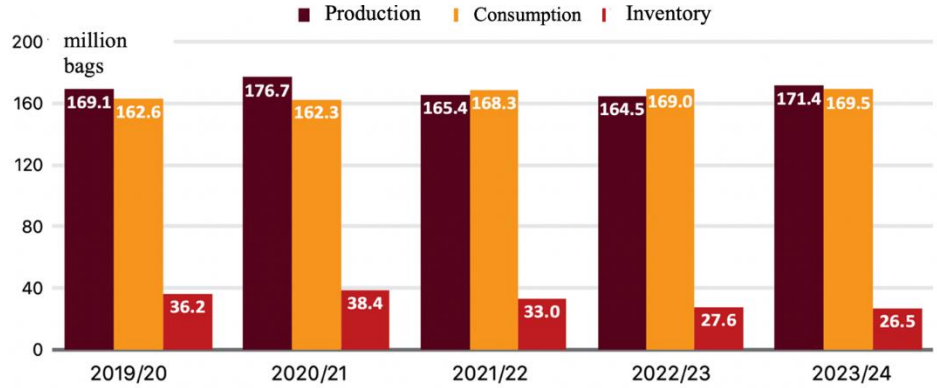

Chart 1: Global Coffee Supply - Demand and Inventory from Crop Years 2019/20 to 2023/24

Source: USDA

Brazil's green coffee exports, the world's largest coffee exporter, are forecasted to rebound and increase by 7.3 million bags from the previous crop year to 39.5 million bags, driven by higher supply and increased import demand from the U.S. and the EU. Data released by the Brazilian Coffee Exporters Association (CECAFE) shows that Brazil's green coffee exports in the first five months of the 2023-2024 crop year (from July to November 2023) have risen by 18.7% compared to the same period in the 2022-2023 crop year, reaching 17.3 million bags. Specifically, robusta exports surged by 420.9% to 3.4 million bags, while arabica coffee exports remained unchanged at 13.97 million bags.

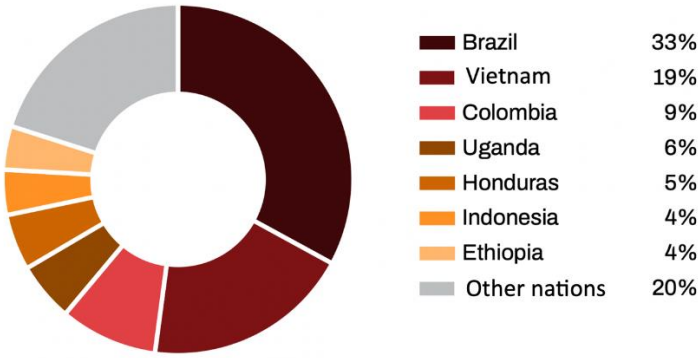

Chart 2: Leading Green Coffee Exporting Countries in the Crop Year 2023-2024

Source: USDA

`Exports from the South American region have surged, while those from Asia have declined.In November 2023, coffee exports from the South American region increased by 24.7% to nearly 6.1 million bags. This strong growth mainly came from Brazil, which recorded a 21.1% increase in export volume to over 4.3 million bags.

Notably, Brazil's robusta coffee exports in November skyrocketed by 850.2%, reaching 0.86 million bags, up from 0.09 million bags in the same period of 2022. This is a record-high figure for Brazil, surpassing the previous peak of 0.7 million bags achieved in August 2023. Brazil is one of the world's largest producers and exporters of robusta coffee, accounting for 8.1% of global robusta exports in the 2021-2022 crop year with over 3.9 million bags.However, within just four months from July to October 2023, Brazil's market share in global robusta exports doubled to 22.3%, with 3.09 million bags. Brazil has effectively seized opportunities from the high global demand, while Vietnam, the world's largest robusta exporter, saw its export volume plummet by 27.5% during the same period to 4.9 million bags.Brazil's continued strong growth in robusta coffee exports in November 2023, despite Vietnam's recovery, demonstrates its significant breakthrough in the global robusta market, and this trend is likely to continue.

Coffee exports from Central America and Mexico also increased by 15.7% to 0.4 million bags in November. This brought the total exports from the region up by 11% in the first two months of the 2023-2024 crop year to 0.9 million bags. Guatemala, Honduras, and Mexico, the main exporting countries in the region, recorded growth rates of 114%, 29.7%, and 11.8%, respectively, in November. This indicates that the region's production is recovering after a sharp decline in the 2022-2023 crop year.

Overall, the average export volume from October and November for these three countries was 0.7 million bags in the 2017-2018 to 2021-2022 crop years. However, it

dropped by 14.6% to 0.6 million bags in the 2022-2023 crop year. Currently, this figure has returned to 0.7 million bags for the 2023-2024 crop year.

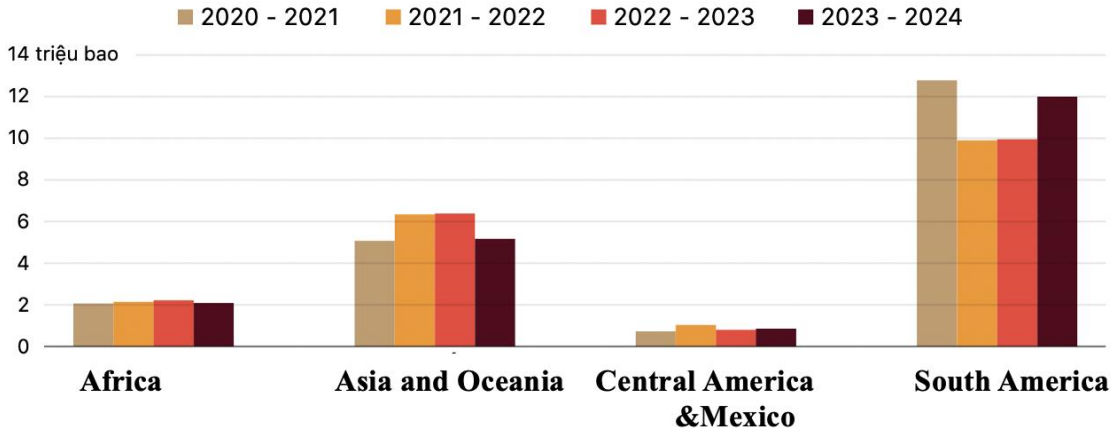

Chart 3: Coffee exports from various regions in the first two months of the crop years from 2020-2021 to 2023-2024

Source: ICO

Conversely, coffee exports from the African region decreased by 13.5% in November and dropped by 8.1% in the first two months of the 2023 - 2024 crop year, totaling nearly 2.1 million bags.This marks the third consecutive month of negative growth for the region, and some speculate that Brazil's increased exports are overshadowing traditional robusta exporters, significantly impacting Africa's coffee exports, where robusta production is predominant. Additionally, Uganda, the largest robusta coffee producer and exporter in Africa, was also affected by delayed harvesting, negatively impacting the available supply.

Coffee exports from the Asian and Oceania regions also sharply declined by 18% to 3.1 million bags in November. The reason behind this is Indonesia's export drop by 45.2% to only 0.5 million bags, the lowest since 2018. Indonesia's harvest volume is estimated to decrease by 16.6% in the 2023 - 2024 crop year, down to 10 million bags from 12 million bags in the 2022 - 2023 crop year due to unfavorable weather conditions. Excessive rain during April to May 2023 damaged coffee crops. Vietnam's exports also decreased by 7.7% in November, but it shows significant improvement compared to the sharp declines of 23.6%, 45.0%, and 44.7% in August, September, and October 2023, respectively. This indicates that supply issues in Vietnam are starting to be resolved, following the lowest inventory levels reported in several years in the fourth quarter of the 2022 - 2023 crop year.

In 2023, the world market price for Robusta coffee surged by 50% compared to the end of the previous year, reaching a record level of 3,000 USD per ton. Meanwhile, Arabica coffee prices experienced a more moderate increase, rising by only 12% compared to a year ago.

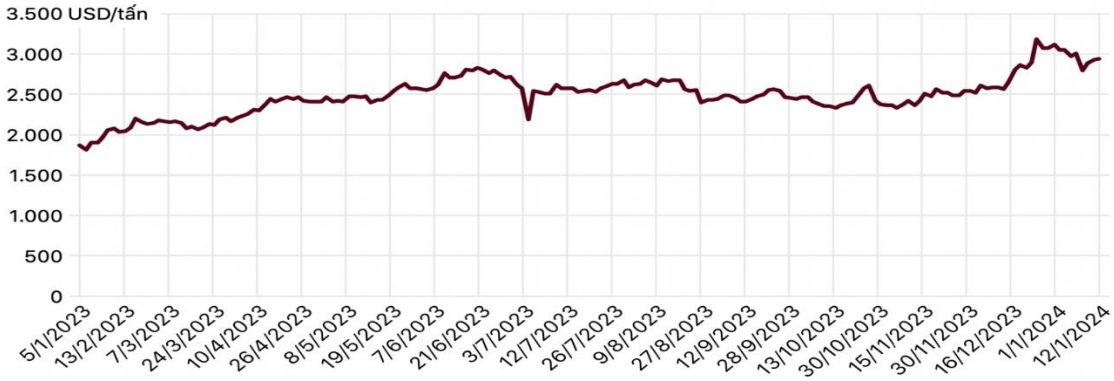

Chart 4: Near-term Robusta Coffee Prices on the London Exchange from 2023 to January 12, 2024

Source: London Exchange

In 2023, influenced by the challenging global economy, both coffee roasters and consumers tended to economize on spending and production costs. As a result, they turned to Robusta coffee as a more affordable alternative to Arabica, driving up demand for Robusta significantly.However, Robusta coffee production was also affected by adverse weather conditions. High demand coupled with reduced supply pushed Robusta coffee prices sharply upwards. Furthermore, concerns over Robusta supply from Asia and disruptions in the Europe-Asia maritime transport via the Suez Canal continued to support market price increases.

The International Coffee Organization (ICO) stated that the tension escalation in the Red Sea has prompted some shipping companies to adjust their coffee transportation routes. Consequently, for coffee from Southeast Asia and East Africa en route to Europe, unforeseen impacts include increased transportation costs due to some shipping companies imposing additional charges to compensate for extended transit times. In addition, according to exporting companies, local hoarding during harvest season contributed to supply shortages, driving up domestic and global prices. Many businesses were unable to secure goods for contracts with later delivery dates.

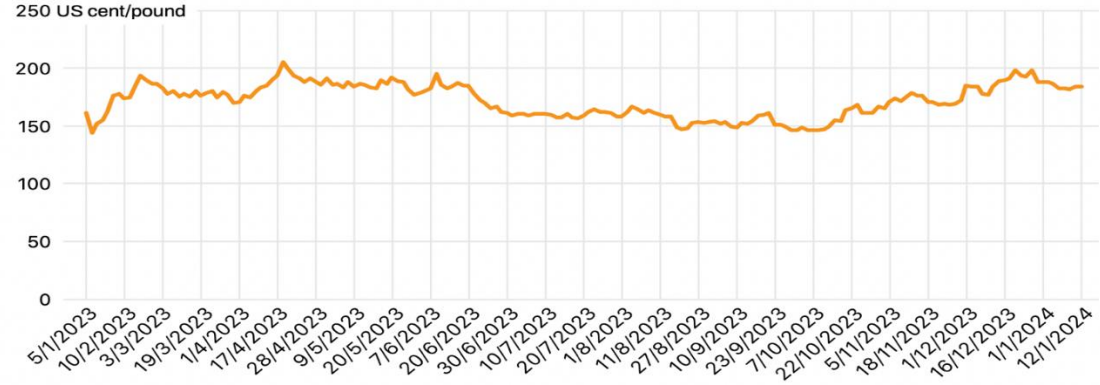

Chart 5: Near-term Arabica Coffee Prices on the New York Exchange from 2023 to January 12, 2024

Source: New York Exchange

2.2. Sustainable Development

The concept of "sustainable development" first emerged globally in 1980. According to the International Union for Conservation of Nature and Natural Resources (IUCN), humanity should not only focus on economic development but also consider the needs of society and the environmental impact.

By 1987, the concept became more widespread. The World Commission on Environment and Development (WCED) clarified in its report: Sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Thus, sustainable development ensures that economic growth is closely linked with social responsibility and environmental protection.

The Asian Development Bank (ADB) also believes that sustainable development involves integrating production processes with resource conservation and enhancing environmental protection. Sustainable development meets current needs without harming the ability to meet future needs.

Kent Fairfield, Joel Harmon, and Scott Behson (2011) defined sustainable development as integrating external factors and internal business limitations, ensuring sustainability through decision-making processes that are organized, directional, and effective.

The Sustainable Coffee Principles were introduced in 2004 by the Global Coffee Platform to help global coffee producers participate in sustainable coffee markets. These principles aim to ensure fundamental sustainable development and promote improvements in economic, social, and environmental aspects of their operations.

- Economic aspect: The objective is for coffee producers to achieve higher yields and quality, stable incomes, and contribute their value to national economic development, sharing benefits with participants. This requires business managers to possess necessary knowledge for sustainable, fair, and profitable operations, such as Good Agricultural Practices (GAP), business management, post-harvest handling, and quality management. Additionally, producers should have access to agricultural services like training, market information, agricultural incentives, and financial services. Businesses must operate transparently and ethically, emphasizing compliance with policies and laws, legal land use, and traceable products.
- Social aspect: The goal is for both producers and workers to benefit and have the best working conditions. Child labor under 15 is prohibited. Labor rights must be ensured, with no discrimination and workers voluntarily choosing their place of work. Businesses should provide clear and understandable working hours, pay, and living conditions that are clean, safe, and secure. Land acquisitions must be voluntary and announced in advance by sellers, avoiding forced displacement.
- Environmental aspect: The goal is to produce while conserving and restoring natural resources. Forests and ecosystems must be conserved, and endangered species protected. Pest and disease control should use Integrated Pest Management (IPM) and minimize chemical and pesticide use. Waste and wastewater management must be effective to minimize impacts on surface and groundwater. Hazardous waste must be handled safely. Conservation of resources should include soil conservation, erosion control, and efficient water use. Lastly, climate change adaptation measures are discussed, emphasizing reduced use of fossil fuels and strategies to adapt to climate change.

2.3. Research Methodology

This article employs qualitative research methods. To assess the current status of coffee exports and criteria for evaluating sustainable coffee export development, secondary data from the General Department of Customs and statistics from some websites.

Based on existing research on sustainable development, policies, viewpoints, combined with firsthand knowledge, documents, observations, the article utilizes qualitative methods to analyze, synthesize, and generalize relevant scientific documents, texts, and statistical data to describe the current situation and propose suggestions to contribute to sustainable development for coffee sector in Vietnam.

3. Results

3.1. Overview of Vietnam's Coffee Exports

According to data from the General Department of Customs, Vietnam's coffee exports in December 2023 reached 207,613 tons, valued at 599.4 million USD. This marked a significant increase of 74% in volume and 68% in value compared to November of the same year. Additionally, it represented a 5.4% increase in volume and a 40.8% increase in value compared to the same period in 2022.

Coffee exports continued to rise in the last month of 2023 due to the supply replenishment from the 2023-2024 harvest and high demand from international importers. By the end of 2023, coffee exports totaled over 1.6 million tons (approximately 27 million bags), a decrease of 8.7% compared to 2022. However, the revenue from exports increased by 4.6%, reaching a record high of over 4.24 billion USD.

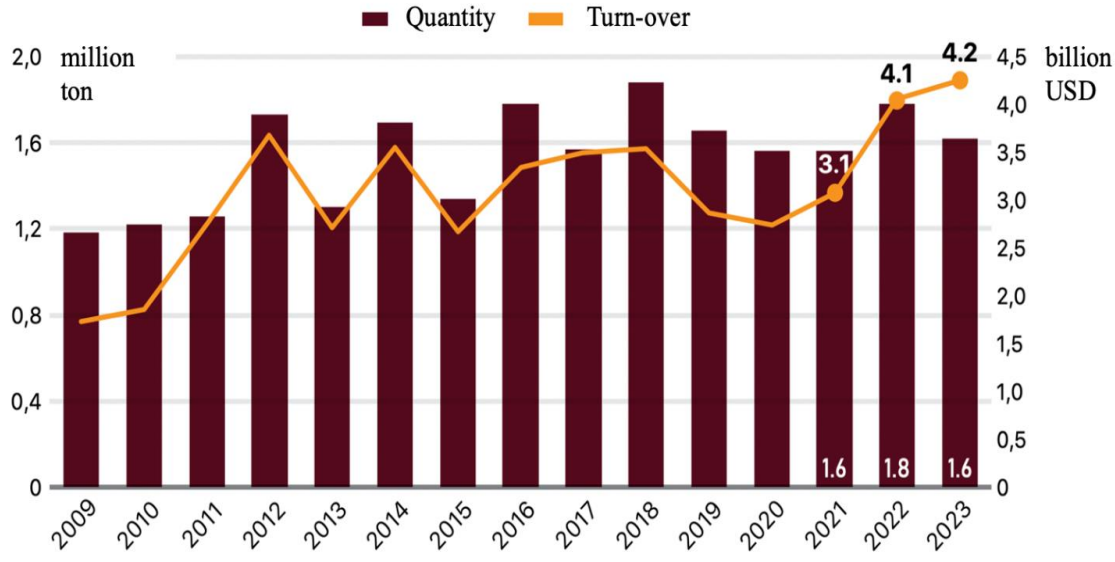

Chart 6: Vietnam's Coffee Export from 2009 to 2023

Source: Data from General Department of Customs

The Import-Export Department (Ministry of Industry and Trade) forecasts that in 2024, Vietnam's coffee sector will continue to benefit from high robusta coffee prices, potentially reaching record highs due to concerns about supply shortages. In 2024, there are mixed signals impacting global coffee prices. In Q1/2024, robusta and arabica coffee prices are expected to remain high due to concerns about supply shortages, with inventory levels at their lowest in 12 years.

The USDA estimates Vietnam's coffee production for the 2023-2024 crop year to increase by 300,000 bags compared to the previous year, reaching 27.5 million bags, with nearly 95% of that being robusta coffee. The USDA projects Vietnam's robusta coffee production for the 2023-2024 crop year at around 26.6 million bags, up 1.2% from the previous year, while arabica is expected to decrease by 11.1% to 880,000 bags. However, Vietnam's total supply remains lower than the previous year due to reduced inventory from the 2022-2023 crop year, which is estimated at 390,000 bags, significantly down from 3.58 million bags in the 2021-2022 crop year.

As a result, Vietnam's green coffee exports are projected to decrease by 2.4 million bags to 23 million bags. End-of-crop-year inventory for 2023-2024 is expected to remain low at 359,000 tons.

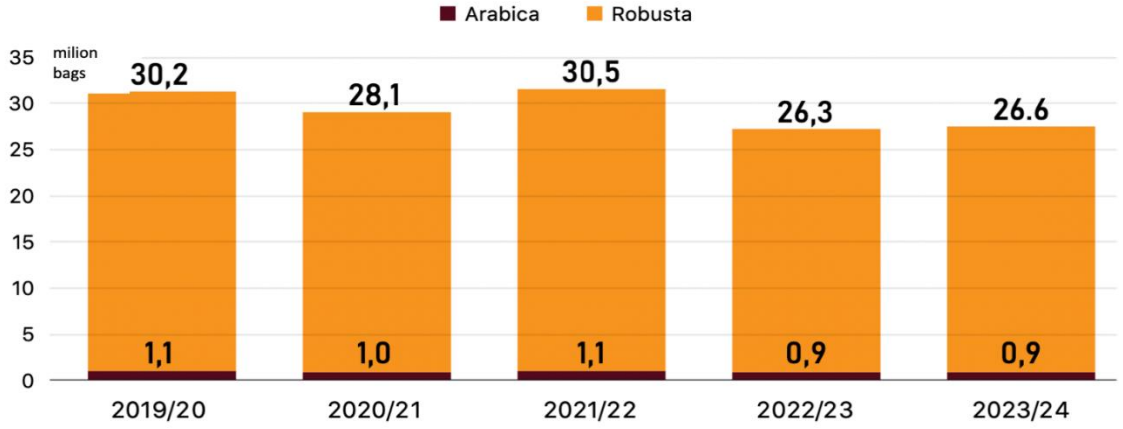

Chart 7: Vietnam's Coffee Production for the Crop Years 2019/20 to 2023/24

Source: USDA

3.2. Current Status of Sustainable Development Aspects in Coffee Export

3.2.1. Economic Aspect

The past year witnessed a surge in domestic and export coffee prices. This was a key factor contributing to the continued growth in the export value of the coffee sector, despite a decline in production volume.

On average in 2023, Vietnam's coffee export price reached 2,614 USD per ton, up 14.5% compared to 2022. However, not all businesses were able to capitalize on the market opportunities. According to data from the General Department of Customs, in 2023, the export value of coffee from FDI enterprises increased by 17.3% compared to 2022, reaching 1.7 billion USD. In contrast, domestic enterprises with 100% capital decreased by 2.6% to just over 2.5 billion USD.

Consequently, the market share of FDI enterprises rose to 40% in 2023 from 36% in 2022, while the market share of domestic enterprises shrank to 60% from 64% the previous year.

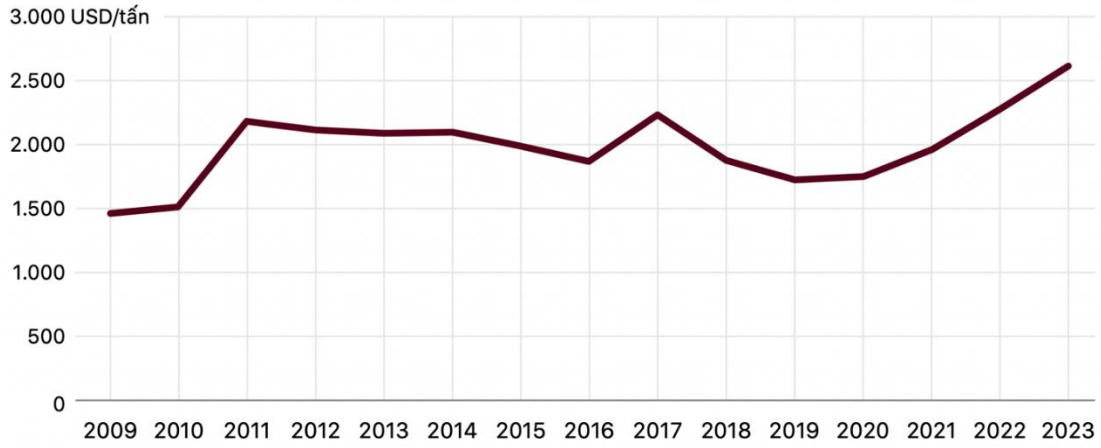

Chart 8: Vietnam's Coffee Export Prices from 2009 to 2023

Source: Data from General Department of Customs

Vietnam's leading coffee export markets in 2023 remained the EU, Japan, the US, and Russia... Among them, the EU continues to be the largest export market with a volume reaching 600,548 tons, valued at nearly 1.5 billion USD, accounting for 37% by volume and 35% by value of Vietnam's total coffee exports. However, compared to 2022, coffee exports to this market decreased by 12.8% in volume and 0.7% in value. Within the EU, coffee exports to Germany reached 196,090 tons, down 12.7%; to Italy reached 142,191 tons, up 2.1%; while exports to Spain and Belgium decreased by 20% and 50.5%, respectively.

Exports to another major market, the US, also decreased by 4.1% over the past year, reaching 293 million USD. Additionally, exports to Russia, the Philippines, and other markets also declined. On the other hand, growth was recorded in exports to Japan (+14.9%), Algeria (+88.4%), South Korea (+27.1%), and notably Indonesia, which surged by 122.4%.

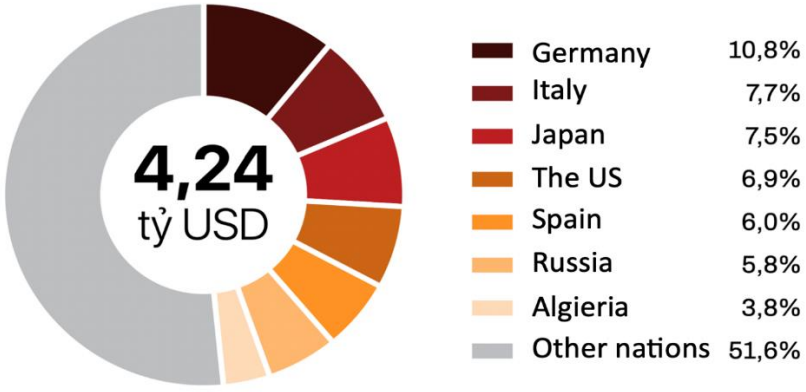

Chart 9: Market Structure of Vietnam's Coffee Exports in 2023 (% by volume)

Source: Data from General Department of Customs

In the domestic market, the price of Robusta green coffee beans increased by 70 - 75% in 2023, rising from 40,000 VND/kg at the beginning of the year to 70,000 VND/kg by the end of the year. Moving into January 2024, coffee prices in key producing provinces in the Central Highlands continued to rise, nearing a new historical milestone of 71,000 VND/kg on January 11, surpassing last year's peak of 70,000 VND/kg.

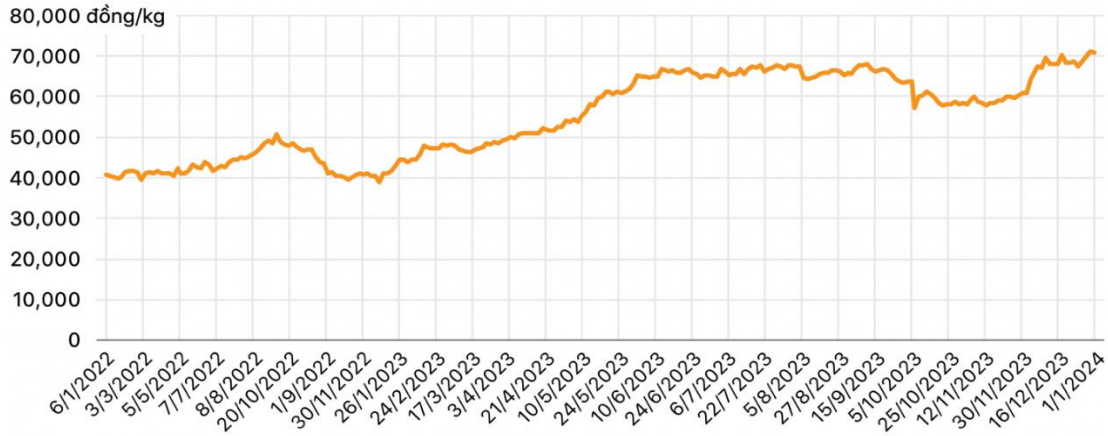

Chart 10: Prices of Robusta green coffee beans in the Central Highlands provinces from the beginning of 2022 to January 12, 2024

Source: Compiled data

According to export businesses, daily hoarding by the public during the harvest season has contributed to a scarcity of supply, pushing domestic prices higher. Many export companies have been unable to secure enough stock to fulfill later delivery contracts. This has led to a decrease in Vietnam's coffee exports in 2023 by nearly 9%, down to 1.61 million tons, according to estimates from the Import-Export Department (Ministry of Industry and Trade). As the world's largest exporter of robusta coffee, domestic market price fluctuations also influence prices on the international market. The price of forward robusta coffee contracts on the London market has also reached a record high, with January 2024 futures contracts rising to $3,075 per ton.

In late 2023, coffee prices on the market continued to experience dizzying increases. In the domestic market, purchasing prices for coffee approached 70,000 VND/kg, an unprecedented level in Vietnam's coffee industry history.The continuous rise in coffee p rices is due to insufficient supply. Many forecasts indicate that the scarcity of supply is ongoing, causing domestic coffee prices in Vietnam to continue rising at least until April 2024.

Contrary to the joy reflected in official data from government agencies, both farmers and some coffee export businesses feel they are not benefiting from the rising coffee prices.

In recent years, coffee-growing areas have shrunk, and purchasing prices for coffee have been fluctuating and rising hourly.

In previous years, my company could calculate production costs annually, but by 2023, production costs are calculated per order. With high purchasing prices, rising production costs, and steady selling prices, businesses are not making profits. Faced with this situation, businesses are shifting to producing higher-end coffee products to increase selling prices. Due to a lack of capital, few businesses bought and stored coffee when prices were low. On the contrary, purchasing coffee now at doubled prices compared to last year, while export prices have only increased by 2.4%, leading to reduced profits.

The coffee market's current volatility, especially with high financial costs, makes Vietnamese businesses hesitant to stockpile coffee. Currently, coffee among traders and agents is almost depleted. Most of the coffee is stored in warehouses of foreign enterprises

with strong financial capabilities, benefiting these companies during this record price surge.

For small and medium-sized enterprises, they face many difficulties in accessing loans. Currently, these businesses mainly rely on mortgage-backed loans. This type of loan limits the amount they can borrow, while purchasing coffee is urgent as it is a highly seasonal agricultural product.

Businesses lacking sufficient capital for purchasing and regulating their plans are pressured into accepting prices when large quantities of coffee are harvested and sold within a very short period. Demand for Vietnamese coffee products in countries like Europe, the US... is substantial. Vietnamese coffee is considered indispensable in the global market because it aligns with global consumer preferences. That's why coffee prices are gradually increasing and have never been as high as they are now since the beginning of the season. This partly reflects the market's significant demand while facing a shortage of supply.

Vietnam's coffee exports will remain dominant until the end of April or early May 2024, as this is when Indonesia and Brazil begin their harvesting seasons. It's crucial for exporting businesses to remain calm in the face of opportunities, to understand and analyze the market thoroughly.

3.2.2. Social Criteria

Coffee is one of Vietnam's key agricultural products, covering an area of over 710,000 hectares and producing more than 1.8 million tons annually. The coffee industry has provided employment and income for over 600,000 farming households, involving 2 million workers, contributing to the socio-economic development of the Central Highlands, Northwest, and other coffee-growing regions nationwide.

The coffee industry is labor-intensive, with statistics showing that between 600,000 to 700,000 workers are employed annually, accounting for approximately 2.93% of the total agricultural workforce and 1.83% of the total national workforce. Therefore, coffee exports contribute to job creation, addressing unemployment issues. This also reduces the burden of labor migration to industrial zones and urban areas in search of employment. People have the opportunity to stabilize their lives and generate income right in their homeland.

Significant growth in coffee production in Vietnam also means the involvement of many farmers and residents in coffee cultivation and production. They have found new sources of income through this crop.

With only 6% of the total coffee production consumed domestically, coffee has become Vietnam's leading export commodity. The coffee production sector supports the livelihoods of about 2.6 million people. Importantly, 600,000 of these are small-scale farmers.

This emerging industry has significantly propelled Vietnam's economy in a short period. Continuous economic growth has improved the quality of life for the Vietnamese people. Based on the national poverty standards issued by the Ministry of Labor, Invalids and Social Affairs, the poverty rate has decreased from over 30% in 1990, 30% in 1992, 15.7% in 1998 to approximately 17% in 2001 (2.8 million households) and 10% in 2000.

Furthermore, global corporations have also participated in developing the coffee industry and supporting Vietnamese farmers. Companies like Nestlé and Mondelez

International have each invested over 200 million USD in farmer training programs to ensure a stable coffee supply.

In 2015, the renowned coffee brand Starbucks introduced its first-ever single-origin coffee from Vietnam to its outlets in more than 50 countries. Over 21,000 farmers have benefited from foreign investment in this booming industry.

Overall, coffee in Vietnam is a growing industry with immense potential for the future. With appropriate policies and guidance, Vietnam's coffee industry can further improve the economy, provide income opportunities, and enhance living standards for many Vietnamese people, contributing significantly to local poverty alleviation efforts.

3.2.3. Environmental Criteria

In line with market trends, many domestic coffee production enterprises in Vietnam have changed their production methods, strengthening the link between processing companies and farmers, ensuring a tight integration from cultivation, care, harvesting to processing coffee. A prime example of this change is that out of the total 600,000 hectares of coffee in the Central Highlands, up to 50% have shifted to cultivation methods following VietGAP standards, thereby enhancing the quality of raw materials to serve processing for demanding export markets worldwide. Many coffee businesses have diversified from merely exporting raw coffee to a range of products. To date, the country has 97 coffee bean processing facilities, 160 roasting and grinding facilities, 8 instant coffee processing facilities, and 11 coffee blending facilities. Consequently, Vietnamese coffee products not only dominate the domestic market but are also exported to many countries.

Developing high-quality coffee is closely tied to green and sustainable development, considered an appropriate direction to elevate Vietnam's coffee sector to stimulate and tap into the domestic and international coffee consumption market, increase export value, and bring higher economic efficiency to coffee growers, farmers, cooperatives, and businesses.

However, Vietnam's coffee production still faces challenges such as negative impacts from climate change, fragmented and small-scale production areas, overexploitation of land, excessive use of inorganic fertilizers, inadequate waste management, lack of sustainability, and most production not yet integrated into value chains. Additionally, many cooperatives have been established but their quality and operational efficiency remain limited; the production infrastructure is not synchronized, and processing facilities do not meet practical production needs.

Vietnam exports coffee to over 80 countries. The European Union (EU) is the largest consumption market, accounting for about 40% of the total coffee export volume. However, the EU's Forest Law Enforcement, Governance and Trade Regulation (EUDR) adopted by the EU Parliament on June 29, 2023, and enforced from December 30, 2024, will significantly impact coffee exports. Specifically, starting December 31, 2024, the EU prohibits the sale of coffee originating from deforested or degraded land. This regulation requires EU coffee companies to collect GPS coordinates of coffee production farms and combine this data with satellite monitoring tools. Consequently, the EU will check compliance and identify potential areas at risk of land degradation and deforestation. The EU regulation is a challenge but also an opportunity for Vietnamese coffee to develop sustainably, adapt to global market regulations. In the future, not only coffee but many

other agricultural products must meet new requirements, especially regarding the environment (greening, forest protection) and sustainable development.

According to the regulation, the EU only cares about cultivation areas post-2020. However, the coffee area we are cultivating post-2020 is minimal. The current area is mostly replanted on areas cultivated before 2020, even before 2000, for a long time, so it will not be significantly affected. Therefore, when implementing the EUDR regulation, there will be no more deforestation for coffee cultivation.

Currently, Vietnam is shifting its cultivation mindset from focusing on area to focusing on productivity linked with quality, applying farming processes based on standards accepted by importers, such as RainForest, 4C standards.

To ensure coffee export volume, Vietnam is reviewing and maintaining areas in regions with advantages and good productivity; based on this, technical solutions are applied to farming practices to reduce input costs and enhance the competitiveness of Vietnamese coffee.

3.3. Some proposals for sustainable development

To achieve sustainable development goals in coffee exports in the coming time, the coffee industry needs to focus on solutions such as:

Firstly, maintaining and strengthening Traditional Export Markets: Vietnamese coffee products need to adapt to the changing product structures to meet market demand and increase the proportion of processed coffee in traditional markets where Vietnamese coffee brands are already recognized. For new markets, there is a need to intensify promotional activities to establish a foothold for Vietnamese coffee products. A strategy that combines both traditional and new markets will ensure a sustainable export market structure. Exporting enterprises should actively participate in international fairs and exhibitions to introduce products and find new customers. Updating market information and trade developments will enable timely adjustments to business operations to fit market signals. In addtion, support and promote certification programs like Fair Trade, Rainforest Alliance, and Organic certifications. These certifications help consumers identify coffee that is produced sustainably and ethically, and they often provide farmers with better prices for their coffee.

Secondly, Human Resource Quality Assurance: Alongside market development, product restructuring, and export value enhancement, businesses in the coffee value chain need policies to maintain stable production through quality human resource management. Quality assurance should start from cultivation, procurement, processing, to coffee export. Many coffee purchasing, processing, and exporting companies have policies to ensure the quality of their workforce. However, the issue of human resource quality in coffee cultivation is often overlooked. Given that human resource quality at the cultivation stage is decisive for coffee quality, support should be provided by coffee purchasing, processing, and exporting companies to enhance human resource quality at the cultivation stage. In addtion, provide farmers with access to education and training programs on sustainable farming practices, financial literacy, and business management. This can help farmers improve their yields, quality, and profitability.

Thirdly, Support and Encourage Stakeholders: Related departments, industries, and localities should find solutions to overcome difficulties, support farmers and businesses to attract investment, apply science and technology, and enhance human resource quality.

Encouraging and strengthening connections and cooperation in coffee production and business aims to stabilize exports and expand markets. Policies should also support and encourage stakeholders in the coffee value chain to prioritize the application of science and technology to ensure coffee production meets international food safety standards. This approach aims to increase the proportion of Vietnamese coffee products meeting high "clean" standards to build the Vietnamese coffee brand in the global market. In addition, encourage and support coffee farmers to adopt sustainable farming practices such as agroforestry, organic farming, and soil conservation. These practices can help improve soil health, reduce water usage, and minimize the use of pesticides and fertilizers. Moreover, provide farmers with access to education and training programs on sustainable farming practices, financial literacy, and business management. This can help farmers improve their yields, quality, and profitability.

Finally, effective Implementation of FTA Agreements: Coffee export enterprises should effectively implement the Free Trade Agreements (FTAs) Vietnam has signed, thereby increasing competitiveness, expanding markets, and enhancing the brand value of Vietnamese coffee products. Organize training sessions and workshops for coffee exporters and producers to help them understand the provisions of the FTA, including rules of origin, tariff schedules, and documentation requirements. Provide legal assistance to coffee exporters to navigate the complexities of FTA provisions and ensure compliance with the agreement. Ensure that coffee production, processing, and packaging comply with international quality and safety standards to meet the requirements of export markets. Participate in international trade fairs, exhibitions, and promotional events to showcase coffee products, build brand awareness, and connect with potential buyers in FTA partner countries.

4. Conclusion

The sustainable development of Vietnam's coffee export industry presents a complex yet vital challenge for the nation's future economic and environmental well-being. Government policies and industry collaborations have played a pivotal role in promoting sustainability, yet more can be done to ensure equitable distribution of benefits and fair treatment of coffee farmers. Technological advancements offer promising avenues for enhancing efficiency and reducing environmental impact, but their widespread adoption remains a challenge due to financial constraints and infrastructural limitations.

In conclusion, the journey towards sustainable development in Vietnam's coffee export industry is ongoing and multifaceted. It requires a concerted effort from all stakeholders - from farmers and producers to policymakers and consumers - to prioritize long-term sustainability over short-term gains. By embracing this holistic approach and fostering a culture of responsible coffee production and consumption, Vietnam can secure a prosperous and sustainable future for its coffee industry while safeguarding the environment and improving the livelihoods of its coffee farming communities.

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SOLUTIONS FOR ACCOUNTING EDUCATION IN THE CONTEXT OF IFRS IMPLEMENTATION IN VIETNAM

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Abstract: In the context of globalization in economic cooperation and development, accounting is no longer an isolated issue unique to each country. Therefore, to meet the diverse requirements of businesses and investors, many countries allow enterprises to choose between national accounting standards or International Financial Reporting Standards (IFRS) when preparing and presenting financial statements. Preparing financial statements in accordance with IFRS enhances the transparency and reliability of accounting information, creating a global language for financial reporting. Following this trend, to successfully implement IFRS in Vietnam, the Ministry of Finance has been undertaking numerous coordinated efforts, such as translating IFRS into Vietnamese, researching and developing guidance on its application, and training human resources. However, most accounting training institutions in Vietnam have not yet incorporated IFRS into their curricula and are not fully prepared for its implementation. This article discusses the challenges of adopting IFRS in Vietnam and proposes several solutions for accounting education in the context of IFRS application.

Keywords: *International financial reporting standards, accounting education, IFRS application*

1. Introduction

In the context of accounting being regarded as a global business language, allowing the adoption of IFRS will provide regulatory authorities, owners, investors—especially foreign investors—with a tool to evaluate and compare financial information across entities using a common language and unified standards, enabling appropriate economic decision-making. One of the reasons Vietnam has not yet been recognized as a market economy is that its financial reporting standards are still incomplete and outdated compared to international practices. Therefore, allowing the application of IFRS in Vietnam will contribute to the international community's recognition of Vietnam as a full market economy, facilitating foreign direct investment (FDI) flows and demonstrating the government's strong commitment to protecting investors and creating a healthy business environment. This serves the goals of sustainable development and enables enterprises to qualify for international stock listings or access preferential loans from international financial institutions such as the World Bank (WB), International Monetary Fund (IMF), and Asian Development Bank (ADB). FDI enterprises, as subsidiaries of multinational corporations, will no longer incur additional costs to convert financial statements to IFRS for consolidation with their parent companies abroad. Moreover, applying IFRS will establish a legal framework for accounting for various financial instruments, assets, and liabilities at fair value. Developing specific regulations for financial instruments and derivative transactions will significantly impact both the primary market (issuance of

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financial instruments) and the secondary market (trading of financial instruments). In the primary market, banks and financial institutions will have a clear legal basis for accounting for newly issued financial instruments such as futures contracts, forward contracts, options, and swaps. In the secondary market, a comprehensive system of financial reporting standards for financial instruments will help promote investment in derivative financial instruments as a type of security traded on centralized exchanges. Notably, the application of IFRS is one of the factors contributing to the upgrade of Vietnam's stock market. It enhances the transparency and reliability of financial statements, safeguarding investors' rights as IFRS requires financial statement items to be recognized and presented based on their substance rather than the form or name of the transaction. This minimizes the impact of transaction form on accounting methods, thereby improving the comparability of financial statements of Vietnamese enterprises with those of other companies in the region and worldwide. IFRS also mandates detailed disclosures about risks that enterprises may face, such as business risks, credit risks, and policy risks, providing more comprehensive information to investors and creditors when making investment decisions. Additionally, IFRS requires the application of various financial models to determine the fair value, recoverable value, value in use, time value, and intrinsic value of assets and liabilities. Thus, financial information provided under IFRS helps enterprises assess their financial position at the reporting date and equips management with better information for forecasting future performance and cash flows. This provides a basis and tools for governance and operations aligned with real-world conditions.Thực tế hiện nay, vấn đề nguồn nhân lực là một trong những rào cản trong áp dụng IFRS.

Therefore, human resource training plays a very important role when enterprises apply IFRS and accounting training at training institutions plays an important role in providing quality human resources for society. Training institutions need to have appropriate changes in accounting training so that graduates can meet the requirements of enterprises operating in many areas of the economy.

2. Challenges in IFRS Adoption and the Reality of Accounting Education in Vietnam

In Vietnam, most accountants and auditors lack substantial experience in applying IFRS, which encompasses numerous new and complex aspects. Additionally, accounting education in Vietnam still faces certain limitations, as outlined below:

Training content

Currently, the training programs at accounting schools over the years have tended to be designed in accordance with the accounting regime, even mentioning VAS relatively limitedly. Meanwhile, the Enterprise Accounting Regime stipulates detailed accounting entries, however, they are only entries of some economic transactions and even if they are more detailed, they cannot cover all economic transactions arising in socio-economic life. On the other hand, in the future, when re-issuing Vietnamese Accounting Standards following the IFRS orientation, the Ministry of Finance plans to not prescribe detailed accounting regimes as they are now, but instead issue a set of guidelines for applying accounting standards. The rigid accounting entries as they are now will no longer be mandatory but will only be for guidance and reference. Accounting account numbers will be considered for enterprises to set up in accordance with the operational characteristics

of each unit to avoid having to map with the parent company's accounting system. In addition, the accounting software system has provided maximum support to accountants in making accounting entries, making accounting entries is almost simply data entry and only plays a secondary role in accounting work. And in fact, currently accounting training is focusing on guiding accounting entries (the goal is only to train data entry people) but must aim to meet the basic and consistent requirements of accounting which is to prepare and present financial statements.

The current accounting training is simply a rigid way of showing people how to do things (sometimes that way is not necessarily appropriate) without telling them why they have to do it that way. If students are only taught how to do things, they will easily turn into robots and lose their creativity.

Training focuses too much on accounting training to be able to declare and settle taxes. Meanwhile, the principles of tax declaration and settlement are not often changed, but detailed regulations such as tax rates, deductible and non-deductible expenses when determining personal income tax... can often change, even change annually because taxes serve the purpose of regulating annual state budget revenue. Focusing on training on tax declaration and settlement, it is very likely that such knowledge will be outdated when students graduate.

Training methods

The implementation of teaching accounting subjects at universities is mostly technical, mainly calculation techniques, meticulously recording accounting transactions in accounting books and finally preparing financial statements, leading to the organization of training programs, linking the matrix of subjects related to the content of accounting subjects that mainly rely on VAS and specific accounting regimes. Even the way of teaching some accounting subjects revolves around legal documents on accounting, such as circulars, decrees, etc. Therefore, when implementing the shift to IFRS training in a systematic way, it will cause universities and lecturers to face great challenges (Luong Thanh Ha, 2022). Previously, we often thought that accounting was mainly about recording (BOOKEEPING) economic transactions arising at the unit, the task of synthesizing, analyzing information and presenting financial statements in many cases was not emphasized as the top priority task. In addition, due to the heavy burden of State management requirements, accounting is aimed at ensuring budget revenue rather than serving the administration and management of the enterprise itself. Therefore, the Accounting Regime focuses on the method of recording and making accounting entries. Accounting methods are heavily influenced by tax regulations, such as: Requiring enterprises to implement a unified system of accounts in terms of numbers and names; Some types of accounting documents, accounting systems and forms of accounting books must follow mandatory forms and procedures. The above problems stem from the policy approach of the centralized subsidy economy, with viewpoints such as if it cannot be managed, it must be banned, the State must uniformly and thoroughly manage and intervene in all socio-economic activities. It is the somewhat outdated concepts from the State management agency in the field of accounting that have made accountants not realize the primary role of accounting is to serve the management decision-making of business owners (investors) rather than serving tax purposes, and have not escaped the shadow of the bookkeeper (BOOKEEPER).

Teachers and students

The human resources of lecturers with international qualifications and professional certificates at universities are still extremely limited. The number of lecturers who are capable of self-training/specialized training in international economics and research in English accounts for only 20% of university lecturers. In addition, there are limitations in investment resources for university facilities, and the system of learning materials oriented towards international economics is not yet popular. Many faculties and schools have to prepare their own learning materials in the form of slides and internal training documents, but only in the direction of basic approaches to IFRS.

Learning materials

The documents commonly used as official textbooks and reference materials in accounting training today are mainly textbooks published by schools. Basically, textbooks and basic reference materials are based on Vietnamese Accounting Standards and Regimes). Meanwhile, the original IFRS documents in English are a significant barrier to research for students (Phan Thi Anh Dao, 2020).

3. Solutions for Accounting Education in the Application of IFRS in Vietnam

Firstly, training content

Early implementation of the development of an accounting training program framework in line with the IFRS application orientation. Accordingly, changing the training direction, instead of training accounting according to the Regime, training institutions conduct training in the direction of training program content including both IFRS and Accounting Regime.

Secondly, Training methods

Changing the accounting training method. Instead of focusing on guiding accounting provisions, training accountants should first provide students with a way of thinking; a method of reasoning, handling, and solving practical problems through case studies. In addition to training in accounting theory and financial reporting standards, it is necessary to train learners how to apply that theory to handle daily practical work taking place at the unit. Apply appropriate accounting principles (among the principles prescribed by the Standards) for each transaction and specific situation. For example, the principle of recognizing revenue according to performance obligations requires deferring the portion of revenue corresponding to unfulfilled obligations and accordingly, the cost of goods sold must not be pre-deducted. The matching principle requires that when revenue has been fully recorded, in some cases, the cost of goods sold must be pre-deducted for unfulfilled obligations in order to present new, fair and reasonable financial statements. Or, the same principle of revenue recognition according to performance obligations, but for resort real estate, it will be handled differently from the Golden Lotus program of Vietnam Airlines.... Even at the international level, the International Accounting Standards Board (IASB) previously named its Standards as International Accounting Standards (IAS), but now it has been and is being converted to International Financial Reporting Standards (IFRS). Changing the name of International Standards is not simply a change of name for a system of Standards, the core issue is to emphasize that the purpose of the Standards is to provide information on financial statements, not accounting records. Therefore, training needs to change in training methods in accordance with the trend and spirit of IFRS. (Trinh Duc Vinh, 2024)

To develop learners' capacity, it is necessary to convey to learners the financial nature of economic transactions, from which to decide how to solve the problem or in other words, learners, in addition to knowing how to do it, must also understand why it is necessary to do it. For example, training must help learners understand why interest can be capitalized but exchange rate losses cannot be capitalized, why expenses must be reduced but not increased, even though both reducing expenses and increasing revenues lead to the same profit result.Cần đào tạo về nguyên lý và những kiến thức cơ bản về xử lý thuế đối với sinh viên chuyên ngành kế toán và những kiến thức thuế thực tiễn cần phải gắn với môi trường thực tế của doanh nghiệp.

As analyzed above, if we focus on training on tax declaration and settlement in schools, it is very likely that such knowledge will be outdated when students graduate. Therefore, training on principles and basic knowledge of tax treatment is enough for accounting students, practical tax knowledge needs to be linked to the real business environment rather than theoretical training.

Modern teaching methods to promote initiative, thinking, reasoning, and handling of research situations linked to reality.

Tthirdly, learning materials:

The application of International Financial Reporting Standards (IFRS) in accounting training poses many new challenges and requirements for the learning materials system and teaching methods. To meet these requirements, here are some learning material solutions that can be applied:

Developing IFRS-compliant learning materials

Textbooks and specialized materials: Compile specialized documents and textbooks on IFRS, explaining the standards in detail, with practical examples and application exercises.

Online learning tools: Develop online learning platforms that provide materials such as video lectures, PDF documents, tests and practice exercises.

Comparative materials: Develop comparative materials between IFRS and current accounting standards in Vietnam (VAS) to help students understand the differences and apply them in practice.

Integrating Technology into Learning Materials

Case Study Simulation: Create business simulations with real data for students to practice preparing and analyzing financial statements according to IFRS.

Interactive learning materials: Use tools such as e-learning, AR/VR to help students approach IFRS in a more intuitive and vivid way.

Accounting software application: Integrate modern accounting software that supports IFRS such as SAP, Oracle or upgraded domestic software.

Training and updating knowledge for lecturers

Intensive training program: Organize intensive courses and seminars on IFRS for lecturers to improve their professional qualifications and update new knowledge. International cooperation: Invite foreign experts or cooperate with international organizations (IASB, ACCA) to provide standardized and quickly updated learning materials.

Enhance practical learning materials

Case studies from businesses applying IFRS: Collect financial statements of

businesses that have applied IFRS as samples for students to refer to.

Practical exercises: Provide exercises that require students to perform steps from accounting, preparing financial statements to data analysis.

Building a learning support system

Open Educational Resources: Create a repository of free materials, including lectures, tests, and FAQs for students to study on their own.

Learning Community: Create an online forum or study group for students to exchange experiences and answer questions related to IFRS.

Bilingual support

There is a need for bilingual materials so that students can both study IFRS and improve their technical English skills since IFRS is written in English..

Link with international certification organization

Encourage students to participate in international certification training programs such as ACCA, CFA, ICAEW, where IFRS is a core content, and support learning materials and training costs.

Fourthly, the lecturer: **Applying International Financial Reporting Standards (IFRS)** in accounting training not only requires innovation in learning materials but also requires improving the quality and capacity of the teaching staff. Below are some specific solutions to improve and develop the teaching staff to meet the requirements of teaching IFRS:

Intensive training and development for lecturers

Organize short-term and long-term courses taught by domestic and foreign experts to help lecturers master the content of IFRS standards, from theory to practice.

The content should focus on specific aspects of IFRS such as: how to prepare consolidated financial statements, fair value, and handling financial instruments.

Encourage lecturers to participate in and obtain international professional certificates such as ACCA (Association of Chartered Certified Accountants), ICAEW (Institute of Chartered Accountants in England and Wales), or CFA (Chartered Financial Analyst).

Ensure funding or cost support for lecturers during their studies.

Building practical teaching capacity

Provide opportunities for lecturers to participate in practice at enterprises that are applying IFRS to gain practical perspectives and specific examples for teaching.

Cooperate with auditing organizations or multinational companies so that lecturers can practice and research more deeply on standards.

Provide courses to improve pedagogical skills, especially teaching complex content such as IFRS.

Use modern teaching methods such as case studies, project-based learning, and technology applications.

International cooperation and professional exchange

Invite IFRS experts from the IASB (International Accounting Standards Board) or reputable accounting organizations to share experiences and guide lecturers on how to apply standards in training.

Create opportunities for lecturers to participate in exchange programs or internships at international universities or financial institutions.

Build a community of accounting lecturers specializing in IFRS, where lecturers can

share learning materials, teaching methods and support each other.

Applying technology in teaching

Ensure lecturers are familiar with teaching technology tools such as accounting software (SAP, Oracle), e-learning platforms, and other online tools.

Support lecturers in developing digital lectures, video lectures, or accounting simulation models based on IFRS.

Connecting lecturers with business practices

Cooperate with IFRS-applying companies to organize practical lectures or business visits.

Encourage lecturers to participate in IFRS application research projects with businesses, thereby creating a database and practical teaching materials.

Fifthly, the Learner

To ensure that learners (students and trainees) can adapt and achieve high efficiency in accounting training according to International Financial Reporting Standards (IFRS), it is necessary to deploy synchronous solutions, focusing on capacity, attitude, and learning conditions. Below are specific solutions::

Raising awareness of the importance of IFRS

Organize seminars, talks, or orientation classes at the beginning of the course to help students understand the importance of IFRS in the context of globalization and modern career requirements.

Invite accounting and auditing experts from businesses that are applying IFRS to share their experiences, helping learners clearly see the practical application of IFRS in their work.

Improve learners' foundational skills

Add English courses in accounting and finance, focusing on IFRS terminology so that learners can access original documents and work in an international environment.

Include case studies in the training program so that students can practice their analytical skills, logical thinking, and handling complex situations in accounting according to IFRS.

Provide instructions on how to use modern accounting software (such as SAP, Oracle) and tools to support financial reporting according to IFRS.

Improve learning methods

Enhance practical exercises, such as preparing consolidated financial statements, calculating fair value, and applying IFRS to specific transactions.

Assign student groups projects related to implementing IFRS at enterprises or analyzing actual financial statements of enterprises applying IFRS.

Encourage students to participate in group discussions, present ideas, and debate accounting issues related to IFRS.

Fostering a Positive Learning Attitude

Inspire learners to see IFRS updates as a continuous requirement, thereby proactively self-studying and improving their qualifications.

Include subjects on professional ethics and social responsibility in the training program so that students are aware of the important role of accounting in ensuring the transparency and accuracy of financial statements.

Sixthly, educational institution

Investing in a rich system of learning materials on IFRS, investing in funding for lecturers to participate in international certification programs, participating in practical activities at enterprises; short-term courses at home and abroad, etc.

In addition to training at training institutions, to ensure the successful application of IFRS, enterprises and related subjects also need to have preparations, changes in thinking and awareness, equip themselves with new skills and knowledge that enterprises need, such as building a timely, systematic, continuous and long-term human resource training plan, not only training the accounting department but also equipping the Board of Directors and key managers with basic knowledge and understanding of finance; Changing leadership thinking, raising awareness of compliance, organizing a strong enough legal department in enterprises. At the same time, to effectively train human resources, enterprises need to take advantage of knowledge, understanding, support and resources from auditing and consulting enterprises, foreign investors, and professional associations; need to build a strong enough information technology system to ensure the efficiency and effectiveness of internal management; Ensure connection between accounting and finance departments and other departments; Ensure connection between parent companies and subsidiaries and affiliated units;...

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STRUCTURAL TRANSFORMATION OF HUMAN RESOURCES IN VIETNAM IN THE CURRENT CONTEXT

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Summary: The transformation of human resource structure is a crucial factor in the economic development of every country, particularly for Vietnam in the current context. In a period of significant change, marked by technological advancements, international integration, and demands for innovation, Vietnam faces major challenges in restructuring and improving the quality of its workforce to meet the economy's demands. This study focuses on clarifying the current state of human resource structural transformation in Vietnam from 2013 to 2023. Data analysis shows that during this period, Vietnam's human resource structure experienced positive shifts, notably an increase in the proportion of labor in modern industries and services, alongside a gradual decrease in the proportion of labor in agriculture. At the same time, the quality of the workforce has improved significantly due to policies that invest in education, vocational training, and skill development. However, the study also highlights major challenges that need to be addressed, including a shortage of high-quality labor in advanced technology sectors, unequal distribution of labor across regions, and limited access to modern training programs for workers in rural areas. Based on these findings, the authors propose solutions for developing human resources in the coming period.

Keywords: *Human resource transformation, human resource structure, Vietnamese workforce*

1. Introduction

The transformation of human resource structure is a key factor in the process of economic development, particularly for Vietnam in the current context. Throughout its process of reform, the Vietnamese economy has witnessed significant changes, transitioning from a centrally planned economy to a market economy with the participation of various economic sectors. However, as the economy undergoes transformation and integrates deeply into the global economy, challenges remain regarding the structure of human resources. In particular, the shift of labor from agriculture to industry and services is occurring slowly and unevenly. Furthermore, the quality of labor has not yet met the increasingly high demands of the economy.

Currently, the Vietnamese economy is facing the Fourth Industrial Revolution, characterized by the rapid development of digital technology, artificial intelligence, and automation. This presents both opportunities for growth and new requirements for human resources, particularly in high-tech industries, manufacturing, financial services, and occupations that demand high professional qualifications. However, Vietnam's labor force remains primarily concentrated in low-skilled and agricultural sectors, while the

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high-tech manufacturing, digital technology, and modern services industries require a workforce with high levels of expertise, creativity, and the ability to work in a digitalized environment.

In this paper, the authors will analyze the state of labor structure transformation and labor productivity in the Vietnamese economy from 2013 to 2023. By doing so, the authors aim to identify both the achievements and the ongoing challenges, and propose solutions for the development of the workforce in the coming period.

2. Research Theory

Economic structure is a concept that has been discussed by researchers for a long time, with various interpretations. Kuznets (1961) argued that economic structure is a coherent system, where the parts have mutual relationships, with each part having its distinct role while all aiming for common objectives. Michael E. Porter (1990), on the other hand, emphasized that economic structure reflects dynamic comparative advantage, influencing the formation of highly competitive industries and products. As a result, the sectoral structure of an economy not only has the potential to be profitable but also to remain competitive under any circumstances.

When discussing economic structural transformation, many scholars have developed their own theories regarding this process in economic development. H. Chenery (1988) and Syrquin M (1988) are prominent authors who made significant contributions to clarifying the concept and theory of economic structural transformation. According to these authors, each country or region, in its development process, must find effective ways to transform its economic structure, maximizing its internal strength, leveraging comparative advantages, and utilizing external factors. H. Chenery (1988) defined the transformation of economic structure as a process of changes in both industrial structure and institutions, playing a crucial role in the sustainable growth of the economy. This includes the accumulation of both physical and human capital, changes in demand, production, circulation, and employment, as well as being closely linked with socio-economic processes such as urbanization, demographic shifts, and income distribution.

The movement of labor between sectors not only drives structural transformation but also increases labor productivity, creating a driving force for economic development. Studies have shown that changes in the proportion of labor between sectors directly impact the GDP structural transformation of the economy. Kuznets (1930) demonstrated that changes in labor productivity would significantly influence the growth scale of sectors. Specifically, some sectors may suffer negative impacts if others expand too rapidly, leading to labor reallocation and changes in sectoral structure. Kuznets (1976) further asserted that labor productivity growth has a strong effect on structural transformation and vice versa, meaning that changes in labor productivity will drive economic structural transformation and vice versa. Additionally, Fabricant (1942) agreed with Kuznets' viewpoint regarding the reciprocal influence between labor productivity and structural transformation. His research showed that technological changes would create new job opportunities, develop new industries, and, in turn, alter labor demand between sectors. It is this technological development and innovation that plays a vital role in creating structural shifts between industries, increasing labor efficiency, and enhancing labor productivity.

In recent years, the concept of economic structural transformation has continued to evolve, with scholars emphasizing the intricate relationship between labor productivity and sectoral shifts. Gollin and Kaboski (2023) highlight that structural transformation encompasses not only the traditional reallocation of labor from agriculture to manufacturing and services but also transitions from rural to urban settings, informal to formal employment, and self-employment to wage labor. These multifaceted transitions are pivotal in understanding economic development dynamics. Ramessur (2021) examines the African context, demonstrating that structural transformation is central to economic development and a crucial source of labor productivity growth. The study underscores that shifts in employment across sectors significantly contribute to overall productivity enhancements, reinforcing the importance of sectoral labor reallocation in driving economic progress. Furthermore, the role of human capital in facilitating structural transformation has been underscored in recent literature. Investment in human capital is significantly and positively associated with the rate at which countries close the labor productivity gap between agriculture and other sectors, highlighting the importance of education and skill development in economic transitions. Additionally, Liu (2022) explores the relationship between structural transformation and total factor productivity (TFP), finding that structural transformation has an inverted U-shaped effect on TFP. This suggests that while initial structural changes can boost productivity, there may be diminishing returns beyond a certain point, indicating the need for balanced and strategic approaches to economic restructuring. These contemporary studies provide nuanced insights into the complexities of economic structural transformation, emphasizing the critical roles of labor reallocation, human capital investment, and balanced sectoral shifts in enhancing productivity and fostering sustainable economic development.

3. Research Methodology and Data

The descriptive statistical method is used to summarize, present, and analyze data in an understandable and accessible way. This method was introduced by John Graunt in 1662. According to this method, data is systematically collected, organized, and compared to facilitate easy analysis.

Regarding the research data, the author utilized reliable data that was statistically compiled from the General Statistics Office of Vietnam, covering the period from 2013 to 2023. This data provides a solid foundation for the analysis of labor force dynamics, employment trends, and structural transformation in Vietnam's economy over the past decade. The data has been meticulously organized to enable clear insights and facilitate the identification of key patterns, trends, and correlations relevant to the study's objectives.

4. Research Findings

In recent years, the labor structure in Vietnam has undergone significant shifts from agriculture to industry and services. The proportion of labor in agriculture has decreased from 48.7% in 2010 to only 26.9% in 2023, which equates to approximately 13.8 million people. This shift reflects the country's ongoing industrialization and urbanization, as well as a move towards more diversified economic activities. Meanwhile, the labor force in the service sector has risen from 29.6% to 39.6% over the same period, with significant growth in sectors such as tourism, transportation, e-commerce, and real estate. These

industries are increasingly attracting labor due to their expanding contribution to the economy and the demand for skilled workers in modern sectors.

The industrial and construction sectors have also seen an increase in labor force participation, accounting for 33.5% of the total workforce in 2023 (General Statistics Office, Vietnam Statistical Yearbook 2023). This shift indicates a significant structural change in the labor market, with an emphasis on higher-skilled, technology-driven sectors such as manufacturing, information technology, and construction. These trends highlight the necessity for Vietnam to continue improving the quality of its human resources to meet the evolving demands of a rapidly advancing economy, especially in the context of the ongoing science and technology revolution.

In order to sustain this transformation, there is an urgent need for further investment in education, vocational training, and skills development to equip the workforce with the expertise required for high-tech industries, digital services, and other emerging sectors. This shift towards high-quality human resources is not just a necessity for maintaining economic growth, but also crucial for enhancing Vietnam's competitive advantage in the global marketplace.

Table 1: Labor Structure by Economic Sector from 2013 to 2023

(Unit: Thousand people)

Sector	2013	2015	2017	2019	2021	2022	2023
Total	52,507.8	53,110.5	53,708.6	54,659.2	49,072.0	50,604.7	51,287.0
Agriculture, forestry, and fisheries	24,569.9	23,135.7	21,458.7	18,831.4	14,262.3	13,937.6	13,815.4
Mining	273.0	230.5	214.7	197.9	175.1	196.0	170.5
Manufacturing and processing industries	7,363.2	8,457.5	9,537.6	11,287.6	11,209.1	11,767.9	11,956.7
Electricity, gas, hot water, steam, and air conditioning supply	132.4	147.6	152.6	192.8	151.4	139.6	145.8
Water supply; waste and sewage management and treatment	119.0	121.9	134.3	163.2	169.0	183.6	155.9
Construction	3,288.7	3,283.4	4,065.3	4,615.2	4,545.2	4,639.8	4,744.8
Wholesale and retail trade; repair of motor vehicles, motorcycles, and other motor vehicles	6,571.6	6,747.4	6,883.6	7,279.9	7,203.9	7,893.6	7,766.3
Transport, warehousing	1,507.8	1,646.9	1,744.4	1,970.8	1,856.5	1,906.5	2,021.6
Accommodation and food services	2,204.7	2,461.6	2,455.2	2,739.4	2,493.4	2,685.0	2,926.3
Information and communication	269.2	345.5	330.2	346.8	284.6	313.2	339.5
Financial activities, banking, and insurance	335.3	370.4	374.8	482.6	484.6	489.7	492.3
Real estate activities	152.0	162.7	226.9	303.4	308.2	366.5	361.1
Professional, scientific, and technological activities	244.2	241.9	245.1	310.5	311.9	358.5	407.8
Administrative and support service activities	226.9	297.0	308.6	355.5	329.9	365.4	415.7

Activities of the Communist Party, social-political organizations; state management, national security; mandatory social security	1,692.5	1,694.9	1,705.1	1,465.1	1,372.6	1,285.6	1,288.6
Education and training	1,816.3	1,863.6	2,008.6	1,986.3	1,861.1	1,891.4	1,976.1
Health and social assistance activities	503.4	543.8	529.9	612.3	597.9	597.6	625.3
Arts, entertainment, and recreation	280.1	279.8	283.3	271.9	267.5	281.3	291.8
Other service activities	780.6	870.4	852.8	1,015.8	1,007.4	1,103.6	1,169.9
Domestic service activities in households, production of material products and self-consumed services in households	173.0	204.6	193.5	227.1	177.0	198.2	211.8
Activities of international organizations and agencies	4,0	3,4	3.4	3.7	3.4	4.3	3.9

Source: Author's compilation from General Statistics Office data from 2013 to 2023.

Over the past decade, Vietnam's labor structure has undergone significant changes, reflecting the clear trend of labor shifting from agriculture to industry and services. This transformation is a result of industrialization, modernization, and efforts to improve the business environment, aimed at enhancing labor productivity and adding value. From 2013 to 2023, statistical data show notable shifts in key economic sectors, such as agriculture, industry, and services. In 2013, the agriculture, forestry, and fishery sector had the largest share of labor, employing 24,569.9 thousand people. However, by 2023, this number decreased to 13,815.4 thousand people, and the sector's share of labor dropped from 48.7% in 2010 to 26.9% in 2023, reflecting a shift in the workforce towards higher value-added sectors. The decline in agricultural labor not only indicates the ongoing urbanization and industrialization but also reflects the results of policies encouraging economic restructuring over the past decade.

In the industrial sector, the workforce has grown steadily, particularly in the manufacturing and processing industries. In 2013, the manufacturing and processing industry employed 7,363.2 thousand people, rising to 7,920.9 thousand in 2015 and reaching 11,956.7 thousand in 2023. This increase demonstrates the positive impact of policies promoting investment in production and industry, especially from the private sector and foreign direct investment (FDI). Additionally, other sectors like electricity generation and distribution, gas, water heating, and air conditioning have also seen changes, with employment falling from 156.3 thousand in 2013 to 145.8 thousand in 2023. The water supply, waste management, and wastewater treatment sectors saw an increase in labor, rising from 97.7 thousand in 2013 to 155.9 thousand in 2023, reflecting the sustainable development of infrastructure services. The construction sector has also shown strong growth, with labor rising from 3,288.7 thousand in 2013 to 4,744.8

thousand in 2023, evidencing the expansion of infrastructure development and urbanization, which has created many new job opportunities.

In the services sector, labor has increased rapidly, affirming the sector's critical role in the economy. In 2013, wholesale, retail, and motor vehicle repair sectors employed 8,205.9 thousand people, decreasing to 6,767.8 thousand in 2015 but recovering to 7,766.3 thousand in 2023. The transportation and warehousing sector grew from 1.508.1 thousand in 2013 to 2,021.6 thousand in 2023. The accommodation and food services sector, linked to the development of tourism, saw a significant rise, from 1,043.3 thousand in 2013 to 2,926.3 thousand in 2023. The information and communications sector also expanded, with employment rising from 269.3 thousand in 2013 to 339.5 thousand in 2023, demonstrating the growth of information technology and communications in the digital era.

Notably, the science and technology sector has seen exceptional growth. The number of workers in this field increased from 244.8 thousand in 2013 to 407.8 thousand in 2023. This growth indicates Vietnam's increasing focus on developing human resources in science, fostering research and innovation to meet the demands of the modern economy. The finance, banking, and insurance sectors also expanded, growing from 335.3 thousand in 2013 to 492.3 thousand in 2023, reflecting the development of the financial sector in supporting economic activities. The real estate sector also saw growth, with employment increasing from 162.4 thousand in 2013 to 361.1 thousand in 2023. The administrative and support services sector increased from 243.2 thousand in 2013 to 415.7 thousand in 2023, highlighting the growing role of support services in the economy.

In summary, Vietnam's labor structure between 2013 and 2023 has seen significant transformation, with a decrease in agricultural labor and an increase in industrial and service sector labor. This shift not only helps enhance labor productivity but also contributes to creating favorable conditions for sustainable economic development. The rapid development of human resources in science and technology has played a crucial role in improving labor quality, driving the growth of industrial and service sectors. These changes reflect Vietnam's success in creating a favorable business environment and promoting investment in high-value-added sectors, thus enhancing its competitiveness and meeting the demands of the globalized economy.

Table 2: Labor Productivity by Economic Sector from 2013 to 2023

(Unit: Million VND/person)

Sector	2013	2015	2017	2019	2021	2022	2023
Total	85.2	97.7	117.2	141	173	199.3	85.2
Agriculture, Forestry, and Fisheries	27.7	32.5	37.9	48.2	75	88.5	27.7
Mining	1,120.5	957.8	961.2	1,167.4	1207.2	1,483.9	1,120.5
Manufacturing and Processing	125.7	128.7	149.3	162.4	185.2	204.2	125.7
Electricity Generation and Distribution, Gas, Steam, and Air Conditioning	847.6	1,099	1,407.9	1462	2,210.6	2,808.2	1,458

Water Supply; Waste Management and Treatment	168.2	207.6	228.4	237.5	254.2	320.7	155.9
Construction	69.3	86	86.4	97.8	111.9	135	69.3
Wholesale and Retail; Repair of Motor Vehicles and Motorcycles	57.6	70.3	83.9	98.9	110.5	129.4	57.6
Transportation and Warehousing	144	155.4	176.2	196.6	203.6	248.6	144
Accommodation and Food Services	57.3	61.1	75.4	82.7	58.9	87.1	57.3
Information and Communication	622.8	588.3	723.6	812	1,073.2	1,043.9	622.8
Financial Activities, Banking and Insurance	599.6	626.7	738.8	700.9	828.9	1018.4	599.6
Real Estate Activities	1,355.4	1,437.9	1,190.1	992.4	1,004.7	1,008.5	1,355.4
Professional, Scientific and Technological Activities	433.6	519.2	592.4	541.9	610.5	539.1	433.6
Administrative and Support Services	298.2	271.6	308.4	322.1	238.6	296.2	298.2
Communist Party, Political-Social Organizations; State Administration, National Defense, and Social Security	57	68.5	79.2	113.3	134.6	162.6	57
Education and Training	69.1	88.6	107.3	141.7	176.6	202.9	69.1
Health and Social Assistance	113.7	135.6	258.6	282.1	460.5	425	113.7
Arts, Entertainment and Recreation	103.9	125.3	151.9	191.6	176.7	220.4	103.9
Other Services	39	43.1	53.1	52.7	47.5	59.1	39
Domestic Work, Production of Physical Goods and Services for Household Consumption	28.9	31.3	40.9	43.1	61.2	60.8	28.9
International Organizations and Agencies	85.2	97.7	117.2	141	173	199.3	85.2

(Source: Author's compilation from Vietnam General Statistics Office data from 2013 to 2023)

Over the period from 2013 to 2023, Vietnam's economy has undergone significant changes in improving labor productivity, with a marked shift between economic sectors. The overall growth in labor productivity from 85.2 million VND per worker in 2013 to 199.3 million VND per worker in 2023 indicates clear improvements in labor efficiency,

reflecting the ongoing industrialization and modernization process in the country. These changes are not only driven by technological advancements but also by policies that promote innovation, improve the business environment, and shift the economic structure throughout this period.

Starting with agriculture, forestry, and fisheries, one of Vietnam's most important economic sectors, this sector has recorded the lowest labor productivity growth in this period. From 27.7 million VND per worker in 2013, labor productivity in this sector only increased to 88.5 million VND per worker in 2023. Despite significant absolute improvements, the growth rate of productivity remains modest. This slow progress is mainly due to Vietnam's agriculture sector still relying on traditional production methods and the use of unskilled rural labor. Factors such as natural disasters, diseases, and dependence on natural conditions have also significantly impacted the sector's development. The lack of technological innovation and the application of advanced scientific techniques in production remains a major challenge for Vietnam's agriculture. Although efforts have been made to improve crop and livestock breeds and farming methods, the agriculture sector still needs a significant push to boost labor productivity, especially in the context of Vietnam aiming for high-tech agriculture to meet both domestic and international market needs.

Meanwhile, the manufacturing and processing industry has witnessed a significant transformation in labor productivity. From 125.7 million VND per worker in 2013, labor productivity in this sector reached 204.2 million VND per worker in 2023, reflecting significant growth and breakthroughs in the industrialization process. This growth is mainly driven by Vietnam's efforts to attract foreign investment, particularly from foreign direct investment (FDI) businesses in processing, manufacturing, electronics, and high-tech industries. Additionally, the adoption of modern manufacturing technologies such as automation and robotics in production lines has helped reduce reliance on manual labor, thus enhancing labor productivity. Industries such as electronics manufacturing, food processing, textiles, footwear, and auto parts have made clear progress in improving product quality, optimizing production processes, and increasing labor efficiency. However, this shift also presents challenges in training and enhancing the skill level of the workforce, especially in industries requiring high technical expertise. The demand for a highly skilled labor force with solid expertise is increasing, so investing in vocational training and education will be critical to maintaining sustainable development in the manufacturing sector.

Notably, the services sector, though not directly contributing to material production, has experienced impressive labor productivity growth during the 2013-2023 period. Labor productivity in the services sector increased from 57.3 million VND per worker in 2013 to 87.1 million VND per worker in 2023. The services sector in Vietnam has grown rapidly thanks to the growth of sectors like information and communication, banking and finance, insurance, tourism, and e-commerce. The development of information technology, especially the internet and mobile applications, has created new opportunities for online services, e-commerce, and financial services. Vietnam has witnessed a boom in the development of online banking services, telecommunications services, and customer service through the internet, driving a substantial transformation in labor productivity in the services sector. Additionally, with the strong growth of tourism, the accommodation and food services sector has also seen notable improvements in labor

productivity, thanks to the development of high-end accommodations and modern dining services. However, the services sector also faces challenges in the quality of human resources, particularly in sectors requiring high soft skills, communication abilities, and customer care. Improving vocational training and developing human resources in the services sector will be a key factor in sustaining this development.

Meanwhile, sectors such as transportation, warehousing, and logistics services have also seen significant growth in labor productivity during this period. Labor productivity in the transportation and warehousing sector increased from 144 million VND per worker in 2013 to 248.6 million VND per worker in 2023, thanks to the development of transportation infrastructure and logistics, particularly with the rise of projects building seaports, airports, and highways. The growth of logistics companies and transportation services has helped reduce transportation costs and improve the distribution of goods domestically and internationally. However, the transportation sector still needs to continue improving service quality, reduce traffic congestion, and enhance the efficiency of transportation infrastructure to ensure sustainable labor productivity growth.

The shift in labor productivity across sectors in Vietnam from 2013 to 2023 shows positive signs of the ongoing industrialization and modernization process. However, there are still many challenges in improving labor productivity in agriculture, construction, and some service sectors. To achieve sustainable development goals in the coming years, improving labor productivity requires not only technological innovation and infrastructure investment but also a stronger human resource development strategy, enhancing the technical skills of workers, especially in manufacturing and service industries. This will be a key factor in helping Vietnam maintain sustainable growth and move towards becoming a high-income economy in the future.

5. Policy Implications

To promote the workforce and shift Vietnam's economic structure towards sustainability, a synchronized strategy and specific solutions are required to enhance the quality of human resources, strengthen adaptability to the development of new economic sectors, especially those in high-value industries and modern services. The following are several proposed solutions:

First, **strengthening labor skills training and development**: One of the core factors in promoting sustainable economic structural transformation is enhancing the quality of the workforce through skills training and development. In the context of globalization and the rapid growth of high-tech industries, improving vocational skills is a prerequisite for enabling the workforce to meet the increasingly stringent demands of the modern economy. The government and businesses must work closely together to design and implement training and retraining programs focused on the skills required for emerging industries and modern service sectors. These programs should not only enhance workers' existing skills but also equip them with the ability to embrace new technologies and operate in digital environments. Particularly, human resources must be intensively trained for key sectors such as manufacturing, information technology, finance, logistics, and financial services. These are high-value industries that play a crucial role in boosting labor productivity and the competitiveness of the economy. Training efforts should not only focus on basic skills but also delve into specialized competencies, such as data analysis, supply chain management, automation, and the application of artificial intelligence (AI).

Furthermore, training programs must be flexible and tailored to the specific needs of each industry, business, and worker group. The government should provide financial support for these programs through subsidies or tax incentives to encourage businesses to invest heavily in workforce development. With thorough preparation, workers will be equipped to meet the demands of the modern labor market, contributing significantly to the process of sustainable economic structural transformation.

Second, **encouraging innovation and entrepreneurship**: Promoting innovation and entrepreneurship serves as a cornerstone for driving sustainable economic restructuring. In an era where technological advancements and environmental concerns shape the global economy, fostering a culture of innovation and entrepreneurship becomes critical to ensuring Vietnam's economic resilience and competitiveness. The government must play a proactive role in creating an enabling environment that supports startups, particularly in high-tech sectors, the digital economy, and green industries. These fields not only promise high value and growth potential but also align with global trends toward sustainability and technological transformation. To achieve this, comprehensive policies should be implemented to nurture entrepreneurial activities. Financial support programs, such as low-interest loans, grants, and venture capital funds, can alleviate the initial financial pressures faced by startups, allowing them to focus on product development and market entry. Tax incentives, particularly for startups in emerging sectors, can further reduce operational costs and encourage business formation. Additionally, entrepreneurship and business management training programs should be developed to equip founders with essential skills in areas such as strategic planning, financial management, and digital marketing. Moreover, fostering a robust innovation ecosystem requires the establishment of incubators and accelerators that provide startups with mentorship, networking opportunities, and access to cutting-edge technologies. Collaborations between universities, research institutes, and businesses should also be strengthened to promote applied research and innovation. By supporting entrepreneurial initiatives and innovation-driven enterprises, Vietnam can stimulate structural economic shifts, diversify its industrial base, and create new employment opportunities. This will not only enhance the competitiveness of Vietnamese businesses but also contribute significantly to the country's transition toward a sustainable and knowledge-based economy.

Third, **focusing on education and scientific research**: Developing high-quality human resources requires prioritizing investment in education and scientific research. This serves as a solid foundation to ensure a workforce capable of innovation and meeting the increasingly demanding requirements of key economic sectors. The government must enhance investment in the education and research system, with a particular focus on scientific, technical, technological, and strategic industrial fields. Such investment should aim not only to improve the quality of education but also to promote applied research, thereby creating a strong link between theory and practice and fostering a dynamic and creative workforce. A critical factor in improving the effectiveness of education and scientific research is strengthening collaboration between universities, research institutes, and businesses. This collaboration can facilitate efficient technology transfer while aligning research efforts with market demands. For instance, research institutes can work directly with businesses to address practical challenges, thereby generating new products,

services, and technologies. This approach not only enhances the competitiveness of enterprises but also drives economic development. Additionally, the focus should be on modernizing university curricula, especially in STEM fields (science, technology, engineering, and mathematics) and advanced technology areas such as artificial intelligence (AI), renewable energy, and biotechnology. These programs should be designed with a practical orientation, enabling students to quickly grasp emerging technological trends and develop the skills necessary to contribute to key economic sectors. To achieve these goals, the government must provide greater support for research funding and establish innovation centers and state-of-the-art laboratories. Moreover, the participation of the private sector in scientific research and technological development projects should be encouraged to ensure that investment resources are utilized effectively. By prioritizing education and scientific research, Vietnam will not only develop a high-quality workforce but also significantly contribute to economic structural transformation, enhance labor productivity, and improve competitiveness in the global market.

Fourth, **implementing policies for reasonable labor allocation**: The effective allocation of labor across industries and regions is a crucial factor in driving economic restructuring and reducing inequalities in workforce distribution. The movement of labor between traditional sectors, such as agriculture, and modern industries and services is essential to ensure that human resources are optimized for the demands of a changing economy. To achieve this, policies for reasonable labor distribution must address disparities between rural and urban areas, promoting balanced development and enabling workers to transition smoothly between sectors. A key aspect of these policies involves supporting rural areas in facilitating career transitions for workers. Many rural workers are often tied to low-productivity agricultural jobs, lacking the skills needed to participate in modern industries. Targeted training programs should be implemented to provide these workers with the necessary vocational skills, enabling them to move into high-productivity sectors such as manufacturing, logistics, and services. Additionally, career transition support programs, including job placement services and financial aid for training, can ease the shift for rural workers into urban-based industries. Moreover, labor mobility policies should address the barriers to inter-regional movement. Simplified administrative procedures and incentives for relocation can encourage workers to move to areas with greater employment opportunities. For instance, providing affordable housing, transportation subsidies, and access to social services in urban areas can attract rural workers while ensuring they have the necessary support to integrate into new environments. At the same time, it is critical to promote the development of industries in rural areas to create local job opportunities. Establishing industrial zones, modern service hubs, and vocational training centers in rural regions can help retain the local workforce, reducing the pressure on urban areas and fostering regional economic balance. This dual approach of supporting labor mobility and creating local opportunities ensures that workforce allocation is aligned with the broader goals of economic transformation and sustainability. By implementing policies that facilitate the rational distribution of labor, Vietnam can address disparities between regions, enhance labor productivity, and support the overall transition of its economic structure toward modernization and inclusivity.

Fifth, **enhancing the application of technology in training and workforce management**: The integration of technology into training and workforce management is

a vital step in preparing the workforce to meet the demands of sustainable development. In a rapidly evolving economic landscape, the ability of workers to operate in high-tech environments and effectively utilize digital tools is becoming increasingly critical. To achieve this, both the government and businesses must actively promote the application of information technology in workforce training, management, and development. One key approach is the development and expansion of online training programs and digital vocational courses. These platforms can provide workers with the flexibility to learn at their own pace, breaking down barriers related to time, location, and cost. Digital courses focusing on high-demand skills, such as data analysis, automation, programming, and digital marketing, can help workers remain competitive and relevant in their industries. Online learning platforms can also improve accessibility, particularly for workers in rural or remote areas who might otherwise lack access to quality training programs. By leveraging e-learning technologies, these platforms can offer interactive content, virtual simulations, and real-time feedback to enhance the learning experience. For example, augmented and virtual reality tools can simulate real-world scenarios, allowing workers to develop practical skills in a controlled and engaging environment. In addition to training, technology can revolutionize workforce management by streamlining processes such as recruitment, performance evaluation, and skill assessments. Companies can use data-driven tools to identify skill gaps, predict training needs, and design tailored development plans for employees. Workforce analytics can provide insights into employee productivity and help businesses align workforce capabilities with organizational goals. The government can play a pivotal role by investing in the development of digital infrastructure and offering incentives for businesses to adopt IT-driven workforce management solutions. Collaborations between public institutions and private organizations can further enhance the development and delivery of digital training programs, ensuring that they align with industry needs. By enhancing the application of technology in workforce training and management, Vietnam can create a skilled and adaptable workforce, capable of thriving in high-tech environments. This not only supports sustainable development but also strengthens the country's competitiveness in the global economy.

Sixth, **attracting talented labor and high-quality workers**: Attracting talented and high-quality workers is a critical strategy for Vietnam to drive sustainable economic growth and remain competitive in an increasingly globalized world. In the current economic landscape, industries such as technology, finance, science, and management play pivotal roles in determining a country's innovation capacity and productivity. To fully leverage these high-value industries, Vietnam must focus on policies that not only develop domestic talent but also attract foreign experts who can bring international expertise and innovative perspectives. One of the key steps is to prioritize domestic talent development. Vietnam should invest heavily in education and vocational training, especially in specialized fields such as information technology, financial engineering, data science, and advanced industrial management. Mentorship programs, scholarships, and collaborations between universities and businesses can help identify and nurture top-performing individuals who can become the backbone of a skilled workforce. However, domestic talent alone may not be sufficient to meet the growing demands of the modern economy. To complement domestic efforts, Vietnam must implement robust policies to

attract foreign experts. These individuals often bring invaluable knowledge, experience, and connections to global markets, which can enhance Vietnam's capacity for innovation and integration into global value chains. Policies that streamline visa processes, provide relocation assistance, and offer long-term residency options will be critical in making Vietnam an attractive destination for global talent. Compensation and working conditions are key to retaining both domestic and foreign talent. Competitive salaries, performance-based bonuses, and comprehensive benefit packages, including housing assistance, healthcare, and education for dependents, are essential. Beyond monetary benefits, a conducive working environment plays an equally important role. This includes fostering a culture of innovation, ensuring access to state-of-the-art tools and technologies, and promoting transparent workplace policies that encourage creativity and collaboration. Furthermore, Vietnam must invest in improving the quality of life in its major economic hubs. Developing infrastructure, ensuring access to high-quality healthcare and education, and creating vibrant urban environments with recreational and cultural amenities will make these cities desirable places to live and work. Social stability and public safety are also crucial factors that contribute to the attractiveness of a location for skilled professionals. By combining these efforts—developing domestic talent, attracting foreign experts, and providing an environment conducive to productivity and well-being—Vietnam can build a robust workforce capable of driving innovation and sustaining growth in key economic sectors. This approach will not only enhance Vietnam's global competitiveness but also support its transition to a knowledge-based economy that thrives on expertise and creativity.

In conclusion, enhancing the quality of human resources will not only meet the needs of economic restructuring but will also contribute to building a sustainable and globally competitive Vietnamese economy. The solutions mentioned above will help optimize this transition, while also driving the country's economic development in the future.

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HIGH-TECH AGRICULTURE DEVELOPMENT IN VIETNAM: A CASE STUDY OF QUY HOP DISTRICT, NGHE AN PROVINCE

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Introduction: High-tech agriculture represents a strategic solution for sustainable development, particularly in Vietnam's agricultural sector, which faces significant challenges such as climate change, labor shortages, and increasing demands for quality products. The integration of advanced technologies in agricultural production not only enhances productivity and quality but also strengthens the competitiveness of Vietnamese agricultural products in global markets. Quy Hop district, Nghe An province, possesses favorable conditions for agricultural development, including abundant natural resources, extensive land areas, and a skilled labor force. Over the years, the district has implemented various high-tech agriculture models, including automated irrigation systems, greenhouse cultivation, and high-quality crop varieties. Despite these efforts, challenges such as limited investment capital, technological capacity, and market connectivity remain obstacles to high-tech agriculture expansion. This study aims to analyze the practical applications of high-tech agriculture in Quy Hop district, assess their effectiveness, identify achievements and limitations, and extract valuable lessons. Based on these findings, the paper proposes solutions for high-tech agriculture development in the district, providing important references for other regions and contributing to Vietnam's sustainable agricultural strategy.

1. Understanding high - tech agriculture development

1.1. Definition of high - tech agriculture development

High-tech agriculture development refers to the integration of advanced scientific and technological innovations into every stage of the agricultural production process. Its primary goal is to optimize efficiency, enhance productivity, and mitigate environmental impacts, addressing critical challenges such as climate change, resource depletion, and increasing food demand. This approach employs a range of cutting-edge technologies, including biotechnology, automation, artificial intelligence (AI), big data analytics, and environmental management systems (FAO, 2010).

By leveraging modern scientific advancements, high-tech agriculture transforms traditional farming into a system capable of achieving maximum efficiency and sustainability. Biotechnology, for instance, plays a crucial role by enabling the development of genetically improved crop varieties that are resistant to pests and diseases, tolerant to drought, and enriched with essential nutrients. These advancements cater to consumer demand for high-quality, safe, and sustainable food products (Pretty, 2008).

Artificial intelligence and big data further revolutionize agricultural practices by enhancing data-driven decision-making. AI-powered tools facilitate precise monitoring

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of crops and livestock, enabling real-time interventions to improve yields. Big data analytics, on the other hand, provides insights into weather patterns, soil health, and market trends, allowing farmers to optimize resource allocation, such as water and fertilizers, while minimizing waste (Zhang, Wang, & Wang, 2002).

Automation technologies, including drones and robotics, significantly reduce labor dependency and operational costs. Drones equipped with multispectral cameras can assess crop health across large fields, while automated irrigation systems ensure precise water delivery, conserving valuable resources. Environmental technologies, such as renewable energy systems and waste recycling methods, contribute to reducing agriculture's carbon footprint and promoting sustainability (FAO, 2018).

High-tech agriculture development not only addresses global agricultural challenges but also strengthens food security, economic resilience, and environmental sustainability. It creates opportunities for farmers to transition from traditional practices to innovative systems, ensuring that agriculture remains adaptive and competitive in the face of rapidly changing global conditions. By adopting high-tech agriculture, regions like Quy Hop district can optimize resource use, enhance product quality, and align with international sustainability standards, driving long-term growth in the sector.

1.2. The role of high - tech agriculture development

High-tech agriculture has emerged as a cornerstone of agricultural modernization, offering transformative potential to enhance economic growth, safeguard the environment, and foster societal progress. As global food demand continues to rise alongside the challenges posed by climate change, high-tech agriculture serves as a crucial mechanism to address these pressing concerns. By integrating cutting-edge technologies such as precision farming, biotechnology, and automation, high-tech agriculture significantly improves productivity, quality, and sustainability within the agricultural sector. Precision agriculture techniques enable the efficient use of inputs like water, fertilizers, and pesticides, thereby optimizing resource allocation and reducing waste (Zhang, Wang, & Wang, 2002).

Furthermore, advanced genetic engineering methods have facilitated the development of crop varieties that are more resistant to pests, diseases, and environmental stresses, ensuring stable yields even under adverse conditions (FAO, 2010). One of the primary contributions of high-tech agriculture is its ability to meet the increasingly stringent food safety and quality standards imposed by international markets. The adoption of advanced technologies ensures consistent product quality and traceability, which are critical for gaining consumer trust and accessing high-value export markets (Pretty, 2008).

By reducing reliance on traditional farming methods that often lack consistency and scalability, high-tech agriculture enhances operational efficiency while building resilience against unpredictable challenges such as natural disasters or market fluctuations.\n\nIn the context of climate change, high-tech agriculture plays an indispensable role in securing global food supplies. Technologies like greenhouses, automated irrigation systems, and efficient post-harvest preservation methods are instrumental in mitigating the impacts of extreme weather events and resource scarcity. For example, automated irrigation systems equipped with sensors can precisely monitor soil moisture levels, optimizing water use and preventing over-irrigation (FAO, 2018).

Similarly, greenhouse technologies provide controlled environments that shield crops from harsh weather, enabling year-round production and higher yields. Post-harvest technologies such as cold storage and innovative packaging solutions help to extend the shelf life of perishable goods, reducing food losses that account for a significant portion of global agricultural waste (Gustavsson et al., 2011).

These advancements collectively stabilize food supplies, minimize economic losses resulting from natural disasters, and enhance the adaptability of agricultural systems to changing climatic conditions. As a result, high-tech agriculture not only contributes to the economic viability of farming but also aligns with global efforts to achieve sustainable development goals related to food security, environmental sustainability, and poverty alleviation. By addressing these multidimensional challenges, high-tech agriculture establishes itself as a transformative force in shaping the future of agriculture.

2. Current state of high-tech agriculture in Quy Hop district

2.1. Crop cultivation

The district has achieved significant progress in applying high-tech agriculture to crop cultivation. Innovations include:

Table 2.1. High-tech irrigation systems application in Quy Hop district

Enterprise/Cooperative	Area (ha)	Crop Type
NCN 32 joint stock Company	90	Tea, Orange
Xuân Thành Co. Ltd.	30	Orange
Phủ Quỳ high-tech agriculture Co. Ltd.	20	Orange
Phương Thảo cooperative	5.5	Orange
Total	145.5	-

Source: Report on the application of high-tech agriculture in Quy Hop district, 2023

The data presented in the table reflects the integration of high-tech agricultural practices among enterprises and cooperatives in Quy Hop district, Nghệ An Province. These organizations have adopted advanced technologies, contributing significantly to the development of sustainable agricultural models in the region. The table indicates that a total area of 145.5 hectares is under high-tech cultivation, primarily dedicated to tea and orange crops. The NCN 32 Joint Stock Company, which operates on 90 hectares, demonstrates a diversified approach by cultivating both tea and orange. This dual-crop strategy not only maximizes land use efficiency but also mitigates risks associated with market or climatic fluctuations. Tea and orange, both high-value crops, are well-suited for the application of high-tech methods, such as precision irrigation and greenhouse cultivation, which optimize resource use and enhance productivity. Xuân Thành Co. Ltd., managing 30 hectares, exclusively focuses on orange cultivation. This specialization allows for a targeted implementation of advanced agricultural technologies, such as automated irrigation and disease-resistant varieties. These methods ensure consistent yields and high-quality produce, aligning with stringent market standards for fresh fruit exports. Similarly, the Phủ Quỳ High-Tech Agriculture Co. Ltd., operating on 20 hectares, and the Phương Thảo Cooperative, utilizing 5.5 hectares, also prioritize orange cultivation. Their contributions, while smaller in scale compared to NCN 32 Joint Stock Company, highlight the expanding adoption of high-tech methods even among smaller enterprises. This reflects a broader trend within the region to leverage advanced agricultural techniques for enhancing productivity and profitability.The cumulative area

of 145.5 hectares under high-tech cultivation underscores the growing recognition of technology's role in modernizing agriculture in Quy Hop district. The focus on tea and orange crops not only caters to local market demands but also enhances the district's competitiveness in the agricultural sector. These practices, when scaled further, have the potential to set benchmarks for high-tech agriculture in other regions, fostering a sustainable and resilient farming ecosystem.

Table 2.2. Development of citrus cultivation areas in 2021 - 2023

Year	Citrus Area (ha)	Yield (tons)
2021	1,740	24,200
2022	1,980	25,300
2023	2,215	26,366

Source: Report on the application of high-tech agriculture in Quy Hop District, 2023.

The data in Table 2.2 illustrates the steady growth in citrus cultivation areas and yields in Quy Hop district from 2021 to 2023, reflecting the district's consistent focus on expanding high-tech agricultural practices. In 2021, the citrus cultivation area reached 1,740 hectares, producing a yield of 24,200 tons. By 2022, the area expanded to 1,980 hectares, with a yield of 25,300 tons, marking an increase of 240 hectares and 1,100 tons. This upward trend continued in 2023, with the cultivated area reaching 2,215 hectares and yielding 26,366 tons. Over the three-year period, the total growth in cultivation area was 475 hectares, while yield increased by 2,166 tons.

The growth in both area and yield indicates the effective implementation of high-tech agricultural methods, such as the use of improved citrus varieties, efficient irrigation systems, and advanced pest control techniques. These technologies have contributed not only to the expansion of cultivation areas but also to higher productivity per hectare, ensuring the consistent quality of citrus produce. The data also suggests a strategic alignment with market demand for high-quality citrus products. The continuous increase in yield highlights the district's ability to meet both domestic and international market requirements while maintaining sustainable farming practices. This expansion showcases the potential for further scaling up high-tech agriculture in Quy Hop district. By investing in more advanced technologies and addressing challenges such as market access and resource optimization, the district could further enhance its position as a leading citrus producer in the region.

Table 2.3. Expansion of high-tech irrigation systems in Quy Hop district

Unit: ha

Year	Area equipped with high-tech irrigation	Increase	Crop type
2021	100	-	Citrus, Tea
2022	120	20	Citrus, Tea
2023	145.5	25.5	Citrus, Tea

Source: Report on the application of high-tech agriculture in Quy Hop district, 2023

The expansion of high-tech irrigation systems in Quy Hop district from 2021 to 2023 demonstrates a significant step forward in modernizing the region's agricultural practices. Beginning with 100 hectares in 2021, the area equipped with these advanced systems

grew steadily, reaching 120 hectares in 2022 and 145.5 hectares in 2023. Over three years, the district achieved a total increase of 45.5 hectares, reflecting a strategic effort to optimize water resource management and improve crop productivity.

This expansion primarily supports citrus and tea cultivation, two of the district's most economically important crops. Both crops are highly responsive to precision irrigation technologies, which provide water directly to the root zone, minimizing waste and ensuring consistent growth. The targeted application of water not only enhances yield quality but also improves resilience to climate variability, a critical factor in maintaining sustainable production levels in a changing environment. By focusing on high-value crops, the district maximizes the economic return on its investment in advanced irrigation infrastructure. The benefits of high-tech irrigation systems extend beyond productivity gains. These systems represent a shift towards more sustainable agricultural practices, reducing water wastage and preventing soil erosion caused by over-irrigation. In a region where water resources are increasingly under pressure, the ability to manage them efficiently positions Quy Hop as a model for environmentally responsible farming. Moreover, the uniformity in water distribution ensures better crop quality, meeting the stringent standards required for both domestic and export markets.

Table 2.4. Economic contribution of citrus cultivation in Quy Hop district

Year	Citrus Area (ha)	Yield (tons)	Average Price (million VND/ton)	Total Value (billion VND)
2021	1,740	24,200	12	290.4
2022	1,980	25,322	13	328.9
2023	2,215	26,366	14	369.1

Source: Report on the application of high-tech agriculture in Quy Hop district, 2023

From 2021 to 2023, the citrus cultivation area expanded from 1,740 hectares to 2,215 hectares, an increase of 475 hectares. This expansion reflects the district's strategic focus on scaling up high-tech agricultural practices, such as precision irrigation, advanced pest control techniques, and the use of disease-resistant citrus varieties. These innovations have not only supported the growth in cultivation areas but also improved productivity. Yield increased from 24,200 tons in 2021 to 26,366 tons in 2023, marking a total growth of 2,166 tons over three years. Economic data reveals that the financial value of citrus cultivation has grown substantially, driven by both increased production and rising market prices. The average price of citrus per ton rose from 12 million VND in 2021 to 14 million VND in 2023, reflecting heightened market demand for high-quality citrus products. Consequently, the total value of citrus cultivation surged from 290.4 billion VND in 2021 to 369.1 billion VND in 2023, representing a remarkable growth of 78.7 billion VND.

This economic growth highlights the strategic alignment between high-tech agriculture and market opportunities. The consistent expansion of cultivation areas, coupled with advanced farming practices, has enabled the district to meet both domestic and international demand for citrus. High-tech methods ensure not only increased yields but also improved fruit quality, making Quỳ Hợp's citrus highly competitive in the market.

To enrich the analysis and provide a more nuanced understanding of the high-tech agricultural development in Quy Hop district, in-depth interviews were conducted with

local stakeholders, including farmers, cooperative leaders, and agricultural officials. These interviews offer firsthand insights into the challenges and successes of implementing advanced agricultural practices in the district.

Box 2.1. Feedback on high-tech agricultural development in Quy Hop district

We aim to expand high-tech agriculture to 200 hectares of citrus and tea cultivation by 2025. However, scaling this requires more robust financial mechanisms and partnerships with private enterprises. Farmers also need regular training to stay updated on technological advancements.

Mr. Hoàng Văn Lâm, a senior official in Quỳ Hợp's Department of Agriculture, 2023

The statement by Mr. Hoàng Văn Lâm, a senior official in Quỳ Hợp's Department of Agriculture, underscores the ambitious goals and the critical challenges faced in expanding high-tech agriculture in the district. His insights highlight three key areas that require attention: expansion targets, financial mechanisms, and capacity building.

2.2. Livestock and aquaculture

Table 2.5. High-tech livestock and production data in 2023

Category	Livestock Type	Quantity (heads/ha)	Automation level	Output (tons)	Yield (tons/ha)	Value (million VND/ha)
Livestock	Pigs	58,640	Fully automated	400	-	-
Livestock	Chickens	20,935	Semi-automated	120	-	-
Aquaculture	Freshwater Fish	0.5 ha	Intensive cage culture	-	7	1,050

Source: Report on the application of high-tech agriculture in Quy Hop district, 2023

The table provides insights into the application of high-tech systems in livestock and aquaculture production in Quy Hop district. The data underscores the transformative role of automation and advanced techniques in enhancing productivity and efficiency across different farming categories. The Masan nutri-science farm exemplifies the adoption of fully automated systems in pig farming. With a capacity of 58,640 pigs, the farm achieves an impressive output of 400 tons annually. The fully automated systems streamline processes such as feeding, health monitoring, and waste management, ensuring compliance with VietGAP standards. This high level of automation not only boosts productivity but also minimizes labor dependency and operational costs, aligning with modern farming trends. Chicken farming, by contrast, operates at a semi-automated level with a capacity of 20,935 birds, yielding 120 tons annually. Although semi-automation still enhances efficiency compared to traditional methods, the potential for scaling up productivity further through full automation exists.

In aquaculture, the use of intensive cage culture techniques has proven to be highly effective. Operating on a modest scale of 0.5 hectares, this system yields an impressive 7 tons per hectare, with a value of 1,050 million VND per hectare. The focus on freshwater fish showcases the district's ability to optimize limited resources, such as water bodies, for high-value production. The intensive method enhances control over environmental factors like water quality and feeding, resulting in consistent yields and quality.

3. General assessment of high-tech agricultural development in Quy Hop district, Nghe An province

3.1. Achievements

Quy Hop district has made notable progress in applying high-tech agriculture, achieving several significant outcomes. The adoption of modern techniques, such as drip irrigation, intensive cage aquaculture, and biotechnology, has substantially increased the cultivated area and improved productivity. High-tech livestock models, such as the fully automated systems at the Masan Nutri-Science Farm, have ensured high productivity and compliance with VietGAP standards. These models demonstrate how automation can streamline processes like feeding and waste management, reducing labor costs and enhancing output.

In aquaculture, the use of advanced technologies has achieved remarkable results, with small-scale operations yielding substantial economic returns. For example, intensive cage aquaculture produces 7 tons per hectare, generating 1,050 million VND per hectare in economic value. These achievements not only improve the district's agricultural productivity but also enhance the quality of agricultural products, meeting the growing demand of both domestic and international markets. Additionally, the expansion of high-tech citrus cultivation has significantly contributed to the district's economic development, with the area under cultivation growing from 1,501 hectares in 2021 to 2,215 hectares in 2023.

3.2. Limitations

Despite these achievements, the development of high-tech agriculture in Quy Hop district still faces several persistent challenges that hinder its full potential.

First, a significant barrier is the lack of sufficient investment capital, particularly for small-scale farmers and enterprises. High-tech agricultural systems require substantial upfront costs for infrastructure, equipment, and technology, which many local farmers find prohibitive. Accessing funding is further complicated by the reluctance of financial institutions to extend credit due to the perceived risks associated with agriculture and the absence of comprehensive agricultural insurance schemes. Limited access to external investment or public-private partnerships also restricts the financial resources available for high-tech agriculture in the district.

Second, the district suffers from a shortage of skilled labor equipped to operate advanced agricultural technologies, a critical factor for high-tech farming models. Farmers, cooperative leaders, and local officials often lack the technical knowledge and expertise required to effectively manage and sustain these practices. This skills gap significantly slows the pace of technology adoption and limits the ability of agricultural enterprises to maximize the potential of high-tech solutions. Moreover, insufficient training programs and a lack of partnerships with academic and research institutions exacerbate this issue, leaving a considerable gap in human resource development.

Third, market connectivity is another critical issue affecting the success of high-tech agriculture in Quỳ Hợp. While citrus fruits and sugarcane have achieved some level of recognition, many other high-tech agricultural products face difficulties in establishing strong branding and accessing higher-value markets. Weak market linkages and the absence of robust marketing strategies reduce the competitiveness of these products, preventing them from achieving their full economic potential. Farmers often lack the resources or support to navigate complex supply chains, further limiting their market reach.

Forth, supporting infrastructure, such as irrigation systems, transportation networks,

and digital connectivity, remains underdeveloped in some parts of the district. Poor road conditions and insufficient storage facilities increase logistical costs and post-harvest losses, diminishing the profitability of high-tech agricultural products. Limited internet access in rural areas also prevents farmers from fully utilizing modern technologies like precision farming, real-time data monitoring, and online marketplaces.

Fifth, addressing these challenges requires a coordinated effort from local authorities, enterprises, and farmers to develop comprehensive solutions. By investing in financial support mechanisms, enhancing human resource capacity, improving market connectivity, refining policy frameworks, and upgrading infrastructure, Quy Hop district can overcome these barriers and unlock the full potential of high-tech agriculture. This will not only drive economic growth but also position the district as a model for sustainable agricultural development in Vietnam.

3.3. Causes of limitations

The identified limitations stem from several underlying causes. First, the limited financial resources available for high-tech agriculture are due to both the lack of strong financial support mechanisms and the perceived risks by financial institutions. Without comprehensive agricultural insurance and incentives, farmers and enterprises face difficulties in securing loans and funding.

The shortage of human resources is largely attributed to insufficient training and capacity-building initiatives. Local farmers and officials lack the technical and managerial expertise needed to implement and sustain high-tech agricultural practices. Educational programs and partnerships with research institutions have not yet been adequately established to bridge this gap.

Policy and regulatory issues arise from a lack of cohesion and targeted support in the development strategy for high-tech agriculture. Problems such as fragmented land ownership, unclear tax policies, and cumbersome administrative processes discourage investment and hinder technological adoption. Market constraints are exacerbated by weak branding and limited infrastructure for connecting producers to broader consumer networks.

Addressing these limitations will require a concerted effort from local authorities, enterprises, and farmers. Comprehensive financial support, targeted training programs, and streamlined policies are essential to creating a more favorable environment for high-tech agricultural development. By overcoming these challenges, Quy Hop district can further its position as a leader in sustainable and innovative agricultural practices, setting an example for other regions in Vietnam.

4. Proposed solutions for high-tech agricultural development in Quy Hop district, Nghe An province

4.1. SWOT matrix for high-tech agriculture development in Quy Hop district, Nghệ An province

STRENGTHS (S)	**WEAKNESSES (W)**
Favorable natural conditions: + Abundant natural resources and fertile land suitable for high-tech agriculture. + Diverse agricultural outputs, including high-value crops like tea and citrus fruits.	*Financial constraints:* + Limited access to funding and high upfront costs for technology adoption. + Lack of agricultural insurance schemes to mitigate risks.

Adoption of Advanced Technologies: + Significant progress in implementing modern techniques like automated irrigation and greenhouse systems. + Increasing application of biotechnology for improved crop varieties. *Supportive Policies:* + Government support and local initiatives promoting high-tech agricultural practices. + Existing frameworks for VietGAP and GlobalGAP certifications. *Economic Contributions:* + Growing economic value of citrus cultivation, with steady increases in yield and market prices. + Advanced livestock and aquaculture systems showing high productivity.	*Skills gap:* + Shortage of skilled labor capable of managing advanced agricultural technologies. + Insufficient training programs and partnerships with research institutions. *Market connectivity:* + Weak branding and limited access to high-value markets for agricultural products. + Fragmented supply chains and inadequate marketing strategies. *Infrastructure deficits:* + Poor road conditions, inadequate storage facilities, and limited internet access in rural areas. + Underdeveloped logistics networks increasing post-harvest losses.
OPPORTUNITIES (O)	**THREATS (T)**
Market potential: + Increasing domestic and international demand for high-quality, sustainable agricultural products. + Opportunity to develop geographical indications (GIs) and certifications to enhance market visibility. *Technology advancements:* + Emerging innovations in AI, big data, and precision farming technologies. + Potential for public-private partnerships (PPPs) to boost technology adoption. Policy support: + Favorable government initiatives and funding programs for agricultural modernization. + Availability of subsidies and incentives for high-tech farming. *Sustainability trends:* + Growing global emphasis on sustainable and eco-friendly farming practices. + Potential for renewable energy integration and organic farming certifications.	*Climate change:* + Unpredictable weather patterns and resource scarcity impacting agricultural productivity. + Increased vulnerability to extreme weather events. *Market competition:* + Stiff competition from other regions and countries with well-established high-tech agriculture sectors. + Price volatility in agricultural markets. *Regulatory and policy challenges:* + Fragmented land ownership and administrative processes hindering large-scale investments. + Inconsistent enforcement of quality standards and certification processes. *Social and economic barriers:* + Resistance to change among traditional farmers. + Economic disparities limiting access to high-tech solutions for small-scale farmers.

Source: the compilation of the authors

4.2. Proposed solutions for high-tech agricultural development

4.2.1. Enhancing financial support

Developing robust financial support mechanisms is critical to alleviating the financial constraints faced by farmers and enterprises in Quy Hop district. The district should implement incentive schemes such as low-interest loans, tax breaks, and subsidies to reduce the financial burden associated with high-tech agricultural adoption. Establishing dedicated funds for high-tech agriculture could mobilize resources specifically targeted at supporting local farmers and cooperatives. Additionally, encouraging public-private partnerships (PPPs) can help attract investment from large enterprises, enhancing access to advanced technologies and creating shared value. Financial institutions in the district should also be incentivized to offer tailored credit products, coupled with agricultural insurance schemes, to mitigate risks for both lenders and borrowers. Furthermore, transparent and accessible funding mechanisms, including simplified loan application processes, should be introduced to ensure financial support reaches even small-scale farmers effectively.

4.2.2. Strengthening human resource development

The lack of skilled labor remains a significant barrier in Quy Hop. To address this, the district should implement comprehensive training programs that equip farmers, local officials, and cooperative leaders with the knowledge and skills required for high-tech agricultural operations. These programs should focus on practical aspects such as operating advanced machinery, using precision agriculture technologies, and understanding modern agronomic practices. Collaborations with academic institutions, agricultural research centers, and international organizations can provide technical expertise and ensure the delivery of high-quality training. Scholarships and incentive programs for young people entering agricultural careers should also be considered to build a sustainable workforce for the future. Moreover, training modules should be regularly updated to align with the latest technological advancements and market trends, ensuring the workforce remains competitive and adaptable.

4.2.3. Improving market access

To enhance the competitiveness of Quy Hop's high-tech agricultural products, efforts should be made to strengthen branding, certification, and marketing initiatives. Developing geographical indications (GIs) and trademarks for products such as citrus fruits and other high-value crops can improve their visibility in both domestic and international markets. Investments in processing facilities and packaging innovations will add value to raw products, increasing their market appeal. Additionally, creating e-commerce platforms tailored to agricultural producers in the district will connect farmers directly with consumers, reducing reliance on intermediaries and increasing profitability. Local authorities should also support farmers in building long-term relationships with large distributors and export-oriented enterprises. Establishing trade promotion activities, such as agricultural fairs and market exhibitions, will further broaden market access and increase product awareness.

4.2.4. Strengthening infrastructure and connectivity

Infrastructure plays a crucial role in supporting high-tech agriculture. Investments should be made in developing modern irrigation systems, electricity grids for remote areas, and reliable transportation networks to reduce logistics costs. Additionally, digital infrastructure, such as internet connectivity, is vital for enabling access to modern tools

like precision farming, real-time data monitoring, and online marketplaces. Improving rural roads and storage facilities will further enhance the efficiency of supply chains and reduce post-harvest losses. Furthermore, establishing centralized logistics hubs in strategic locations within the district can optimize distribution and ensure timely delivery of products to markets. These hubs could also serve as collection points for small-scale farmers, facilitating aggregation and streamlining transportation.

4.2.5. Promoting sustainable practices

Sustainability should be a core principle of high-tech agricultural development in Quy Hop. Encouraging environmentally friendly practices, such as integrated pest management (IPM), renewable energy-powered systems, and organic farming, will ensure long-term ecological balance. Providing training and resources for farmers to adopt these methods will align local agriculture with global sustainability trends, enhancing marketability and resilience to climate change. Additionally, initiatives such as reforestation projects and water conservation programs should be integrated into agricultural planning to address environmental challenges. Certification schemes for sustainable farming practices, such as GlobalGAP or organic certifications, can also be promoted to increase the market value of local products.

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THE IMPACT OF INSTITUTIONAL QUALITY ON CO2 EMISSIONS: A COMPARATIVE STUDY

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Abstract: This paper evaluates the role of institutional quality, reflected through global development indicators (World Development Indicators - WDI), governance indicators (Worldwide Governance Indicators-WGI), and globalization indices (KOF - Globalisation Index) in the interaction between institutional quality and environmental quality. Using the Feasible Generalized Least Squares (FGLS) method, with a sample of 134 countries from 2010 to 2023, the results show that enhancing institutional quality can reduce CO2 emissions in the atmosphere. Based on these findings, the paper proposes several policy implications for improving institutional quality in various aspects to contribute to environmental improvement across six regions: All (Global), High_income (High-income countries), Low_income (Low-income countries), Asia, Europe, and Africa.

Keywords: *Institutional quality, CO2 emissions, FGLS, Asia, Europe, Africa*

1. Introduction

Environmental issues have become a global challenge in today's world, posing an urgent threat to humanity. CO2 emissions, the primary cause of climate change, not only disrupt ecological balance but also threaten the survival of the entire planet (Mert & Caglar, 2020; Phuc Canh & Ai Nguyen, 2018). Both developing and developed countries are facing environmental degradation as global warming and climate change intensify. In light of this, environmental sustainability has garnered significant attention from the international community, scientists, and policymakers, as evidenced by research from (Amin et al., 2022) and (Văn Hưng, 2024). Therefore, investigating the impact of institutional quality on CO2 emissions worldwide is essential, providing a foundation for recommendations and solutions to improve environmental quality.

Although numerous studies have explored the relationship between institutional quality and environmental quality, such as the research by (Hồng Ngọc & Thị Lam, 2022) in Asia, which found a U-shaped relationship between institutional quality and environmental pollution, and (Jahanger et al., 2023), which examined countries in Asia, Africa, and Latin America and found that institutional quality and resources reduce CO2 emissions, research on developing countries shows mixed results. For example, studies by (Jahanger et al., 2023) and (Yang et al., 2022) indicate that despite improvements in institutional quality, CO2 emissions still increased in these countries. In contrast, (Cẩm Vân, 2022) research in Vietnam shows that improvements in institutional quality lead to reduced CO2 emissions in both the short and long term. On the other hand, studies by (Islam et al., 2021) in Bangladesh and (Maduka et al., 2022) in Nigeria concluded that improving institutional quality does not help reduce CO2 emissions.

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However, no studies have yet compared the impact of institutional quality on CO2 emissions across different continents or compared high-income and low-income countries. Thus, this study addresses these gaps. Additionally, we examine which components of

institutional quality play the most critical role globally and within specific country groups and regions. Our study uses the FGLS method to address issues of heteroskedasticity and AR(1) autocorrelation (according to ERIC, Director of Applications and Training at Aptech Systems, Inc.).

The findings of this study show that institutional quality reduces CO2 emissions. Specifically, improvements in institutional quality in high-income countries lead to smaller reductions in CO2 compared to low-income countries. In Africa, the impact is stronger than in Asia, while Europe shows no statistically significant effect. Among the components, regulatory quality and the rule of law have the most significant impact on reducing CO2 emissions. The results of this study are expected to serve as a useful reference for researchers and provide a basis for proposing recommendations tailored to the specific realities of each region.

The remaining sections are structured as follows: (2) literature review, (3) research model and data, (4) findings and discussion, and (5) conclusions and recommendations.

2. Literature review

Many studies have explored the factors influencing CO2 emissions, which are deeply affected by various complex and diverse elements. Some factors have clear impacts on CO2 levels. Natural resources have been shown to help reduce CO2 emissions due to their counteracting effect on pollution (Jahanger et al., 2023). On the other hand, industrialization, economic growth, and population tend to increase emissions (Paul R. Ehrlich & John P. Holdre, 1971; Yang et al., 2022). Inflation, however, has a reducing effect on CO2 emissions according to (Đình Thành & Văn Bồn, 2016). Many other factors influence CO2 emissions depending on the specific context. Financial development can either reduce (Amin et al., 2022) or increase emissions (Ali et al., 2019). Foreign Direct Investment (FDI) also shows mixed results: some studies argue that FDI reduces CO2 through green technologies (Thuy Diem & Hoai Trong, 2024), while others suggest it increases emissions (Việt Hồng Anh & Thủy Tiên, 2023). Similarly, exports and the use of renewable energy can both increase and decrease CO2 emissions depending on their implementation (Cẩm Vân, 2022). Globalization shows a contrasting effect depending on the country (Xu et al., 2023). Remittances have been shown to have no significant impact on CO2 emissions according to (Wawrzyniak & Doryń, 2020).

Theory suggests that institutional quality plays a crucial role in reducing CO2 emissions, one of the main causes of climate change (Mert & Caglar, 2020). The theory regarding the impact of institutional quality on CO2 emissions suggests that countries with strong institutions can reduce CO2 emissions by strengthening environmental regulations (Dal Bó & Rossi, 2007), promoting economic growth (Dutta et al., 2013), improving resource allocation (Ebeke et al., 2015), or production (Carter & Olinto, 2003). Theoretical studies have shown that countries with high institutional quality tend to have lower CO2 emissions. For instance, (Tabassum et al., 2023) found that countries with better governance indicators can implement more effective environmental management practices, thereby reducing air pollution. (Chhabra et al., 2023) also emphasized that

strong institutions are capable of controlling CO2 emissions by establishing strict regulations and developing policies that encourage the use of environmentally friendly technologies.

There have been many empirical studies aimed at estimating the impact of institutional quality on CO2 emissions. Specifically, when studying developing countries, the research by (Phuc Canh & Ai Nguyen, 2018) and (Yang et al., 2022) shows that institutional quality increases CO2 emissions in developing nations, while the studies by (Mười Một & Thanh Tùng, 2018) show that institutional quality contributes to reducing greenhouse gas emissions. Not limited to one-way effects, the study by (Hồng Ngọc & Thị Lam, 2022) revealed a U-shaped relationship between institutional quality and CO2 emissions. For continents and regions, studies supporting institutional quality reducing CO2 emissions, such as those by (Việt Hồng Anh & Thủy Tiên, 2023), indicate that Asia, the Americas, and Africa have a reducing impact on CO2. Similarly, the BRICS countries, according to (Chhabra et al., 2023), show similar results. However, when considering OECD countries in (Cao et al., 2022) study, the opposite result is found: institutional quality increases CO2 emissions in the long term. In contrast, the research by (Tam Hien et al., 2017) in 17 countries in the Asia-Pacific region found that institutional quality and CO2 have a U-shaped relationship. Finally, for individual countries, institutional quality has different impacts on CO2 emissions. Studies by (Cẩm Vân, 2022) in Vietnam; (Liu et al., 2020) in China, India, Japan, Russia, and the US; (Salman et al., 2019)) in Indonesia, South Korea, and Thailand all show that institutional quality reduces CO2 emissions. For India and Bangladesh, as per (Hunjra et al., 2020), the results are consistent with the above view, while in Pakistan, institutional quality increases CO2 emissions.

Some studies aim to clarify the impact of institutional quality on the relationship between other variables and CO2 emissions. For example, the research by (Salman et al., 2019) shows that institutional quality in East Asia increases CO2 emissions through economic growth. Muhammad et al. (2019) also indicate that institutional quality through economic growth, finance, and FDI increases CO2 emissions in the short term but reduces CO2 emissions in the long term. (Chung, 2021) finds that the average institutional quality in emerging economies through FDI may increase pollution. Additionally, some studies delve into the detailed impact of specific institutional factors on CO2 emissions, such as (Maduka et al., 2022), who found that the control of corruption index reduces CO2 emissions in the long term, while the regulatory quality index has no impact.

The methods used in the referenced studies are quite diverse. Some studies use more than three estimation methods, with GMM (including its variations like GMM-PVAR) being the most commonly used method. Other studies use methods like those by (Khan et al., 2021), and ARDL is also applied in several studies, such as (Tabassum et al., 2023) and (Islam et al., 2021). In addition, basic methods like FEM, REM, and OLS are also widely used, as seen in studies like (Liu et al., 2020). Generally, studies begin with basic estimation methods and then combine them with other techniques to obtain the best results.

Our paper contributes to current research on the impact of institutional quality on CO2 emissions by comparing across continents and between high-income and low-income countries in the period from 2010 to 2023. In addition to examining the role of institutional quality in CO2 emissions in general, we also investigate the role of each

component index of institutional quality in CO2 emissions to identify which component is most important for each region and group of countries. Furthermore, our study applies the FGLS method to address the issue of heteroscedasticity and AR(1) autocorrelation (according to ERIC)

3. Empirical model and data

3.1. Research Data

The study collected data worldwide for the period 2010-2023, primarily from the World Development Indicators (WDI) and the KOF Globalisation Index. Table 1 provides a detailed explanation of the variables, including their sources, signs, measurement methods, and descriptions.

After excluding countries with insufficient data, the research divided the study area into six regions: All (Global), High-income, Low-income, Asia, Europe, and Africa. The High- income and Low-income regions were classified based on the World Bank's four income group classifications. The High-income region combines High-income and Upper-middle-income countries, while the Low-income region includes Lower-middle-income and Low-income countries.

3.2. Research Model

Building on the works of (Islam et al., 2021; Liu et al., 2020; Tabassum et al., 2023; Xu et al., 2023), the general model employed in this study is expressed as follows:

$$lco2_{it} = \beta_0 + \beta_1 * fd_{it} + \beta_2 * fdi_{it} + \beta_3 * lexp_{it} + \beta_4 * lrem_{it} + \beta_5 * lrec_{it} + \beta_6 * ln_{it} + \beta_7 * lindus_{it} + \beta_8 * lgdp\_cap_{it} + \beta_9 * lpop_{it} + \beta_{10} * lg_{it} + \beta_{11} * inf_{it} + \beta_{12} * iq_{it} + u_{it} \quad \textbf{(01)}$$

$$lco2_{it} = \beta_0 + \beta_1 * fd_{it} + \beta_2 * fdi_{it} + \beta_3 * lexp_{it} + \beta_4 * lrem_{it} + \beta_5 * lrec_{it} + \beta_6 * ln_{it} + \beta_7 * lindus_{it} + \beta_8 * lgdp\_cap_{it} + \beta_9 * lpop_{it} + \beta_{10} * lg_{it} + \beta_{11} * inf_{it} + \beta_{12} * \text{corrupt\_c}_{it} + \beta_{13} * \text{gov\_e}_{it} + \beta_{14} * \text{rl}_{it} + \beta_{15} * \text{rq}_{it} + \beta_{16} * \text{va}_{it} + \beta_{17} * \text{ps}_{it} + u_{it} \quad \textbf{(02)}$$

Explanation:

βn: Estimated coefficients representing the impact of independent variables on the dependent variable.

uit: Random error term, capturing unobserved factors and measurement errors.

i: Represents individual countries in the dataset.

t: Denotes time, spanning from 2010 to 2023.

n: Total number of countries in the study, which is 134.

Table 1: Description of research variables in the research model

Variables	Symbol	Description	Measure variables	Source	Expectation
Dependent variables					
CO2 emissions	lco2	Logarit of Co2 emissions	CO2 emissions level (kt)	WDI	
Independent variables					
Financial development	fd	Financial development level (% GDP)	Financial development level based on domestic credit (% GDP)	WDI	- Building on the research by (Amin et al., 2022)

Foreign direct investment	fdi	Foreign direct investment level (% GDP)	This is the sum of equity, reinvested earnings, and capital flows, showing net investment into a country (% GDP)	WDI	+ Similar to the findings of (Thúy Kiều & Thông Tiến, 2019)
Export	lexp	Logarithm of Export	Total exports of government services, in US$	WDI	+ Building on the research by (Borhan et al., 2012)
Remittances	lrem	Logarithm of remittances	Remittances comprise personal transfers and compensation, in US$	WDI	-
Renewable energy	lrec	Logarithm of renewable energy	Renewables energy in total final energy consumption (% of total final energy consumption)	WDI	- As demonstrated in the research by (Cẩm Vân, 2022; Chhabra et al., 2023)
Natural resource	ln	Logarithm of natural resource	Total natural resources rents (% of GDP)	WDI	+ Similar to the research by (Jahanger et al., 2023)
Industry	lindus	Logarithm of industry	It comprises value added in mining, manufacturing (% GDP)	WDI	+ Similar to the research by(Yang et al., 2022)
Economic growth	lgdp_cap	Logarithm of GDP per capita	GDP per capita, in US$	WDI	+ As indicated in the research by (Bích Ngọc et al., 2022)
Population	lpop	Logarithm of population per years	Total population	WDI	+ Building on the findings of (Bích Ngọc et al., 2022)

Globalization	lg	Logarithm of globalization	Measures the economic, social and political aspects of globalization	KOF Index	+ Similar to the findings of (Xu et al., 2023)
Inflationary	inf	Inflationary level	The consumer price index reflects the annual percentage change in the cost to the average (annual %)	WDI	- Building on the research of (Đình Thành & Văn Bồn, 2016)
Institutional quality	iq	Average of 6 institutional quality variables	This index measures different aspects of institutional quality	WDI	- Similar to the studies by (Cẩm Vân, 2022; Liu et al., 2020; Việt Hồng Anh & Thủy Tiên, 2023)
Corruption control	corrupt_c	corruption control level	This index measures control of corruption	WGI	
Government effectiveness	gov_e	government effectiveness level	This index measures government effectiveness	WGI	
Rule of law	rl	rule of law level	This index measures affection for the rule of law	WGI	
Regulatory Quality	rq	Regulatory Quality level	This index measures regulatory quality	WGI	
Voice and Accountability	va	Voice and Accountability level	This index measures affection for the voice and accountability	WGI	
Political Stability	ps	Political Stability level	This index measures political stability	WGI	

The study of the application of the Feasible Generalized Least Squares (FGLS) method is a flexible and powerful tool. It provides a reliable approach to regression analysis when heteroscedasticity and autocorrelation exist in the model. In addition, FGLS also improves efficiency in modeling complex and highly realistic data structures by refining errors related to heteroscedasticity and autocorrelation (ERIC). Research papers using the FGLS method: (Hoàng Minh, 2021; Tam Hien et al., 2017).

4. Empirical results and Discussion

4.1. Summary statistics

Table 2: Statistical results (Word)

Variable	Obs	Mean	Std. dev.	Min	Max
Dependent Variables					
co2	1.922	179746.40	864542	22	1.09*10^7
Independent Variables					
fd	2.213	48.31	40.60	-4	254.66
fdi	2.175	8.64	55.41	-1303.10	1282.60
exp	2.199	1.38*10^11	3.51*10^11	1.07*10^7	3.72*10^12
rem	2.479	2.79*10^9	7.86*10^9	0	1.25*10^11
rec	2.244	32.39	28.56	0	95.5
n	2.164	6.17	9.40	0	79.43
indus	2.432	25.94	11.68	2.35	74.81
gdp_cap	2.534	15859.51	25711.76	199.58	240862.2
pop	2.590	3.67*10^7	1.44*10^8	10241	1.43*10^9
g	2.121	57.97	15.05	1	91
inf	2.315	6.46	21	-7	557
iq	2.381	-0.03	0.90	-2.29	1.86

Table 2 presents the descriptive statistics of the variables in the regression model. Descriptive statistics provide an overall description of the data used in the model. The main descriptive quantities include the mean, standard deviation, minimum and maximum values of the variables during the study period discussed in this section. It can be seen that almost all variables have positive mean and standard deviation values, fluctuate between years and tend to be uneven.

4.2. Correlation matrix

Table 3: *Correlation matrix*

	lco2	**fd**	**fdi**	**exp**	**rem**	**rec**	**n**	**indus**	**gdp_cap**	**pop**	**g**	**inf**	**iq**
lco2	**1.0000**												
fd	0.2356	**1.0000**											
	0.0000												
fdi	-0.0263	0.0054	**1.0000**										

	0.2576	0.8097							
exp	0.7985	0.4097	-0.0509	**1.0000**					
	0.0000	0.0000	0.0251						
rem	0.3449	0.1481	-0.0704	0.3342	**1.0000**				
	0.0000	0.0000	0.0011	0.0000					
rec	-0.1396	-0.3649	0.0050	-0.2460	-0.0759	**1.0000**			
	0.0000	0.0000	0.8205	0.0000	0.0004				
n	-0.0544	-0.2677	-0.0477	-0.1256	-0.1171	0.0799	**1.0000**		
	0.0186	0.0000	0.0330	0.0000	0.0000	0.0002			
inud s	0.0984	-0.0193	-0.0483	0.0698	0.0428	-0.1252	0.6162	**1.0000**	
	0.0000	0.4582	0.0081	0.0000	0.2070	0.0140	0.0000		
gdp_cap	0.0677	0.5079	0.1883	0.3887	-0.0206	-0.2358	-0.1257	0.0353	**1.0000**
	0.0032	0.0000	0.0000	0.0000	0.0032	0.0000	0.0000	0.0815	
pop	0.7751	0.1775	-0.0296	0.5413	0.7400	-0.0273	-0.0457	0.0996	-0.0585 **1.0000**
	0.0000	0.0000	0.1676	0.0000	0.0000	0.1959	0.0335	0.0000	0.0032

g	0.1358	0.6635	0.0063	0.3890	0.1639	-0.4564	-0.2408	0.0817	0.4092	0.0499	**1.0000**	
	0.0000	0.0000	0.7804	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0214		
inf	-0.0216	-0.1388	-0.0363	-0.0566	0.0085	0.0898	0.0499	-0.0153	-0.1120	-0.0009	-0.1122	**1.0000**
	0.3622	0.0000	0.0983	0.0104	0.6833	0.0000	0.0257	0.4694	0.0000	0.9657	0.0000	
iq	0.0444	0.5446	0.1120	0.3180	-0.0259	-0.3591	-0.3502	-0.1429	0.6600	-0.0688	0.6813	-0.2216	**1.0000**
	0.0532	0.0000	0.0000	0.0000	0.2171	0.0000	0.0000	0.0000	0.0000	0.0000	0.0008	0.0000	0.0000

The results of the correlation matrix presented in Table 3 show the correlation coefficients comparing each pair of variables. In general, the variables are correlated with the dependent variable (CO2). However, the remaining independent variables are also correlated, so there is a possibility of multicollinearity in the model. Most of the independent variables are correlated with the dependent variable, so they will be included in the regression model to explain the dependent variable.

4.3. Empirical results

Table 4: Adjusted regression results using FGLS

Variable	**FGLS All**	**FGLS High_income**	**FGLS Low_income**	**FGLS** Asia	FGLS Europe	FGLS Africa
fd	0.004***	0.004***	0.009***	0.001***	0.000	0.009***
	0.000	0.000	-0.001	0.000	0.000	-0.001
fdi	-0.010***	-0.010***	-0.004***	-0.001	0.001	0.001
	-0.001	-0.001	-0.001	0.000	-0.001	-0.002
lexp	0.244***	0.329***	0.131***	0.226***	0.035	0.015
	-0.018	-0.016	-0.025	-0.023	-0.049	-0.037
lrem	-0.026***	-0.016***	-0.039***	-0.009	-0.023	0.057***
	-0.001	-0.001	-0.002	-0.016	-0.014	-0.011
lrec	-0.302***	-0.253***	-0.357***	-0.221***	-0.353***	-0.159***
	-0.008	-0.007	-0.015	-0.013	-0.028	-0.013

ln	0.019***	0.020***	0.037***	0.043***	0.018***	0.054***
	-0.005	-0.05	-0.009	-0.01	-0.006	-0.012
lindus	0.230***	-0.119***	0.156***	-0.028	0.267***	0.303***
	-0.025	-0.029	-0.045	-0.052	-0.059	-0.061
lgdp_ca p	0.433***	0.013	0.705***	0.407***	0.268***	0.865***
	-0.02	-0.024	-0.039	-0.039	-0.055	-0.045
lpop	0.749***	0.719***	0.947***	0.859***	0.856***	0.884***
	-0.015	-0.015	-0.025	-0.023	-0.04	-0.031
lg	0.978***	0.557***	0.209***	0.491***	0.739***	1.295***
	-0.059	-0.07	-0.07	-0.094	-0.201	-0.145
inf	0.001**	0.005***	0.003***	0.010***	0.000	0.001
	-0.001	-0.001	-0.001	-0.003	-0.001	-0.001
iq	**-0.367*** **	**-0.089*** **	**-0.214*** **	**-0.101*** **	**-0.071**	**-0.382*** **
	-0.017	-0.022	-0.033	-0.033	-0.049	-0.038
Constan t	-15.173***	-10.252***	-14.406***	-13.865***	-8.884***	-19.474***
	-0.222	-0.295	-0.375	-0.475	-0.85	-0.473
Observa tions	1.285	780	505	307	350	373
Number of id	134	79	55	36	33	38

*** p<0.01, ** p<0.05, * p<0.1

In general, after addressing the issues of autocorrelation and heteroscedasticity, the results have become more reliable and closely aligned with the group's expectations regarding the signs. Specifically, for the variable **iq** (institutional quality), the findings fully match the group's expectations.

All five variables—Globalization, Natural Resources, Population, Industrialization, and Economic Growth—are found to increase CO2 emissions, which aligns with the predicted results. This is because these factors drive production, transportation, and other essential services, leading to increased demand for electricity, water, and energy, which puts pressure on resources and raises CO2 emissions. This result is supported by various studies such as (Bích Ngọc et al., 2022; Xu et al., 2023)

Financial development has been shown to increase CO2 emissions in most regions worldwide, except in Europe, where it is not statistically significant. This is because, as

financial systems develop, businesses and individuals gain easier access to capital, which in turn boosts production and consumption. Exports, regardless of the region, increase greenhouse gas emissions due to the strong industrial production associated with them, as evidenced by (Borhan et al., 2012). Inflation increases CO2 emissions; in the short term, inflation limits consumption and reduces the production and consumption of goods (Đình Thành & Văn Bồn, 2016). However, in the long term, persistently high inflation forces governments to prioritize price control and economic support over environmental policies.

Remittances reduce emissions in most countries by promoting the consumption of higher- quality, environmentally friendly products. However, in Africa, remittances have the opposite effect, as they stimulate consumption and production more intensely. Still, according to the study by (Wawrzyniak & Doryń, 2020), remittances have no significant impact on environmental quality. Renewable energy reduces CO2 emissions in countries worldwide, from low-income to high-income nations and across all continents, due to the use of sustainable natural resources, as noted by (Cẩm Vân, 2022). For continents, the impact of renewable energy usage is most negative in Europe, followed by Asia, and finally, Africa. Based on the results, Foreign Direct Investment (FDI) has a reducing effect on CO2 emissions globally, which aligns with the findings of (Thuy Diem & Hoai Trong, 2024) for developing countries and (Khan et al., 2021) for global research.

Our research shows that, in general, institutional quality in high-income and low-income countries, as well as in the regions of Asia and Africa, has a reducing effect on CO2 emissions. With a 1% significance level, this means that for every 1-point increase in institutional quality, global CO2 emissions decrease by 44.35%. Specifically, in high-income countries, emissions decrease by 9.31%, while in low-income countries, emissions decrease by 23.86%. In terms of regions, institutional quality reduces CO2 emissions by 10.63% in Asia and 46.52% in Africa. This result can be explained by governments strengthening environmental regulations and policies aimed at reducing CO2 emissions. Additionally, national leaders have called on people to raise their environmental awareness and responsibility, contributing to positive and sustainable changes. This is demonstrated through studies by (Cẩm Vân, 2022; Jahanger et al., 2023)

When comparing high-income and low-income regions, the average institutional quality in low-income countries appears to have a stronger effect in reducing CO2 emissions compared to high-income countries. This is because, in high-income nations, emission control and the use of clean energy are already relatively well-developed, so improving institutional quality may not lead to significant changes in CO2 emissions as it does in low-income countries, as noted by (Sheng et al., 2023). When comparing Asia and Africa, although Asian countries may have improved institutions, they often face complex governance issues due to high populations and rapid urbanization, making emission control more challenging. In contrast, Africa, with its smaller industrial scale, sees a more noticeable impact from environmental policies when implemented, as noted by (Sheng et al., 2023).

However, the results indicate that institutional quality in Europe is not statistically significant. According to the article “Cuộc chiến không khí sạch ở Châu Âu: Nhiệm vụ bất khả thi?” by (Hoàng Lâm, 2023), when countries enact stricter CO2 emission laws for environmental sustainability, these policies affect the interests of citizens and face

opposition. This makes it difficult for governments to maintain and enforce such regulations.

Table 5: The impact of small variables in the iq variable combination

Using the component variables of institutional quality years: 2010-2023

VARIABLES	GLS All	GLS High	GLS Low	GLS Asia	GLS Europe	GLS Africa
corrupt_c	-0.213***	-0.165***	0.190***	86	0.225***	0.236***
	-25	-25	-46	-56	-42	-52
gov_e	0.112***	0.091***	43	0.175***	-0.344***	-0.504***
	-32	-31	-41	-60	-55	-81
rl	-0.117***	19	-0.118***	-0.219***	-18	-0.343***
e^kq -1	*12,47%*		*12,52%*	*24,48%*		*40,92%*
	-32	-37	-45	-64	-66	-80
rq	-0.222***	-0.071***	-0.624***	-0.337***	-0.091**	-0.148**
e^kq -1	*24,86%*	*7,36%*	*86,66%*	*40,07%*	*9,53%*	*15,95%*
	-24	-25	-43	-62	-39	-68
ps	0.084***	0.129***	0.057***	0.119***	0.088***	0.130***
	-15	-15	-22	-20	-26	-30
va	0.032*	-0.050**	21	-0.053*	0.154***	0.064*
	-17	-22	-24	-28	-42	-38
Constant	-15.377***	-10.645***	-16.511***	-15.810***	-9.240***	-22.016***
	-260	-328	-448	-508	-757	-487
Observations	1.285	780	505	307	350	373
Number of id	134	79	55	36	33	38

When separating the institutional quality variable, it will include component variables such as Corruption control; Government effectiveness; Rule of law; Regulatory quality; Political stability; Voice and Accountability. Some variables have a large impact on reducing CO2 emissions such as Regulatory quality and Rule of law, while there are still variables with positive but insignificant impacts. Specifically, when the Regulatory quality variable increases by 1 point, CO2 emissions in all countries, high-income countries, low-income countries, Asia, Europe and Africa decrease by: 24.86%, 7.36%, 86.66%, 40.07%, 9.53% and 15.95%, respectively. This is explained by the fact that when there are effective environmental policies, such as strict emission standards or carbon taxes, they create incentives to change behavior and promote environmentally friendly technology. When the Rule of Law variable increases by 1 point, CO2 emissions in all countries, low-income countries, Asia and Africa decrease by:

12.47%, 12.52%, 24.48% and 40.92% respectively. This is due to the transparent and strong enforcement of legal systems that help ensure that businesses and individuals comply with environmental regulations. This reduces deforestation, and uncontrolled

emissions and encourages the use of clean energy. Similar to the studies by (Liu et al., 2020; Việt Hồng Anh & Thủy Tiên, 2023).

5. Conclusion and Implications

This study analyzes the impact of institutional quality on global CO2 emissions, employing the FGLS method on data from 134 countries during the 2010-2023 period. In light of the significant increase in CO2 emissions, governments, including Vietnam, need to focus on improving institutional quality to foster green growth. Based on the research findings, several important policy implications can be drawn to achieve sustainable development and reduce CO2 emissions in the future.

The findings confirm the crucial role of institutional quality in environmental improvement. However, to optimize its impact, policies must align with the unique economic, social, and environmental characteristics of each region. While certain factors, such as regulatory quality and the rule of law, have effectively contributed to reducing CO2 emissions, other elements have not met expectations. Governments should enhance the effectiveness of the rule of law, and regulatory quality, and address issues like corruption, government efficiency, and political stability. For high-income countries, investments in green technology and stricter environmental standards should be encouraged. Meanwhile, low- and middle- income countries need to improve institutional frameworks and strengthen international cooperation to advance green solutions. Asia should focus on developing clean energy, whereas Africa needs to improve energy infrastructure and reduce reliance on fossil fuels. Regional collaboration is essential to tackle pollution and climate change, steering efforts toward sustainable development.

The research highlights that globalization, natural resources, exports, population growth, industrialization, and economic growth all contribute to rising CO2 emissions. High-income countries should adopt carbon taxes and support clean technologies for low-income nations. Low-income countries should prioritize the development of clean energy and sustainable resource management. Europe should maintain its climate policies, Africa should conserve forests and renewable energy, and Asia needs to shift its industrial practices and build green urban areas.

According to the World Bank, Vietnam ranks 21st globally in CO2 emissions, underscoring the need for significant institutional reforms. Vietnam should enhance regulatory quality and the rule of law, improve transparency, increase accountability, and adopt digital technologies to create an effective legal framework. This includes refining legal structures, enforcing strict emission standards, and addressing corruption in climate projects. Training personnel, investing in monitoring technologies, and fostering international cooperation are crucial. One key solution to reducing CO2 emissions is developing the carbon credit market by establishing credit standards, improving measurement systems, and expanding international carbon credit trading platforms. Additionally, Vietnam must transition its energy sector, prioritize renewable energy, phase out coal power, upgrade smart grids, promote a green economy, support clean technologies, and foster a circular economy to reduce emissions stemming from exports, industrialization, resource exploitation, and economic growth.

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PEOPLE'S ARTISTIC CONSUMPTION BEHAVIOR TOWARDS NIGHT FOLK PERFORMANCE ARTS IN THE CONTEXT OF NIGHT-TIME ECONOMY DEVELOPMENT

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Abstract: The research aims to study the consumption behavior of night folk performing art, finding out the influencing level of 5 factors, including product cognition, cultural identity, past behavioral, reference groups và accessibility. Within the scope of this study, the data was collected from 800 local participants who have experienced night folk performing art in Hanoi, Hue and Ho Chi Minh city. Using Exploratory Factor Analysis (EFA) and linear regression analysis, it is proved all hypotheses have been accepted, confirming that the examined independent variables directly impact the dependent variable. All five investigated factors have a significant influence on night folk artistic consumption, especially product cognition and cultural identity. To foster the growth of the night art consumption trend, which is the contributor to night-time economic development, based on the survey responses, the team research put forward some recommendations.

Keywords: *night folk performing art, artistic consumption behavior, night-time economy.*

1. Introduction

The night economy encompasses a wide range of activities, from dining and shopping to cultural experiences and tourism. A key factor contributing to the success of night economies is the integration of cultural and historical elements (Lovatt & O'Connor, 1995), including folk performing art. The performing arts of Southeast Asia are a reflection of local lifestyles, beliefs, and traditions that have been inherited across generations (Pongpaiboon, 1999). The arts of each location tell a specific story of the ethnic groups that have influenced the area (Nutong, 1988). Those are the reasons why performing art plays a prominent part in local entertainment throughout the world. It is consumed that this kind of art has to face the risk of being replaced by modern entertainment forms; however, it has intertwined with modern entertainment and become more familiar with a wider audience (Koanantakool, 1989).

Previous studies on performing arts have not specifically studied the forms of performing arts at night. In addition, those studies have not been synthesized by representatives of each region of Vietnam. Previous research has also pointed to factors that influence consumer behavior, but it has not clarified the extent of the impact of those factors. So, consumer behavior is the most direct and effective way to predict whether or not the consumer implements a certain consumption (Fishbein & Ajzen, 1975). The purpose of the research is to clarify how the main factors (product cognition, cultural

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identity, past behavioral, reference groups and accessibility) influence the consumption behavior of performing arts, which is the basis for analyzing consumer behavior of tourism performing arts and expanding the consumption market.

The specific focus on the night folk performing art consumption behavior in Vietnam is a relatively novel area of study, with limited existing research directly applicable to this context. The research of this paper is also based on the results of a combination of questionnaires and data analysis.

2. Literature Review

In Vietnam, the night-time economy is the consumption activity that serves the material and spiritual life of people and takes place at night, from 6 pm to 6 am the following day. Zmyslony and Pawlusiński (2019) showed that the night-time economy is an umbrella construct describing a range of activities, venues, and consumer service providers clustered upon their nocturnal agenda. These activities are (1) night-time economy core activities - operating only or intensifying their performance from the late evening into the early hours of the morning (concert halls, casinos, night markets, gaming centers, bars, and coffee shops...); (2) night-time economy complementary activities - extending their daytime performance into late evening hours (shops, museums, galleries, sport, fitness centers and hotels...); and (3) night-time economy supporting activities - referring to the multi-industrial performance of a city (hospitals health care, goods delivery, shared services centres, cleaning services, police and public security, repair and maintenance, public and private transport, buildings illuminations and creative industrials).

Intangible cultural heritage is defined as the practices, representations, expressions, knowledge, skills - as well as the instruments, objects, artifacts, and cultural spaces associated therewith - that communities, groups and, in some cases, individuals recognize as part of their cultural heritage (UNESCO, 2003a). As a form of intangible cultural heritage, performing arts range from vocal and instrumental music, dance and theatre to pantomime, sung verse, and beyond. They include numerous cultural expressions that reflect human creativity and that are also found, to some extent, in many other intangible cultural heritage domains (UNESCO, 2003b). The cultural activity includes traditional performing arts at several famous tourist attractions across the three regions of Vietnam: North, Central, and South, featuring performances such as water puppetry, *hát xẩm* (folk songs), and *đờn ca tài tử* (amateur chamber music), among others. Walker et al. (2003) have identified traditional performing arts to be a tool that can promote regional/national image, contribute to economic gains, and facilitate globalization through promoting local culture. Yet, they also strongly expressed the concern for taking advantage of culture to make money. While these studies have generated information about performing arts as tourism products, the literature is lacking in studies that help identify specific factors that influence performing arts tourists' art consumption behavior and the extent to which such behavior impacts the overall night-time economy; previous studies have only mentioned the relationships between factors without providing the extent of their positive or negative impact, or assessing their influence in terms of magnitude - such as identifying which factor has the most significant effect. After conducting extensive research and consultation, the researchers found that artistic consumption behavior is a critical factor

influencing the night-time economy in general, and traditional folk performance arts in particular.

Art consumption behavior refers to the ways in which individuals or groups engage with, experience, and interact with art. This encompasses a wide range of activities and preferences related to enjoying, purchasing, and participating in art. Based on the Theory of Planned Behavior (TPB) and research by Cui and Photchanachan (2021), which focused on domestic individual tourists who have experienced Guangxi tourism performing arts as the research subject, the study investigated the influence of five factors on art consumption behavior, including product cognition, cultural identity, past behavior, reference groups, and perceptual behavioral controls. The results of this study indicated that the aforementioned factors had a significant influence on consumer behavior. Additionally, the study also made a remark on the mediating variable, indicating that consumers' purchase intention is an incomplete intermediary. Building on previous research, the researchers omitted the mediating variable "consumers' purchase intention" from the model of Cui and Photchanachan (2021) and used the variable “accessibility”, replacing the factor "perceptual behavioral controls", which was considered limiting in constructing the research questionnaire and causing confusion. Accessibility is a crucial factor in understanding art consumption behavior because it directly impacts who can engage with art, how often, and in what ways. By examining the accessibility (ability to pay, location accessibility, schedule, information accessibility), the research can clarify consumption behavior in the arts.

To inherit the results of previous research and design a suitable model for the research area, this study investigates five main factors, which are considered the most decisive to artistic consumption behavior, including product cognition, cultural identity, past behavioral, reference groups và accessibility.

Based on a synthesis of some previous pieces of research and primary research carried out in three cities/provinces presented for three key economic regions for the night-time economy in Viet Nam ensuring geographic diversity and cultural variation. Hanoi, as the capital, reflects both urban development and traditional influences. Hue, with its culture-rich and historical significance, offers insights into tourism-oriented consumer behavior. Ho Chi Minh City, the largest and most economically dynamic city in the southern region, represents the economic hub of Vietnam.

In Vietnam, there is still a lack of comprehensive and in-depth studies assessing the demand, potential, measurability, orientation, and requirements for developing the night-time economy nationwide, particularly in the field of folk performance arts. The researchers have identified key factors influencing artistic consumption behavior in night-time performance art.

3. Research Methodology

3.1. Research Framework Model

After establishing the theoretical basis and synthesizing previous studies, the author proposes a research model as follows:

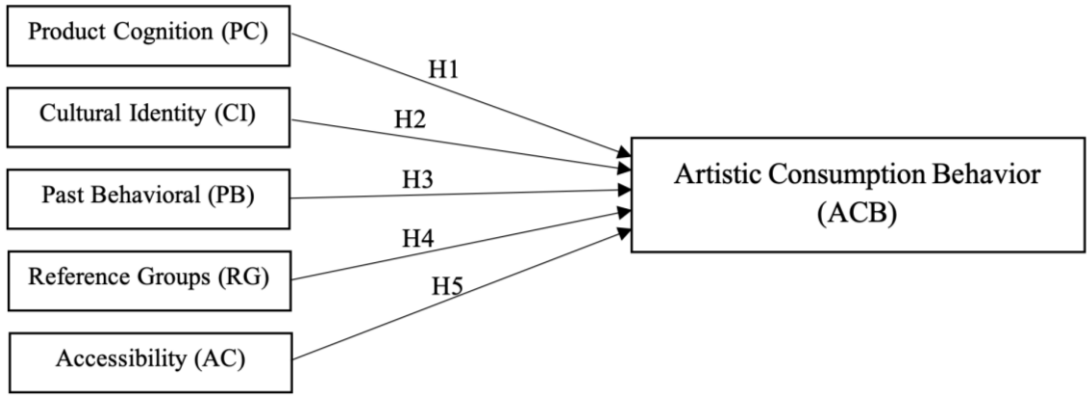


Figure 1. Conceptual framework model

Based on the theoretical basis and previous studies presented above, the authors propose the following research hypotheses:

Hypothesis 1 (H1). *Product cognition will positively affect artistic consumption behavior.* ***Hypothesis 2 (H2).*** *Cultural identity will positively affect artistic consumption behavior.*

Hypothesis 3 (H3). *Past behavior will positively affect artistic consumption behavior.*

Hypothesis 4 (H4). *Reference groups will positively affect artistic consumption behavior.*

Hypothesis 5 (H5). *Accessibility will positively affect artistic consumption behavior.*

3.2. Research Data

The sample size depends on the estimation method used in the study. In this research, the researchers intend to use exploratory factor analysis (EFA) and regression analysis. The study selected residents who watched night folk performances in Vietnam as experimental samples. As the time for night-time economic activities, the paper considered 6 p.m. to 6 a.m. the next morning.

The quantitative research is based on primary data collected through surveys. Using indicators such as product cognition, cultural identity, past behavior, reference group, accessibility, artistic consumption behavior, the study targeted individuals who had attended night-time art performances in three cities representing three regions of Vietnam. The survey was designed using convenience sampling, and stratified sampling methods, and the data were collected using a 5-point Likert scale.

The paper selected districts with potential for night-time economic development, in Ha Noi, Hue, Ho Chi Minh city research obtained 838 usable survey responses. The sample size according to the initial design was 800 survey questionnaires, including 342 questionnaires distributed in Ha Noi city, 210 questionnaires distributed in Hue city, and 283 questionnaires distributed in Ho Chi Minh city. The study collected a total of 800 valid questionnaires; 38 questionnaires were invalid.

3.3. Data Processing and Analysis Methods

The researchers applied quantitative research methods, particularly the descriptive research approach, by testing hypotheses and analyzing data to examine the impact of independent variables on dependent variables.

An online survey is used, incorporating indicators to evaluate product cognition, cultural identity, past behavior, reference group, accessibility and artistic consumption behavior. The survey also records the demographic and socio-economic characteristics of respondents. Survey respondents are chosen based on the following criteria: (1) They have experienced at least one type of night performing art; (2) They have experienced night performing art in Hanoi/Hue/Ho Chi Minh city; (3) They have to pay for experiencing night performing art.

For secondary research data, the synthesis method facilitates the integration of information from various data sources into generalized conclusions. This approach provides a comprehensive and multidimensional perspective, enhancing the accuracy of the research findings.

After collecting responses, the researchers process and organize the data into an Excel spreadsheet. Invalid responses are excluded based on specific criteria, such as: (1) respondents providing identical answers across all questions and (2) completing the questionnaire with repetitive patterns, suggesting a lack of genuine engagement with the questions. After completing the data cleaning process, all valid samples will be processed using SPSS software to assess the reliability of the measurement scale, conduct descriptive statistics, perform exploratory factor analysis (EFA), and execute linear regression analysis. For Regression analysis, to identify factors affecting artistic consumption behavior, the overall correlation model has the form:

$$ACB = f (PC, CI, PB, RG, AC)$$

where: the dependent variable is ACB - artistic consumption behavior. The independence variables are PC - Product cognition, CI - Cultural identity, PB - Past behavior, RG - Reference groups, AC - Accessibility. Specifically, the following hypotheses were tested: To examine how the factors directly affect the overall satisfaction level, a linear regression equation will be used:

$$ACB = b0 + b1*PC + b2*CI + b3*PB + b4*RG + b5*AC + ei$$

The variables included in the regression analysis are determined by calculating the scores of the factors.

The analysis is carried out through the following steps: ***Step 1:*** Describe the research sample to determine whether the sample size is large enough to conduct quantitative research. ***Step 2:*** Check the Cronbach's Alpha reliability coefficient to determine the degree of correlation between the scales and conduct exploratory factor analysis (EFA). ***Step 3:*** Use multivariate regression analysis to determine the level of influence of factors on the dependent variable. ***Step 4:*** Interpret the factors and analyze the adjusted model.

3.4. Research Scale

The study employs a 5-point Likert scale (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree) for evaluation. The authors collect data from various locations using an online questionnaire (Google Form). The questionnaire is distributed through Facebook groups and communities from September to November 2024, targeting individuals who meet the predefined sampling criteria. Additionally, the research group leverages existing networks to disseminate the questionnaire using the snowball sampling method. The technique applied in this study involves a closed-ended questionnaire.

Table 1. The scale of variables

No	Variable	Code	Number of Indicators	Cronbach's Alpha	Source
1	Product Cognition	PC	4	0.831	Lin et al. (2017)
2	Cultural Identity	CI	4	0.864	Man-U (2019)
3	Past Behavioral	PB	3	0.866	Witek and Kuźniar (2023)
4	Reference Group	RG	3	0.833	Eszter (2008)
5	Accessibility	AC	3	0.847	Carvalho et al. (2015)
6	Artistic Consumption Behavior	ACB	3	0.803	Cui and Photchanachan (2021)

Source: The authors and results from SPSS

The results of the reliability assessment for the measurement scales of the variables within the model show that Cronbach's Alpha coefficient for all variables has Cronbach alpha coefficients from 0.803 to 866. The variable-total correlation coefficients for all observed variables are also greater than 0.5. Furthermore, the Cronbach's Alpha If Item Deleted coefficients, when removing observations, are all lower than the Cronbach's Alpha coefficients of the variables. These results indicate the reliability of the measurement scales and the validity of the data values used for analysis in the research model.

4. Research Results

4.1. Descriptive Statistics

Through descriptive analysis, female respondents performing arts in three cities accounted for 442 (55.25%), mainly aged between 30 and 49 years old (43.75%), bachelor degree accounted for 53.75%, personal monthly income was relatively average between 5 and 10 in millions of VND. Most of the residents have watched ***water puppetry***, with 331 (41.37%) respondents. In addition, 100% of the respondents have watched tourism performing arts. Through the difference analysis of demographic variables, respondents of different ages, education levels, monthly income and occupations showed significant differences in their artistic consumption behaviour, while those of different genders showed little difference.

4.2. Kaiser-Meyer-Olkin (KMO) test

EFA analysis for 5 independent variables, 17 scales. Hypotheses: {H0: The variables are not correlated with each other and H1: The variables are correlated with each other}. The result of Bartlett's test shows a significance value (Sig=0.000<0.05), indicating that H0 is rejected. At a 5% significance level, the variables are correlated with each other. While the KMO coefficient = 0.871 > 0.5 ensures reliability. The analysis of variance extracted reached a value of 56.324% (>50%), demonstrating that 56.324% of the variation of the data was explained by 5 factors, the measurement scales were extracted and accepted.

Table 2. KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.871
Barlett's Test of Sphericity	Approx Chi-Square	3266.160
	df	136
	Sig.	.000

Source: Results from SPSS

We used Bartlett's test to check whether the observed variables in the group of factors were correlated with each other in the population. If so, the level of statistical significance would be satisfied (Sig.< 0.050). The results showed that Sig. = 0.000, indicating that the factors in the model were correlated with each other and had statistical significance.

4.3. Exploratory Factor Analysis (EFA)

Initially, our original model comprised 20 observed variables, which were categorized into 5 primary factors. Subsequently, we conducted an Exploratory Factor Analysis (EFA), temporarily disregarding the relationship between dependent and independent variables. Varimax rotation was employed to enhance the clarity of the data. The results are presented in the table below:

Table 3. Rotated Component Matrix

	Component				
	1	2	3	4	5
PC1	.712				
PC2	.568				
PC4	.552				
PC4	.538				
CI3		.705			
CI4		.632			
CI1		.612			
CI2		.568			
PB1			.764		
PB3			.685		
PB2			.575		
RG1				.808	
RG3				.685	
RG2				.572	
AC2					.723
AC1					.592
AC3					.572

Source: Results from SPSS

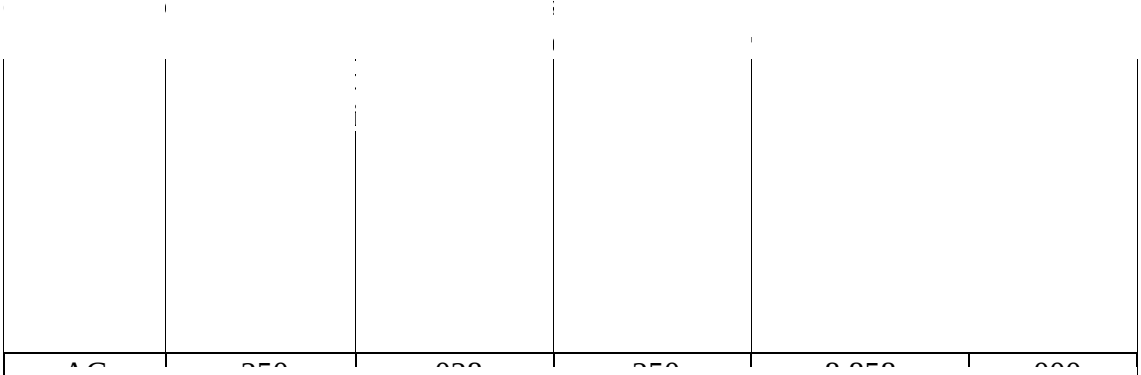
A factor loading >0.5 is the indicator of the correlation between the observed variables and the group of factors, where the higher the load coefficient, the stronger the correlation, and vice versa. A load factor greater than or equal to 0.5 shows that the observed variable has practical significance. The results of the rotation matrix table (Table 3) showed that the observed variables of each factor group had convergent values, showing a high level of significance, with loading coefficients all greater than 0.5. The

loading factor was bigger than 0.5, so, it could be concluded that the measurement scale of factors was satisfied (Giao & Vuong, 2019).

4.4. Analysis of Regression Models

The regression coefficients and test results are shown in Table 4.

We con ...bles were significant with the



a. Dependent Variable: Artistic consumption behavior (ACB)

Source: Results from SPSS

All the p-values = 0.000 show the correlation between product cognition, cultural identity, past behavioral, reference group, accessibility and the artistic consumption behavior.

We conducted a level test. Following the model, the results showed that the R2 was 0.770, and the test coefficient was statistically significant. The adj R-squared = 0.766 indicates that 76.60% of the change in PC - product cognition, CI - cultural identity, PB - past behavioral, RG - reference group, AC - accessibility can explain artistic consumption behavior of people in Viet Nam.

The regression equation representing the relationship between the variables in the model is as follows:

ACB = 0.312*PC + 0.307*CI + 0.219*PB + 0.259*RG + 0.25*AC

The 5 independent variables included in the regression analysis all affect the dependent variable in the same direction. Based on the magnitude of the Beta normalized regression coefficient, the order of impact from strongest to weakest of independent variables to dependent variables is product cognition (0.312), cultural identity (0.307), reference groups (0.259), accessibility (0.250), past behavior (0.219) *(Table 4)*. It can be seen that factors of product cognition have the most important influence on artistic consumption behavior. The relationship between product cognition, cultural identity, past behavior, reference groups, and accessibility plays a significant role in shaping artistic consumption behavior. These independent variables collectively influence the patterns and tendencies in how individuals engage with and consume artistic products and experiences.

4.5. Discussion

The results of this study align consistently with previous research (Cui & Photchanachan, 2021). Through the process of discussion and data analysis, the researchers identified that factors such as product recognition, cultural identity, past behavior, reference group, and accessibility positively influence and play a significant role in shaping the artistic consumption behavior of people in three representative provinces/cities. These independent variables collectively influence the patterns and

tendencies in how individuals engage with and consume artistic products and experiences. Combining these two elements creates a powerful impact in promoting consumption in these fields, where cultural factors and product value perception play a pivotal role.

Through the research findings, the research group identified that product cognition, cultural identity, reference group, accessibility, and past behavior have varying levels of influence, ranked from highest to lowest, respectively. The result showed that product cognition has the most important influence on artistic consumption behavior. Raising community awareness of folk art through education and communication is a strategic measure. Integrating folk performing arts into formal education is important. Curricula should not only focus on theoretical knowledge but also provide experiential learning opportunities that allow students to experience themselves in cultural heritage. Historical contents and musical elements of folk performances should be integrated into subjects such as history, literature and music. Extracurricular activities, such as traditional music clubs, folk dance workshops, and student-led performances, can also foster a practical knowledge of folk culture. National events and celebrations can amplify the impact of folk performing arts. It allows people to experience traditional performances, emphasizing their cultural and historical significance. Moreover, digital technology and media platforms should be leveraged for educational purposes. For example, documentaries, podcasts or interactive online content can serve as engaging tools to educate the younger generation about the history, meaning and techniques of folk performances. Gamification, such as virtual reality tours of cultural sites or interactive storytelling apps, can make learning about folk arts more immersive and appealing. Both education and communication are powerful tools to elevate the role of folk performing arts as both a cultural treasure and an educational resource.

It is also essential to have a clear understanding of the cultural identity values created by these art forms, as they directly influence the preservation of traditional culture, the development of tourism, and the promotion of local economies. This becomes even more urgent considering that Vietnamese folk art originates from the lives of the Vietnamese people and spans the history and culture of the S-shaped country (N Duong, 2024). Each region preserves a unique form of art, such as ***ca trù*** in the North, ***đờn ca tài tử*** (amateur chamber music) in the South, or ***cải lương*** in the Central region. Although there are various ways of expression, all these forms authentically reflect the lives and souls of the people and contribute to helping international friends gain a deeper understanding of Vietnam's long-standing culture. To fully leverage this potential and foster sustainable development, a multi-faceted approach is crucial. This necessitates enhancing the dissemination of Vietnamese cultural values, aligning with the directives outlined in Government Decree 14/2014/NĐ-CP on Cultural Heritage, through multifaceted communication campaigns, integrating traditional arts education into the curriculum as mandated by Circular 30/2014/TT-BGDĐT, and organizing diverse cultural festivals and events, as outlined in Government Decree 79/2012/NĐ-CP, that authentically represent local heritage. Concurrently, cultivating profound cultural experiences, as emphasized in Government Decree 144/2015/NĐ-CP on tourism development, by promoting cultural tourism and facilitating inter-regional cultural exchange is paramount. This aligns with the growing recognition of the cultural industry's potential to contribute significantly to economic growth, as evidenced by the increasing focus on cultural tourism and creative industries in recent years.

The analysis shows that reference groups have a significant and positive impact on artistic consumption behavior in Vietnam, with a standardized Beta coefficient of 0.259. This highlights that an individual's engagement with artistic products and experiences is partly shaped by social interactions and the influence of groups they associate with. Reference groups serve as an important point of comparison, shaping individuals' attitudes, preferences, and behaviors. In the digital age, individuals can easily consult opinions from friends, family, or online influencers. The authors propose the creation of online communities, forums, or applications where people can share experiences and discuss artistic performances, particularly those involving folk performing arts. Social media campaigns should emphasise user-generated content and influencer endorsements, showcasing the emotions and value derived from attending these events.

As the research result has shown that consumers' past behavior has an impact on their consumption behavior, there is a need for a strategic approach that aligns with their preferences and habits. By utilizing historical data analysis, such as ticket purchase frequency, preferred performance genres, and event attendance rates, it is possible to classify and identify audience segments. Based on these analyses, the performance content can be tailored to suit these preferences, such as offering traditional or modern performances, ensuring greater appeal to wider age ranges. Additionally, creating interactive experiences, such as behind-the-scenes previews or post-event discussions, fosters deeper engagement with these customers. Moreover, online platforms are ideal for sharing captivating content to attract repeat attendance such as offering online ticketing and loyalty programs. Finally, gathering feedback post-event ensures continuous improvement and helps refine strategies for future success. This also fosters a sense of being heard and valued among customers, making them more likely to return and remain loyal to the business.

In addition to the above factors, accessibility plays a crucial role in promoting consumer behavior toward nighttime folk performing arts. To optimize this factor, it is essential to select performance venues in central or densely populated areas while improving transportation systems and supporting infrastructure. In terms of finances, flexible ticket pricing policies should be implemented, with regular free performances and sponsorships from businesses and governments. To leverage the impact of accessibility factors in promoting behavior toward folk performing arts, the research group recommends that government agencies should expand models of television programs and national-level celebrations with cultural and artistic characteristics, including traditional arts and classical arts, to reach more audiences. These events must be harmoniously integrated to appeal to diverse age groups, thereby spreading awareness not only among Vietnamese citizens but also to international audiences. In addition, it is necessary to collaborate with mass media such as television and newspapers to organize specialized programs, reports, or talk shows with the participation of cultural experts and folk artists.

However, despite the findings, the study has some limitations. Notably, there is a significant difference between peak and off-peak seasons, and a bias in the sample of customers. This is likely due to the use of a quota sampling method. While time is a significant factor influencing consumer behavior, the uneven sample distribution may compromise the accuracy and reliability of the research. Another limitation is the discrepancy between the proportion of residents in the three cities in the sample and the actual population proportion. Data collection in each city was challenging and costly, and

limited time and resources led to convenience sampling. The researchers suggest the next research topic, which is expected to expand the target group and sample size, with even more diversity, to reflect a broader scope, focusing on provinces and cities with a concentration of various forms of folk art performances, such as Bac Ninh Province, Phu Tho Province, and Hoi An City.

5. Conclusion

This study investigates the determinants of artistic consumption behavior in the context of night folk performing arts, a critical component of Vietnam's burgeoning night-time economy. Focusing on three major cities - Hanoi, Hue, and Ho Chi Minh City - quantitative methods were employed to analyze data collected from 800 participants. The results reveal that product cognition, cultural identity, past behavior, reference groups, and accessibility significantly influence consumption behavior, with product cognition and cultural identity demonstrating the strongest effects.

Demographic analysis indicates that independent variables including product cognition, cultural identity, past behavioral, reference groups và accessibility substantially affect artistic consumption behavior. These findings underscore the necessity of designing nuanced strategies to promote engagement with traditional performing arts across diverse audience segments.

To enhance the integration of folk performing arts into the night-time economy, the study underscores the importance of elevating public awareness of cultural values and national identity. Policy recommendations include increased support for folk artists, the integration of traditional art with contemporary cultural trends, and strategic investments in infrastructure to improve performance venues and accessibility. Such measures are critical for attracting both domestic and international audiences and for fostering long-term sustainability.

Despite its contributions, this study has certain limitations, including the focus on three cities and data collection during non-peak tourist seasons. Future research should address these gaps by expanding to additional regions and incorporating a broader range of cultural and economic variables. Such efforts would provide a more holistic understanding of the role of traditional performing arts in fostering sustainable development.

In summary, this research contributes to the academic and practical understanding of night folk performing arts' role in cultural preservation and economic growth. The findings offer a framework for policymakers, cultural organizations, and researchers aiming to leverage Vietnam's rich artistic heritage as a catalyst for a vibrant and sustainable night-time economy.

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APPLICATION OF TECHNOLOGY IN SUSTAINABLE TOURISM DEVELOPMENT IN NGHE AN PROVINCE

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Summary: In 2023, Nghe An welcomed over 6.3 million domestic tourists, with nearly 98.9% of these tourists staying overnight. Despite the province's significant strides in adopting technology in tourism services such as ticket booking, tour booking, hotel reservations and online payments, it still faces numerous challenges in optimizin technology to sustainable tourism development. Using the methods of description, synthesis and analytical, the author collected and processed data from 2018 to 2023 to assess the current state of tourism and technology application in Nghe An. From there, the article proposes several solutions to enhance the effectiveness of technology application in sustainable tourism, including upgrading information technology infrastructure, training and developin human resources, establishing supportive policies and incentives for businesses and developing an integrated tourism information management system.

Keywords: technology, Nghe An, sustainable tourism development

1. Introduction

The Fourth Industrial Revolution (Industry 4.0) is profoundly impacting all aspects of social life and economic sectors, including tourism. Advanced technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), Big Data, and Blockchain are transforming the tourism industry's operations, from booking tickets and hotel reservations to enhancing tourists' travel experiences. These technologies help improve management efficiency, enhance customer service, and create innovative and attractive tourism products. Recognizing this trend, the Ministry of Culture, Sports, and Tourism approved a plan in December 2022 titled "Application of Industry 4.0 Technologies for the Development of Smart Tourism, Promoting Tourism as a Key Economic Sector."

Nghe An province boasts significant tourism potential with numerous natural landscapes and rich cultural heritage, such as Cua Lo Beach, Pu Mat National Park, and the Kim Lien historical site. However, to effectively harness these resources and ensure sustainable tourism development, Nghe An must adopt modern technologies. In response, the People's Committee of Nghe An approved a strategy in 2023 for developing tourism in the province until 2030, with a vision toward 2035. This strategy emphasizes the priority of leveraging science, technology, human resources, and innovation to enhance the province's appeal.

Researching and applying technology will enable Nghe An to develop effective tourism promotion strategies, access international tourism markets, and increase the number of tourists and revenue. Additionally, it will foster technological infrastructure development and enhance technological skills among the local workforce, laying a solid

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foundation for sustainable tourism growth.

2. Literature Review and Research Methods

2.1. Concepts of Technology and Sustainable Tourism Development

2.1.1. Technology

According to UNESCO (2015), Information and Communication Technology (ICT) refers to technologies, including the Internet, wireless networks, mobile phones, computers, software, network devices, multimedia communication, and related applications used to create, process, store, and exchange information.

Wikipedia defines technology as the invention, modification, use, and knowledge of tools, machines, techniques, vocational skills, systems, and organizational methods aimed at solving a problem, improving an existing solution, achieving a goal, or performing a specific function that requires a high level of expertise.

2.1.2. Sustainable Tourism Development

According to the World Travel and Tourism Council (WTTC, 1996), "Sustainable tourism is about meeting the needs of tourists and host regions today while protecting and enhancing opportunities for the future."

The United Nations World Tourism Organization (UNWTO, 2013) defines sustainable tourism development as development that meets the needs of present tourists and the tourism industry while safeguarding and enhancing future opportunities. This requires balancing three key aspects: economic, social, and environmental.

The 2017 Tourism Law of Vietnam defines sustainable tourism development as tourism development that simultaneously meets economic, social, and environmental requirements, ensuring a harmonious balance of interests among stakeholders involved in tourism activities without compromising the ability to meet tourism needs in the future.

2.2. Research Methods

Data Collection Methods: This study utilizes secondary data sourced from the statistical yearbooks of Nghe An province from 2018 to 2023, the Department of Tourism of Nghe An, and relevant documents and articles on tourism and sustainable tourism.

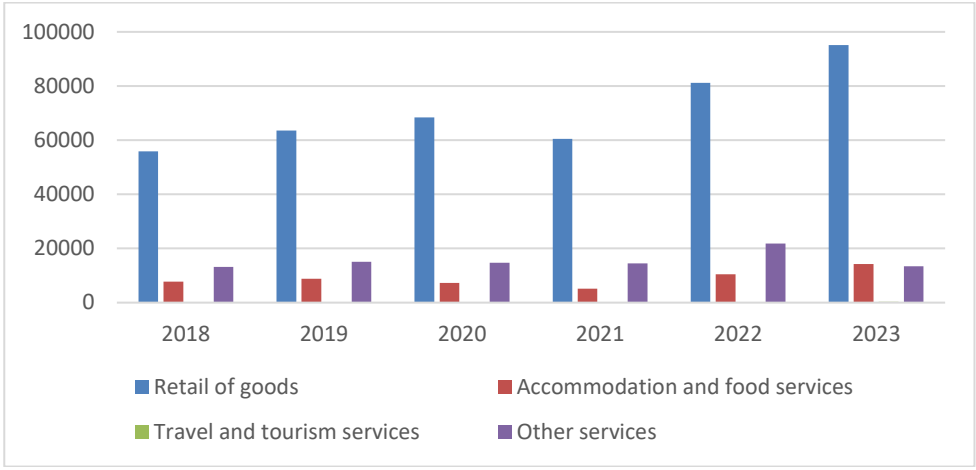
Data Processing and Analysis: The study employs descriptive statistical methods to evaluate the current state of tourism development in Nghe An. Comparative methods are used to analyze various indicators of tourism development, such as revenue, tourist arrivals, and the ICT Index of Nghe An province from 2018 to 2023

3. The Current Status of Technology Application and Tourism in Nghe An Province

3.1. Current Status of Tourism in Nghe An Province

Nghe An province has witnessed significant growth in total retail sales of goods and revenue from consumer services during the 2018-2023 period, with a strong recovery in 2022 and 2023 following the pandemic.

Figure 1. Total Retail Sales of Goods and Revenue from Consumer Services by Business Sector (billion VND)



Source: *Nghe An Statistical Yearbook 2022 and the December and Annual Summary Report 2023.*

According to Figure 1, revenue from retail sales of goods consistently remained the largest, accounting for approximately 72-75% during the 2018-2023 period. Accommodation, food services, travel, and other services accounted for the remaining nearly 30%. However, the overall trend during this period shows revenue increasing from 2018 to 2019, followed by a decline in 2020 and 2021, before rebounding in 2022.

Specifically, revenue from accommodation and food services rose from VND 7,756 billion in 2018 to VND 8,816 billion in 2019, then fell to VND 7,341 billion in 2020 and VND 5,119 billion in 2021. A significant recovery occurred in 2022 with a 200% increase, reaching VND 10,528 billion, and further increased to VND 14,293 billion in 2023. The sharp decline in revenue during 2020 and 2021 was due to the severe impact of the COVID-19 pandemic, which significantly disrupted the tourism industry. Many tourism companies were forced to close, and revenue from travel services plummeted from VND 153 billion in 2018 and VND 165 billion in 2019 to VND 83 billion in 2020 and just VND 21 billion in 2021. However, Nghe An province saw a strong recovery, with revenue increasing to VND 114 billion in 2022, a more than 500% increase compared to 2021, and reaching VND 350.5 billion in 2023.

Despite this recovery, travel services in Nghe An province still account for a very small proportion of the overall structure, contributing only 0.1-0.2% during the 2018-2023 period, with a particularly low figure of 0.03% in 2021.

Table 1. Revenue from Travel Services by Economic Sector (billion VND)

	2018	**2019**	**2020**	**2021**	**2022**	**2023 (estimated)**
Total	153	165	83	21	114	351
State- owned	4	5	3	1	6	23
Non- State- owned	149	160	80	20	108	328
Collective	-	-	-	-	-	-
Private	149	160	80	20	108	328
Individual	-	-	-	-	-	-
Foreign-invested	-	-	-	-	-	-

Source: NGKT of Nghe An Province, 2018-2023

Tourism service revenue in Nghe An province experienced significant fluctuations during the 2018-2023 period, particularly impacted by the COVID-19 pandemic in 2020 and 2021. Total revenue peaked at VND 351 billion in 2023, following a strong recovery from the record low of VND 21 billion in 2021. The non-state sector, especially the private sector, accounted for the largest proportion of total revenue, ranging from VND 149 billion (2018) to VND 328 billion (2023), highlighting its pivotal role in the development of tourism in Nghe An province. Meanwhile, revenue from the state sector remained low but showed significant growth, increasing from VND 1 billion (2021) to VND 23 billion (2023). Notably, there was no revenue from foreign-invested enterprises during this period, emphasizing the urgent need for policies to attract and encourage foreign investment to diversify resources and promote sustainable tourism development.

Table 2. Number of Domestic Tourists in Nghe An Province (Thousand visitors)

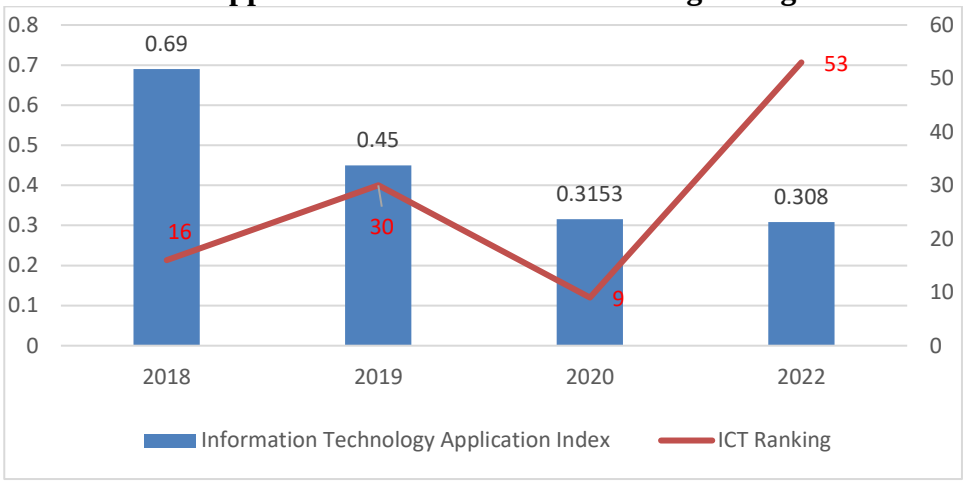
	2018	**2019**	**2020**	**2021**	**2022**	**2023 (estimated)**
Guests served by accommodation establishments	5,474.8	6,537.8	3,961.6	2,868.1	7,920.8	6,298.7
Overnight tourists	4,292.9	4,740.3	2,939.8	2,247.8	6,270.1	5,166.4
Day tourists	1,179.9	1,797.5	1,021.8	620.3	1,650.6	1,132.2
Number of guests served by travel agencies	41.6	54.4	27.2	8.7	45.8	67.5

Source: NGKT of Nghe An Province, 2018-2023.

From 2018 to 2023, the total number of domestic tourists in Nghe An province showed an upward trend. Specifically, the number of tourists served by accommodation establishments increased from 5,474.8 in 2018 to 7,920.8 in 2022. However, in 2023, the number is estimated to reach 6,298.7, showing a slight decrease compared to 2022. This group represents a significant portion of the total domestic tourists in Nghe An. The number of overnight tourists also increased from 4,292.9 in 2018 to 6,270.1 in 2022, before slightly decreasing to 5,166.4 in 2023. This trend demonstrates the province's growth and appeal to tourists. However, the group of tourists served by travel agencies still remains small, with the number decreasing from 54.4 in 2019 to 8.7 in 2021, and then rising to 45.8 in 2022, with a sharp increase to 67.5 in 2023. This group mostly participates in tour services or travel packages from travel agencies, accounting for only about 0.5% compared to the accommodation services. In 2023, travel agencies performed better, serving 1.47 times the number of tourists compared to 2022, and nearly 7.5 times more than in 2021. The importance of accommodation establishments and service companies is evident, and they must strive to further develop and attract tourists, diversifying tourism products to ensure the sustainable development of tourism in Nghe An in the future.

3.2. Current Status of Technology Application in Nghe An Province

Table 3. ICT Application Index and ICT Rankings of Nghe An Province



***Source**: Report on Vietnam's Readiness Index for ICT Development and Application, 2018, 2019, 2020, and 2022*

Between 2018 and 2022, Nghe An Province experienced a significant decline in its ICT index, dropping from 0.69 in 2018 to 0.308 in 2022. This reflects a notable reduction in the province's capacity to adopt information technology. The ICT ranking also showed instability, falling from 16th place in 2018 to 30th in 2019, climbing to 9th in 2020, but then plummeting to 53rd in 2022. These fluctuations highlight the challenges Nghe An faces in maintaining and improving ICT adoption.

The increasing prevalence of information technology has brought numerous benefits to the tourism sector in Nghe An. The province has identified digital transformation as a strategic goal to build a smart tourism ecosystem, which was approved by the Provincial People's Committee as part of Nghe An's Tourism Development Strategy to 2030, with a vision to 2035. Local tourism businesses have actively developed, maintained, and operated websites and social media platforms such as Facebook and TikTok to promote and facilitate tourism business activities.

Technology application has enhanced collaboration with tourism companies and travel agencies, driving suitable demand-stimulation programs and introducing a range of online tours through platforms like **mynghean.vn** and **dulichnghean.com**. Online booking platforms such as **Vntrip.vn**, **Traveloka**, **Booking.com**, and **Agoda** have also become widely used, facilitating seamless connections between customers and accommodation providers, including homestays, villas, and hotels in areas like Cua Lo, Vinh City, and Quynh Luu. These online spaces have vividly showcased Nghe An's distinctive products and cuisine in an engaging and appealing manner.

In 2021, Nghe An became the fourth locality, after Khanh Hoa, Da Nang, and Ninh Binh, to collaborate with TikTok Vietnam to promote tourism on the TikTok platform. In early 2022, Nghe An launched the smart tourism portal **Visitnghean.com**, enabling tourists to search and access tourism information based on location. This initiative is part of the province's smart city project, leveraging digital platforms to create an ecosystem that mutually benefits tourists, authorities, and businesses, thereby gradually developing a high-quality tourism industry.

In December 2022, the Hoang Thi Loan Memorial Site (part of the Kim Lien Relic

Site) officially launched an interactive touchscreen application for visitors. The integration of digital technology into the preservation and promotion of heritage values has made the artifacts at the Kim Lien Relic Site more vibrant and left a lasting impression on visitors.

3.3. Assessment of Potential and Challenges in Applying Technology for Sustainable Tourism Development in Nghe An Province

3.3.1. Potential

Nghe An Province holds significant potential for sustainable tourism development due to stable growth in tourist numbers and revenue from consumer services. Key highlights include:

Stable Revenue Growth: Total retail sales and consumer service revenue increased from VND 55,854 billion in 2018 to VND 95,112.4 billion in 2023. Revenue from accommodation, food, and travel services grew significantly, with accommodation and food services rising from VND 7,756 billion in 2018 to VND 14,293.1 billion in 2023.

Growth in Domestic Tourism: The number of tourists served by accommodation facilities increased from 5.47 million in 2018 to 7.92 million in 2022, with a slight decrease to 6.298 million in 2023. Overnight tourists also rose significantly from 4.29 million in 2018 to 6.27 million in 2022, before slightly declining to 5.16 million in 2023.

Growth in Travel Agency Services: The number of tourists served by travel agencies grew from 41,621 in 2018 to 45,824 in 2022, and further to 67,510 in 2023.

Technological Infrastructure Development: Nghe An has leveraged technology in tourism activities through online booking platforms, and promotion via social media channels such as Facebook and TikTok, as well as various tourism websites.

3.3.2. Challenges

Despite the potential, Nghe An Province faced several challenges from 2018 to 2023, including:

Decline in Travel Services Revenue: Revenue from travel services fell sharply from VND 153 billion in 2018 to VND 21 billion in 2021 before recovering to VND 144 billion in 2022. The fluctuations, driven by the COVID-19 pandemic, posed significant challenges to the tourism and travel sectors.

Limited Contribution of Travel Agencies: While the number of tourists served by travel agencies increased, this segment remains small, accounting for only 0.5% in 2022 and 1% in 2023. This highlights the need for travel agencies to explore new strategies and train staff to align with social trends.

Fluctuations in ICT Application and Rankings: The ICT application index dropped from 0.69 in 2018 to 0.308 in 2022. The province's ICT ranking also showed significant volatility, ranking 53rd out of 63 provinces in 2022. This decline reflects instability and insufficient ICT application in Nghe An, potentially due to inadequate investment in technological infrastructure and a shortage of high-skilled technical resources.

Dependency on the Private Sector: Most revenue comes from private enterprises, with minimal contributions from the public sector and no foreign investment. This dependency limits technological quality, scale, and investment resources.

To fully harness Nghe An’s potential, efforts should focus on enhancing ICT application, improving the ICT index, reducing reliance on the private sector, and increasing public and foreign investment. Strengthening technological infrastructure and

fostering a more diversified investment landscape are crucial for achieving sustainable tourism development.

4. Proposed Solutions for Technology Application in Tourism Development

In light of the challenges mentioned, several solutions are proposed, including upgrading technological infrastructure, training high-quality human resources, and developing supportive policies to encourage businesses to participate in the digital transformation of tourism.

First, upgrade information technology infrastructure to support online tourism services. Nghe An province should develop a high-speed internet network to ensure stable and fast connections at all tourist areas. Efforts should be made to establish free public Wi-Fi systems at tourist attractions, restaurants, hotels, and public spaces, enabling tourists to easily access information and share their experiences. Priority should be given to major tourist attractions such as Cua Lo Beach, Kim Lien Historical Site, and eco-tourism spots like the tea islands in Thanh Chuong and community tourism in Con Cuong.

Second, train and develop a workforce with technological skills. This involves providing technology training for tourism employees and organizing IT skills courses for staff, from tour guides to managers. Collaborative programs with universities and training centers should be developed to create specialized courses focusing on the application of IT in smart tourism.

Third, establish supportive policies and incentives for tourism businesses to adopt modern technology. Investment incentives such as tax breaks, financial support, and favorable conditions should be provided to encourage businesses to invest in IT for tourism. Innovation programs should also be introduced to reward companies and individuals that develop creative applications and technological solutions for tourism.

Fourth, develop an integrated tourism information management system to make it easier for tourists to access and use tourism services. The smart tourism portal *Visitnghean.com* should be upgraded to provide more detailed and updated information about tourist sites. Mobile applications should also be developed to help tourists search for information and access other tourism services. Big data analytics should be used to collect, analyze, and forecast tourism trends, enabling effective strategic decision-making in tourism development. Additionally, a centralized information management system should be created to facilitate information sharing among tourism businesses, managers, and tourists.

Furthermore, Nghe An province can collaborate with major technology companies to apply the latest technological solutions in tourism or partner with other provinces to share technological resources and experiences. This collaboration could also help in building inter-provincial tours and promoting Nghe An tourism on various technological platforms.

5. Conclusion

The application of technology in sustainable tourism development in Nghe An has brought significant benefits, enhancing business efficiency and promoting the sustainable development of the local tourism sector. Based on data analysis from 2018 to 2023, Nghe An has achieved substantial progress, attracting a large number of tourists and increasing revenue. However, challenges remain, including maintaining and improving the ICT application index, investing more in technological infrastructure, training human resources, and developing smart technology platforms.

For sustainable tourism development, Nghe An needs to prioritize the application of

IT in all aspects of the tourism industry. This paper proposes solutions focusing on upgrading IT infrastructure, enhancing workforce training, formulating supportive policies, and promoting tourism management and marketing. These efforts aim to position Nghe An as an attractive and sustainable tourism destination.

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BENEFITS AND DIFFICULTIES OF IMPLEMENTING GREEN ACCOUNTING IN SUSTAINABLE DEVELOPMENT

Dr. Duong Thi Quynh Lien[1]

Summary: In today's era, when the environment is facing serious challenges, implementing green accounting as a solution not only helps businesses manage their finances effectively but also contributes positively to sustainable development. Green accounting is not only a supporting tool in the accounting management process but also an implementation of environmental thinking in businesses. Green accounting is considered an important tool related to the aspects of the impact of the natural environment on the economy. The article studies green accounting, as well as the benefits and difficulties of implementing green accounting in businesses in Vietnam and proposes some key solutions to strengthen the implementation of green accounting, contributing to economic development associated with environmental protection and sustainable development.

Keywords: *green accounting, environmental accounting, environment, sustainable development*

1. Problem statement

Sustainable development is becoming a common trend in the world and the world is moving towards "greening" activities such as: green growth, green bonds, green accounting, etc. According to studies in the world, green accounting is considered an important tool related to the aspects of the impact of the natural environment on the economy and is considered a direction of transformation towards sustainable development, towards the development of a green economy. Strengthening the implementation of green accounting in enterprises in Vietnam in the current period, contributing to sustainable development is one of the urgent requirements. Green accounting is considered an important tool related to the aspects of the impact of the natural environment on the economy and is considered a direction of transformation towards sustainable development, towards the development of a green economy. This is also a new and long-term approach, in line with the general development trend in the world. The application of green accounting, especially environmental accounting, contributes to providing accurate, transparent, complete and responsible information, thereby helping to improve the image of the enterprise in the eyes of management agencies, shareholders, investors and business partners.

2. General overview of green accounting

Green accounting is a type of accounting that incorporates environmental costs into the financial results of a business's operations. The main purpose of green accounting is to help businesses understand and manage the reciprocal relationship between traditional

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economic objectives and environmental objectives, towards sustainable development. The term green accounting was first popularized by economist Peter Wood in the 1980s.

Green accounting can be understood as a modern and comprehensive accounting system to record, summarize and report for an organization, to fully reflect the contents of assets, liabilities, investment capital, revenue and expenditures for the country's green environment.

According to S. Sudhamathi, S. Kaliyamoorthy (2014), green accounting includes 3 main objectives:

- Identify, collect, calculate and analyze materials and energy-related materials;
- Internal reporting and use of environmental cost information;
- Provide information related to other costs in the decision-making process, with the aim of making effective decisions and contributing to environmental protection.

Some studies suggest that green accounting is divided into many different perspectives, including 5 main contents: Environmental financial accounting; environmental management accounting; environmental finance; environmental law; ethics and relations with the social community.

Some studies suggest that green accounting is divided into many different perspectives, including 5 main contents: Environmental financial accounting; environmental management accounting; environmental finance; environmental law; ethics and relations with the social community. Green accounting in general and environmental accounting in particular are part of green growth, aiming at the goal of "by people, for people", contributing to creating stability and sustainability for environmental resources and social development.

The United Nations has requested countries and organizations around the world to implement an environmental accounting system to serve the purpose of recording data related to business activities of enterprises that have an impact on the environment. In 2014, the United Nations launched an application program called " Economic and Environmental Accounting System" or Green Accounting.

However, the study by Sherine & Jacob & Jolly (2012) stated that many opinions have noted that calculating income and expenses from the environment is not easy because these expenses are often hidden or difficult to record. In addition, revenue and expenses will be difficult to measure according to the numerical aspects of financial accounting, because it is related to the future and other intangible factors...

3. Benefits of implementing green accounting

Research and business practices around the world show some benefits of green accounting for business production and operations. Implementing green accounting in businesses brings some of the following main benefits:

Firstly, implementing green accounting meets the issue of sustainable development, balancing economic development with environmental protection and social progress; changing the mindset, awareness, management methods and enhancing the responsibility for environmental protection of administrators, as well as the collective of employees in the enterprise.

Second, implementing green accounting creates conditions for managers in enterprises to see more clearly the level of costs incurred, including environmental costs. From there, there are measures and methods to effectively manage costs and use resources

and energy economically and reasonably, etc. to change product production plans towards green products, environmentally friendly, contributing to environmental protection and effective integration.

Third, implement green accounting and contribute to enhancing the reputation of the enterprise. From there, it enhances the competitiveness of businesses both domestically and internationally. Green accounting helps provide more accurate, complete and comprehensive information to measure the implementation process, thereby improving the image of the business with stakeholders, helping businesses improve relationships with creditors, banks, shareholders, customers, etc. Meeting international environmental standards helps businesses create commercial advantages, enhance reputation in the community by developing a "green" image.

Fourth, it contributes to reducing costs and lowering product prices, increasing revenue and profits; creating opportunities for investment in facilities, machinery, and modern technology to produce better, cleaner, and environmentally friendly products. Thereby, enhancing the competitive advantage of businesses. If done well, businesses will limit input factors such as raw materials, energy, and labor consumed in the process of creating pollution, increase the efficiency of resource use, and increase competitive advantage due to reduced production costs.

Fifth, help managers make decisions easily. Good implementation of green accounting helps managers make important decisions such as reducing production costs, increasing productivity, investing in machinery and equipment to produce better, cleaner products, bringing quality products, leading to lower costs. This helps businesses have a competitive advantage in terms of selling price and higher profits, reducing legal issues.

Sixth, improve the accounting system. Green accounting also helps improve the existing accounting system by organizing the accounting information system more scientifically and connecting the information flow of activities from the business departments.

Seventh, forecasting environmental impacts. Green accounting helps accountants anticipate the environmental impacts, some factors that can cause a business or organization, thereby helping business administrators and policy makers have ways to deal with and resolve appropriately. Thereby, helping to reduce environmental risks as well as risks to public health, while improving management accounting and environmental finance at the enterprise level.

4. Some difficulties in implementing green accounting

In the course of business operations, many enterprises have created waste that is harmful to the environment. Along with Vietnam's development strategy of rapid and sustainable economic development, good environmental protection and harmonious resolution of economic, environmental and social issues. The State has paid attention and issued more and more legal regulations to limit the over-exploitation of natural resources for economic and social development, at the same time, also to limit to the maximum extent violations, environmental destruction and environmental pollution.

However, the implementation of green accounting in Vietnam today will also face many difficulties and challenges:

- Many businesses tend to avoid applying green accounting. And for businesses to comply with legal requirements, it is inevitable that more and more costs will arise with

increasing scale related to the environment, environmental protection, handling of environmental impacts and improving environmental quality in business contracts of businesses and in implementing investment projects.

- Currently, the accounting accounts have not recorded significant costs related to the environment such as repair costs, compensation costs, incident response costs and cleanup and handling costs in accidents, destruction of the ecological environment and living environment.
- Financial regulations, standards, accounting regimes and contract practices do not provide and meet the necessary information on environmental costs according to the requirements for contract decision-making and financial reporting.
- Lack of qualified human resources: The application of green accounting requires a team of staff with high professional qualifications in accounting and environment. However, this human resource is currently in short supply.

5. Solutions to enhance green accounting implementation with sustainable development

To effectively implement green accounting in businesses and contribute to sustainable development, the following solutions need to be implemented :

Firstly, state management agencies need to realize that, for countries, when the input factors of the economy still rely heavily on natural resources, the application of green accounting is mandatory, but requires a reasonable long-term roadmap. The application of green accounting in enterprises; It is necessary to research; issue documents guiding the application of green accounting; have policies to encourage individuals; organizations; enterprises to research and apply green accounting.

Second, it is necessary to complete the construction of an index system to evaluate environmental efficiency. The environmental management reporting system will provide information on environmental costs to business managers.

Third, amend, supplement and perfect environmental accounting standards. Accordingly, some Vietnamese Accounting Standards (VAS), for example: VAS 03, need to be supplemented in the direction of allowing the recognition of future costs as a constituent element in the initial formation value of fixed assets (dismantling costs, returning the site of fixed assets to restore the current state of fixed assets, etc.). In addition, it is necessary to study and supplement some new accounting standards to reflect in the future on government grants according to the provisions of IFRS11. This standard will help businesses have a basis to record and explain the value of grants, subsidies and other forms of support from the Government, when the sustainable development trend has spread globally and many countries choose to implement green growth strategies, through encouraging environmental protection activities with the principle of prevention rather than severely punishing activities that cause environmental pollution.

Fourth, perfecting the identification and recording of green accounting information. In order to provide complete and accurate green financial accounting information, Green Accounting to external parties, demonstrating the responsibility of enterprises in environmental protection activities. As a basis for comparison between enterprises in the same industry, the same production and business sector in investing in environmental protection activities, it is necessary to independently identify environmental assets and environmental liabilities. At the same time, there must also be separate items in the

financial statements to reflect. For environmental assets, for the purpose of environmental protection, tangible fixed assets related to the environment in enterprises need to be independently identified, showing separate values in the fixed asset list and classified according to each environmental activity. This separation will help external parties accurately assess a company's investment in end-of-pipe waste treatment facilities, as well as gain insight into the company's environmental impact reduction goals.

Fifth, improve the provision of green accounting information. As environmental concerns increase, more and more stakeholders pay attention to environmental information. Environmental reports have become a means of corporate accountability, meeting the needs of various pressure groups (Government, investors, customers, etc.). Most businesses are currently not listed on the stock market, so environmental information is presented mainly through financial statements, while listed businesses use annual reports to disclose this issue. The use of separate environmental reports or integration of environmental information in financial statements and annual reports must be appropriate to the economic context and size of the business, whether the business is listed or unlisted, and the information users.

Sixth, promote the power of the 4.0 Industrial Revolution; apply modern advanced science and technology to green accounting to achieve high efficiency and international integration.

Seventh, it is necessary to study the experience of applying green accounting of countries around the world; especially developed countries; from there, draw lessons for Vietnam to achieve the highest efficiency in applying green accounting for businesses.

6. Conclusion

Green accounting is a type of accounting that records and calculates environmental cost factors into the business performance of an enterprise. The main purpose of green accounting is to help businesses understand and manage the interrelationship between traditional economic goals and environmental goals, aiming at sustainable development. Applying green accounting helps businesses not only ensure compliance with environmental laws, increase the reputation and position of businesses in the global competitive trend, but also contribute to the sustainable development of the national economy.

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THE ROLE OF DIGITAL COMPETENCE IN WORK READINESS OF STUDENTS IN VIETNAM

Le Duc Hoan[1], Nguyen Truc Quynh[2], Luu Hoang Minh[3], Hoang Minh Phong[4], Tran Minh Duc[5], Le Minh Khue[6]

Abstract: In the 4.0 industrial revolution era, digital competence has become a core factor in helping students improve their adaptability and readiness to participate in the labour market. In Vietnam, students' digital competence development is limited and they face many challenges. There have been some studies on digital competence, but research has yet to focus on the relationship between digital competence and students' work readiness in Vietnam. Through synthesizing theoretical issues on digital competence and work readiness of workers and systematizing domestic and international studies on the relationship between digital competence and work readiness of workers, the authors analyze the role of digital competence in the work readiness of students in Vietnam in the context of current digital transformation. The study also mentions several other factors affecting work readiness, such as self-efficacy and emotional intelligence. The study advises the incorporation of digital skills into training programs, broadening their scope across many sectors and tightly intertwining theory with practice. At the same time, it is necessary to invest in improving technology infrastructure, promoting cooperation between universities and businesses, enhancing training and organizing soft skills courses to improve digital competence and enhance the work readiness of students in Vietnam.

Keywords: *Digital competence, Digital literacy, Digital transformation, Labour market adaptability, Work readiness.*

1. Introduction

Information technology has infiltrated every aspect of life in the digital age, from communication, entertainment, shopping, work, study, etc. In that context, many businesses and organizations have pioneered technological innovation in hardware and software to survive and integrate. According to a report by Cisco & IDC (2020), 62% of small and medium enterprises in Asia-Pacific expect digital transformation to create new products, and 56% of businesses see that competition is changing and digital transformation helps companies to keep pace. In Vietnam, according to a report by the Vietnam Federation of Commerce and Industry (2021), more than 92% of businesses today have been interested in or are applying digital transformation to a certain extent. However, the gap in digital competence, especially AI, between Vietnam and developed countries is increasingly evident, reflecting the gap between training and actual needs (GTCI 2020).

In the Fourth Industrial Revolution period and amidst significant digital transition, "digital competence" is of considerable importance. In 2006, according to the

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Recommendation of the Council of Europe, digital competence was identified one of the keys to lifelong learning, with its definition updated by this organization in 2018 as follows: "Digital competence involves the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society". The conference "Enhancing Digital Capacity for Youth," conducted in September 2023 in Vietnam, highlighted the issues confronting young individuals amid the rapidly advancing 4.0 industrial revolution, characterized by the trend of automation and a global labour transition. This is also when Vietnam needs comprehensive policies to equip and enhance digital competence for the workforce and increase work readiness for workers, especially young workers. If workers actively improve their digital competence and engage in the digital transformation process, it will positively impact their future employment prospects and opportunities for personal development.

According to data from the Ministry of Education and Training, as of the 2023-2024 school year, Vietnam has about 2 million students. Every year, university graduates strongly supplement the country's workforce. In the context of the world economy in general and the Vietnamese economy, in particular, implementing intense digital transformation, Vietnam is embarking on a new era of advancement, enhancing digital competence for the student cohort, which is vital for the nation's future employment. This study analyzes the role of digital competence in the work readiness of students in Vietnam. Through synthesising and systematizing related research results, the authors present the theoretical basis of digital competence and work readiness and clarify the role of digital competence and some other factors in improving the adaptability and meeting the job requirements of students in the current digitalized working environment.

2. Theoretical basis

2.1. Digital competence

2.1.1. Concept of Digital competence

The concept of digital competence has received the attention of many researchers, and many definitions have been proposed depending on different approaches. From the approach of academic research in educational institutions, Cazco et al. (2016) argued that digital competence is the value, belief, knowledge, ability and attitude to use technology appropriately, including computers and various software as well as the Internet, allowing research, access, organization and use of information to form knowledge. Similarly, Tang and Chaw (2016) defined digital competence as the awareness, attitudes and abilities of each individual to appropriately use digital tools and facilities to identify, access, manage, combine, evaluate, analyze and synthesize digital resources, construct new knowledge, create media representations and communicate with others in specific life situations to carry out constructive social action and to reflect on this process.

From the approach of studying policy documents, Ferrari and Yves Punies (2013) defined it as the set of knowledge, skills, attitudes, strategies and perceptions required when using digital means and information technology (IT) to perform tasks, solve problems, communicate, manage information, collaborate, create, share content and form knowledge in a practical, selective, complete, flexible, creative, ethical and appropriate way for learning and working, leisure and participating in society. The European Commission later chose this definition to make an official definition in the DigComp digital competence framework for European citizens.

In 2018, UNESCO defined that “digital competence involves the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society”. It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), safety (including digital well-being and competence related to cybersecurity), intellectual property related questions, problem solving and critical thinking.

Thus, many definitions of digital competence have been proposed from different approaches. Although these definitions have remarkable similarities in core content, the diversity of definitions of digital competence has led to the diversity of digital competence frameworks.

2.1.2. Digital competence framework

A digital competence framework is understood as a concretization to describe or express in the most general way the components of digital competence (such as computer competence, information and communication technology competence, information competence and media competence, etc.). Each digital competence framework will be built based on the perspectives of digital knowledge and will depend on the subject of the application. Digital competence frameworks have differences between different countries depending on the country's orientation, the labour force, and the various stages and levels of economic development (Table 1).

Table 1: Some Digital Competence Frameworks that have been developed

Content of digital competence frameworks	**European Digital Competence Framework (DigComp 2.1)**	**UNESCO Digital Competence Framework**	**Digital Competence Framework according to the Digital Age Thinking Program of the University of Social Sciences and Humanities**
Year of proposal	2018	2018	2019
Proposed organization	European Commission	UNESCO	University of Social Sciences and Humanities - Vietnam National University, Hanoi cooperates in research with Facebook.
Object	For all European citizens.	For all global citizens.	For students in the 21st century.
Digital Competence Area	Five digital competence areas/domains: (1) Information	Seven digital competence areas (divided into 26 component	Seven digital competence areas/scopes: (1) Operating equipment

	and data processing competence, (2) Information and data proficiency, (3) Digital content creation, (4) Security, and (5) Problem-solving, divided into 21 component competencies.	competencies): based on the five digital competence areas of the European Competence Framework, UNESCO proposes to add two more digital competence areas: Operating digital devices, Related work orientation competence and adding to problem-solving competence, a competence in computational thinking.	and software; (2) Exploiting information and data; (3) Communicating and collaborating in digital environments; (4) Digital safety and security; (5) Creating digital content; (6) Learning and developing digital skills; (7) Using digital competencies for works.

Source: Author's compilation

Thus, Vietnam has taken initial steps in developing a draft digital competence framework for various subjects. Developing and publishing a digital competence framework for students is an essential and urgent task. The digital competence framework is a foundation for creating training courses to improve digital competence for students in the 21st century. The goal is to help students acquire the necessary digital competencies to live, study, work and participate in social communication proactively, positively and safely in a digital environment. The digital competence framework is widely provided to all organizations and other training units as a reference document for developing digital competence programs for each subject.

2.2. Work readiness

2.2.1. Definition of work readiness

The labour market is undergoing notable changes driven by globalization and swift technological progress. This presents a significant challenge for learners and the upcoming labour force, as they need to possess both targeted expertise and broad skills to meet the increasing expectations of employers. Preparing for the workforce is essential to fulfilling job requirements and adjusting to contemporary settings.

According to Caballero et al. (2010), work readiness is defined as the extent to which graduates possess the skills and qualities necessary to be prepared to succeed in a rapidly changing working environment. The study of Caballero et al. (2011) has expanded the definition to consider work readiness as a multidimensional construct. Work preparation includes personality, organizational insight, job aptitude, and social intelligence. Employers now evaluate graduates' contextual fit, abilities, and adaptability rather than academic credentials. According to Peersia et al. (2024), work readiness has been defined in three main approaches, each with specific differences. The first definition is based on the focus on individual motivation and potential benefits. The process-based definition of

work readiness results from the interaction and continuous development between the individual and the environment to adapt to new requirements. Meanwhile, the performance-based definition focuses on the ability to perform tasks and the individual's value to the organization.

Based on the definition of work readiness presented in the studies, the authors propose that *work readiness is a set of skills, personal qualities and professional competencies that help graduates meet job requirements and contribute to the organization's sustainable development.*

2.2.2. Factors affecting students' work readiness

Digital competence

Digital competence is essential in enhancing work readiness, especially in the context of the Fourth Industrial Revolution. According to Lestari and Santoso (2019), digital competence contributes 14.9% to students' work readiness by developing problem-solving and information technology skills. Digital competence enhances work readiness by improving critical thinking, data management, and effective use of information technology. This helps individuals adapt to digital transformation and handle crises well in the modern workplace (Lee and Meng, 2021). Noviyanto and Wijanarka (2023) also pointed out that digital competence affects 2.99% of vocational secondary school students' work readiness, helping them adapt to modern job requirements. Furthermore, expanding upon prior research, Pham Thi To Loan (2024) argues that digital competencies influence work readiness by providing technological skills, promoting creative thinking, enhancing the ability to integrate into a digital society, and preparing for the increasing demands of the labour market.

Self-efficacy

Many international and Vietnamese studies demonstrate that self-efficacy strongly and positively influences work readiness. In Oginska-Bulik's (2005) study, self-efficacy helps reduce stress, improve adaptability to the work environment, and enhance personal performance. Meanwhile, Mashigo (2014) and Masole and Dyk (2016) emphasized that self-efficacy, a component of psychological capital, is a significant predictor, helping to improve confidence and ability to work in real-life situations, supporting employees to achieve work goals and increasing work efficiency. Pham Thi To Loan (2024) found that self-efficacy improves students' flexibility and work performance in the context of digital transformation in Vietnam, enabling them to satisfy digital labour market demands. Thus, self-efficacy is the foundation for promoting self-confidence and is a decisive factor in each individual's willingness to work.

Emotional Intelligence

Many domestic and foreign studies show that emotional intelligence plays a vital role in improving students' work readiness. In Mashigo's study (2014), emotional intelligence has a positive relationship with organizational ability and work capacity, helping students manage emotions and adapt to the work environment. The group of authors Lestari and Santoso (2019) also came to a similar conclusion when emphasizing that emotional intelligence and digital and technological competencies contributed 6.6% to students' work readiness, especially during the Industrial Revolution 4.0. Noviyanto and Wijanarka (2023) showed that emotional intelligence accounted for 10.11% of the impact, helping students develop confidence and maintain stable work performance. In

Vietnam, research by Nguyen Thuy Nghiem and Nguyen Quoc Cuong (2023) also confirmed that emotional intelligence helps reduce anxiety, increase the sense of connection and improve the integration ability of vocational school graduates. From the above studies, emotional intelligence is essential in supporting new graduates in overcoming work challenges while improving their working capacity in modern contexts.

3. The role of digital competence in work readiness of Vietnamese students

3.1. Some characteristics of digital competence of the labour force in Vietnam

According to a survey by PwC (2021), 84% of Vietnamese people, especially Gen Z, the workforce and those about to enter the working age, are aware of the critical role of technology and digital competencies in their work; 72% want to learn digital skills, higher than the global survey rate of 52%. In addition, 37% of survey participants also showed a high desire to use a specific type of technology proficiently. These figures show a positive signal in the characteristics of Vietnamese workers in terms of digital competencies.

On the other hand, Vietnam's labour force is abundant, but the rate of trained workers is relatively low compared to other countries in the region. According to the report on the status of capacity building for workers at the Multilateral Forum (2021), more than 70% of human resources need more technical expertise, which is a significant limitation and a real barrier in the 4.0 industrial revolution. The World Bank assessed the quality of Vietnam's human resources at only 3.79/10 points, ranking 11th out of 12 Asian countries participating in the ranking; the Knowledge Economy Index (KEI) reached 3.02 points, ranking 102nd out of 133 countries classified. At the same time, in the report, when self-assessing the labour capacity in the current enterprise, nearly half of the enterprises said that their labour force meets the digital technology requirements at an average level (48%). Among the enterprises participating in the survey, 8.2% found that the level of human resource response to digital transformation in the enterprise could have been better (7.3%) or very poor (0.9%). In addition, the survey "Labour demand in different types of enterprises" conducted by the Department of Employment in recent years shows that the IT capacity of workers graduating from vocational training institutions is still a pretty large gap compared to the job requirements of enterprises (Nguyen Quang Hung, 2022). In particular, at higher levels in some specific areas of digital technology application 4.0, the level of response to digital skills requirements of workers still needs to be improved. According to the results of the 2021 enterprise survey of the Institute of Labour Science and Social Affairs (ILSSA), most employers believe that workers only meet the average and low or very low level in the field of data analysis (83.25%); data security/communication security (86%); application of support systems (83.3%); application of collaborative software (84.5%); applying non-technical skills such as systems thinking and process understanding (74.1%). Human resources to lead the digitalization process in Vietnam still need to improve in developing and equipping comprehensive digital competencies.

Thus, it can be seen that although Vietnam has an abundant labour force, the quality of the labour force, especially the digital competencies to be work-ready, adaptable and meet job requirements, still needs to be improved.

3.2. Some international studies on the relationship between digital competence and work readiness of workers

The relationship between digital competence and work readiness has been clarified through many international studies, affirming that digital competence is a necessary skill and a decisive factor in improving adaptability and labour efficiency in global digital transformation.

A study by Lestari & Santoso (2019) found that digital competencies contributed 54.7% to the employability of accounting students. When combined with technological and human competencies, skills such as accessing information, using data analysis software, and exploiting technology supported students in successfully transitioning from the educational environment to the labour market. This is especially significant in an increasingly digital accounting industry, which places high demands on the ability to use technology. This result is consistent with a study in the UK by Lloyds Bank (2019), which focused on the relationship between digital competencies and workers' income levels. The survey noted that digital competencies improve living quality and economic stability as well as employability. This shows that digital competencies are essential in the job market and personal and societal growth.

According to the Good Things Foundation (2019), worker support programs for digital competence training are essential to alleviating unemployment. The survey emphasized that digital competence facilitates employment opportunities and enhances analytical skills and self-confidence. This is especially important for industries affected by automation, suggesting that digital competence is essential for workers to adapt to rapid changes in the modern labour market. In the European context, Bejaković & Mrnjavac (2020) analyzed the risk of automation in approximately 40-60% of jobs in the EU and highlighted the role of digital competence in maintaining competitiveness and improving overall labour productivity. This finding adds to previous research suggesting that digital competence deficits can lead to higher unemployment and reduced economic efficiency.

OECD Education Working Papers (2020) affirm the importance of digital competence as OECD member countries actively implement digital competence training programs to narrow the gap between education and practice. The report emphasizes that digital competence, especially in STEM fields, should be considered a foundation for preparing learners for the digital labour market. This policy links other practical studies by providing a strategic solution to the digital transformation problem. Panjaitan et al. (2024) focused on Generation Z in Jakarta, further elucidating the positive impact of digital competencies on work readiness. Skills such as online communication, rapid information processing, and technology adoption at work help young people adapt to increasing demands and confidently enter the digital workplace. This result is similar to previous findings, confirming the critical role of education in improving digital competencies. Rahmat et al. (2024) extended the scope of analysis to young workers in rural areas. The study highlighted that digital competence shortens the time to find a job and improves the quality of work performance. In particular, digital competence has facilitated young workers to easily participate in the information technology and digital service industries, where the demand for digital skills is increasing.

An international study shows that digital competencies are essential to work readiness. Digital competencies help workers adapt, perform, and advance in a digital labour market. Governments, educational institutions, and businesses increasingly

recognise the importance of developing digital competencies to meet the demands of the digital workforce. Investment in digital competencies will play a key role in preparing the global workforce for the challenges of the fourth industrial revolution.

3.3. Digital competence and work readiness of students in Vietnam

Digital transformation drives development in Vietnam and is linked to global trends. Vietnam led the digital transformation initiative to satisfy new development needs in recent years. Digital transformation success depends on workforce digitization. Therefore, the Vietnamese government has issued several measures to increase labour skills to respond to the 4.0 Industrial Revolution's digitalization and automation. Innovative digital teaching and learning methodologies and IT training quality assessment are among these solutions. Prime Minister's Directive No. 24/CT-TTg (May 28, 2020) encourages firms to value practical skills and national vocational credentials when hiring. Prime Minister's Decision No. 2289/QD-TTg (December 31, 2020) also outlines a plan to increase labour skills and retrain workers for Fourth Industrial Revolution occupations. Prime Minister's Decision 146/QD-TTg (2022) underlines that universalizing digital skills is essential for digital transformation and society building. Thus, human resource development is critical for sustainable digital transformation and meeting the "National Digital Transformation Program to 2025, with Orientation to 2030".

One of the directions for developing human resources in the era of the 4.0 Industrial Revolution is to create the digital competence of workers. Digital competence in the context of digital transformation in Vietnam is an essential factor of the 21st century, especially in the context of the 4.0 Industrial Revolution (Bui, 2023). In the study, the author pointed out that although Vietnam has advantages in internet infrastructure and the rapid development of the digital economy, the digital competence of human resources is still limited, the quality of training is uneven, there is a shortage of high-quality labour, and weak cooperation between businesses and training institutions. Phan Thi My Dung and colleagues (2023) also focused on assessing the role of digital competencies in students' readiness and employability. In particular, digital competencies include skills related to using technology, analyzing data, and working on digital platforms. The authors' research results at Foreign Trade University show a strong correlation between the ability to master digital skills and the opportunity to find suitable jobs. Students with high digital competence are often more confident, adaptable to modern job requirements, and better meet the recruitment standards of employers.

Nguyen Van Thuy (2023) examined students' digital competencies, innovative skills, and job flexibility in a rapidly emerging digital economy. The study examined how digital and innovation skills affect university graduates' work adaptability. From March to April 2023, 240 students from 10 Hanoi economic universities provided data. These 2021-2022 graduates have worked in Vietnamese companies for less than a year. The study found that digital competencies improve job search and retention. Innovation increases flexibility and adaptability to changing labour market demands. Pham Thi To Loan combined theories and studies from 2010 to 2023 to outline digital employment needs and factors affecting students' job performance in 2024. According to the study, human, social, cultural, psychological, and digital competence are the primary determinants of job effectiveness. Students must learn problem-solving, digital communication, and content creation in the digital age. Artificial intelligence, big data, and machine learning

are also becoming vital job skills. Students must constantly develop digital competence to adapt to the future job market.

Studies in Vietnam have confirmed that digital competence is essential in promoting students' work readiness in digital transformation. Students with high digital competence are often more confident and adaptable to work and meet job requirements in the current economic context.

4. Conclusion and recommendations

Digital competence has become essential for students' employability in Vietnam, particularly in the global digital revolution. However, the development of digital competence of Vietnamese students still faces many challenges, such as the gap in technology infrastructure between regions and training programs at many universities that still need to fully integrate digital competence content into teaching. To improve students' digital competence, it is necessary to implement many specific and long-term solutions:

First, universities must integrate digital skills into their formal training programs, merging theory and practice in economics, education, and the arts. Soft skills training, digital thinking and work counselling, and digital skills support centres will help students develop digital competencies and work readiness to confidently apply technology and advance their careers in the modern workplace.

Second, governments and organizations must allocate resources to enhance the technical infrastructure in underprivileged regions, ensuring that high-speed internet and contemporary learning devices are accessible to all students, irrespective of geographic or economic conditions. This would reduce the digital divide between regions and enable students in underprivileged areas to access online educational resources and global learning opportunities.

Third, colleges and businesses must collaborate, organize internships, seminars, and practical projects, and provide students with opportunities to strengthen their practical skills and understand labour market needs. This cooperation helps students practice professional skills and builds a professional network, expanding future job opportunities.

Fourth, it is necessary to strengthen specialized English training for students so that they can access international materials and technology. English training programs need to be closely combined with digital skills teaching, helping students not only understand but also apply the knowledge they have learned in practice, which not only enhances students' competitiveness in the global labour market but also helps them become more confident when working in multicultural environments and using advanced technology.

In this study, the authors have systematized the theoretical framework of digital competence and work readiness and analyzed the role and impact of digital competence on the work readiness of workers in general and students in Vietnam in particular. From there, they proposed several solutions to improve digital competence and enhance work readiness for students in Vietnam. The study would be more complete and convincing if there were more survey data and quantitative analysis on the current status of students' digital competence and their work readiness after graduation, which will be the next development direction for this article.

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EVALUATING ECONOMIC GROWTH IN THE NORTH CENTRAL REGION: THE ROLE OF PUBLIC AND PRIVATE INVESTMENT

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Abstract: This paper evaluates the role of public and private investment in driving economic growth in the North Central Region during the 2010-2023 period. While the region possesses significant economic potential, it faces challenges in terms of resources, infrastructure, and development models. Given the limitations of public investment funding and the necessity to mobilize private sector resources effectively, analyzing the interplay between these sources of capital becomes crucial for shaping sustainable regional development policies. Utilizing data from statistical yearbooks of provinces in the North Central Region, the paper assesses the state of economic growth, public and private investment, and proposes solutions to optimize public investment, leverage private investment potential, foster public-private partnerships (PPP), and enhance the role of the labor force to promote sustainable economic growth in the region.

Keywords: *North Central Region, public investment, private investment, regional economic growth.*

1. Introduction

The North Central Region of Vietnam, encompassing six provinces from Thanh Hoa to Thua Thien Hue, holds a strategically significant role in the nation's socio-economic development. This region serves as a vital connection between the northern and southern parts of the country and boasts substantial potential in agriculture, industry, tourism, and services. In the context of economic development, investment is regarded as a fundamental driver of growth, especially in developing nations. Public investment and private investment are two critical pillars that significantly influence the pace and quality of economic growth in the North Central Region.

According to Decision No. 376/QĐ-TTg dated May 4, 2024, issued by the Prime Minister on the "Approval of the North Central and Central Coast Regional Planning for the 2021-2030 period, with a vision to 2050," the annual economic growth target for the region is set at 7.5-8%. During 2010-2023, the North Central Region consistently recorded economic growth, peaking at 14.3%, with a low of 2.4%, and an average of 4.3%. Both public and private investments have been instrumental in achieving this growth. In 2010, the total investment in the region reached VND 60,978.6 billion, Public investment counting for 40% and private investment for 60%. By 2023, total investment in North Central Region creased to VND 120,900 billion, while the share of Public investment declined to 23%, and private investment rose to 77%. Although investment resources have increased, the effectiveness of these investments has not yet been maximized. Many public investment projects face difficulties in disbursement and implementation, leading to delays and resource wastage. At the same time, private

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investment in the North Central Region still faces many barriers, such as an unfavorable business environment, inconsistent policies, and limitations in access to capital. These issues not only affect the efficiency of investments but also hinder the sustainable economic growth of the North Central Region.

In this context, evaluating the state of public and private investment, and clarifying the roles of these two sources of capital in the economic growth of the North Central Region, has become an urgent task. This article focuses on analyzing secondary data to assess: (1) The contribution of public and private investment to the economic growth of the North Central Region; (2) The challenges and limitations in investment implementation; and (3) Proposing solutions to enhance investment efficiency, creating a foundation for sustainable economic development for the North Central Region in the context of global integration and competition.

2. **Theoretical Basis and Research Methods**

2.1. Theoretical Basis

2.1.1. Concepts and Roles of Public and Private Investment

Public Investment: Public investment is a key aspect of economic development, with various approaches. According to the World Bank (2010), public investment refers to government spending that helps increase physical capital accumulation, including investments in infrastructure undertaken by central governments, local authorities, and public sector enterprises. The Organization for Economic Cooperation and Development (OECD, 2016) defines public investment as encompassing both physical infrastructure and soft infrastructure, with a service life of over one year. In Vietnam, the Public Investment Law (2014) defines public investment as "the investment activities of the State in programs and projects for the construction of socio-economic infrastructure to serve economic and social development".

Public investment plays a pivotal role in infrastructure development, facilitating economic activities, and enhancing social welfare. It serves as a critical foundation for promoting sustainable growth and addressing regional disparities.

Private Investment: Private investment focuses on non-governmental investment activities aimed at generating economic profits. According to the Cambridge Dictionary (2008), private investment is defined as investments made by companies, financial institutions, or private individuals. The World Bank (2019) describes private investment as the expenditure by the private sector on domestic fixed asset additions. Vietnam's Investment Law (2014) defines private investment as the use of funds (money and assets) by private investors for business production, equity contribution, share purchases, or project implementation within a specified period, primarily targeting profit generation.

Private investment serves as a key driver for innovation, job creation, and production capacity enhancement. It fosters enterprise growth, boosts labor productivity, and significantly contributes to national economic growth.

2.1.2. Regional Economic Growth Theory

Regional growth theory focuses on explaining the differences in growth rates and levels of development among economic regions while emphasizing the role of spatial factors, resources, and specific economic drivers in shaping the regional development process.

Growth Poles Theory by Benjamin Higgins (1959), specifically detailed and applied

to developing countries, highlights the significance of identifying and fostering growth poles to promote comprehensive economic development.

Balanced and Unbalanced Growth Theory by Hirschman (1958) underscores the importance of effectively allocating investment resources, prioritizing sectors or industries with high potential spillover effects to stimulate regional growth. This perspective is particularly relevant to the North Central Region, where unique natural and economic conditions require a close synergy between public and private investment to maximize resource efficiency.

The study on the role of public investment and private investment in the economic growth of the North Central Region provides a scientific and practical foundation for formulating regional economic development policies that promote sustainable growth, balance among localities, and enhance the region's economic competitiveness in the context of international economic integration.

2.2. Research Methodology

2.2.1. Research Data

The article uses secondary data from official sources such as the Statistical Yearbook of the North Central Region provinces from 2010-2023, reports from the General Statistics Office, and reports from relevant departments and agencies related to investment and economics in the North Central Region. Additionally, scientific documents, articles, and studies related to economic growth, public investment, and private investment have been collected, referenced, and updated.

2.2.2. Analytical Methods

Descriptive statistical method: This method is applied to summarize and assess the economic growth situation of the North Central Region provinces during the period from 2010 to 2023, including indicators such as GDP, GDP growth rate, and the scale of public and private investment.

Comparative method: This method is used to compare economic indicators between provinces in the region and with other economic regions, in order to assess the role of public and private investment in the economic growth of the North Central Region.

3. Current Economic Growth in the North Central Region

3.1. General Economic Growth

From 2010 to 2023, amidst the progress of innovation, economic openness, and the era of Industry 4.0, the socio-economic development of provinces in the North Central Region has achieved notable milestones. One of the highlights is the region's economic growth, as illustrated in the following figure:

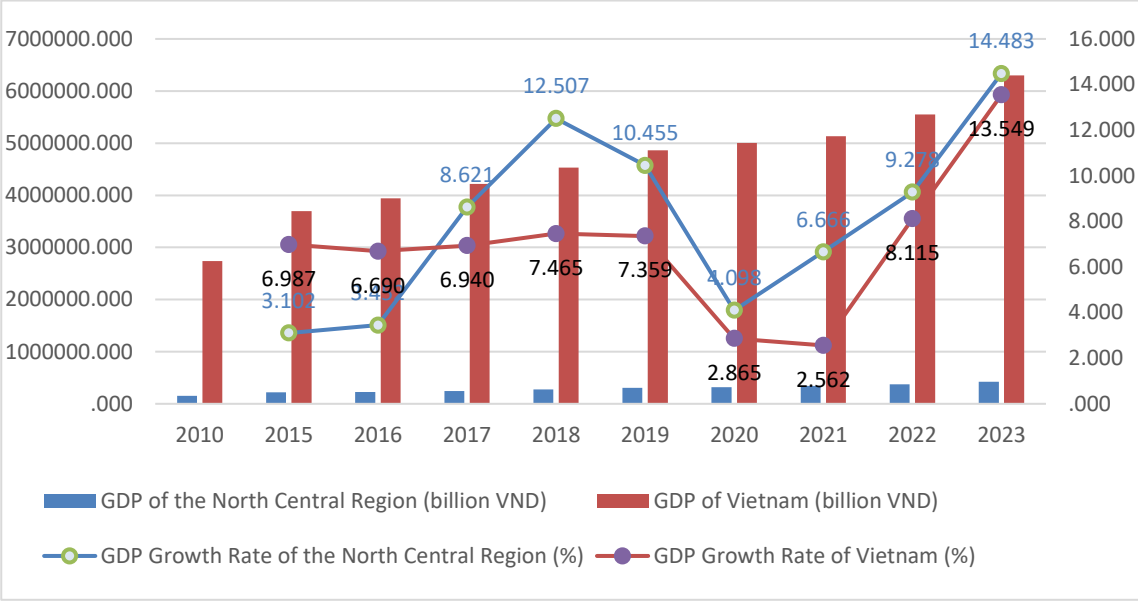

Figure 1. GDP of the North Central Region and Growth Rate in the Period 2010-2023

Source: Compiled and calculated by the author

The data from the the statistical table shows that the GDP of the North Central Region and the whole country experienced significant growth during 2010-2023. The GDP of the North Central Region inceased from 151,498 billion VND in 2010 to 404,900 billion VND in 2023, a 2.67-fold rise, while the national GDP rose from 2,739,843 billion VND to 6,302,670 billion VND, a 2.3-fold increase. GDP of the North Central provinces growth rate averaged 7.8% per year, with a peak of 14.48% in 2023 and a low of 2.97% in 2020, compared to the national average of 5.46% per year, which peaked at 13.55% in 2023 and a low of 2.87% in 2020.

In the period from 2010 to 2015, the GDP growth rate of the North Central Region frequently outpaced the national average, notably reaching 9.55% in 2013 compared to the national rate of 5.55%. In the 2016-2020 period, GDP of the North Central provinces growth fluctuated significantly, from 2.97% in 2020 to 12.51% in 2018, while the national growth rate remained stable between 2.87% and 7.43%. Despite the strong impact of the COVID-19 pandemic and global economic fluctuations, the North Central Region demonstrated a rapid recovery capability. Particularly, in the 2021-2023 period, the GDP of the North Central Region grew sharply, peaking at 14.48% in 2023, surpassing the national growth rate of 13.55%. In 2023, Thanh Hoa led the region with a GRDP share of 33%, followed by Nghe An at 31%, while Quang Tri recorded the lowest share at 5.5%.

This growth affirms the significant role of investment and economic development strategies in driving the GDP growth of the North Central Region compared to the whole country. Throughout the 2010-2023 period, all six provinces in the North Central Region exhibited stable and positive GDP growth.

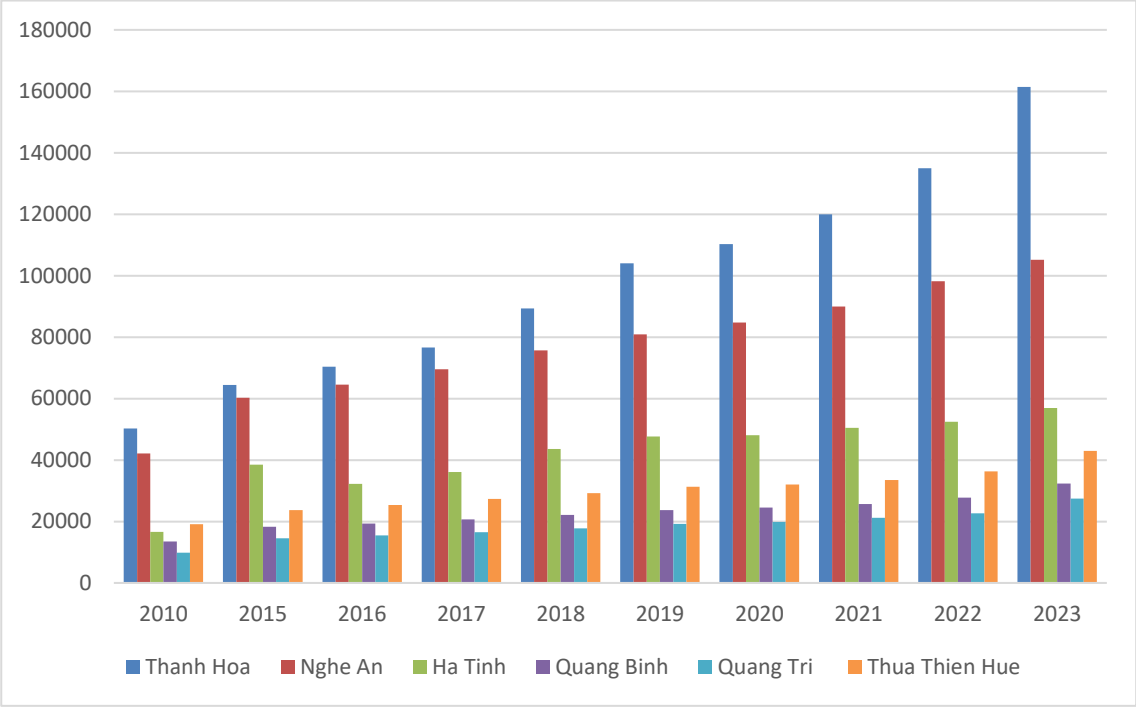

Figure 2: GDP of the North Central Region Provinces from 2010 to 2023

Source: Statistical Yearbooks of North Central Provinces,2010-2023

From 2010 to 2023, the provinces in the North Central Region exhibited significant GDP growth, although the growth rate and fluctuations varied across provinces. Thanh Hoa led in GDP scale, inceasing from 50,258 billion VND to 161,458.18 billion VND. Growth rates fluctuated significantly, with a decline of 5.76% in 2015 and a peak of 19.59% in 2023. Nghe An's GDP grew from 42,169 billion VND to 105,170.77 billion VND, with more stable growth rates ranging from 6% to 10%. Ha Tinh saw impressive economic development, with GDP rising from VND 16,584 billion to VND 56,938.63 billion, though its growth rate was volatile, peaking at 20.85% in 2018 and dropping sharply to 16.03% in 2016. Quang Binh's GDP grew from 13,508 billion VND to 32,349.20 billion VND, with stable growth, peaking at 10.03% in 2023. Quang Tri's GDP increased from 9,821 billion VND to 27,417.04 billion VND, with growth rates ranging from 6% to 8%, but but making a significant leap to 20.85% in 2023. Thừa Thiên Huế's GDP rose from 19,158 billion VND to 42,961.47 billion VND, with a stable growth rate ranging from 4% to 8% and peaking at 18.32% in 2023.

Overall, all provinces in the North Central Region achieved economic growth, yet the levels of fluctuation and development challenges remain evident. This disparity underscores the need for more balanced and sustainable regional development strategies.

3.2. The Role of Public Investment

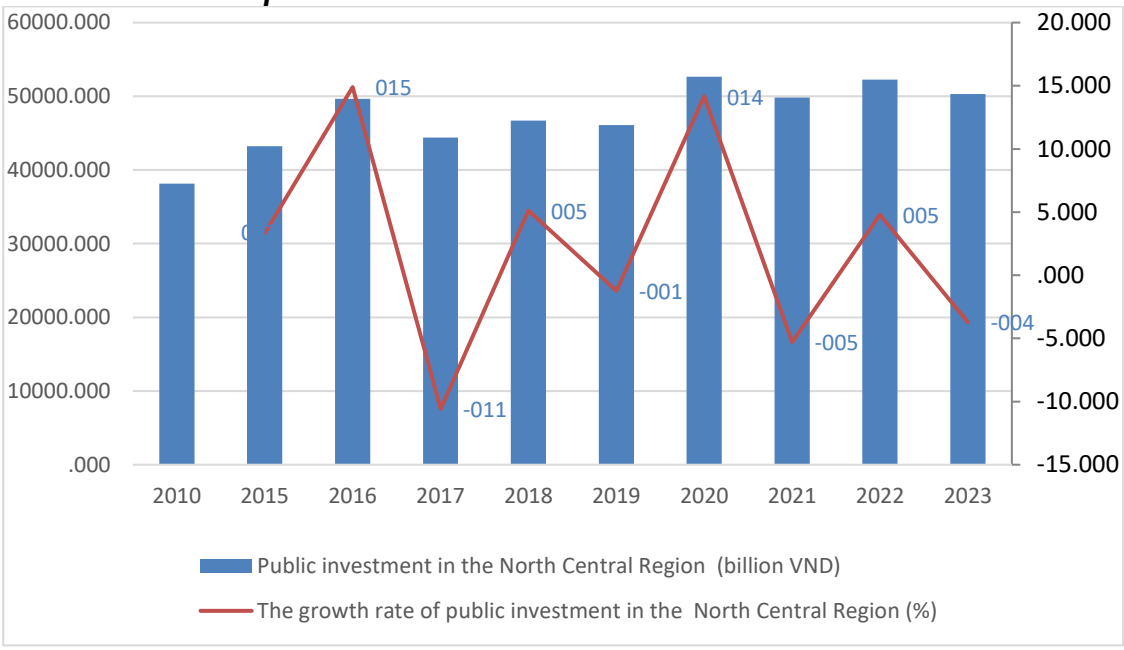

Figure 3. The public investment in the North Central region from 2010 to 2023

Source: Statistical Yearbooks of North Central Provinces,2010-2023

During the 2010-2023 period, public investment in the North Central Region experienced considerable fluctuations, contrasting with the stable trends observed nationwide. In the early years, public investment decreased significantly, particularly in 2011, with a 10.39% drop compared to 2010, primarily due to reductions in Nghe An (19.43%), Quang Tri, and Thua Thien Hue (over 12%). From 2012 to 2016, public investment rebounded, peaking in 2016 with a 14.89% incease, driven by strong growth in Thanh Hoa, Nghe An (over 24%), and Quang Tri (11.9%). However, from 2017 to 2023, public investment remained volatile, with alternating inceases and decreases, reflecting regional economic challenges and varying investment conditions.

However, the proportion of public investment in the North Central Region averaged only 9.97% of the total public investment nationwide, significantly lower than the region's land area, which accounts for 15.6% of the country. This indicates that the region has not received an appropriate level of investment prioritization, resulting in constraints on infrastructure development and economic growth.

In terms of capital structure, the state budget accounted for the largest share, increasing from 58.86% in 2010 to 73.3% in 2023, confirming the key role of the state budget in public investment projects. Borrowed capital decreased from 28.54% to 14.07%, while the equity of state-owned enterprises sharply declined from 66% to 3.12%, reflecting the trend of reduced dependence on borrowed capital and the diminishing role of state-owned enterprises.

Overall, public investment has made significant contributions to economic growth of the North Central Region. However, challenges remain, including slow disbursement progress, low investment proportions, and a lack of infrastructure development synchronization. Addressing these issues effectively is crucial to maximizing the role of public investment in driving regional economic growth.

3.3. The Role of Private Investment

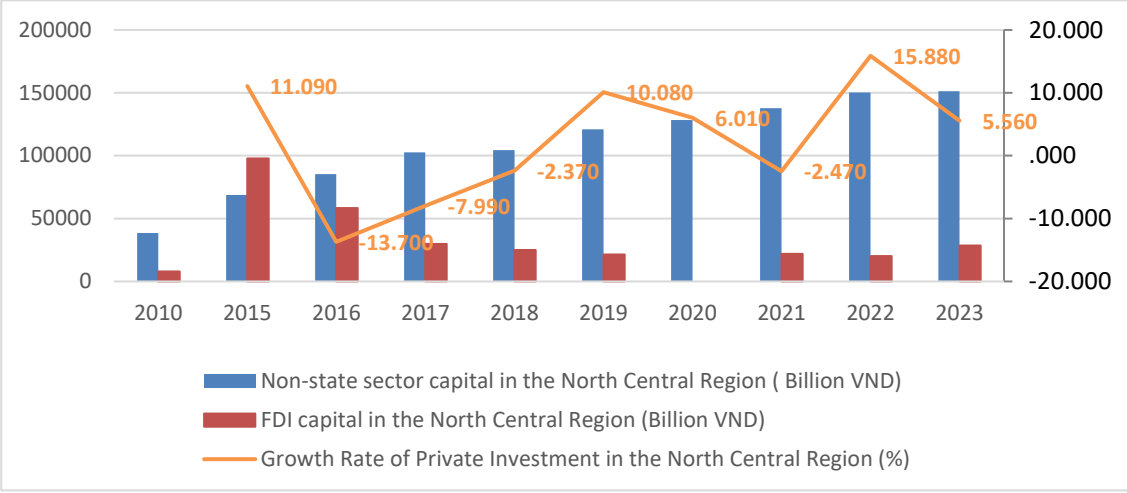

Figure 4: Private Investment in the North Central Region from 2010-2023

Source: Statistical Yearbooks of North Central Provinces,2010-2023

Private investment includes capital from the non-state sector and FDI capital. During the period 2010-2023, investment from the non-state sector grew significantly from VND 38,448.19 billion in 2010 to VND 151,389.54 billion in 2023, indicating that the private sector has been playing an increasingly important role in the regional economy. Meanwhile, FDI capital also recorded growth, rising from VND 7,842.26 billion in 2010 to VND 28,500.99 billion in 2023; however, this increase was smaller compared to that of the domestic sector.

The growth rate of private investment fluctuated significantly during this period. From 2010 to 2015, it achieved a high growth rate of 11.09%, but it then sharply declined in 2016 (-13.70%) and 2017 (-7.99%), likely due to macroeconomic factors or an unfavorable investment environment. From 2018 onwards, the growth rate gradually stabilized, with a notable increase of 15.58% in 2022, reflecting a recovery and stronger investment attraction.

In terms of capital allocation structure, FDI capital accounts for a much smaller proportion compared to non-state sector capital, demonstrating that the domestic private sector remains the primary driver of private investment in the North Central region. However, the slow and fluctuating growth of FDI capital suggests that further policies are needed to improve the investment environment and attract foreign capital more effectively, contributing to the sustainable economic development of the region.

Overall, private investment has been a significant driver of economic growth in the North Central Region. However, it faces challenges such as investment competition, inconsistent policies, and constraints in the business environment. To ensure sustainable development, it is essential to improve the investment climate, enhance FDI attraction, and provide more effective support to the private sector.

3.4. The Role of Public-Private Partnerships (PPP) in Promoting Regional Economic Growth

The Public-Private Partnership (PPP) model is an effective collaboration framework between the public and private sectors for implementing public projects, sharing benefits and risks. Given the limitations of public investment resources, PPP is regarded as a

strategic solution to mobilize private sector capital, playing a critical role in infrastructure development and driving economic growth in the North Central Region. (i) *Mobilizing Private Capital:* With limited state budget resources, PPP facilitates the attraction of substantial private sector funding, reducing financial pressures and enabling the execution of critical infrastructure projects. (ii) *Improving Infrastructure*: PPP projects focus on essential areas such as transportation, energy, and public services, not only enhancing infrastructure quality but also fostering economic growth in the region. (iii) *Enhancing Management Efficiency*: The involvement of the private sector brings expertise, technology, and effective management capabilities, improving the implementation and operation of infrastructure projects.

In the North Central Region, the PPP model has been successfully applied to several major projects, serving as a significant driver of regional economic development. North-South Expressway Project (Nghe An and Ha Tinh sections): This segment of the North-South Expressway has been implemented under the PPP model since 2021. It has enhanced transportation connectivity between the North Central Region provinces and other regions, boosting trade and regional economic development. Nghi Sơn Port (Thanh Hoa): With contributions from domestic and foreign private investors, the Nghi Sơn Port project has not only advanced maritime economic development but also improved the region's logistics capacity. Currently, the port features 25 active berths, serving as a central component of economy of the North Central Region development strategy. Vung Ang 2 Thermal Power Plant (Ha Tinh): A major PPP energy project with a capacity of 1,330 MW and an investment of USD 2.2 billion, executed under a Build-Operate-Transfer (BOT) model. The project ensures energy security, generates thousands of jobs, and contributes to local economic growth.

These prominent projects demonstrate the significant role of PPP in leveraging the economic potential of the North Central Region. When effectively implemented, the PPP model not only improves infrastructure quality but also contributes to building a balanced and sustainable regional economy, promoting integration and long-term economic growth.

4. Solutions and Recommendations

Firstly, Optimize public investment: Public investment from the state budget should avoid being dispersed and instead focus on key areas in line with the regional planning for the North Central Region and Central Coastal Area from 2021 to 2030, with a vision to 2050. Specifically, the North Central Region should become an economic growth hub with a focus on the petrochemical industry, electricity, and renewable energy, while the coastal areas of Thanh Hoa, Nghe An, and Ha Tinh should develop into an important industrial center for both the region and the nation.

Secondly, Promoting the potential of private investment: Private investment, with its large share and potential, needs to be encouraged to contribute more to economic growth. The business environment needs to be improved, particularly by enhancing the Provincial Competitiveness Index (PCI) of the provinces in the region. Focus should be placed on supporting small and medium-sized enterprises (SMEs) according to the 2017 Law on Supporting SMEs and related decrees, while also fostering entrepreneurship, innovation, developing key economic sectors, and improving the quality of the workforce.

Thirdly, Strengthen the public-private partnership model: It is essential to effectively combine public investment and private investment, leveraging the guiding role of public

investment and the potential and effectiveness of private investment as the main resources driving economic growth. Research and implement appropriate coordination methods between these two funding sources to restructure the economy, innovate growth models, and ensure sustainable economic development. This is particularly important in sectors such as the maritime economy, scientific and technological development, innovation, and digital transformation, which align with the realities of the North Central Region.

Fourthly, Promote the role of labor: Labor is the region's largest and most valuable resource. Properly utilizing public and private investment can generate more jobs, attract labor to the region, and improve workers' incomes, thereby driving the development of the domestic market. At the same time, investment in the education service system from both public and private sources is necessary to improve labor quality, increase the proportion of trained labor, and contribute to restructuring the economy towards efficiency and sustainability.

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RESEARCH MODEL OF MANAGEMENT ACCOUNTING FOR LIFE CYCLE COSTING IN VIETNAMESE CONSTRUCTION ENTERPRISES

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Tran Thi Hanh[3], Ngo Phuong Thao[4]

Abstract: This article researches the level of application of cost management accounting (CMA) according to the product life cycle at Vietnamese construction enterprises based on conducting an initial qualitative survey of 17 Vietnamese construction enterprises, specifically in the Red River Delta region. It can be seen that applying CMA over the product life cycle brings many opportunities but also certain barriers. Up to now, there have been quite a few research projects on CMA, but there are very few studies on applying CMA according to the product life cycle, especially in construction enterprises, and this field has a quite high GDP ratio in Vietnam. Vietnam. Therefore, the authors conducted this study to generalize the basic theory of CMA, CMA according to the product life cycle and the current situation of application in businesses, thereby providing appropriate and appropriate recommendations-some solutions to further promote the application of CMA according to the product life cycle in Vietnamese enterprises. Besides, the author also presents the use of analytical tools and methods designed so that businesses can pay more attention to it, for the benefits when applied in making decisions. Decisions of your business. The benefits of applying CMA can help businesses optimize the life cycle costs of a construction project, and help make timely decisions - the key to opening the door to help businesses. The unit can be more successful in its current field, keeping up with current developments.

Keywords: *Management accounting, product life cycle, life cycle costing, construction business.*

1. Introduce

International economic integration has become a "hot" trend globally, it creates many opportunities but also brings significant challenges of the strategic nature of the times, facing increasingly fierce competition requiring us to have new directions and steps forward so as not to fall behind the times. Talking about this issue, we cannot ignore the development of the construction industry, which has made important contributions to economic growth, to the development of the country that is "racing" on the path of international integration, and sustainable and comprehensive development. In 2023, the construction industry's GDP is estimated at 7.5%, which shows that this industry plays an important role in the Vietnamese economy. However, in the integration process, businesses in the construction sector are facing many challenges. Its characteristic is project-based operations, with large investment values (tens to thousands of billions of VND), many complex costs with long production and business cycles, and risks in terms of progress and quality. Therefore, it requires businesses to have effective cost

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management methods, in which applying CMA according to the product life cycle is a highly feasible solution. This raises the question: "How can we effectively apply cost management accounting according to the product life cycle in Vietnamese construction enterprises?"

Although previous studies have addressed management accounting, its practical application in construction enterprises is still limited and has not been widely studied. The research gap lies in the lack of studies on the specific impact of cost management accounting on construction enterprises in this area. Firstly, the study emphasizes its role in promoting the application of product life cycle cost management accounting in construction enterprises. Secondly, the study points out the practical difficulties in the process of implementing and applying product life cycle cost management accounting, thereby proposing highly applicable solutions. Thirdly, Previous studies on cost management accounting in Vietnam were conducted in industrial manufacturing enterprises such as bricks, garments, plastics, mechanics, etc. However, there are still limited studies on cost management accounting in the construction enterprise group, specifically cost management accounting according to the product life cycle in Vietnamese construction enterprises. Fourth, the study provides some information to support administrators and executive boards in orienting and planning product development strategies.

In the construction industry, with the characteristics of large-scale, complex projects affected by many unstable factors, the application of cost accounting is an urgent requirement. Cost accounting helps enterprises identify weaknesses, detect unnecessary expenses, and propose timely improvement measures. Product life cycle cost accounting plays an important role in the construction industry in Vietnam and is an essential tool to improve operational efficiency and profitability. This systematic monitoring enables managers to make informed decisions based on accurate financial data, ultimately optimizing resource allocation and minimizing waste. Additionally, it supports sustainable practices by promoting the use of cost-effective and environmentally friendly construction materials and methods, in line with the global shift towards sustainability in the industry. With the role of management accounting, it helps enterprises identify, Risk control, helping to minimize unnecessary losses.

The general objective of the study is to assess the current situation, improve the effectiveness of cost management throughout the entire life cycle of construction projects, and contribute to the sustainable development of the construction industry. As for the specific objective: In terms of theory, the study aims to systematize the theoretical basis, identify the characteristics of the construction industry that affect the application, and propose a model suitable for the reality of Vietnamese construction enterprises. In terms of practice, the study focuses on assessing the current situation and analyzing the difficulties and challenges that enterprises face when implementing cost management accounting according to the product life cycle. From there, propose practical solutions to improve the effectiveness of applying life cycle cost management accounting in construction enterprises, meeting practical requirements in the construction industry in Vietnam.

2. Research overview and theoretical framework

2.1. Theoretical basis

*** Cost management accounting**

The term "cost management accounting" is used to identify management information needs and provide that information to solve identified problems. In business management, management accounting information is essential to managers. The concepts of cost management accounting are presented in the table below.

Table 1: Concept of Management Accounting

Author	Concept
(A.Atkinson et al., 2001)	Management accounting is the process of continuously improving and adding value to the activities of planning, designing, evaluating, and operating financial and non-financial information systems to guide management actions, motivate, support, and create the cultural values necessary to achieve the strategic, tactical, and operational goals of an organization. Cost management accounting is a part of the accounting system.
Institute of Management Accountants (IMA)	Cost management accounting is a technique or method for determining the cost of a project, a process, or a product. This cost is determined by direct measurement, arbitrary transfer, or systematic and reasonable allocation.
(Periasamy P, 2010)	Cost management accounting is a formal accounting system established to record costs. It is a systematic process for determining the unit cost of a product produced or a service provided.
(Edward J. VanDerbeck, 2010)	Cost management accounting provides detailed cost information as needed by managers to control current business operations and plan for the future.
Hansen et al. (2007)	Cost management is the identification, collection, classification, and reporting of cost information for managers for planning, control, and decision-making. The operation of the cost management system will provide information on the costs of products and services promptly to management levels related to the results and effectiveness of activities when they need it.
Cost management accounting (CMA) is a basic and important part of business management accounting. CMA provides specific information about costs and is a means to control costs in businesses.	

(Source: author's synthesis)

*** Product life cycle cost**

Table 2: Concept of Product Life Cycle Cost

Author	Concept

Asiedu and Gu (1998)	Product life cycle costs include all costs associated with a product throughout its life cycle, from design, production, operation, maintenance to disposal.
Woodward (1997)	Product life cycle cost is the sum of all costs incurred from the beginning to the end of the product life cycle, including initial investment costs, operating costs and termination costs.
Barringer and Weber (1996)	Life cycle cost is the total cost associated with owning and using a product over its life cycle, including acquisition, operation, maintenance, and disposal costs.
Life cycle costing (LCC) is a comprehensive method for calculating the total cost of ownership over the life of a product, including the costs of purchase, maintenance, operation, and disposal.	

(Source: author's synthesis)

Life cycle costing is a topic of particular interest to the above researchers. Life cycle costing (LCC) studies have helped optimize costs while maximizing resource efficiency throughout the life of a product. LCC was first developed in the mid-1960s, primarily to support the US Department of Defense in the procurement of military equipment (Epstein, 1996). The work of LFL King and ADG Seely (1970s) extended the application of LCC to complex engineering systems, such as power, transportation, and technology systems. The authors studied how to calculate life cycle costs in long-term systems, emphasizing the need to include all factors from initial investment to operating and maintenance costs. This research helped expand the application of LCC to industries other than construction and the military, encouraging the application of this method in other industrial systems.

Life cycle costing (LCC) is a comprehensive method for calculating the total cost of ownership over the life of a product, including the costs of purchase, maintenance, operation, and disposal (Brown, 1979; Norman, 1990; Bull, 2003). It is particularly useful for products that have a high initial cost but are cost-effective in the long term (Brown, 1979). LCC can be applied at various levels, from the entire site to individual components, and is most effective when implemented in the early design stages (Norman, 1990). The method involves estimating and reducing the costs associated with each stage of the product's life cycle to minimize total costs and provide economic benefits to both the manufacturer and end-user (Testa et al., 2011). As a management accounting tool, LCC aims to clarify the relationship between design options and cost estimates, supporting informed decision-making in procurement and investment (Testa et al., 2011).

*** Product life cycle costing in the construction business**

The life cycle cost of an asset is(B. Addis & R. Talbot, 2001, p. 1)defined as: the present value of the total cost of that asset over its operating life. This includes the initial capital cost, financing costs, operating costs, maintenance costs, and the ultimate disposal costs of the asset at the end of its life. Among the most important drivers of change in construction, the use of life-cycle costing (LCC) in evaluating project proposals has been identified as one (Winch & Courtney, 2001). (Kirkham, 2005)has seen a rapid increase in the adoption of LCC in construction. He sees this shift as largely a recognition of the

benefits that life-cycle costing can bring to the design and operation of built assets. The construction industry is one of the largest contributors to pollution and waste throughout its life cycle (Horvath, 2004). Approximately 40% of the world's resource and energy use is associated with the construction and maintenance of buildings. It is well understood that environmental responsibility requires a long-term perspective - understanding that early design decisions have a profound impact on the life of a building. Green designs often have significant operational benefits - lower energy operating costs, better use of building resources, lower maintenance costs due to more robust designs, etc. Sustainable construction methods can be applied at any stage of the construction process, from design to demolition. Ideally, the impact of the built environment should be addressed on a life-cycle basis, from the origin of building materials, through the production and installation of resources, to the final demolition of the building.(Allen & Iano, 2004). Therefore, LCC is widely recognized as one of several methods that can be used to calculate and provide a more comprehensive view of costs.

*** Product life cycle cost management accounting**

Life cycle costing is an economic evaluation method of business operations that considers all the costs (and benefits) associated with each activity or project throughout its life cycle.

Agreeing with the authors Barringer & Weber (1996), ISO 15663-1 (2000), and Ellis (2007), the research team believes that this method helps manage costs incurred through the stages of the product life cycle. This method focuses specifically on reducing costs to achieve the set target cost. Moreover, the types of costs in each stage of the product life cycle are closely linked, with businesses planning a reasonable budget right from the research and development stage, which can minimize costs in the following stages. The author also stated that the product life cycle accounting method would not be suitable for preparing financial statements according to current standards. However, this method is very effective in supporting managers in planning when researching and introducing new products to the market.

*** The role of product life cycle cost accounting**

- Especially suitable for products with short life cycles, businesses can estimate relatively accurately the quantity and selling price of products (ACCA).

- Helping businesses act sooner to generate more revenue or cut more costs (ACCA), businesses can find unnecessary or inefficient costs and eliminate them(William Lanen et al.), and control costs incurred during the stages of the product life cycle(UK, 2023).

- Helps managers make important decisions related to products such as product development or improvement (ACCA) and helps businesses make accurate and effective decisions during business operations.(Brimson, 1997).

- The product life cycle targets the identified customer and establishes the product's brand image according to that target group. So the product when launched on the market will achieve a better market share (ACCA).

2.2. Theoretical framework

*** Contingency Theory**

Contingency theory in management accounting emphasizes the alignment of accounting systems with organizational circumstances (Otley, 1980). Tiessen and Waterhouse (1983) highlighted that organizational structure is shaped by technological

and environmental factors, influencing the suitability of management accounting systems. In unstable environments with rapid technological changes, decentralized models are more effective, whereas centralized models suit stable environments with slower changes. Chenhall (2006) noted that most management accounting research is inherently contingency-based, focusing on the appropriateness of techniques in specific contexts.

This study applies contingency theory to analyze how enterprise characteristics and size influence the adoption of cost management accounting systems in Vietnamese construction enterprises, particularly in implementing product life cycle cost management.

***Cost - benefit theory**

According to Quynh Anh (2023) and Drèze and Stern (1987), cost-benefit theory evaluates decisions or projects by ensuring benefits exceed costs. This involves identifying, measuring, and comparing benefits and costs using both financial and non-financial methods. Widely used in project management and policy evaluation, this theory helps assess feasibility and guides decision-making. Challenges include quantifying non-financial elements such as social or environmental impacts.

3. Factors affecting, Research model and Research methods

3.1. Factors affecting the application of product life cycle cost management accounting in construction enterprises

Table 3: Influencing factors

STT	Independent variable	Dependent variable	Study
1	Enterprise size	Applying CMA according to LCC	Shields et al. (1995) Chenhall (2003)
2	Qualifications of accountants	Applying CMA according to LCC	Mia and Clarke (1999) Garrison et al. (2010)
3	Business strategy	Applying CMA according to LCC	Langfield-Smith (1997) Cadez and Guilding (2008)
4	Cost of organizing international economic relations	Applying CMA according to LCC	Al-Omiri and Drury (2007); Baines & Langfield-Smith (2003)
5	Business owners' awareness of international accounting	Applying CMA according to LCC	Shields et al. (1995) Ahmadzadeh et al. (2011)
6	Legal regulations and standards	Applying CMA according to LCC	Ittner & Larcker (2001) Hopper et al. (2007)
7	Product life cycle	Applying CMA according to LCC	Asiedu & Gu (1998) Dekker & Smidt (2003)

(Source: Author's synthesis)

Factor 1: Business size

Enterprise size has a great influence on labor productivity, production processes, cost allocation, and product cost management. Large enterprises with strong financial and human resources often easily deploy advanced management accounting tools to control costs effectively, while small enterprises often have their own characteristics and prioritize simpler accounting methods that are suitable for practical conditions. Research by Shields et al. (1995) shows that enterprise size is an important factor in determining the application of modern management accounting methods, while Chenhall (2003) states that the complex organizational structure of large enterprises requires the use of advanced tools to manage costs more effectively. Research on the impact of enterprise size helps enterprises adjust appropriate management accounting methods, ensuring efficiency and high applicability in practice. Libby and Waterhouse (1996) showed a relationship between the size of the organization and the tendency to change management accounting because larger companies often have more resources to change. This study expected that the larger the company, the more useful the cost management accounting information will provide. This explains that when the enterprise is larger in size, it will lead to better financial resources, therefore, it can have enough resources to cover the costs of investing in the apparatus and accounting information system of the enterprise.

Factor 2: Qualification of the accountant

The level and expertise of accountants play an important role in the application of modern management accounting tools. Mia and Clarke (1999) pointed out that as the competitive environment becomes more intense, managers need more useful information for control and planning, leading to the use of information from management accounting information systems (MAIS) for more effective decision-making. Garrison et al. (2010) also emphasized that accountants with specialized skills will increase their ability to apply sophisticated cost management methods such as life cycle costing (LCC). This allows businesses to control costs more effectively throughout the product life cycle, thereby improving their competitiveness in the market.

Factor 3: Business Strategy

Business strategy has a significant influence on the adoption of modern management accounting methods. Langfield-Smith (1997) argues that firms with long-term business strategies and a focus on innovation are more likely to adopt advanced management accounting tools to adapt to changing business environments. Similarly, Cadez and Guilding (2008) point out that strategies aimed at low-cost or value-added competition influence the choice of management accounting methods, with low-cost firms often focusing on cost control and reduction, while value-added firms prioritize tools that support innovation and improvement. This helps firms optimize operations and achieve sustainable competitive advantage.

Factor 4: Cost of organizing international economic relations

Studies on the cost of implementing a management accounting system also indicate that implementing a complex management accounting system can be a barrier, especially for small and medium-sized enterprises. Al-Omiri and Drury (2007) argue that the cost of implementing a management accounting system is one of the major barriers when these enterprises want to apply complex management accounting systems, due to the lack of resources and financial capacity to invest in modern cost management tools. In addition,

Baines and Langfield-Smith (2003) emphasize that evaluating the cost of implementing a management accounting system compared to the long-term benefits it brings is an important factor in helping enterprises decide whether to apply tools such as LCC. This decision helps enterprises consider between the initial investment cost and the potential for future cost savings.

Factor 5: Business owners' awareness of international accounting

Business owners' awareness of management accounting plays an important role in deciding the level of investment and application of management accounting tools. Shields et al. (1995) pointed out that management's awareness of the benefits of management accounting has a great influence on the decision to invest in management accounting systems and the level of application of cost management tools. If management clearly understands the value that management accounting brings in controlling costs and improving operational efficiency, they will be willing to invest in modern management accounting systems. Similarly, Ahmadzadeh et al. (2011) argued that management's awareness of the importance of management accounting, especially the application of LCC, will motivate businesses to deploy and use these tools to optimize costs and improve competitiveness.

Factor 6: Legal regulations and standards

Legal regulations and accounting standards play an important role in promoting or inhibiting the development of management accounting. Ittner & Larcker (2001) argue that legal regulations and accounting standards can strongly influence the application of management accounting tools in enterprises, as they can create a legal framework or a barrier to the implementation of advanced management accounting methods. Meanwhile, Hopper et al. (2007) emphasize that a clear and standardized legal environment will facilitate the application of management accounting, help enterprises comply with regulations and at the same time optimize cost management methods. Clarity and transparency in regulations help enterprises feel more secure when investing in modern management accounting systems.

Factor 7: Product Life Cycle

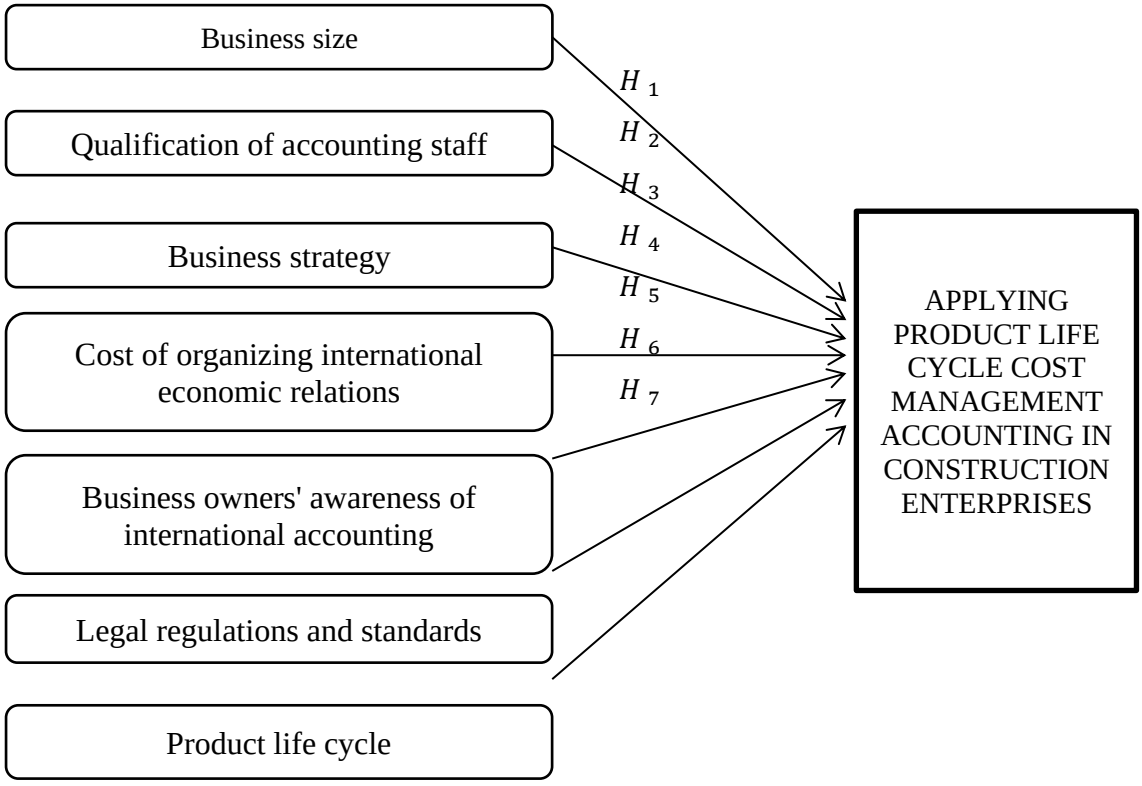
The application of LCC analysis becomes necessary for businesses with products that have long and complex life cycles, especially in the manufacturing and construction industries. Asiedu & Gu (1998) pointed out that for these businesses, life cycle cost analysis helps them identify and manage costs at all stages of the product life cycle, from design, and production to maintenance and product recall. In addition, Dekker & Smidt (2003) emphasized that understanding the product life cycle helps businesses optimize costs at each stage, thereby implementing LCC more effectively, helping to control and minimize overall costs throughout the product's existence.

Based on the research overview, from previous studies, research conditions, and selected factors in the research process, the author has proposed a research model under the inheritance of the research results of (Le Quynh Anh, 2023), by finding out the problems in the research, the group of authors has proposed a research model of factors affecting the application of product life cycle cost management accounting in construction enterprises.

3.2. Research model of factors affecting the application of management accounting

Synthesizing previous studies, the research team predicted factors affecting the application of product life cycle cost management accounting, limited to Vietnamese construction enterprises. The authors built and developed a research base model including seven main factors affecting the application of product life cycle cost management accounting in construction enterprises.

Table 4: Research model



3.3. Research methods

The article applies qualitative research methods based on desk research data on secondary documents related to management accounting according to product life cycle based on data from doctoral dissertations, scientific articles, the internet, reports, and topics with related topics. Data is collected, synthesized, and then statistically analyzed to analyze the concepts of management accounting, and management accounting according to product life cycle, overview the factors affecting the application of management accounting in construction enterprises, and initially build a research model.

After that, the authors of the article surveyed department heads, university lecturers of accounting and auditing, consultants, and chief accountants at enterprises. This is a group of people with solid professional knowledge or practical experience in teaching, training, working, and building training programs in the field of accounting and auditing to edit the the research model. After summarizing, we give dependent variable is defined as the application of management accounting according to the product life cycle, and the independent variable includes factors affecting the application of management accounting in construction enterprises: Enterprise size, accounting staff qualifications, business

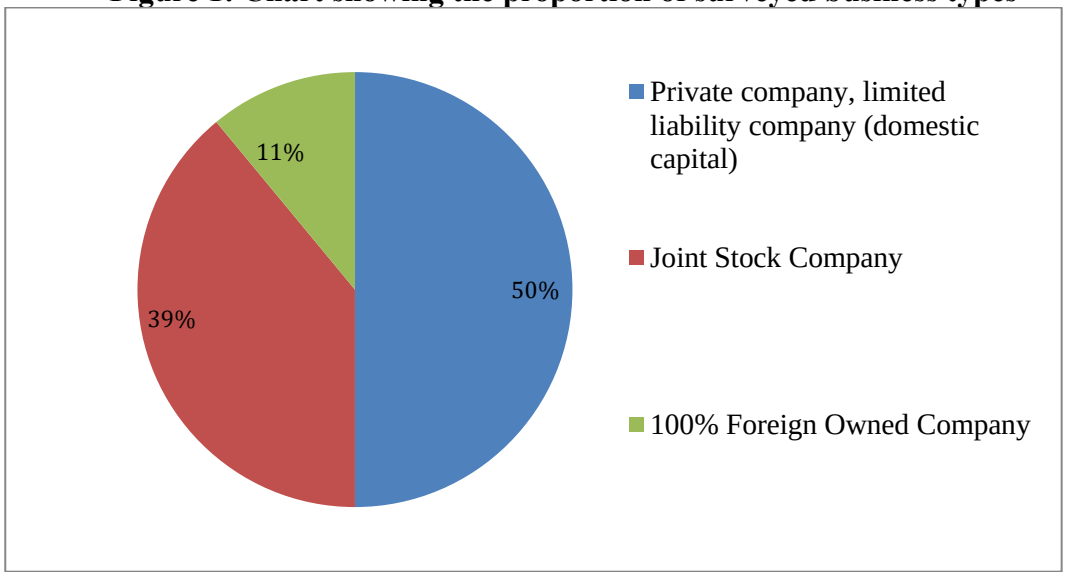
strategy, cost of organizing management accounting, business owners' awareness of management accounting, standards, and legal regulations, product life cycle.

Additionally, combining primary data interviews collected through expert interviews at 17 construction enterprises with research subjects including executives, chief accountants, management accountants, general accountants, accountants, and technicians at different types of enterprises such as private companies, joint stock companies, 100% foreign-owned companies, and limited liability companies (domestic capital). This data has helped the research team present the results in this publications have and directions in continuing to implement the research.

4. Research results

Based on the research overview and the research model proposed by the group, the authors conducted case studies and interviewed experts. The group surveyed 17 construction enterprises with research subjects including executives, chief accountants, management accountants, general accountants, accountants, and technicians. The initial survey results collected by the authors are as follows:

Figure 1: Chart showing the proportion of surveyed business types



(Source: Author compiled from survey results)

From the chart above, we see that among the surveyed businesses, Private companies, and LLCs account for the majority with 50% of the total number of enterprises applying product life cycle cost management accounting. This shows that private enterprises and LLCs are the key units in Vietnam that use this advanced financial management method. Joint stock companies ranked second with 39% of the total number of enterprises. Although not as majority as private and LLCs, joint stock companies are still an important group in applying cost management accounting. Meanwhile, 100% foreign-owned companies account for only 11% of the total number of enterprises using this method. Although the rate is lower than that of domestic enterprises, their presence also shows that the trend of applying cost management accounting is spreading to foreign-invested enterprises in the Vietnamese market.

In general, the chart reflects that life cycle cost management accounting is being focused on and applied more and more widely in construction enterprises in Vietnam.

Private companies, LLCs, and joint stock companies play a leading role in this trend. This shows the interest and efforts of enterprises in applying modern financial management tools to improve operational efficiency.

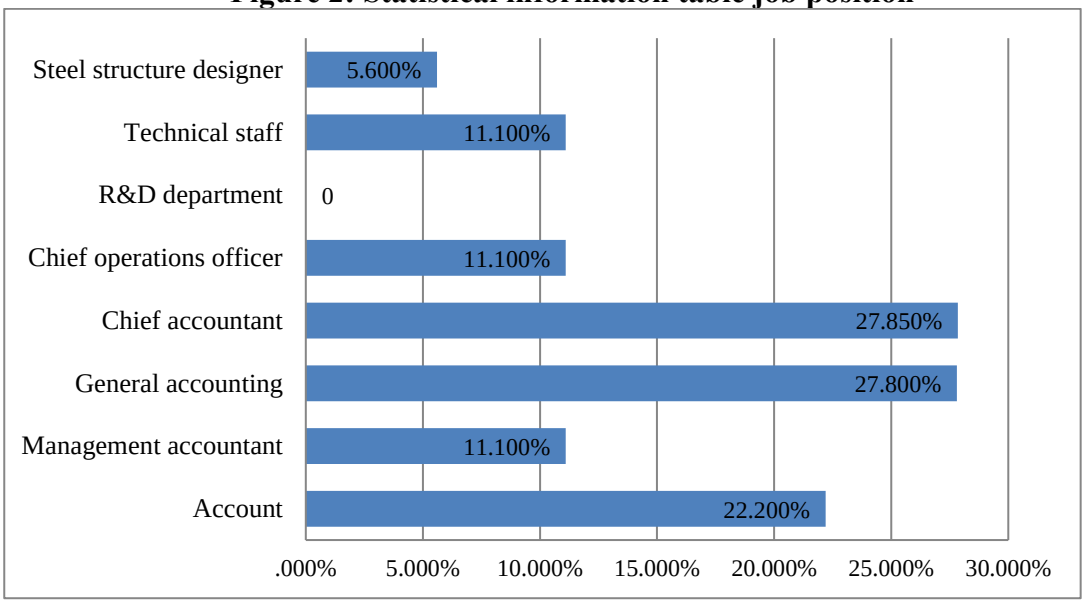
Table 4: Statistical table of information about survey subjects

Survey information		Rate (%)
Sex	Male	27.2%
	Female	72.8%
Age	22 to 27 years old	16.7%
	28 to 35 years old	27.8%
	36 to 45 years old	55.6%

Source: Author compiled from survey results

Among the surveyed enterprises, the proportion of female respondents is higher than that of male respondents (nearly 3 times higher). Which, the age group from 36 to 45 years old accounts for the majority (55.6%) while the age group from 22 to 27 years old accounts for the least proportion, only 16.75%.

Figure 2: Statistical information table job position



Source: Author compiled from survey results

The results of the data collection summarized in the table above show that the job positions in the enterprise: Chief accountant, and general accounting for the highest proportion, both over 25%, accountant over 20%, and chief operations officer, management accountant, and technical staff for 11.1%. In the results collected from the survey, the role of Steel structure designer represents a fairly low proportion, and there are no employees working in the R&D department.

Table 5: Survey information about Businesses that have not recorded/tracked LCC

Survey information		Rate (%)
Know the method	Have	42.9%
	Are not	57.9%
Is the method necessary?	Have	85.7%
	Are not	14.31%

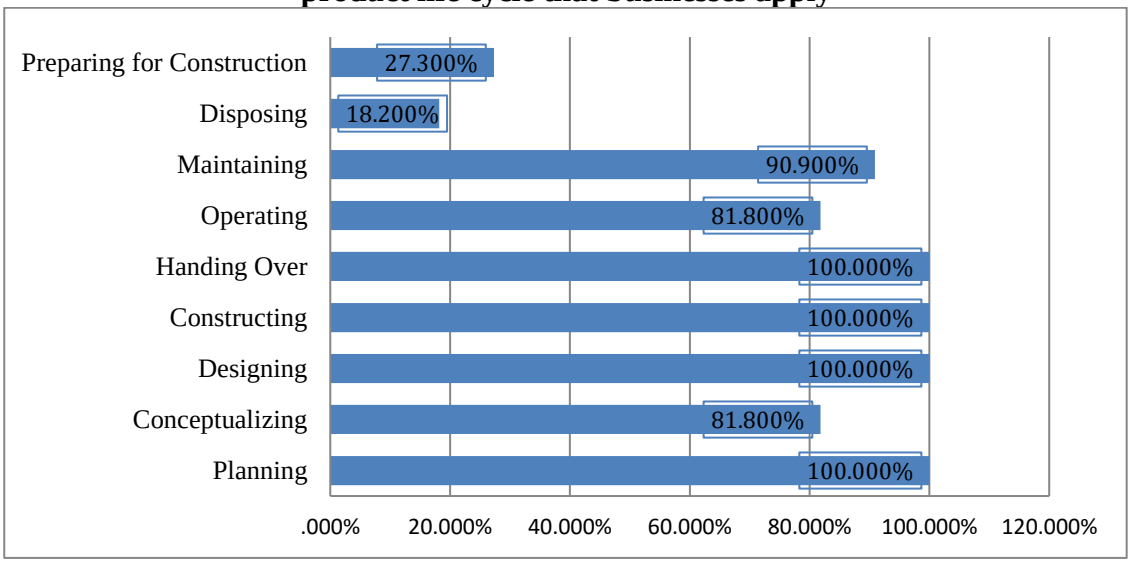
Intend to apply to your company	Have	71.4%
	Are not	28.6%

Source: Author compiled from survey results

Through the survey group information as shown in the table above, we can see that the current number of businesses in the product life cycle cost management method is low (42.9%) showing that there are still many gaps in information and knowledge dissemination. This is an opportunity for the research team to promote communicimtion and introduce the method to the user audience. Although the rate of awareness method is still low, but the partMost businesses that know the method find it necessary (85.7%) showing the potential and practical value of the method LCC for businesses. In addition, up to 71.4% of businesses intend to apply this method, reflecting their interest and desire to learn and innovate. This is considered a positive signal for the spread and effectiveness of applying this method in construction businesses. However, more than a quarter of businesses do not intend to apply this method, which shows that there may be barriers when applying the method in practice.

Overall, the survey results show a gap between awareness and appreciation by businesses. Effective communication strategies are needed to tap this potential, and the effectiveness of this approach needs to be more widely disseminated.

Figure 3: Survey information about Stages of the construction industry product life cycle that businesses apply



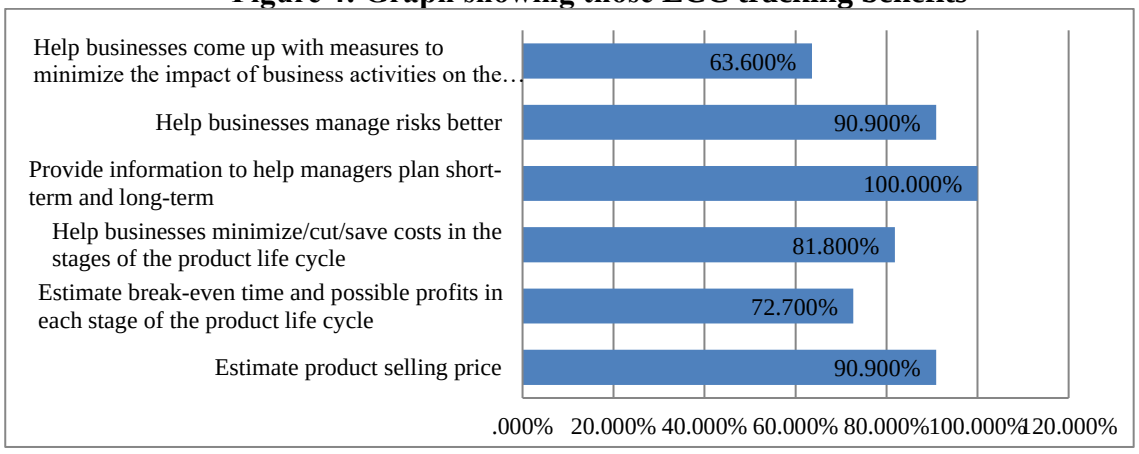
Source: Author compiled from survey results

From the above statistical table collected from actual survey data, it can be seen that the stages of a product life cycle are quite diverse. Some stages account for an absolute percentage of 100% (Planning, design, construction, handover) showing that the project is on schedule and according to the plan. These are bright spots in the implementation process. In addition, there are also stages that account for a high percentage of over 80% such as idea generation, maintenance, and operation, which shows that these tasks have been implemented quite well. The figure of 90.9% of the maintenance stage is also quite impressive, showing that maintenance and repair work has been well implemented, ensuring the operation and exploitation of other work items. However, there are 2 notable

stages: construction preparation (27.30%) and disposal (18.20%) with low application levels. These may be points that need to be focused on and improved during the implementation process because the preparation stage is crucial for the smooth implementation of the project.

Overall, the data sheet provides a comprehensive view of the progress of a product life cycle. Essential, high-percentage stages need to be maintained, while weak areas such as construction preparation and disposal need to be improved to improve the efficiency of the entire process. Ensuring maintenance also plays a very important role in this process.

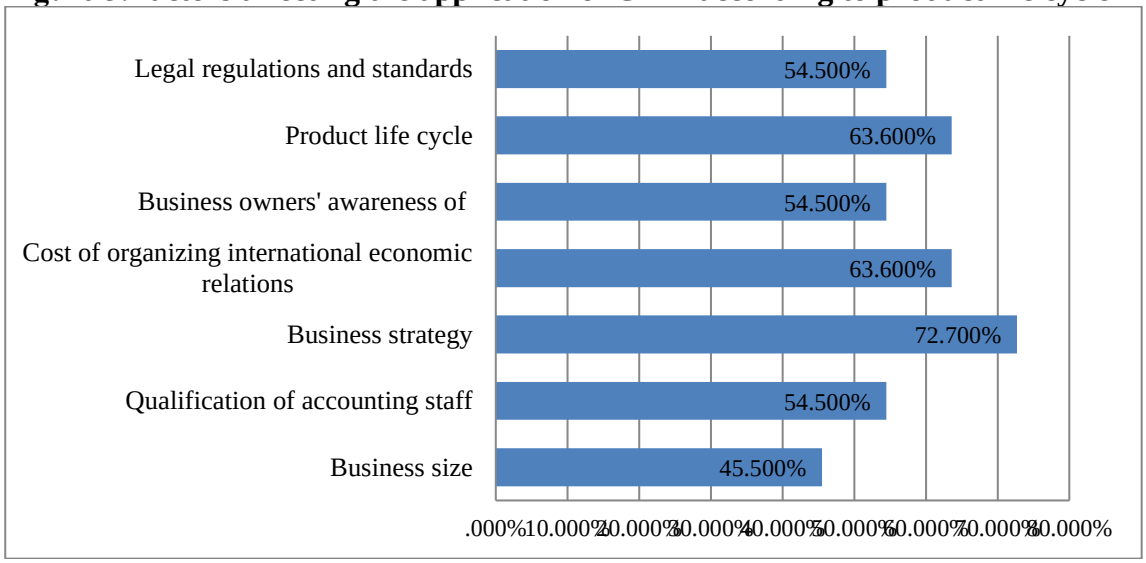
Figure 4: Graph showing those LCC tracking benefits



Source: Author compiled from survey results

From the above data, we can see that the benefits of recording/tracking product life cycle costs for businesses are quite uniform, meaning that businesses participating in the survey see the benefits of recording/tracking product life cycle costs. Benefits are highly appreciated especially providing information to help managers plan short-term and long-term (100%). Jobhelp businesses come up with measures to minimize the impact of business activities on the environment and society that are not yet evident.

Figure 5:Factors affecting the application of CMA according to product life cycle



Source: Author compiled from survey results

Through the above data, we can see that there are 7 factors affecting the application of CMA according to the product life cycle. Business strategy is the most influential factor (72.7%), followed by the product life cycle factor and the factor of organizing CMA costs (63.6%), legal regulations and standards, business owners' awareness of CMA, accounting staff qualifications (54.5%), and business size (45.5%). Through the survey of 17 experts from 17 different businesses, it shows that the model of influencing factors is appropriate. In the following research models, the research team will continue to conduct studies with a larger sample size and perform quantitative research to assess the influence of factors on the application of CMA according to the product life cycle in Vietnamese construction businesses.

In general, the results compiled from the survey show that although many businesses are aware of the product life cycle cost management method and most businesses are aware of the importance of applying the method, the percentage of businesses intending to apply this method is not too high. This shows that there are certain barriers to widespread application. Businesses mainly apply product life cycle cost management in stages of the product life cycle such as planning, design, construction, and handover. The survey participants acknowledge the benefits of using this method, particularly in providing valuable information for the planning process. However, the benefits of minimizing environmental and social impacts have not been highly appreciated. The most influential factor in the application of product life cycle cost management is business strategy. Businesses with clear business orientation and flexible strategic planning tend to apply this method. In summary, awareness of the importance of product life cycle cost management is increasing, but the application of this method in practice is still limited. Construction enterprises need solutions to effectively implement product life cycle cost management techniques. Additionally, the government should establish policies, support mechanisms, and incentives for economic development, creating an environment where businesses can access and gain knowledge about such tools. Product life cycle management can provide valuable insights to managers.

5. Conclusion and policy implications

The study has conducted an overview of domestic and foreign research projects on cost management accounting methods associated with product life cycles, selecting and applying appropriate management accounting methods to each stage in the product life cycle.

Qualitative research methodsSpecifically, the method of prevention is still in-depth, collecting survey data through questionnaires, asking for expert opinions, and building detailed research cases to conduct an assessment of the current status of applying the cost management accounting method system in each stage of the product life cycle at Vietnamese construction enterprises. The study offers a number of proposals for applying cost management accounting methods suitable for each stage of the product life cycle at Vietnamese construction enterprises, specifically applying the target cost method in the research stage and the standard cost method in the product production stage. The thesis proposals include choosing the method, building a management accounting information system (vouchers, accounts, reports), and building a cost management accounting machine suitable for cost management goals at each stage of the product life cycle. Through the survey, some findings on the awareness of product life cycle cost

management accounting is still a major limitation, many businesses do not have full awareness of the importance of applying product life cycle cost management accounting and the benefits it brings in the future. Difficulty in collecting data. Businesses have known about product life cycle cost management accounting but do not really have enough experience and capacity to apply it to the accounting system.

The research model has been confirmed by experts to be appropriate. Through the survey of 17 experts from 17 different enterprises, it shows that this research model is reasonable. In the following research models, the research team continues to conduct surveys with a larger sample size and conduct quantitative research to evaluate the impact of product life cycle cost management accounting in construction enterprises.

Through a survey of 17 different businesses, it was agreed that product life cycle cost management accounting has a positive impact on management and efficiency for businesses. Therefore, there are some implications that have also pointed out factors related to the application of product life cycle cost management accounting. So, in order to be able to apply and increase the efficiency of business operations, some work needs to be done. The research team has put forward some policy implications as follows: first, the most influential factor is business strategy, there needs to be related strategies to control well the costs to create capital for future investment. Need to have a clear business orientation, plan a flexible business strategy, take advantage of all competitive advantages and have a high demand for international integration development, then the feasibility of applying product life cycle cost management accounting will increase. Enterprises must make detailed plans, closely follow the proposed plan, regularly check and compare the plan with reality, and continuously control costs so that when any risk occurs, the enterprise will have a backup plan and promptly come up with appropriate and effective solutions. The second factor is the product life cycle, enterprises need to understand and understand the life cycle of electronic products to create conditions for applying product life cycle cost management accounting and minimize risks for construction enterprises, find information about life cycle costs to serve decision making, the first necessary condition is to understand and understand the stages of the product life cycle. Next to the cost of organization and management, it is necessary to consider the revenues and expenditures in the process of product development, additional investment in the production process, planning, budgeting, and estimating costs. Organizational costs affect the third factor. If you want to improve the qualifications of accounting staff, you need to help them understand the importance of cost management accounting, and product life cycle control to reduce costs in the construction process or increase awareness of the management team. Currently, the understanding of managers about these methods is still limited. This can be completely explained by the fact that managers and managers at all levels in construction enterprises are often people who have grown up from a team of engineers and technical workers. Although they have a lot of professional experience, their management knowledge and skills in organizing production resources have an impact on the business owner's awareness of cost management accounting according to the product life cycle. By learning new, modern tools that are appropriate for your business, the ability to apply life cycle management accounting is likely to be successful and effective.

Although there are still many difficulties, businesses also see the clear advantages of applying product life cycle cost management accounting such as: helping businesses to find measures to minimize the impact of business activities, manage risks, provide

information to help managers plan short-term and long-term, estimate product selling prices, etc. Applying management accounting brings many positive economic impacts to businesses such as saving costs, estimating break-even time, etc. In addition, the study also contributes to consolidating the theory of product life cycle cost management accounting, especially in the construction sector in Vietnam. This study helps open up directions for studies related to non-cost management accounting according to the product life cycle. However, the survey subjects are still limited and not general, so there are no accurate and realistic results. The research is still being continued by the group of authors and these are only the initial research results of the research process. Therefore, the exact determination of the influencing factors will be clarified in future studies.

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ENHANCING LECTURER QUALITY TO DEVELOP HUMAN RESOURCE TRAINING IN THE CONTEXT OF DIGITAL TECHNOLOGY

Le Thi Ngoc Mai[1]

Abstract: The industrial revolution 4.0 with the integration of high technology, information technology, artificial intelligence, computerization of production, business administration, and the creation of digital economies is considered as an inevitable trend of the times. In that context, providing high-quality human resources to meet the requirements of digital transformation is one of the urgent requirements today. In order to have high-quality output human resources for the labor market, universities need to quickly transform to meet the requirements of the new era. In particular, the teaching staff is always the basic resource, mainly deciding the quality and effectiveness of the school's training. Therefore, improving the quality of lecturers to improve the quality of training is inevitable in the context of digital transformation at educational institutions. The article analyzes the impact of digital transformation on higher education, the current state of lecturer quality, and points out opportunities and challenges to improve the quality of lecturers. From that, some key solutions are proposed to improve the quality of lecturers in the context of digital transformation.

Keywords: *Lecturer, quality, human resources, digital technology.*

I. INTRODUCTION

The Industrial Revolution 4.0 (Industry 4.0) is a revolution that has a profound impact on all economies and all industries when it allows the connection between the real world, the virtual world and living things. Industry 4.0 with digital technology has created a trend to merge all kinds of technologies with the center being artificial intelligence, internet of things, cloud computing, wireless mobile technology, nanotechnology, and automation. automation, robotics, etc. Digital technology is characterized by the combination of a real system with a virtual system, a smart production platform, outstanding labor productivity, and the connection through smart mobile devices, helping to organize production - value chains thereby creating products with high knowledge content. Advances in digital technology have an impact on the development of all fields, in which in the field of education and training. Set digital transformation requirements at educational institutions to meet the changes of the new era.

In the digital age, learners can learn online anywhere, anytime and through many different media. Learning is not only directly in the school, class, knowledge is no longer exclusively in the hands of lecturers, but students can also absorb and learn knowledge from many different sources such as websites, youtube, google, etc. New teaching methods will be born, switch to "e-school", "smart classroom", forms of online learning, learning on the internet using digital technology, virtual reality classroom, etc. That will

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gradually substitute for current forms and methods of teaching. This is posing significant challenges to the teaching force at educational institutions today.

Facing the constant change of digital technology, the field of education and training also needs to quickly catch up with changes to meet the increasing requirements of the quality of human resources provided to the labor market. In which, improving the quality of lecturers is considered as one of the most urgent and necessary needs in the digital transformation process at education and training institutions.

II THEORETICAL BASIS

Digital technology

Digital technology associated with breakthrough achievements on the digital technology platform is having far-reaching effects on countries in the region and the world, including Vietnam. Industry 4.0 with achievements such as artificial intelligence (AI), cloud computing (Cloud Computing) and blockchain (Bolckchain) helps to apply automation technologies to the data entry process, increasing the accuracy of data entry processes input data. Cloud computing systems help accomplish a variety of tasks including accounting, management, helping employees and stakeholders access and applications through computers and mobile devices (Lobana, 2013). Today, digital technology allows accountants to manage operations more efficiently and flexibly through the basis of the Internet when all activities are in real time and information is shared immediately (Aysel Guney, 2014). With new achievements in science and technology, it will help teachers and learners come closer together, lecturers can promptly guide and answer questions for students. Forming many new forms and methods of teaching and learning associated with digital technology.

Table 1. Concepts of Digital Technology

Author	Concepts
(Guédon, 2001)	Digital technology is "the transformation of information from physical form to digital form, enabling easy copying, sharing, and accessing of information from anywhere." He emphasizes the impact of digital technology in changing the way knowledge is accessed and shared, especially in the academic context.
(Kurzweil, 2005)	Digital technology is an extension of artificial intelligence (AI), where digital systems can learn, develop, and bring about unprecedented changes in the fields of science and society. He views digital technology not only as a supportive tool but also as a part of the evolution of human intelligence.
(Turkle, 2011)	Digital technology not only changes the way information is exchanged, but also distorts the relationships between humans and technology, increasing loneliness in an interconnected world.
Tim Berners-Lee (1999)	Digital technology refers to the tools and platforms that facilitate the connection and sharing of information through a global network, transforming the way we communicate and learn. He views digital technology as the foundation for creating a digital world, where information and data can be accessed and shared easily and quickly.
Digital technology is the use of data, software, and network systems to create, store, process, and transmit information. Digital technology impacts society, changes the way we communicate and learn, and contributes to the remarkable development of artificial	

intelligence and the future of digital civilization.

(Source: Author's compilation from references)

Digital Technology in Human Resource Training

In previous studies, researchers have highlighted the following concepts of digital technology in education:

Table 2. Digital Technology in Training

Author	Concepts
(Bates, 2005)	Digital technology in education is "the application of information and communication technologies (ICT) to improve, support, and create new learning methods, helping to expand learning opportunities for everyone."
(Naqvi et al., 2012)	Digital technology in education is "a tool that completely changes the way of learning and teaching, allowing students to learn at their own pace and enabling instructors to focus on more interactive teaching methods."
(Jonassen et al., 2008)	Digital technology in education is "tools that support active learning, where students not only receive information but also engage in problem-solving, critical thinking, and creating new knowledge." He emphasizes that digital technology is not just a tool for delivering information, but also a tool that helps learners develop higher-order thinking skills.
(Prensky, 2001)	Digital technology in education is "the integration of digital technologies into teaching and learning to help students develop the skills needed for the 21st century, with a particular emphasis on the application of new technologies such as video games, social media, and online learning." According to Prensky, the current generation of learners is accustomed to using digital technology and requires an appropriate educational approach to fully harness their potential.
Digital technology is not only a tool to support teaching but also a fundamental factor in changing the way education is organized and developed. Digital technology helps create flexible, interactive, and personalized learning environments, while playing a crucial role in developing learners' skills, especially in the digital age.	

(Source: Author's compilation from references)

Human resource theory and human resource development

Leonard Nadle's Human Resource Theory and Christian Batal's Human Resource Theory. In essence, the development of teaching staff is the development of human resources in universities and colleges, a process of influence of the management subject to develop each individual and the team to meet the goals of the organization office. Developing a teaching staff of sufficient quantity, ensuring quality, on that basis, this team well fulfills the requirements of the school and society (Nadler, L&Nadler, Z., 1987) (Batal, 2002). According to (Super, 1957), the Career Development Theory emphasizes that an individual's career is a continuous developmental process through different stages of life. In universities, faculty members need to be supported in their career development through opportunities for continuous learning and training. Super suggested that faculty members can progress through various stages of their careers, from starting to teach to becoming experts in their field. To improve teaching quality in universities, there needs

to be a clear process of change and support from leadership. Kotter introduced 8 steps for change management, including creating a sense of urgency, building a strong leadership team, and developing specific change strategies. Universities need to continually change and improve teaching and research methods to enhance the quality of faculty and the workforce throughout the system (Kotter, 1996). According to (Dessler et al., 2015) argue that human resource management not only includes recruitment and training but also the development of faculty members through career development programs, professional development, and enhancing research capabilities. Faculty members in universities need to be supported in developing both their professional expertise and teaching methods, while also participating in scientific research activities.

The role of lecturers and training quality

The teaching staff has a decisive position and role in the quality of training at universities, because they are the ones who directly train the society with skilled engineers, bachelors, masters and doctors professional skills to meet human resource needs for the whole society (Kalninsh, 2010), (TDMS, 2007). The teaching staff plays an important role in the quality of training, building and developing the brand and reputation of the universities. In addition, this team is also a pioneer in expertise, scientific research and international cooperation of the society. Where there is a strong teaching staff in terms of quantity and quality, that institution has a high reputation, high competitiveness, training quality human resources, extensive scientific cooperation and integration with the region and the world (Weissmann, 2013).

III METHODOLOGY

The qualitative research method is applied by collecting secondary data from relevant documents related to education, training, and the current status of lecturer quality in Vietnam. This data is gathered from statistics provided by relevant ministries and sectors, scientific articles, economic journals, internet sources, reports, seminars, and other related topics. The collected data is then statistically processed, synthesized, and analyzed to clarify the current situation of lecturer quality at educational institutions in Vietnam.

IV RESULTS

4.1 Impact of digital technology on education and training

In the context of the industrial revolution 4.0, which has brought the risk of disrupting the traditional labor market, threatening the jobs of low-skilled workers and middle-skilled workers to establish the labor market, creative knowledge associated with digital technology. In particular, education and training are most strongly influenced by training products that must respond to the rapid changes of the labor market.

Digital technology affects teaching content

The new requirements of the labor market in the digital economy drastically change the demand for resources, the structure of occupations and qualifications. Therefore, it is required for the higher education process that it is necessary to train workers with enough new skills to adapt to the rapidly changing production and business environment. If in the past, training content only focused on transmitting academic knowledge, now, that knowledge quickly becomes outdated. The Industrial Revolution 4.0 requires workers to have sufficient basic knowledge, skills and the ability to think critically, resolve conflicts, adapt to change, work in groups, and work with others. creativity, language skills, communication, behavior, digital skills and internet connection, social skills, creating and

maintaining relationships and especially need to be physically fit (Bui Van Dung, Tran Thi Thuy Truong, 2020).

Digital technology has turned education that only focuses on transmitting academic knowledge, but now it has been replaced by providing highly practical knowledge, learning through practice rooms, and virtual models to help students understand and understand more clearly in practice. Internship activities at enterprises and construction sites are increasingly being focused on by universities. Increase the initiative and positivity in learning through essays, harvest reports, internship reports, and internship reports.

Digital technology affects teaching methods

Digital technology requires learners to have access to the applications of the industrial revolution 4.0. Therefore, in the process of teaching and vocational training, it is also necessary to apply the latest technologies to turn the lecturer into an expert in the professional field. The teaching process is not simply implemented on paper and pen, in the form of a traditional classroom, but needs the support of technology devices, through online classes. This allows teachers to promote their full potential, creating a favorable environment for students to self-study, self-improve, and self-think. Through improving the working quality of teachers and students, with the support of audio-visual-digital devices, education in the 4.0 era helps to enhance information continuously, adding accuracy to accuracy. realism of advanced learning and information tasks; help increase learners' motivation; promote independent learning and equip learners to take control of their own learning; develop learners' thinking at a higher level, have the ability to apply knowledge and skills to analyze challenging problems, grasp broad concepts, be able to generate ideas and come up with new solutions (Bui Van Dung, Tran Thi Thuy Truong, 2020).

In the digital age, lecturers are not only communicators but also take on the additional role of catalyzing, coordinating and guiding learners to grasp new needs and trends, as well as prepare students with tools. necessary for self-study and self-training of necessary professional skills. In the face of the enormous amount of knowledge and information in the digital age, lecturers need to combine a variety of methods and means connected to the internet to be able to orient the meaning and quality of information sources. Through the application of active teaching methods, teachers interact and support learners to help them gain new knowledge and problem-solving abilities more effectively.

Digital technology affects the capacity of teachers

The digital age also brings new requirements for teachers. Lecturers need to have the capacity to manage network resources, be able to use technology proficiently to serve the teaching process, to convert from traditional teaching forms to teaching methods that apply technology. digitization technology. Forms of online learning E-Learning: learning through electronic devices; Mobile Learning: Learning through mobile devices; Blended-learning: a learning model that combines classroom learning and online learning; context aware u-learning: contextual learning, through collaborative environments: learning in highly interactive environments; cloud computing: using cloud computing technology should be strongly applied (Phan Thi Thanh Hai, 2022).

The impact of digital technology has required universities to develop strategies and plans to foster faculty and staff in their professional capacity and improve course research. Lecturers need to actively access scientific knowledge and the most advanced

technologies. Because lecturers are the ones who contribute to orientation as well as ensure the quality of human resources output at universities, in response to the requirements of the new context, they must improve their foreign language skills to connect and integrate with global higher education trends. Lecturers need to improve their level of information technology and foreign languages through training programs, self-study or study through books, movies, self-study apps, multimedia media, etc.

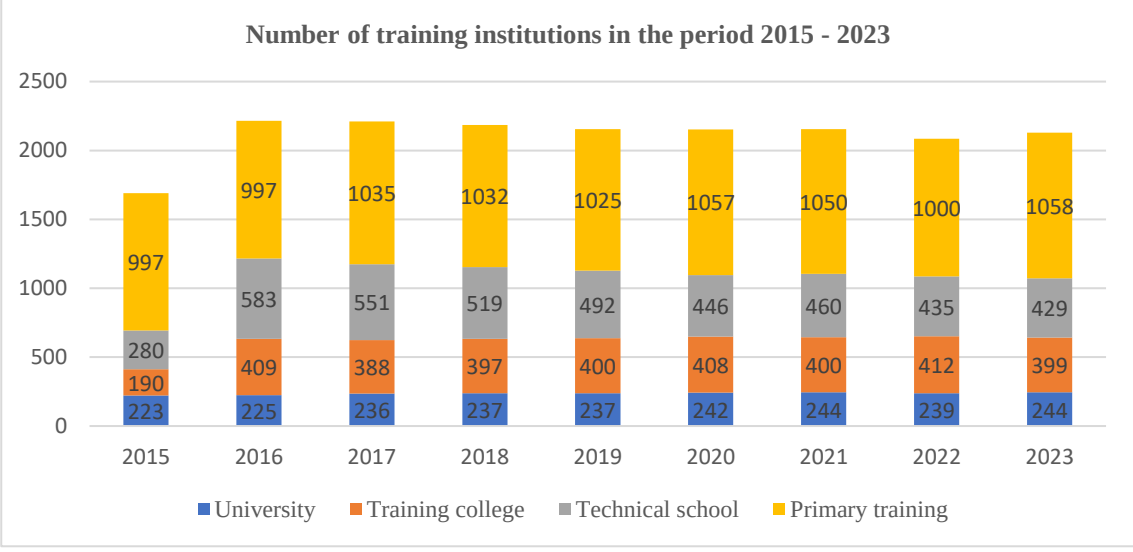
4.2 The current state of the quality of Vietnamese teachers

Based on reports and statistics from the General Statistics Office, the Ministry of Education and Training, and other recent studies, the current situation of the quality of lecturers in Vietnam can be summarized in the following aspects:

- Number of Educational Institutions

According to statistical data, the number of higher education institutions, including universities, colleges, and vocational training centers, is quite large in Vietnam, capable of meeting the demand for supplying a high-quality workforce for the digital economy. However, issues related to the quality of lecturers as well as the quality of education need more attention.

Table 3. Number of Educational Institutions in the Period 2015 - 2023



(Source: Ministry of Education and Training, 2023)

- Educational Qualifications of Lecturers

According to statistics from the Ministry of Education and Training, by 2022, approximately 65-70% of lecturers at universities and colleges in Vietnam hold master's or doctoral degrees. Among them, about 30% of lecturers have doctoral degrees, mostly concentrated in large universities such as Hanoi National University, Ho Chi Minh City National University, and other top-tier universities. However, the percentage of lecturers with doctoral degrees at regional universities and specialized institutions is still low, usually ranging from 10-15%.

Table 4. Data on Management Staff, Lecturers, and Employees at Higher Education Institutions (2021-2022)

	2020-2021			2021 - 2022		
	Total	Include		Total	Include	
		Public	Non-public		Public	Non-public
Managers, lecturers, staff	**89,004**	**67,743**	**21,261**	**90,615**	**67,266**	**23,349**
Managers	**881**	674	207	**851**	637	214
Staff	**11,547**	8,731	2,816	**11,585**	8,633	2,952
Lecturers	**76,576**	58,338	18,238	**78,190**	58,011	20,179
Including:						
- Professor	**578**	443	135	**602**	462	140
- Associate Professor	**4,635**	3,933	702	**4,601**	3,772	829
Divided by training level						
- Doctor	**23,956**	20,090	3,866	**25,366**	20,753	4,613
- Master	**46,062**	34,038	12,024	**46,942**	33,681	13,261
- Bachelor	**5,890**	3,774	2,116	**5,514**	3,434	2,080
- Other qualifications	**668**	436	232	**368**	143	225

(Source: Ministry of Education and Training, 2022)

- Quality of Lecturers by Discipline

Universities offering natural sciences (mathematics, physics, chemistry, biology) and engineering and technology (electrical engineering, electronics, mechanical engineering, information technology) tend to have higher-quality lecturers compared to other fields. The percentage of lecturers with doctoral degrees in these disciplines is generally higher, typically ranging from 30-40% at large universities such as Hanoi University of Science and Technology, Ho Chi Minh City University of Science and Technology, and universities within the Vietnam National University system. Lecturers in these fields often participate in international scientific research and adopt more modern teaching methods. The quality of lecturers in the medical and pharmaceutical fields is usually highly rated, as these fields require deep expertise combined with practical experience. Most lecturers in this sector hold advanced degrees (Ph.D., associate professor) and have substantial practical experience in healthcare. At institutions like Hanoi Medical University and Ho Chi Minh City University of Medicine and Pharmacy, the percentage of lecturers with a Ph.D. may reach 50-60%. Lecturers in economics and business management at Vietnamese universities also have a relatively high percentage of holding master's or doctoral degrees. However, the number of Ph.D holders in these fields is not as high as in natural sciences or engineering. The percentage of lecturers with doctoral degrees in these disciplines typically ranges from 20-30% at prestigious universities. Institutions such as the National Economics University and Foreign Trade University are known for their high-quality lecturers in this field. Social sciences (sociology, psychology, literature, history, political science) and humanities tend to have a lower percentage of lecturers with doctoral degrees. The percentage of lecturers with Ph.D in these fields at universities generally ranges from 10-20%. Lecturers in these disciplines primarily focus on theoretical research and social issues but lack a strong connection with applied research or international research projects. The education field also has a large number of lecturers, but the quality of lecturers may not be consistent. At

teacher training institutions, the percentage of lecturers with doctoral degrees is often low. Lecturers in this field are typically master's degree holders or have high expertise in specialized areas. The percentage of lecturers with doctoral degrees in education is about 10-20%. Although there have been improvements in the quality of lecturers in fields like natural sciences, engineering, and medicine in Vietnam, there are still significant disparities between disciplines and universities. Social sciences, humanities, and education still require considerable efforts to enhance the quality of lecturers, particularly by strengthening international training and research.

- Training and Development for Lecturers

Data from the General Statistics Office in 2022 shows that the percentage of lecturers participating in professional development and training courses is about 15-20% each year. However, most of these training programs focus on theory and lack a connection to practical teaching. International training programs for Vietnamese lecturers are also starting to receive more attention, but the number of lecturers participating remains modest, with only about 5-10% of lecturers nationwide involved.

- Teaching Methods and Technology

The use of technology in teaching is still quite limited. Although around 50-60% of lecturers use information technology in teaching (such as teaching software, classroom management tools, online teaching), the predominant teaching method remains traditional, with the use of blackboard lectures and printed textbooks. Modern teaching methods such as project-based learning, problem-based learning, or blended online learning have not been widely adopted, particularly in private universities and educational institutions in remote areas.

- Income and Working Conditions

According to information from the Ministry of Education and Training, the average salary of university lecturers in Vietnam ranges from 7 million to 15 million VND per month (approximately 300 to 600 USD), depending on their position, rank, and university. Lecturers with higher academic titles (such as Associate Professors or Ph.D. holders) generally earn higher salaries, which can reach 15 million VND per month or more. Newly graduated lecturers or those with a master's degree may start with a lower salary, around 7 million VND per month. However, this salary is insufficient for lecturers to maintain their livelihoods in major cities like Hanoi or Ho Chi Minh City, where the cost of living is high. As a result, many lecturers have to take on additional work, teach extra classes, or participate in research projects to supplement their income. The working conditions at universities in Vietnam vary widely. Top universities, such as Hanoi National University and Ho Chi Minh City National University, usually have modern and fully equipped facilities, with classrooms outfitted with the latest technology. However, at provincial universities or private institutions, the facilities and teaching equipment are more limited, affecting the quality of teaching. The working environment at public universities can be quite stressful, with demands for teaching, research, and participation in administrative activities. Most lecturers are required to teach, prepare lessons, create exams, and engage in scientific research, but the time available for research is still insufficient. While lecturers' salaries are low, many universities offer benefits such as social insurance, health insurance, paid leave, and support for advanced training

programs. However, these benefits are not enough to encourage lecturers to make long-term contributions, especially at private universities.

- Research Quality

The percentage of lecturers involved in scientific research has increased in recent years. According to the Ministry of Education and Training (2022), about 30-35% of lecturers at universities in Vietnam participate in scientific research. However, this figure varies greatly between universities: larger institutions, particularly those under the Vietnam National University system, have higher rates of lecturers engaged in research. The research conducted by lecturers still lacks a strong connection to practical needs and the labor market. Only about 5-10% of lecturers participate in international research projects, primarily those with doctoral degrees at major universities, while the rest focus mostly on teaching with little attention to research. Although the participation of lecturers in scientific research has increased, the number of international scientific papers published by Vietnamese lecturers remains relatively modest. A report from the Ministry of Education and Training indicated that in 2022, Vietnam had about 15,000 international scientific papers, but only around 5-10% of lecturers participated in publishing these papers. Lecturers focus primarily on natural sciences, engineering, and healthcare, with universities such as Hanoi National University and Ho Chi Minh City University of Science and Technology having research that meets international standards. Fields such as social sciences and humanities have lower research output, with fewer international studies being published. One of the factors affecting research is financial resources and infrastructure. According to a survey in 2022, about 40-50% of lecturers reported lacking financial resources to conduct research and develop research projects. Larger universities, especially those with international partnerships, tend to receive more funding for scientific research. While scientific research in Vietnamese universities has progressed, there is still a lack of strong links between research and practical application. Only a small portion of lecturers have research that applies to real-world practices or collaborate with businesses to implement research findings into actual products.

- Evaluation of Lecturer Quality

Although improvements have been made in evaluating lecturers through student feedback surveys, this process has not been fully implemented across all universities and colleges. The evaluation results are often considered in a narrow scope and are not used to improve overall teaching quality.

Thus, the quality of lecturers in Vietnam faces several challenges regarding professional qualifications, teaching methods, working conditions, and income. While there have been many efforts to improve the situation, stronger investments in retraining lecturers, improving working conditions, raising salaries, and encouraging scientific research are needed to enhance the quality of teaching and education.

4.3. Opportunities and challenges to improve the quality of lecturers in the digital age

Opportunity

In the context of rapidly developing digital technology and its application to all aspects of social life, including training, has created an opportunity to develop high-quality training programs, digitize activities. of the school in enrollment, training and quality assurance. Digital technology helps create opportunities for teachers and learners

to quickly update knowledge, enhance digital skills for managers and teachers of vocational education to form e-schools. Promote quality assurance, online education, and assessment of vocational skills in the digital environment with the cooperation of international vocational education organizations.

Digital technology has a strong impact on improving the quality of teachers' work. Digital technology brings smart designs, quick and widespread connections to help teachers and students get closer together, teachers can easily access, timely support for students' questions outside of class time. With classes with the support of technology equipment, it also helps teachers promote creativity in imparting knowledge and students have a favorable environment for self-study and self-reflection.

In the era of information technology and digital transformation, teachers have easier access to quality learning resources from other countries around the world. This creates more opportunities for lecturers to self-study to improve their professional capacity, change and improve teaching forms and methods applying digital technology. The lecturers can also exchange academically through joint programs affiliated with domestic and foreign universities without having to train in that country for a long time. Helping lecturers save on study and living costs while still being able to access advanced training programs to improve professional capabilities, as well as improve foreign language skills and update new technologies in teaching.

Digital technology and integration also offer opportunities to attract foreign investment capital for training institutions. Facilitate linkage of national and international curricula. Lecturers also have the opportunity to receive intensive training abroad scholarships sponsored by NGOs to learn new knowledge and skills to impart to students. This helps to improve the quality of teaching and learning.

Challenge

Digital transformation and international integration bring challenges in the training process. Attention should be paid to developing English and computer skills; working skills, independent research and teamwork; ability to adapt to changes; train students' sense and industrial working style to suit the dynamic and modern working environment in the era of integration and digital revolution. Therefore, teachers must also equip themselves with outstanding knowledge and skills to be able to pass on to students.

Despite the constant development of digital technology, the thinking and teaching style of lecturers at training institutions have not changed in the context of digital transformation. Some lecturers are afraid to change or teach on the digital platform a way to cope, lack of creativity. There are even lectures that are no different from traditional lectures despite the support of modern technology. From there, the challenge is to change the thinking and teaching style in the context of digital technology application.

Universities have focused on investing in facilities, but the investment has not met the research and teaching needs of lecturers in the context of rapidly changing technology and many equipment for activities, outdated teaching models, this has reduced the quality of teaching as well as the adaptability of students in the digital age.

Applied scientific research activities are limited due to the lack of connection between universities and businesses. Especially for technology and engineering schools, the focus must be on linking with businesses to carry out implementation research, to improve the efficiency of scientific research projects, especially towards create patents.

The ability to use foreign languages in research and teaching of lecturers is still limited. While the educational environment does not only take place within the school, in the country but also on a global scale.

The knowledge and ability to use information technology of the lecturers are still limited. Many lecturers have good expertise, but the ability to use technology is not high, and the skills in designing lessons and courses on digital platforms are not yet proficient. The design of teaching scripts, building images, videos, integrating screen pages, etc. for many lecturers is still new.

Remuneration, priority, material and spiritual conditions, working conditions for lecturers are still limited. Not creating motivation for the teaching staff to strive for self-study, self-training to improve their capacity, as well as being dedicated and dedicated to the profession.

Thus, digital transformation has created opportunities but also brought challenges for training as well as improving the quality of trainers in training in Vietnam to be able to provide high-quality human resources to meet the needs of the future. increasing demands of the labor market.

V SOLUTIONS

In the context of digital transformation and international integration, the requirements for improving the quality of lecturers can be met through the following solutions:

On the State side

The State needs to review and inspect the quality of training institutions in a reasonable and scientific manner, focus on supporting the development of educational institutions with strengths in various professions, and dissolve training institutions. does not guarantee the quality of human resources. Reviewing the contingent of teachers and lecturers to standardize to meet the target by 2022-2030. Towards giving autonomy to training institutions in terms of personnel, finance, and training.

The functional agencies need to accelerate the modernization of information technology infrastructure, the application of e-government in the entire system serving the management and administration of vocational education, building an electronic library, online training system, encouraging vocational training institutions to set up specialized classrooms, multimedia, virtual reality equipment, etc.

Strengthening activities of forecasting human resource needs to meet social needs in the context of digital transformation and integration, thereby determining the direction for education and training. The State needs to make timely adjustments to training, in line with the requirements of socio-economic development in each period.

Strengthen bilateral and multilateral cooperation activities in education and training such as: scientific research, fostering teachers and administrators; create favorable conditions in terms of legal and social environment to attract foreign investors for cooperation in research, high-quality vocational training, opening representative offices. Create conditions for experts in the fields to research and develop careers. Continue to cooperate with the Governments of Germany, France, Australia, Japan and Korea in implementing signed ODA projects in the field of vocational training.

Towards the training institution

It is necessary to focus on digital transformation, technology application in training and school administration. Schools need to develop a suitable roadmap to ensure 100% of work is digitized by 2025, towards the formation of smart schools. It is necessary to reform the training program and develop online training. Training programs need to be designed flexibly, meeting occupational standards in relation to the labor market. Focus on training key occupations included in the list of ASEAN skills competitions. Increase practical training time at enterprises. Increase the training time on practical skills, soft skills, foreign languages, and informatics. It is necessary to focus on training and fostering to improve the professional competence of lecturers such as organizing advanced training sessions, training in information technology, foreign languages, etc.

Changing training methods on the basis of student-centered learning, applying information technology in lesson design and delivery. Renovate the form and method of assessing learning results in the direction of meeting the working capacity and enhancing the creativity of learners. Promote applied research activities, technology research, teaching means and information technology application in teaching and training management. Improve the quality of scientific research in vocational education institutions, associate research with transfer activities at the institution. Focusing on simulation studies, human-machine interaction studies.

Building a list of teaching equipment, focusing on key national occupations, in the direction of approaching the standards of facilities of countries in the region and internationally. Building software to simulate, digitize lectures, virtual classrooms, online learning. Develop a strategy for school development, foster talent, process training activities to ensure that the training program is accredited in the period of 2025-2030 according to international standards such as AUN, ABET, etc. prestigious international organizations such as ASIIN, AQAS, FIBAA, CTI, HCERES, etc.

Completing the salary policy associated with the performance of the teaching staff. Wages are associated with job performance both in terms of quantity and quality so that it becomes a motivation for labor, in accordance with regulations, reasonably commensurate with the work, on time and ensuring fairness among employees having same type of work. It is possible to apply 3P salary payment and evaluate work performance according to KPIs for each position. Wages need to ensure life and ensure competitiveness among educational institutions to become one of the motivations for lecturers to dedicate themselves to the profession. Training institutions develop reasonable internal spending regulations, with salary increases adjusted according to coefficients. Build an attractive reward and welfare system. The forms and reward regimes need to be transparent, timely, in the right place, at the right time.

Assigning suitable jobs to each subject of lecturers such as teaching, researching, building training programs, etc. That will become attractive and inspiring for lecturers. Matching the capacity, interest, interests, and passion of the lecturers, thereby helping to foster awareness of the necessity in the assigned work so that they can devote themselves to the job. Create excitement for position-based work, give lecturers autonomy so that they can be attracted to participate in the work management process, enhance creativity. Improving the physical environment for employees such as machinery and equipment for research and teaching... helps lecturers have a comfortable working space, full of equipment and facilities to promote creativity in teaching and study. Building a favorable

mental environment for lecturers as managers need to have a democratic leadership style, listen and pay attention to the thoughts and aspirations of the lecturers. Create a friendly working atmosphere, sociable among colleagues, are treated fairly. In order to build a favorable spiritual environment to create a close relationship with the school, the trade union organizations, the youth union also needs to play a good role in connecting and protecting the legitimate interests of the employees so that the lecturers can feel secure in work.

Lecturer

Contribute ideas on human resource training needs, orientations and solutions in the process of economic integration. Provide information on labor recruitment needs. Coordinating with domestic and foreign schools through feedback on the quality of students, contributing ideas in the compilation and criticism of training contents and programs; organizing teaching, guiding practice, fostering skill improvement, and assessing the results of learners at training institutions.

Lecturers need to actively participate in advanced forms of training, online training to both improve their qualifications and access new teaching models, thereby supplementing knowledge and diversifying teaching forms. Lecturers are active in the application with a teaching model in the digital age such as E-learning; B-learning; teleconference. At the same time, lecturers need to be people who directly participate in practical processes and work at enterprises to have conditions for innovation and creativity, and to link theory with practice. Promote scientific research so that lecturers can apply modern methods to teaching.

Lecturers need to promote their initiative and creativity to constantly improve their teaching capacity such as developing curricula at the subject level, determining learning goals, and teaching methods that are active and appropriate to the results. It combines a variety of methods such as teaching through situations, group discussions, exploration, simulation, projects, etc. Training capacity for communication, problem solving, decision making, conflict handling, not stop learning and practice to develop and perfect the master. Lecturers need to improve the level of applying information technology and using modern means in teaching, managing resources and data on the internet, using digital technology in teaching, etc.

Lecturers also need to improve the standards and ethics of teachers. Self-study and practice to grasp new achievements of digital technology applied to teaching. It is necessary to be fluent in at least one foreign language, the most important is English with the ability to research specialized scientific fields.

VI CONCLUSION

The context of digital transformation has brought many opportunities but also posed many challenges for Vietnamese education and training, in which the quality of teachers in schools is a decisive factor to the quality of education institutions. Therefore, lecturers need to constantly learn to improve their expertise and skills in accordance with the context of digital transformation to be able to train generations of high-quality students worthy of society's trust.

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FACTORS AFFECTING GREEN INNOVATION IN VIETNAMESE ENTERPRISES: A CASE STUDY OF NGHE AN PROVINCE

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Abstract: This study analyzes the factors influencing green innovation in enterprises in Nghe An, including environmental ethics, green dynamic capabilities, green creativity, green knowledge sharing, pressure from government agencies, and competitive pressure. The research findings indicate that all these factors positively impact green innovation, with green dynamic capabilities being the most influential factor. The study provides recommendations for the Government and enterprises to promote green innovation, aiming for sustainable development at the local level.

Keywords: *green innovation, enterprises*

1. Introduction

Previous studies have approached green innovation based on Stakeholder Theory. Research by Huang et al. (2009), Qi et al. (2010), Sarkis et al. (2010), Guoyou et al. (2013), and Weng et al. (2015) emphasizes that a company's green innovation is shaped by the interaction between stakeholder power and managerial perception of environmental factors (Sarkis et al., 2010).

According to this theory, stakeholders—including customers, suppliers, internal employees, competitors, and regulators—play an important role in driving enterprises to adopt green innovation strategies. To meet environmental demands from stakeholders, enterprises need to develop appropriate management strategies that minimize risks while leveraging opportunities to enhance operational efficiency. Companies that fail to respond to stakeholder pressures risk significant reputational and financial losses. Conversely, systematic stakeholder management can yield long-term benefits, particularly in improving both environmental and financial performance (Guoyou et al., 2013).

In Vietnam, a developing country with an economy and regulatory system still in transition, external pressures from stakeholders, particularly the Government, may play a crucial role in directing green innovation. Furthermore, raising awareness and commitment from internal stakeholders such as managers and employees is essential, as they are directly responsible for implementing and operating green innovation strategies within enterprises.

This study aims to analyze and assess the impact of various stakeholder groups on green innovation in Vietnamese enterprises, focusing on a case study in Nghe An province. The findings are expected to provide a scientific and practical basis for enterprises and policymakers to develop effective strategies to promote green innovation, contributing to sustainable development.

2. Literature review

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The Organization for Economic Cooperation and Development (OECD) defines innovation as the development or implementation of a new product (goods or services), process, marketing method, or organizational method that represents a significant improvement in business activities, management practices, or stakeholder engagement. Initially, the OECD's definition emphasized innovation within the production sector, focusing primarily on product and process enhancements. However, in 2005, the scope of the definition was broadened to include innovations in marketing and organizational practices. In subsequent years, the OECD further refined this concept, defining innovation as the creation or adoption of a new product or process that substantially differs from prior versions.

Additionally, the term "unit" in this context was expanded to include any entity involved in the innovation process, such as organizations across various sectors, households, and even individuals (OECD, 2018). Building on existing definitions of green innovation, this study adopts the framework proposed by Chen et al. (2006). Green innovation is characterized as advancements in the hardware or software of green products or processes, encompassing technological innovations aimed at energy efficiency, pollution reduction, waste recycling, eco-friendly product design, and enhanced environmental management within businesses.

3. Data and Research methodology

3.1. Data

To ensure the accuracy and comprehensiveness of the research, this section presents the variables, coding, and observed indicators used in the data collection and analysis process. The variables are identified based on theoretical foundations and previous studies, supported by reliable data sources.

Table 3.1. Summary of research variables, indicators, and sources

Variables	Coding	Observed variables	Sources
Green innovation	DMX	1. The company prioritizes the use of environmentally friendly materials in the design or development of products. 2. The company optimizes energy and material usage to minimize waste in production and product design. 3. When developing or designing products, the company carefully considers their recyclability, reusability, and biodegradability. 4. The company's operational processes aim to minimize emissions of toxic substances or waste into the environment. 5. The company actively reduces the consumption of resources such as water, electricity, or fossil fuels in its operations. 6. The company minimizes the use of raw materials such as sand, stone, wood, or other natural resources in production activities.	Chen et al (2006)
		7. The company's operational processes incorporate	The

		the use of renewable energy.	authors proposes
Environmental ethics	DDMT	1. The company implements clear policies to ensure environmental protection in its business operations. 2. The company allocates appropriate budgets for investing in and procuring environmentally friendly solutions. 3. The company integrates environmental protection goals and visions into its marketing strategies. 4. The company embeds environmental protection plans, visions, and responsibilities into its corporate culture.	Chang (2011)
Green creativity	STX	1. Employees in the company propose new initiatives to achieve environmental protection goals. 2. Employees suggest creative ideas to enhance environmentally friendly operational efficiency. 3. Employees actively support and encourage colleagues to implement new green ideas. 4. Employees transform green ideas into detailed and feasible plans for implementation. 5. Employees seek and develop innovative solutions to address the company's environmental challenges.	Chen & Chang (2013)
Green dynamic capabilities	NLDX	1. The company quickly identifies and seizes opportunities for environmentally sustainable development. 2. The company possesses the capability to develop and apply environmentally friendly technologies. 3. The company effectively acquires, integrates, shares, and applies environmental knowledge in its business operations. 4. The company manages and successfully implements environmental expertise throughout the organization. 5. The company allocates resources efficiently to support green innovation initiatives and activities.	Chen & Chang (2013)
Green knowledge sharing	CSKTX	1. Employees in the company clearly know whom to contact when they need market-related information. 2. The company regularly organizes meetings between departments to discuss market trends and developments. 3. The workplace is designed to encourage and facilitate information exchange among employees. 4. The company proactively encourages mentoring and consulting activities among employees to	Abbas & Sağsan (2019), Lin & Chen (2016), Rubel et al (2021)

		improve work efficiency. 5. Employees frequently use digital tools (video calls, phones, management software, etc.) to exchange information. 6. Employees are encouraged to share and discuss knowledge gained from seminars, conferences, or exhibitions. 7. Employees actively share environmental knowledge from sources such as newspapers, magazines, and television with colleagues.	
Pressure from government agencies	ALCQNN	1. Environmental protection regulations in Vietnam are strictly enforced. 2. These regulations significantly impact the business strategies and activities of enterprises. 3. Environmental policies effectively support the green transformation of production and operational processes. 4. Local authorities show interest in the environmental protection initiatives and activities of enterprises. 5. Local governments use environmental protection criteria to assess the reputation and social responsibility of enterprises.	Qi & Shen (2010), Rui & Lu (2021)
Pressure from competitors	ALDTCT	1. The company's competitors establish environmental standards to enhance the quality of products and services. 2. Competitors develop business strategies that integrate environmental factors to strengthen their competitive advantage. 3. Competitors recognize that green innovation significantly benefits operational efficiency and sustainable development.	Christmann (2004), Hsu et al (2013)
		4. The company's competitors leverage environmental factors as a tool to enhance customer trust and loyalty.	The authors proposes.
		5. The company's competitors believe that green innovation delivers superior benefits compared to initial investment costs.	Hsu et al (2013)

Source: Authors's summary

3.2. Research Model

Based on the presented theories and analyses, the research team identifies that the factors influencing green innovation in enterprises in Nghe An include Environmental Ethics, Green Creativity, Green Dynamic Capabilities, Green Knowledge Sharing, Pressure from Government Agencies, and Pressure from Competitors. To control the

differences in green innovation among enterprises with varying characteristics, the research team decided to use the following control variables:

Research by Guo et al. (2020), Song et al. (2020), and Zhou et al. (2020) shows that enterprise size has a significant positive correlation with green innovation. Enterprise size is evaluated based on the total number of employees (Dibrell et al., 2011; Liao, 2016). According to Decree No. 39/2018/ND-CP, the research team categorizes enterprise size into three groups: Enterprises with fewer than 100 employees; Enterprises with 100 to 200 employees; Enterprises with more than 200 employees.

According to Song et al. (2020), operating time has a significant impact on the level of green innovation in enterprises. Operating time is measured based on the number of years since the enterprise was established (Liao, 2016). Enterprises with longer operational history often possess better experience and resources to implement green innovation compared to newly established ones.

Studies by Zhang & Zu (2019) and Song et al. (2020) show that different enterprise types significantly influence the degree of green innovation. Referring to the Enterprise Law 2020, the research team categorizes enterprise types into three groups: Private enterprises and partnerships; Joint-stock companies; Limited liability companies (LLCs). These control variables allow the research team to analyze and compare differences in green innovation among enterprises in Vietnam, particularly in Nghe An. This provides a foundation for relevant policy recommendations and strategic directions to promote green innovation effectively.

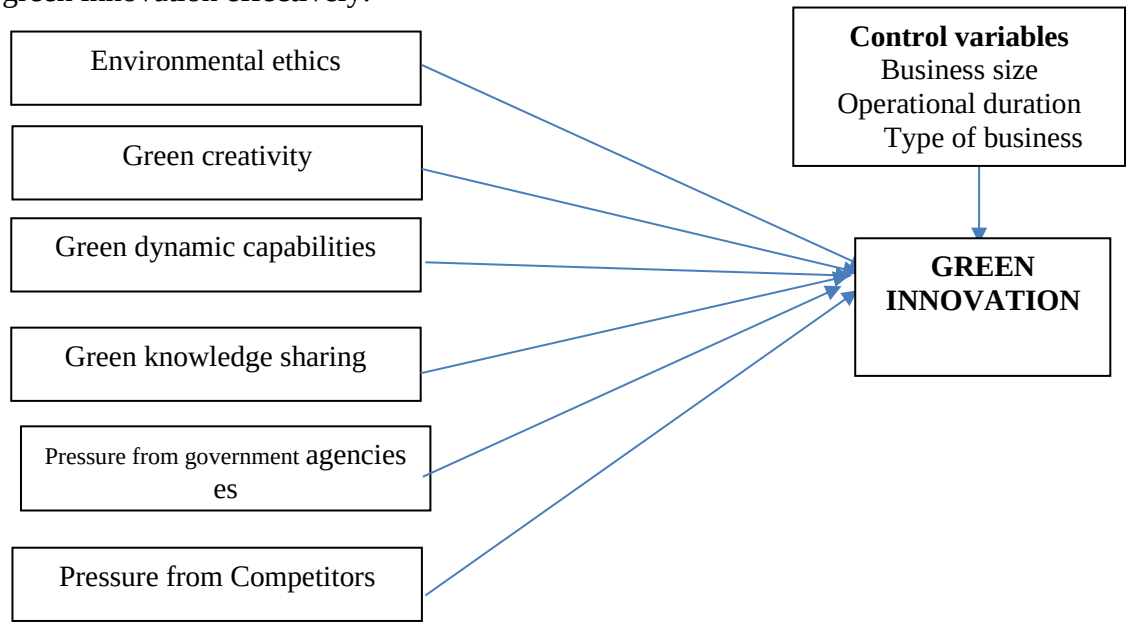

Figure 3.1. Proposed research model

Source: Authors' analysis results

Hypotheses of the Model

H1: Environmental ethics positively impact green innovation in enterprises.

H2: Green creativity positively impacts green innovation in enterprises.

H3: Green dynamic capabilities positively impact green innovation in enterprises.

H4: Green knowledge sharing positively impacts green innovation in enterprises.

H5: Pressure from government agencies positively impacts green innovation in enterprises.

H6: Pressure from competitors positively impacts green innovation in enterprises.

3.3. Research Methodology

The study conducted formal surveys using two methods: direct surveys and online surveys via Google Forms. A total of 250 responses were collected. The respondents evaluated statements related to green innovation in enterprises using a Likert scale from (1) to (5) as follows: (1): Strongly disagree; (2): Disagree; (3): Neutral; (4): Agree; (5): Strongly agree. This study employed a multiple regression model. Specifically, the authors performed the following steps: Reliability testing: to ensure the reliability of the measurement scales; Exploratory factor analysis (EFA): to identify and refine the underlying factors; Pearson correlation analysis: to evaluate the relationships between variables; Multiple regression analysis: to assess the impacts of independent variables on green innovation.

4. Results and discussion

4.1. Results

Through Cronbach's Alpha analysis, observed variables with a correlation coefficient between the variable and the total score (Corrected Item-Total Correlation) of less than 0.3 are excluded from the scale. Each component of the research concepts (influencing factors) must have a Cronbach's Alpha coefficient greater than 0.6.

The research team evaluated the reliability of the scale using Cronbach's Alpha for each group of observed variables corresponding to the different influencing factors. The results of these analyses are presented in the following tables.

(1) Green innovation group (DMX)

Table 3.2. Cronbach's Alpha test for the Green Innovation (DMX) Scale

Reliability Test	
Cronbach's Alpha Value	0.847
Reliability Test	Cronbach's Alpha

Item-Total Statistics				
Observed Variable	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
DMX1	22.90	14.80	.620	.810
DMX2	22.91	15.30	.580	.815
DMX3	22.94	15.20	.560	.817
DMX4	22.93	15.0	.610	.812
DMX5	22.90	15.10	.590	.816
DMX6	22.93	15.20	.550	.820
DMX7	22.92	15.0	.605	.812

Source: Authors' analysis results

According to the data table, the Cronbach's Alpha reliability coefficient for the Green Innovation factor in enterprises indicates that all corrected item-total correlations for the observed variables exceed 0.3. The Green Innovation factor has a Cronbach's

Alpha value of 0.847, which is greater than 0.6. Therefore, the scale for the Green Innovation factor is deemed reliable and appropriate.

(2) Environmental ethics factor (DDMT)

Table 3.3. Cronbach's Alpha Test for the Environmental Ethics (DDMT) Scale

Reliability Test	
Cronbach's Alpha	Total Observed Variables
.789	4

Source: Authors' analysis results

The Cronbach's Alpha coefficient for the Environmental Ethics factor indicates that the corrected item-total correlations of all measurement variables exceed 0.3. The Environmental Ethics factor has a Cronbach's Alpha value of 0.789, which is greater than 0.6. Therefore, the scale for the Environmental Ethics factor is deemed reliable and appropriate.

(3) Green dynamic capabilities factor (NLDX)

Table 3.4. Cronbach's Alpha Test for the Green Dynamic Capabilities (NLDX) Scale

Reliability Test	
Cronbach's Alpha	Total Observed Variables
.810	5

Source: Authors' analysis results

The Cronbach's Alpha coefficient for the *Green dynamic capabilities* factor in enterprises indicates that all corrected item-total correlations for the measurement variables exceed 0.3. The Green dynamic capabilities factor has a Cronbach's Alpha value of 0.810, which is greater than 0.6. Therefore, the scale for the Green dynamic capabilities factor is deemed reliable and appropriate.

(4) *Green creativity factor* (STX)

Table 3.5. Cronbach's Alpha test for the green creativity (STX) scale

Reliability Test	
Cronbach's Alpha	Total Observed Variables
.788	5

Source: Authors' analysis results

The Cronbach's Alpha coefficient for the *Green creativity factor* in enterprises indicates that all corrected item-total correlations for the measurement variables exceed 0.3. The Green creativity factor has a Cronbach's Alpha value of 0.788, which is greater than 0.6. Therefore, the scale for the Green creativity facto is deemed reliable and appropriate.

***(5) Green knowledge sharing factor (CSKTX*)**

Table 3.6. Cronbach's Alpha test for the green Knowledge Sharing (CSKTX) Scale

Reliability Test	
Cronbach's Alpha	Total Observed Variables
.788	7

Source: Authors' analysis results

The Cronbach's Alpha coefficient for the factor *Green knowledge sharing* in businesses shows that the observed variable CSKTX3 has a total correlation coefficient

of 0.268, which is less than 0.3. The Cronbach's Alpha value if CSKTX3 is removed is 0.822, which is greater than the current Cronbach's Alpha value of 0.788 for the Green knowledge sharing factor. Therefore, the research team decided to remove the observed variable CSKTX3 and reprocess the data for the second analysis.

Table 3.7. Cronbach's Alpha Test for the factor of Green knowledge sharing (CSKTX) - Second Analysis

Reliability Test	
Cronbach's Alpha	Total Observed Variables
.822	6

Source: Authors' analysis results

The Cronbach's Alpha coefficient for the factor *Green knowledge sharing* in businesses indicates that the total correlation coefficients of all component measurement variables exceed 0.3. The Cronbach's Alpha value for this factor is 0.822, which is greater than 0.6. Therefore, the scale for the factor *Green knowledge sharing* is deemed appropriate.

(6) Pressure from Government agencies factor (ALCQNN)

Table 3.8. Cronbach's alpha test for the pressure from Government agencies (ALCQNN) scale

Reliability Test	
Cronbach's Alpha	Total Observed Variables
.817	5

Source: Authors' analysis results

The Cronbach's Alpha coefficient for the *Pressure from Government agencies factor* in enterprises indicates that all corrected item-total correlations for the measurement variables exceed 0.3. The Pressure from Government agencies factor has a Cronbach's Alpha value of 0.817, which is greater than 0.6. Therefore, the scale for the Pressure from Government agencies factor is deemed reliable and appropriate.

(7) Pressure from competitors factor (PFC)

Table 3.9. Cronbach's Alpha test for the scale of pressure from competitors (PFC)

Reliability Test	
Cronbach's Alpha	Total Observed Variables
.814	5

Source: Authors' analysis results

Referring to Table 3.9, the Cronbach's Alpha coefficient for the factor of Pressure from competitors demonstrates that all item-total correlation coefficients for the component measurement variables exceed the threshold of 0.3. With a Cronbach's Alpha value of 0.814, which is greater than 0.6, the scale for the factor "Pressure from Competitors" is validated as reliable and appropriate.

+ Exploratory Factor Analysis (EFA)

(1) For Independent variables

The final exploratory factor analysis retained 28 observed variables across 6 independent variables. The results show 6 factors were extracted with Eigenvalues > 1, a KMO value of 0.916 (meeting the requirement of > 0.5), and the total variance explained is satisfactory.

The observed variable CSKTX6 was excluded because it loaded onto both Factor 1 and Factor 3.

The observed variable ALDTCT5 was removed due to a factor loading coefficient below 0.5.

The Bartlett's test result was 0.916 with a significance level of sig = 0.000 < 0.05, confirming that the observed variables are correlated in the dataset, making it suitable for factor analysis.

The variance extraction table for independent variables indicates that only 6 Eigenvalues are greater than 1, confirming the formation of 6 factors, which aligns perfectly with the initial model of 6 groups of factors. The Eigenvalues are all above 1, and the cumulative variance explained is 58.214%, indicating that these 6 factors account for 58.214% of the variation in the 28 observed variables.

Table 3.10: Factor Matrix

	Factor					
	1	2	3	4	5	6
ALCQNN1	0.694					
ALCQNN4	0.686					
ALCQNN2	0.660					
ALCQNN5	0.647					
ALCQNN3	0.598					
NLDX5		0.728				
NLDX3		0.695				
NLDX2		0.680				
NLDX4		0.678				
NLDX1		0.650				
STX1			0.703			
STX2			0.688			
STX3			0.650			
STX4			0.625			
STX5			0.572			
CSKT1				0.696		
CSKT5				0.691		
CSKT7				0.677		
CSKT2				0.614		
CSKT4				0.579		
DDMT2					0.734	
DDMT3					0.730	
DDMT1					0.695	
DDMT4					0.687	
ALDTCT4						0.731
ALDTCT2						0.700
ALDTCT3						0.699
ALDTCT1						0.671
Extraction Method: Principal Component Analysis.						

Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 6 iterations.

Source: Authors' analysis results

The observed variables in the model were all retained as they exhibited factor loadings greater than 0.5. Each variable loaded correctly onto its original factor, with the lowest loading being 0.579 (CSKTX4) and the highest loading being 0.734 (DDMT2), meeting the requirements for factor analysis.

(2) For the Green innovation variable

The Bartlett's test result was 0.894 with a significance level of sig = 0.000 < 0.05, indicating that the observed variables are correlated in the dataset, making it suitable for factor analysis. The variance extraction table for the dependent variable shows that only one Eigenvalue exceeds 1, meaning only one factor group is formed. This aligns perfectly with the Green Innovation variable in the model. The Eigenvalue is greater than 1, and the cumulative variance explained is 52.275%, indicating that this factor group accounts for 52.275% of the variation in the 7 observed variables.

+ Correlation analysis

The correlation coefficients between variables do not exceed 0.8. According to Shrestha (2020), when the correlation coefficient is below 0.8, the likelihood of multicollinearity is minimal.

Based on this, the authors conclude that there is no evidence of multicollinearity between the independent variables and the dependent variable, nor among the independent variables themselves.

+ Regression analysis and Hypothesis testing

(1) Testing the fit of the regression model

The adjusted coefficient of determination is 0.546. This indicates that 54.6% of the variation in Green Innovation is explained by the six independent variables, while the remaining 45.4% is due to factors outside the model and random error.

Table 3.11: Model Fit Test

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	100.576	6	16.763	90.846	.000b
	Residual	81.741	443	.185		
	Total	182.318	449			
a. Dependent Variable: DMX						
b. Predictors: (Constant), DDMT, STX, NLDX, CSKTXX, ALCQNN, ALDTCT						

Source: Authors' analysis results

Among the independent variables, the F-test used in the ANOVA table assesses the hypothesis regarding the overall fit of the linear regression model. The F-statistic is 90.846, with a significance level of sig. = 0.000 < 0.05. Therefore, the proposed linear regression model is appropriate for the data and can be utilized.

(2) Regression results

The statistical results indicate that all regression coefficients are non-zero and sig. < 0.05, confirming that the six independent variables—Environmental ethics, Green creativity, Green Dynamic capabilities, Green knowledge sharing, Pressure from

government authorities, and Pressure from competitors—significantly influence Green Innovation in businesses.

The sample regression equation, rewritten with standardized regression coefficients, is as follows:

DMX = 0.109*DDMT +0.277*STX + 0.294*NLDX + 0.158*CSKTX + 0.092*ALCQNN + 0.093*ALDTCT

Based on the model results, all factors positively influence green innovation in businesses in Nghe An.

(3) *Hypothesis Testing Results*

In summary, based on the above analyses, the research team has synthesized the results of hypothesis testing as follows:

Table 3.12: Results of hypothesis testing in the study

Hypothesis	Description	Results
H1	Environmental ethics positively influence green innovation in businesses.	Proven
H2	Green creativity positively influences green innovation in businesses.	Proven
H3	Green dynamic capabilities positively influence green innovation in businesses.	Proven
H4	Green knowledge sharing positively influences green innovation in businesses.	Proven
H5	Pressure from government authorities positively influences green innovation in businesses.	Proven
H6	Pressure from competitors positively influences green innovation in businesses.	Proven

Source: Authors' analysis results

4.2. Discussion

The research team analyzed issues related to green innovation in businesses in Nghe An. Despite being a locality with rapid economic growth, businesses in this area still face challenges such as environmental pollution and high energy consumption. Policies and legal frameworks related to green innovation remain vague; however, many businesses have started adopting international green standards such as Leed, Edge, and Lotus.

Based on foundational theories, the research team identified six factors influencing green innovation in businesses in Nghe An: Environmental Ethics, Green Dynamic Capabilities, Green Creativity, Green Knowledge Sharing, Pressure from Government Authorities, and Pressure from Competitors. The findings reveal that all six factors have a positive impact, with Green Dynamic Capabilities exerting the strongest influence.

5. Conclusion and Recommendations

Based on the research findings, the authors offer several recommendations for government authorities to foster green innovation among businesses in Nghệ An.

Firstly, the government should provide subsidies and financial assistance to support businesses pursuing green initiatives. This aid would help mitigate the upfront costs associated with training, technological advancements, marketing adjustments, and production restructuring. In parallel, authorities should collaborate with financial institutions to introduce green credit schemes, offering preferential incentives to promote

environmentally sustainable projects.

Moreover, it is essential to organize specialized workshops on green innovation, establish platforms for sharing experiences between domestic and international enterprises, and facilitate connections with experts to adopt and implement effective green innovation models.

To support these efforts, the government should refine the policy framework by eliminating overlapping regulations, ensuring transparency, and making policies more accessible to businesses. Additionally, mechanisms should be put in place to address feedback and proposals from enterprises in a timely and reasonable manner. Achieving sustainable green innovation requires active collaboration and mutual understanding between the government and the business community.

At the local level, authorities should closely monitor businesses' practical efforts in areas such as reducing air and water pollution, conserving energy, recycling materials, and adopting eco-friendly practices. Regular inspections are necessary to address environmental violations effectively, eliminate superficial compliance reporting, and emphasize the tangible outcomes of environmental initiatives.

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DIGITAL TRANSFORMATION AT VIETNAM AIRLINES CORPORATION: CURRENT STATUS AND SOLUTIONS

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Abstract: Digital transformation plays an important role in the development of the aviation industry in general and Vietnam Airlines in particular. The article will analyze digital transformation at Vietnam Airlines Corporation, pointing out achievements, limitations and causes of limitations in the digital transformation process. On that basis, propose some solutions to promote the digital transformation process at Vietnam Airlines Corporation in the coming time.

Keywords: Digital transformation, Vietnam Airlines

JEL code:

1. Introduction

Digital transformation has become an inevitable trend of the global aviation industry. Not only does it help aviation businesses solve market problems, digital transformation also creates a foundation for sustainable development in the future. Accordingly, Vietnam Airlines clearly defines the goal of "Making Vietnam Airlines become a digital airline by 2025, maintaining its pioneering role in leading Vietnam's air transport industry, and at the same time being in the leading group in transformation." numbers of the ASEAN aviation industry".

Current status of digital transformation at Vietnam Airlines on the contents of building and promulgating digital transformation strategies, programs and plans; Propagate and raise awareness about digital transformation; Digital data and digital technology; Building a digital culture has shown that Vietnam Airlines is gradually orienting the development of digital transformation with a long-term vision, to not only improve internal operations but also bring customers the best experiences. The results achieved in the digital transformation process have put Vietnam Airlines in the group of airlines with advanced digital technology. Vietnam Airlines continues to promote management innovation, effectively exploit data and constantly apply technology to maintain its pioneering position in the regional aviation industry.

2. Current status of digital transformation at Vietnam Airlines Corporation

2.1. Develop and promulgate digital transformation strategies, programs and plans

Vietnam Airlines determines that digital transformation is inevitable if it wants to have breakthroughs in development and not be left behind in the 4.0 Industrial Revolution, especially after the crisis period brought about by the Covid-19 pandemic. Many digital transformation strategies, programs and plans in Vietnam Airlines' Digital Transformation Strategy have been issued and implemented:

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Table 2.1. Vietnam Airlines' digital transformation strategies

No	Job content	Chair
1	Customer Experience Strategy	TTS, DVHK
2	Digital Brand Strategy	TT
3	Digital Marketing Strategy	TTS, TT
4	Ecosystem strategy	TTS, KHPT
5	Digital transformation strategy	CĐS
6	Risk management strategy	CĐS, TCKT
7	Data strategy	CĐS

Source: Digital transformation center - Vietnam Airlines

Vietnam Airlines has developed, issued and implemented 7 Strategies, of which the Customer Experience Strategy is assigned to the digital marketing (TTS) and aviation services (DVHK) departments to preside over; Digital Marketing Strategy is chaired by the Digital Marketing and Communications Department; The ecosystem strategy is chaired by the digital marketing department and the Planning and Development department (KHPT); Data Strategy (Data Management Framework) and Digital Transformation Strategy are chaired by the Digital Transformation Center; The risk management strategy is co-chaired by the Digital Transformation Center and the Finance and Accounting Department. And now the Digital Transformation Strategy has been issued.

After the Digital Transformation Strategy was issued, agencies and units under Vietnam Airlines proactively implemented work related to digital transformation, along with 12 key programs and 7 digital platforms. built and deployed.

Table 2.2. Vietnam Airlines' digital platforms

No	Job content	Chair
1	Customer data platform	TTS
2	Omnichannel	TTS
3	The Axis platform integrates applications	CĐS
4	Platform for collecting, processing, and analyzing big data	CĐS, CNTT
5	VNA E2E Partner Management Platform	TCKT
6	E-learning knowledge management and sharing platform	TCNL
7	Customer feedback collection platform	Ban Tiếp thị số

Source: Digital transformation center - Vietnam Airlines

In addition, Vietnam Airlines has also developed digital applications and digital technology applications with 5 application contents in the commercial sector, 14 applications in the general management sector and 4 applications in the commercial sector. flight operations.

2.2. Propagate and raise awareness about digital transformation

Vietnam Airlines clearly identifies digital transformation as one of the key tasks that must be implemented very drastically. Digital transformation is the basis for improving management efficiency, thereby increasing revenue, reducing costs, creating profits and sustainable development. Digital transformation is not only about technology, but the human factor is the prerequisite. Therefore, the digital transformation process requires a change in awareness and working style of employees throughout the corporation. This is an inevitable process in the 21st century and requires leadership and direction from the

Corporation's Party Committee for Vietnam Airlines to ensure success.

Vietnam Airlines' initial success came from many factors, but the consensus of all officers and employees played an important role. In particular, the Party Committee and leadership of Vietnam Airlines play an important role in promoting digital transformation because they have created a favorable environment and international integration, reducing limiting factors and complex processes., especially for digital products.

Vietnam Airlines determines that communication and communication about digital transformation is very important in promoting digital transformation. Employees need to understand and agree in making the transition. This requires continuity and efficiency in communicating information. In particular, Vietnam Airlines has succeeded in promoting youth on the digital transformation journey. And the Youth Union is the place where Vietnam Airlines' youth and enthusiasm converge, promoting the spirit of "dare to think, dare to do" with many contributions to innovation, digital initiatives... and ensuring 100% youth union membership. understanding of digital culture.

In addition, Vietnam Airlines also determines that each officer and employee actively participating in the digital transformation process is an important factor to ensure that businesses can apply digital technology effectively and provide The best service for customers at each stage and each location. Therefore, on the digital transformation journey, each officer and employee of Vietnam Airlines will be a "Digital Lotus" - symbolizing solidarity, creativity and the spirit of drastic change in thinking and perception. Each officer and employee of Vietnam Airlines needs to actively participate in courses and training to improve the knowledge and technical skills necessary to use digital technology. Officials and employees also regularly propose improvements related to digital transformation to improve work efficiency and effectiveness. Especially in order to increase cooperation both internally and externally, Vietnam Airlines officials and employees have proactively exchanged and shared experiences during the work implementation process.

Table 2.3: Comment on Vietnam Airlines' vision and digital transformation strategy

Unit:: %

Target	Evaluation resu lts according to levels (%)				
	Totally agree	**Agree**	**No comments**	**Disagree**	**Completely disagree**
1. VNA has a realistic digital transformation vision, which can become specific projects and initiatives	33,31%	44,01%	19,8%	2,3%	0,58%
2. VNA has planned a clear strategy and action plan to achieve that vision	33,46%	42,64%	20,52%	2,86%	0,52%
3. Digital transformation vision and strategy are being well implemented throughout the organization.	31,88%	40,05%	23,36%	4,21%	0,50%

Source: Survey data of Vietnam Airlines

The results of a survey of employees at VNA about VNA's vision and digital transformation strategy show that VNA's employees have high confidence and determination to digitally transform with 77.32% agreeing with VNA. have a realistic digital transformation vision, which can become specific projects and initiatives; 76.10% agree that VNA has planned a clear strategy and action plan to achieve that vision; 71.93% think that communicating the Vision and Digital Transformation Strategy are being implemented well throughout the organization.

2.3. ***Digital data and digital technology***

Vietnam Airlines Corporation always focuses on promoting research and development activities in digital technology and digital data. In particular, Vietnam Airlines' research center has the role of advising and assisting the Board of Directors and the General Director. The center's activities also research and propose application solutions in the field of technology and management in the aviation field. At the same time, providing services for the company's production and business activities. Currently, Vietnam Airlines' research center is operating with two main specialized departments: the Technology and Management Solutions Department and the Science and Technology Services Department with a total of 20 employees.

In the first phase, Vietnam Airlines focuses on upgrading technical infrastructure, e-commerce website, and mobile app to speed up processing operations and increase convenience when purchasing tickets., increasing online payment methods to better meet the needs of passengers to buy air tickets. The addition of many ticket cancellation and change utilities, pre-flight and post-landing announcements gives customers many interesting experiences.

Marketing activities in the digital environment are promoted by Vietnam Airlines through the application of tools to measure the number of visitors to websites and mobile applications, and analyze data to understand customers' wants and needs. From there, draw portraits and market directly to them through digital tools. In addition, applying customer management programs to manage and direct marketing through sending Email, Web push, App push, SMS, Zalo messages according to forecasts of customer desires and needs. them at different times. The company has also established criteria such as: 85% of customers are satisfied across all channels and touch points, 80% of customer information is collected and analyzed...

In parallel with diversifying programs on online sales channels, Vietnam Airlines continuously expands distribution channels, shifting from mainly focusing on distribution channels through box offices and airline ticket sales agents to the form of distribution channels. Online ticket sales on e-commerce platforms and e-commerce wallets of domestic and international partners to increase accessibility as well as add more methods for customers to buy tickets.

With strong investment in technical infrastructure, Vietnam Airlines has promoted online check-in methods via websites, mobile applications and increased self-check-in kiosk check-in counters at many airports in the country. and abroad.

Since 2019, Vietnam Airlines has launched a new mobile application version with many modern and easy-to-use features, helping passengers quickly search for flights, look up itineraries, and book tickets online., promptly update promotional programs,...

In addition, Vietnam Airlines also expands many payment methods on new

technology platforms such as: payment by QR code through domestic payment gateway Napas (Momo, Moca applications) and domestic payment gateway VNPay; At the same time, adding SOFORT Banking online payment service in German, Swiss and Austrian markets... to create maximum convenience for passengers.

To solve the operational and management problem of Vietnam Airlines, iERP used Business Intelligence (BI) technology from Oracle - the world's leading provider of ERP software and solutions for businesses. The integrated system for flight operations and operations (iOCC) is a system for the Operations Management Board to manage flights with information collected from other departments such as the Technical Department and the Operations Management Board., Service and Trade - Finance sector. iOCC provides important information to supervisory staff such as weather information, aircraft breakdown details, load parameters, flight schedules, revenue and costs for timely handling.

The requirements of the Integrated Flight Operations Control System (iOCC) Project - Vietnam Airlines set for the iERP team are extremely complex, strict and meticulous, including display requirements of the system. system, system warning requirements, system reporting and data exploitation requirements, and plan effectiveness requirements.

Previously, managers and flight operations supervisors had to observe and monitor information on about 20 computer screens, but now information is aggregated on only 4 screens. Furthermore, information and changes are continuously updated. The iOCC system processes data centrally and immediately to help managers and flight operations supervisors manage flight schedules, failures and other aircraft information quickly to take appropriate measures. timely handling. Besides, managers can track revenue and cost indicators, compare and analyze them between weeks, months, quarters, etc. to understand the "health" of the business. business as well as have timely plans to increasingly optimize profits for Vietnam Airlines.

To meet the needs of the times, Vietnam Airlines always focuses on improving online care services through the establishment of a 24/7 customer care center (call center), care via automatic messages. (chatbot) and currently the airline has also deployed a "Virtual Assistant" service that applies machine learning and artificial intelligence (AI) to replace employees communicating with passengers (callbot). The company's goal is to have 70% of interactions and responses automated. With online applications and utilities, customers can experience all stages of the ticket purchasing process from booking, ticket issuance, baggage purchase, online check-in and changes to tickets in the digital environment.

2.4. ***Building digital culture***

The process of building Vietnam Airlines Digital Culture is the journey of the Digital Lotus with continuous and strong transformation. The center of the lotus is the customer, symbolizing customer-centricity. The two small wings near the center represent Safety and Data-Based Decisions - these are two prerequisites for VNA's success. The next two wings represent Innovation and Adaptive Flexibility - the necessary capabilities for digital transformation at VNA. The two outermost wings are Expanding Cooperation and Digital Thinking - new ways of working for VNA people. On that development journey, beliefs, attitudes and standard behaviors will be continuously propagated and enforced by each VNAer.

Clearly define the goal of "Making VNA become a digital airline by 2025,

maintaining its pioneering role in leading Vietnam's air transport industry, and at the same time being in the leading group in digital transformation of the ASEAN aviation industry." ", on August 20, 2021, the Corporation's Board of Directors decided to establish a Digital Transformation Steering Committee with the function of advising in directing the implementation of digital transformation strategies, plans and programs., promulgate policies and procedures mechanisms and policies to create a favorable environment to promote digital transformation, meeting VNA's digital transformation requirements.

In February 2022, the Digital Transformation section was officially launched on Spirit's internal communications page. The articles in the section are carefully invested, diverse in content and form, revolving around the topics: Digital Transformation work in the world, domestically and at VNA; what VNA has been doing and will do to realize the goal of digital transformation; Cooperation activities in the field of digital transformation... Not only is it an information channel directly related to digital transformation activities, the launch of a section on the Spirit page contributes significantly to forming thinking and awareness. about VNA's digital culture.

“Customer experience” is one of the 5 elements of digital culture, a pedestal that supports other elements, and a source to nurture the “Digital Lotus” - Vietnam Airlines digital culture is “lush” and develop. With the motto "Digital transformation starts with digital culture", in addition to applying technology to all aspects of production and business, Vietnam Airlines has been paying great attention to building "Digital Culture" to realize reality. transforming the vision of becoming a digital airline by 2025. Vietnam Airlines' "digital culture" has gradually been shaped in each officer and employee and will be strongly spread, thereby creating total strength, creating the premise for Vietnam Airlines to transform digitally labour.

3. Results and discussion

3.1. Results

In the past 5 years, with its best efforts, Vietnam Airlines has made strong changes in digital transformation from a score of 76 (in the group of airlines with limitations in digital technology) in 2017 to a score of 76 (in the group of airlines with limitations in digital technology) in 2017. score 113 in 2021 (belonging to the group of airlines transitioning to digital technology) despite the context that the aviation industry is facing many difficulties in the years heavily affected by the Covid 19 epidemic. Year 2023 has reached the group of Airlines with advanced digital technology. This assessment is based on the digital airline rating scale - DAS (Digital Airlines Score) to evaluate the level of digital transformation of an airline with levels from the group "Airlines that still have limited technology". digital technology" to the group "Airlines with advanced digital technology" by construction.

In the period 2020 - 2023, Vietnam Airlines has increased the proportion of its ticket sales through online channels; Improve DAS score to 120 points or more, belonging to the group of airlines with advanced digital technology; Join the ecosystem of e-commerce platforms and wallets in Vietnam; Connect to metadata search platforms (Metasearch); Increase sales and diversify complementary services; Personalize sales and service processes and enhance customer experience across all touch points.

Currently, with a relatively solid digital technology foundation, Vietnam Airlines has set specific goals for each stage to carry out the digital transformation task of this

enterprise through very specific and specific goals. has gradually achieved the set goals.

3.2. Limitations and causes

Vietnam's aviation industry faces many challenges when starting its digital transformation journey.

First, the number of aviation professionals knowledgeable about how to handle advanced digital technologies is not too large. They may not be knowledgeable about the intricacies of IoT, AI and data analytics, so comprehensive training and upskilling programs are needed to ensure smooth knowledge transfer. shall.

Second, the constant change in customer needs poses a significant challenge. Passenger expectations are constantly changing, demanding a more personalized travel experience. To meet these changing requirements, a more proactive approach to the digitalization process is needed, ensuring rapid adaptation. The aviation industry itself is also lacking initiative in the digital transformation process.

Third, there seems to be resistance within industry organizations to move away from traditional methods and embrace innovative digital solutions. To overcome this barrier, businesses need an effective change management strategy and foster a culture of innovation.

In addition, budget constraints can hinder digital transformation progress. Investing in digital infrastructure, technology and cyber security measures requires significant financial resources. Having to balance this large investment with other operating costs can be a financial challenge airlines face.

4. Some solutions to promote digital transformation at Vietnam Airlines

First, regularly review and promptly amend regulations that are no longer appropriate, creating favorable conditions for the digital transformation process. Maximize the strengths of infrastructure and experience in implementing IT systems, data advantages, partner network and brand reputation.

Second, unleash and maximize all resources, have appropriate mechanisms and policies to mobilize huge resources during the digital transformation process.

Third, reform and build a lean, effective and efficient apparatus, cutting down unnecessary intermediaries. Promote decentralization and decentralization of power associated with strengthening inspection and supervision and clearly defining the responsibilities of each individual employee. Complete the inspection and supervision mechanism, ensure consistency in all activities and promote the initiative and creativity of each employee.

Fourth, promoting digital transformation associated with ensuring security and safety is an objective necessity for Vietnam Airlines to make a breakthrough in the coming time. Focus on building comprehensive digitalization in all activities. Synchronously connecting databases creates a foundation for streamlining the apparatus and reforming administrative procedures.

Fifth, Changing the thinking and awareness of each employee in Vietnam Airlines is a key factor to bring success. Each individual in VNA needs to be trained to understand the importance of digital transformation, understand VNA's vision and mission of becoming a digital airline, from there, in every action, the their work, every employee is aware of the fact that "Digital transformation needs to start with the smallest tasks."

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RESEARCH ON THE IMPACT OF COST OF DEBT ON THE RISK OF BANKRUPTCY OF ENTERPRISES LISTED ON THE VIETNAM STOCK MARKET

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Abstract: This research examines the relationship between debt costs and the risk of bankruptcy of enterprises listed on the Vietnam Stock Exchange. The research uses Edward I. Altman's (1968) adjusted Zscore index model to measure the risk of bankruptcy of listed enterprises. The research sample includes 447 enterprises listed on the Vietnam Stock Exchange with 2235 observations in 5 years from 2019 to 2023. Stata 17 software is used to perform multivariate linear regression, with balanced table data, the authors perform estimates according to the smallest squares model (Pools OLS); and run the tests of the model. The results of the study show that there are five factors affecting the risk of corporate bankruptcy and explain 88.10% of the fluctuation of the risk of corporate bankruptcy. In particular, the cost of borrowing, financial leverage, and collateral has an adverse impact on the Zscore index, increasing the risk of bankruptcy of listed enterprises, the rate of return on total assets and the current payment rate has a positive impact on the Zscore index. reducing the risk of bankruptcy of listed enterprises.

Keywords: *cost of debt, corporate bankruptcy, financial leverage, Vietnamese listed enterprises.*

1. ASK THE PROBLEM

1.1 Introduction

In recent years, the use of loans to finance business activities of enterprises has become a popular trend in Vietnam. For businesses listed on the stock exchange, debt costs not only affect profits but also play an important role in financial risk management.

Studying the impact of debt costs on the risk of bankruptcy of enterprises listed on the Vietnam Stock Exchange is one of the issues of high urgency, especially in the context that the global economy as well as the country are facing many major fluctuations. Factors such as rising inflation, changes in monetary policy, and shocks from financial crises all have a strong impact on business operations. For enterprises listed on the Vietnamese stock market, the use of loans is a common option to expand business scale and maintain competition. However, the cost of debt - including interest rates and costs incurred from borrowing - when not well controlled, can become a major financial burden, reducing operational efficiency and increasing the risk of bankruptcy. In today's economic environment, managing and controlling debt costs is more urgent than ever. Businesses often face complex decisions about balancing equity and loans. On the one hand, debt borrowing helps to quickly increase financial capacity, creating opportunities for businesses to invest and develop. However, if the cost of debt exceeds profitability, the business will fall into a "debt burden", leading to cash flow pressure and increasing the risk of insolvency, even bankruptcy. In this context, it is extremely important to study the

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relationship between debt costs and bankruptcy risk, helping businesses and investors better understand potential risks as well as effective financial management measures. Studying the impact of debt costs not only benefits businesses in optimizing their capital structure but also provides important information for investors and financial institutions. Investors can rely on these analyses to more accurately assess the risks and potential of the business, thereby making rational investment decisions and minimizing financial risks. In addition, this study is also of great significance in contributing to debt management policies and the development of healthy financial markets. Moreover, assessing the impact of debt costs also helps businesses raise awareness of the importance of strategic financial management, thereby better orienting the effective use of loans. In particular, in the context that many small and medium-sized enterprises in Vietnam are facing financial difficulties due to the lack of stability from loans, the research results will provide practical solutions for them to survive and develop sustainably.

This research brings many values from theory to practice, meeting the urgent needs of businesses in managing financial risks, optimizing capital structures, and ensuring sustainable development in the context of volatile economies. This study will also contribute to improving financial management policies, promoting transparency, and developing the stock market, thereby creating favorable conditions for the comprehensive development of Vietnam's economy.

2. THEORETICAL BASIS AND RESEARCH METHODS

2.1 Theoretical basis and experimental research

There are many scholars who have studied the relationship and influence of debt and financial leverage on the risk of bankruptcy of enterprises:

The equilibrium theory, developed by Modigliani and Miller and extended by Miller, adds the impact of taxes, bankruptcy costs, and intermediate costs to the analysis of capital structures. In theory, businesses optimize debt-to-equity ratios to maximize economic benefits. Initially, debt benefits from a tax shield, but when debt is exceeded, the cost of bankruptcy increases, canceling out this benefit and increasing the average cost of capital (WACC). Wald (1999) emphasized that the tax savings from debt would balance the cost of bankruptcy. Breadley et al. (1984) classify bankruptcy costs into three categories: direct administrative costs, indirect costs (loss of liquidity, restoration of operations), and loss of tax benefits when tax credits cannot be used in the future.

The Pecking Order Theory, initiated by Donaldson (1961) and developed by Myers and Majluf (1984), explains how businesses prioritize funding sources when raising capital. In theory, businesses prioritize using retained profits first, then borrowing, and finally issuing new shares, in order to minimize costs arising from information asymmetry. Because managers often know the internal situation better than investors, the issuance of new shares can be seen as a signal that the business is overvalued, leading to a decline in the stock price. Therefore, the theory emphasizes the order of funding: retained profits, borrowing, and then issuing shares. Different from the trade-off theory, this theory focuses on the role of information asymmetry in determining financial strategy, helping businesses choose the right source of capital for the specific context and situation.

The theory of representation is an important foundation in the study of the risk of corporate bankruptcy, especially for joint-stock companies, when conflicts of interest

between shareholders and managers arise. Shareholders prioritize profits and stability, while managers can pursue personal interests through short-term risky strategies, even manipulating financial statements, pushing businesses to bankruptcy without clear warning. Studies in the U.S. (859 firms, 1986-2004) and China (74 firms, 2002-2006) indicate that size, business performance, and financial leverage are all affected by proxy conflicts and predicted bankruptcy risks. Applying this theory helps to explain the causes of bankruptcy, build forecasting models, and improve risk management, especially in Vietnam, where representative conflicts have a strong impact on financial performance.

The work of Edward I. Altman (1968) made an important contribution to the development of the Z-Score model, a widely used bankruptcy risk forecasting tool. Altman initially analyzed 22 financial indicators, divided into 5 main groups: liquidity, profitability, financial leverage, debt solvency, and operational efficiency. From there, he developed the Z-Score formula for manufacturing enterprises listed on the stock exchange with the formula Z= 0.012X1 + 0.014X2 + 0.033X3 + 0.006X4 + 0.999X5. Later, the formula is adjusted to Z = 1.2X1 + 1.4X2 + 3.3X3 + 0.6X4 + 1X5. The financial metrics in the model include working capital on total assets (X1), retained earnings on total assets (X2), profit before tax and interest on total assets (X3), equity on total debt (X4), and sales on total assets (X5). Altman pointed out that if Z < 1.81, the business is at high risk of bankruptcy; if Z > 2.99, the enterprise is in the safe zone; and if Z is in the range of 1.81 to 2.99, the enterprise is in the warning zone. Altman then adapted the model for private businesses by changing the way equity is calculated by book value, creating the formula Z' = 0.717X1 + 0.847X2 + 3.107X3 + 0.42X4 + 0.998X5. According to the Z' model, if Z' < 1.21, the enterprise has a high risk of bankruptcy; Z' > 2.9 is an enterprise not at risk of bankruptcy, and Z' is between 1.23 and 2.9 is the warning zone. In 1995, Altman, along with J. Hartzell and M. Peck, continued to adapt the Z-Score model to apply to all professions, eliminating the X5 variable and coming up with the formula Z" = 6.56X1 + 3.26X2 + 6.72X3 + 1.05X4. The Z" model has the following evaluation levels: Z" > 2.6 is not at risk of bankruptcy, Z" from 1.23 to 2.6 is in the warning zone, and Z" < 1.1 is at high risk of bankruptcy. The Z-Score, Z', and Z" models have become important tools in assessing the risk of bankruptcy of businesses in many different contexts.

Ohlson's (1980) study provided a model for predicting bankruptcy. The author has succeeded in developing the O-score by using accounting variables that represent factors that are important in forecasting the likelihood of bankruptcy including: (i) the size of the business, (ii) the financial structure represented by the leverage measure, (iii) the profit measure, etc (iv) a measure of current liquidity. Ohlson proposed an O index to distinguish between bankrupt and non-bankrupt companies. A company with an O> index of 0.038 is classified as bankrupt with other factors unchanged.

Altman et al. (2013) studied a sample of 1,602 companies, accounting for less than 10% of the total. To test the feasibility of applying the model on a larger scale, the authors need to identify parameters that can be adjusted to suit companies of large, medium, and small sizes. With some exceptions, large manufacturing companies in Italy still retain the typical characteristics of small and medium-sized enterprises. Qualitative and strategic factors, like financial and governance choices, have not changed significantly. When applying the index to the sample in the EA, the results show a high percentage of

companies that are in the difficult group, while the "gray area" of the model is relatively narrow compared to the Z'-Score, at least in terms of average classification.

The study by Gholamreza Jandaghi et al. (2021) applies machine learning methods to identify important factors leading to business bankruptcy, in order to support banks and financial institutions to reduce credit risk. Analyzing data from 218 companies listed on the Tehran and OTC exchanges between 1992-2017, the study used an algorithm to optimize the ant colony combined with the nearest K-neighbor to select variables and classify them. At the same time, the problem of unbalanced data is handled by the subsampling technique. The results indicate that variables such as EBIT/total revenue, equity ratio, current payment ratio, cash ratio, and debt ratio are the most important indicators in financial health forecasting. The model achieved an accuracy of 75.5% to 78.7% on both the training and test samples, confirming the effectiveness of machine learning in improving business bankruptcy forecasts.

The study by Hoang Thi Hong Van (2020) uses the Z-Score model to evaluate the ability to forecast the financial status of Vietnamese enterprises, based on data from 30 joint stock companies that were delisted on HOSE and HNX due to liquidation and dissolution in the period 2012-2019. The results show that the Z-Score model achieves an accuracy of 76.67% when forecasting bankruptcy 1 year before and 70% before 2 years. Non-bankrupt enterprises have an ROA of 4%-5.5%, more than twice as high as the bankruptcy group (about 2.5%). The ROE of the bankruptcy group was lower than the bank loan rate, while the active group averaged 11.2%, higher than the bank interest rate. The average asset value of a bankrupt enterprise is also significantly lower. The study confirms that the Z-Score model can help assess financial health and support effective investment decisions.

The research of Nguyen Thi Tuyet Lan (2019) applies the O-score model and log analysis to identify factors affecting the bankruptcy risk of enterprises in the construction industry listed on the stock exchange. Data from 109 companies on HOSE and HNX over 13 years were used, with 1,417 observations. The results show that the debt-to-asset ratio has a positive impact, while the return on assets has the opposite impact on the risk of bankruptcy. The study also proposes governance policies such as improving business efficiency and adjusting reasonable debt ratios.

Authors Phan Tran Trung Dung, Nguyen Thi Ha Thanh, Vo Van Hung (2021) have approached the problem from a different perspective by using the Logit regression model to analyze the factors affecting the risk of bankruptcy and the probability of default of real estate enterprises in Vietnam. This study is based on the theory of Beaver (1966) who found that financial leverage ratios and short-term solvency are the main factors leading to bankruptcy risk.

Research by author Vo Thi Van Na (2022) has provided an overview of the factors affecting the risk of corporate bankruptcy in the context of the COVID-19 pandemic. This study highlights the impact of factors such as business size and operating markets, using a quantitative approach with Stata 14 software to run regressions. Although the results are not detailed in this document, Vo Thi Van Na's research makes an important contribution to a better understanding of the risk of bankruptcy in the context of a crisis.

Finally, the study of authors Truong Thanh Hang & Nguyen Thi Nga (2022) studied the relationship between the risk of bankruptcy and the financial factors of listed

enterprises. This study uses data from 439 companies listed on the stock exchange and applies the Zscore model to measure bankruptcy risk. The results show that the current rate of return on total assets and payment rate has a positive impact on the Zscore index, reducing the risk of bankruptcy of listed enterprises, financial leverage has the opposite impact on the Zscore index, increasing the risk of bankruptcy of listed enterprises.

Through published studies on the influence of factors on bankruptcy risk, it can be seen that financial leverage, current payment ratio, and return on total assets all have a direct impact on the bankruptcy risk of enterprises listed on the stock exchange. The current payment rate has a positive relationship with the Z-score index: as the current solvency of the business increases, the Z-score index also increases, helping to reduce the risk of bankruptcy.

The cost of debt can significantly impact a business's bankruptcy risk, especially when it exceeds the organization's ability to manage and pay. However, studies on the relationship between debt costs and bankruptcy risk in Vietnam are still limited. Much of the previous research has focused on factors such as capital structure, profitability, business size, and market conditions, while the role of debt cost, a key factor affecting financial situation and solvency, has not been fully exploited. This shortage creates a research gap, which not only limits the understanding of the impact of debt costs on bankruptcy risk but also affects the development of forecasting models and effective financial management strategies. Further research on debt costs will help complete the overall picture, support businesses to establish appropriate financial strategies, mitigate risks, and enhance long-term stability.

2.2. Research methods

Research Hypotheses

Through the study of published scientific research works and relevant theories, the authors have developed scientific hypotheses, specifically as follows:

(1) Cost of debt (COD): The high cost of borrowing reduces the financial flexibility of businesses, making it more difficult for them to respond to economic shocks or fluctuations in the industry. In severe cases, this can lead to insolvency and cause the business to go bankrupt. From there, the hypothesis (H_1) was put forward by the authors as follows:

H_1*: Debt costs have the opposite impact on the Z-core index, increasing the risk of bankruptcy of enterprises listed on the Vietnam Stock Exchange*

(2) Financial Leverage (FL): Studies by Phan Tran Trung Dung, Nguyen Thi Ha Thanh, Vo Van Hung (2021), Truong Thanh Hang & Nguyen Thi Nga (2022) have found that financial leverage ratio is one of the main factors leading to bankruptcy risk. Businesses with high financial leverage will face liquidity risks and insolvency when the market fluctuates unfavorably. From there, the hypothesis (H_2) was put forward by the authors as follows:

H_2*: Financial leverage has an adverse impact on the Z-core index, increasing the risk of bankruptcy of enterprises listed on the Vietnam Stock Exchange*

(3) Return on total assets (ROA): ROA is an important measure of comprehensive financial performance, affecting both short-term decisions and long-term strategies of businesses. Studies by Nguyen Thi Tuyet Lan (2019), Hoang Thi Hong Van (2020), Truong Thanh Hang & Nguyen Thi Nga (2022) also show that the rate of return on total

assets is related to the risk of bankruptcy of listed enterprises. If a business has a low Return on Total Assets (ROA), it can increase financial pressure, make it more difficult for businesses to maintain debt payments, and increase the risk of bankruptcy. From there, the hypothesis (H_3) was put forward by the authors as follows:

H_3*: Return on total assets has a positive impact on the Z-core index, reducing the risk of bankruptcy of enterprises listed on the Vietnam Stock Exchange*

(4) Current Ratio of Payments (CR): According to the results of studies by Edward I. Altman (1968), Gholamreza Jandaghi et al. (2021), Phan Tran Trung Dung, Nguyen Thi Ha Thanh, Vo Van Hung (2021), Truong Thanh Hang & Nguyen Thi Nga (2022) show that there is a relationship between the current rate of payment and the risk of bankruptcy of enterprises. If the business has a high current payment rate, it helps the business cope with short-term debt repayment pressure, reducing the risk of bankruptcy. From there, the hypothesis (H_4) is put forward by the authors as follows:

H_4*: The current payment rate has a positive impact on the Z-core index, reducing the risk of bankruptcy of enterprises listed on the Vietnam Stock Exchange*

(5) SIZE: On the basis of representative theory, the study of enterprise bankruptcy risk can consider the impact of the enterprise size factor. Business size is not only a measure of financial strength but also an important basis for investors and creditors to make decisions. Large businesses often benefit from low interest rates, preferential loan conditions, and better access to capital. Meanwhile, small businesses face higher debt costs due to high credit risk, weak negotiating power, and limited funding options. Research by Vo Thi Van Na (2022) also shows that business size has a relationship with the risk of bankruptcy. Investors and creditors often see higher profit potential in large enterprises, thanks to the ability to take advantage of economies of scale to optimize costs and profits. Small businesses often have weak financial capacity, vulnerable to high interest rates. From there, the hypothesis (H_5) was put forward by the authors as follows:

H_5*: The size of enterprises has a positive impact on the Z-core index, reducing the risk of bankruptcy of enterprises listed on the Vietnamese stock exchange*

(6) Collateral (CT): Collateral plays an essential role in financial transactions, helping to increase the ability to borrow capital. Collateral, if not used properly, can lead to a decline in the Z-score and increase the risk of bankruptcy of the business. To mitigate risks, businesses need to carefully manage the use of collateral in their financial structure, focusing on improving operational efficiency and reducing dependence on debt. From there, the hypothesis (H_6) was put forward by the authors as follows:

H_6*: Collateral has the opposite impact on the Z-core index, increasing the risk of bankruptcy of enterprises listed on the Vietnam Stock Exchange.*

Data, models, and research methods

The study sample included 447 businesses with 2,235 observations over 5 years from 2019 to 2023. The data source is information from the financial statements of enterprises listed on the Vietnam Stock Exchange through the database page of FiinPro-X.

In the period of 2019-2023, Vietnam's economy faced many challenges but also achieved important achievements. Before the COVID-19 pandemic, the economy grew steadily with strong exports and abundant foreign investment inflows. However, the pandemic disrupted production and trade, especially tourism and services. From 2022, the economy has recovered thanks to public investment, tourism recovery, and free trade

agreements. However, Vietnam still faces pressures from the weakening international market, inflation, and difficulties in the real estate sector. To maintain sustainable growth, it is necessary to focus on digital transformation, green economy, and reform. The study on the risk of bankruptcy at this stage clarifies the impact of the pandemic, financial crisis, and international economic fluctuations, and shows the relationship between the cost of debt and the risk of bankruptcy of enterprises.

- Measurement of dependent variables (Zcore) - Risk of business bankruptcy

Zscore dependent variable is measured according to the adjusted Zscore model - Z" by Altman Edward, J. Hartzell and M. Peck, 1995 for all industries, enterprises, the adjusted bankruptcy risk forecast model Z" = 6.56X1 + 3.26X2 + 6.72X3 + 1.05X4

In which, the indicators in the bankruptcy risk forecast model are:

X1: Working capital on total assets; X2: Retained earnings on total assets; X3: Profit before interest and taxes on total assets; X4: Equity on total debt;

- Measure independent variables and control variables in the model:

Table 1: Measuring independent variables and control variables

Variable symbol	Variable name	Definite formula	Source
	Independent variables		
COD	Debt Expenses	Interest expense on total debt.	
	Control variables		
FL	Financial Leverage	Total debt to total assets.	Research by Phan Tran Trung Dung, Nguyen Thi Ha Thanh, Vo Van Hung (2021), Truong Thanh Hang & Nguyen Thi Nga (2022)
ROA	Return on total assets	Net Return on Total Assets	Research by Nguyen Thi Tuyet Lan (2019), Hoang Thi Hong Van (2020), Truong Thanh Hang & Nguyen Thi Nga (2022)
CR	Current payout rates	The ratio of short-term assets to short-term liabilities.	Research by Edward I. Altman (1968), Gholamreza Jandaghi et al. (2021), Phan Tran Trung Dung, Nguyen Thi Ha Thanh, Vo Van Hung (2021), Truong Thanh Hang & Nguyen Thi Nga (2022)
SIZE	Business Size	Ln (total assets)	Research by Vo Thi Van Na (2022)
CT	Collateral	Tangible fixed assets on Total Assets	Group of authors researched and synthesized

Source: Summary of research by the authors

In order to achieve the research objective of studying the impact of debt costs on the bankruptcy risk of enterprises listed on the Vietnam Stock Exchange, the study conducted a hypothesis test from H_1 to H_6 with the support of Stata 17 data analysis software, using a multivariate linear regression model:

$$Zscore=\beta0 + \beta1COD + \beta2FL + \beta3ROA + \beta4CR + \beta5SIZE + \beta6CT + e$$

With equilibrium data, the authors performed estimation according to the least squares model (OLS), tested the model's tests, tested the correlation coefficient, and multi-collinear between variables.

3. RESULTS AND DISCUSSION

The authors performed statistics describing variables by variables, number of observations, mean values, standard deviation, smallest and largest values summarized in Table 2

Table 2. Statistics describing variables

Get lost	Number of observations	Average value	Standard deviation	Smallest Value	Greatest Value
Zscore	2,235	3.440375	3.27003	-9.72603	36.64786
COD	2,235	0.0659034	0.105229	-0.312509	2.19176
FL	2,235	0.5257716	0.1939232	0.0303826	1.29499
ROA	2,235	0.0487469	0.0633898	-0.3642	0.6031
CR	2,235	1.8331683	1.662531	0.03	26.01
SIZE	2,235	28.2514	1.585641	24.4769	34.13479
CT	2,235	0.2052595	0.2157352	0	0.9626768

Source: Summary of research by the authors

According to the data of Table 2, we see:

The Zscore variable - The risk of bankruptcy of enterprises has an average value of 3.4404, indicating that the risk of bankruptcy of enterprises in the study sample is quite high. However, the large standard deviation (3.2700) reflects the wide dispersion of the risk of bankruptcy among businesses. The smallest value is -9.7260 and the largest is 36.6479, indicating a significant disparity, which indicates a large difference between businesses in terms of bankruptcy risk.

The COD variable - Cost of Debt has an average value of 0.0659, which is quite low compared to the other variables in the table. The standard deviation is only 0.1052, indicating the stability and low volatility of debt costs between enterprises. The smallest value is -0.3125 and the largest is 2.1918, reflecting the difference but not too large in the cost of businesses. Overall, the COD variable was highly stable, the data was concentrated near the mean, and there were few major differences between observations.

The FL variable - Financial leverage has an average value of 0.5258, indicating that the businesses in the study sample use moderate financial leverage. The standard deviation is 0.1939, indicating a not-too-large dispersion in the use of leverage between businesses. The smallest value is 0.0304 and the largest is 1.2949, which reflects the disparity but remains under control. In general, businesses tend to use relatively stable financial leverage.

ROA - Return on total assets has an average value of 0.0487, indicating that the profitability of the businesses in the study sample is quite low. The standard deviation is 0.0634, although not high, but still shows a slight difference in profitability between businesses. The smallest value is -0.3642 and the largest is 0.6031, which shows that

some businesses are underperforming, while others are more profitable. This result reflects that the efficiency of using assets of businesses is still limited.

CR - The current payout ratio has an average value of 1.8332, reflecting the short-term solvency of the businesses in the study sample is quite good. However, the standard deviation is 1.6625, indicating a large dispersion and a significant difference in the prevailing settlement rate between businesses. The smallest value is 0.03 and the largest is 26.01, proving that some businesses have serious difficulties in making payments, while others have very high solvency.

The SIZE variable - Business size has an average value of 28.2514, reflecting the relatively large and stable business size in the study sample. The standard deviation is 1.5856, indicating a moderate level of dispersion. The smallest value is 24.4769 and the largest is 34.1347, which indicates that there is a difference in size between businesses, but not too large. In general, the enterprises in the study sample were relatively uniform in size and there were few big differences.

The CT variable - Collateral has an average value of 0.2053, which is quite low compared to the other variables. The standard deviation is 0.2157, indicating a fairly large degree of dispersion in the data of this variable. The smallest value is 0 and the largest is 0.9627, representing a significant difference between businesses in using this index. This reflects that some businesses do not have a Collateral value, while others have a high level of Collateral.

In general, the statistical table shows that there is a large difference in the risk of bankruptcy, and the current payment rate between the businesses in the sample, reflected in the wide dispersion and large differences between businesses.

The results of the correlation coefficient test and the results of the multi-collinear test between the independent variables, control variables, and dependent variables of the model (Table 3) show that the independent variables and control variables in the model are correlated with the dependent variable Z (Risk of enterprise bankruptcy). The correlation value table shows that it is qualified to proceed to the next step of the regression analysis between variables. The VIF variance magnification factor is used to verify whether there is a multi-collinear phenomenon occurring in the model with independent variables. The evaluation criterion is that when the VIF coefficient is >10, it means that there is a multi-line (Hoang Trong and Chu Nguyen Mong Ngoc, 2013). The information in Table 3 shows that no multi-collinear phenomenon occurs, which qualifies for the next step of regression analysis between variables.

Table 3: Testing of correlation coefficients and multilinearity between variables

	Zscore	**COD**	**FL**	**ROA**	**CR**	**SIZE**	**CT**	**VIF**
Zscore	1.0000							1.00
COD	-0.0119	1.0000						1.82
FL	-0.7599	0.0247	1.0000					1.56
ROA	0.4333	-0.0739	-0.4135	1.0000				1.24
CR	0.8291	0.0593	-0.5192	0.1470	1.0000			1.14
SIZE	-0.0859	0.0276	0.1896	0.0041	-0.0177	1.0000		1.06
CT	-0.1640	-0.0069	-0.1275	0.1330	-0.2063	-0.0370	1.0000	1.01

Source: Summary of research by the authors

Table 4: Regression results using least squares (OLS)

	Constant	COD	FL	ROA	CR	SIZE	CT	R - Squared
OLS	5,141 (0,000)	-0,677 (0,003)	-6,658 (0,000)	10,375 (0,000)	1,121 (0,000)	-0,011 (0,449)	-1,877 (0,000)	88,10 %

Where: The values in the first row in each cell are taken from the coefficient column
The values in parentheses are taken from the p_value column of the variable
Source: Summary of research by the authors

The authors used the White test on Stata to check the variable error variance of the model, whereby the P-value is 0.0000, so it is concluded that the model has variable error variance. The authors used a stable estimation of the covariance matrix proposed by White (1980) to recalculate the test values when there is a change in variance.

The regression results after overcoming the variable error variance of the model by a solid estimate of the covariance matrix by White (1980) are presented in Table 5 as follows:

Table 5: Results of model regression using stable estimation of the covariance matrix to overcome the phenomenon of variable variance

	Constant	COD	FL	ROA	CR	SIZE	CT	R - Squared
The model uses the stable estimation of the covariance matrix	5.141 (0.000)	-0.677 (0.045)	-6.658 (0.000)	10.375 (0.000)	1.121 (0.000)	-0.011 (0.48)	-1.877 (0.000)	88.10 %

Where: The values in the first row in each cell are taken from the coefficient column
The values in parentheses are taken from the p_value column of the variable
Source: Summary of research by the authors

Through the results of the regression model using the stable estimation of the covariance matrix to overcome the variable error variance phenomenon in Table 5, with 95% reliability, the regression model with the selected variables satisfies the p-value < 0.05.

According to the results of the model, the H_1, H_2, H_3, H_4, and H_6 hypotheses are accepted in accordance with the expectations set by the authors, the H_1 hypothesis is consistent with the results of the studies of Phan Tran Trung Dung, Nguyen Thi Ha Thanh, Vo Van Hung (2021), Truong Thanh Hang & Nguyen Thi Nga (2022). The H_2, H_3, H_4 hypotheses are also consistent with the results of the studies of Edward I. Altman (1968), Nguyen Thi Tuyet Lan (2019), Hoang Thi Hong Van (2020), Phan Tran Trung Dung, Nguyen Thi Ha Thanh, Vo Van Hung (2021), Gholamreza Jandaghi et al. (2021), Truong Thanh Hang & Nguyen Thi Nga (2022). The H_5 hypothesis is not accepted, the p-value of the variable "Company size" is 0.48, indicating that there is no clear statistical relationship with the dependent variable "Risk of corporate bankruptcy" in this study, there is not enough evidence to confirm the influence of the company size variable in this regression model.

Variables such as the cost of borrowing, the profitability of assets, the current payment rate, financial leverage, and collateral have an impact on the Zscore index, which

indicates the risk of bankruptcy of the enterprise. The fluctuation of these variables explains 88.10% of the variation of the dependent variable as the risk of bankruptcy of the enterprise.

The regression equation is rewritten as follows:

Zscore = -0.677*COD - 6.658*FL + 10.375*ROA + 1.121*CR - 1.877*CT + e

The regression results indicate that the cost of debt of listed enterprises in Vietnam has a direct impact and the opposite impact on the risk of bankruptcy of enterprises, which means that the cost of debt increases, reducing the value of the Zscore index and increasing the risk of bankruptcy of enterprises. The results of the study can be explained by a number of reasons as follows:

First, when the cost of borrowing increases, businesses face a greater interest burden, which reduces net profit due to higher financing costs. In case the profit is not enough to offset the cost of debt, the business will suffer from a decline in financial capacity, affecting solvency and sustainable operations, thereby increasing the risk of bankruptcy.

Second, if the enterprise borrows debt but cannot use this capital effectively to generate profits higher than the borrowing cost, the business profit will not offset the interest cost. This situation reduces free cash flow and debt solvency, causing Zscore to decline and the risk of bankruptcy increases.

Third, when the cost of borrowing increases and the risk of bankruptcy appears, the confidence of investors and partners may decline. This can make it difficult for businesses to access new sources of capital to restructure or maintain operations, leading to a spiral of financial recession and increasing the risk of bankruptcy.

The regression results show that control variables such as financial leverage, current payment ratio, rate of return on total assets, and collateral have different impacts on the risk of bankruptcy of enterprises listed on the stock exchange in Vietnam.

In which, the profitability of total assets and the current solvency of the enterprise increases, the bankruptcy risk assessment index (Zscore) increases. The higher the ROA, the more efficiently the business uses assets to generate profits. This shows a stable and sustainable financial situation, minimizing the risk of bankruptcy. The current increase in solvency means that businesses have enough resources to repay debts in the short term, strengthen the confidence of investors and banks, and reduce financial risks. Meanwhile, the variables of debt costs, financial leverage, and collateral have the opposite impact on the Z-core index, increasing the risk of bankruptcy of enterprises listed on the Vietnam Stock Exchange. Businesses use loans to increase the scale of operations and profits. However, if you rely too much on debt without effective management, financial costs (interest) and debt repayment pressure will increase, imbalance cash flow, and increase the risk of bankruptcy. Collateral is often used to borrow capital, however, over-reliance on collateral for borrowing reduces financial flexibility. If the business is unable to repay its debts, the assets will be confiscated, causing heavy losses, reducing financial value, and increasing the risk of bankruptcy.

The results of the study show that the management of debt costs, financial leverage, solvency, and profitability play an important role in minimizing the risk of bankruptcy of enterprises. These factors significantly affect the financial health and viability of businesses, requiring managers to have effective capital use strategies and risk management to ensure stable and sustainable operations in the long term.

4. CONCLUSION

The research results show that the cost of debt and financial leverage and collateral are three factors that increase the risk of bankruptcy of listed enterprises in Vietnam. In contrast, the current rate of return on assets and solvency plays an important role in minimizing the risk of bankruptcy and improving the viability of the business. This emphasizes the importance of effective debt management, improving profitability, and improving liquidity to enhance financial health. The regression results also show that the model explains up to 88.10% of the volatility of the dependent variable (bankruptcy risk), proving that these factors have a great and reliable influence in forecasting the bankruptcy risk of enterprises. Therefore, businesses need to be cautious when using loans and financial leverage, and focus on improving profitability and payment to maintain stability and sustainability

Through the results of the study, the authors propose a number of solutions for Vietnamese listed enterprises, specifically as follows:

First: Enterprises need to build a dedicated team in financial risk management to monitor and evaluate factors affecting debt costs such as interest rate fluctuations, exchange rates, and macroeconomic conditions. At the same time, cooperate with credit rating agencies to improve credit ratings, and help borrow capital with lower interest rates.

Second: Businesses should develop an effective cash flow plan, and prioritize paying debts ahead of time or maintaining cash reserves. It is necessary to optimize the short-term asset cycle and recover debt to reduce financial pressure.

Third: Enterprises need to determine a reasonable loan debt level, not exceeding profitability and payment. Limit dependence on debt by raising capital from other sources such as issuing stocks, bonds, or investment funds. Using new forms of credit such as leasing financial assets and cash flow-based credit will help optimize cash flow and reduce collateral pressure.

Fourth: Businesses need to ensure the transparency and reliability of financial statements to improve their reputation and attract investors. Clearly communicate the plan to use the loan and future business performance to strengthen the trust of shareholders and partners.

Fifth: Businesses need to monitor the fast payment rate, current payment rate, and net cash flow from business activities to detect liquidity problems. Restructuring inefficient divisions, focusing on highly profitable core business areas.

In addition, large-scale listed enterprises need to take advantage of their advantages to raise capital effectively, but at the same time, they need to carefully consider the cost of capital and liquidity risk. The focus on improving business efficiency and profitability not only reduces financial pressure but also builds solid trust from partners and investors, contributing to maintaining stability and sustainable development.

To focus on improving business efficiency and increasing profitability, businesses can apply strategies, such as: Restructuring inefficient operations to reduce costs, looking for new opportunities in international markets or untapped customer segments, etc focusing on products/services with high-profit margins and reducing the proportion of low-profit products/services. In addition, businesses can take advantage of retained earnings to finance operating and investment costs, thereby reducing pressure from interest costs and improving liquidity. Improving business efficiency and increasing profitability not only helps businesses reduce their dependence on loans but also improves

their position in the market and increases trust from investors and partners. This creates favorable conditions for businesses to develop sustainably in the long term.

Implementing these recommendations will help listed enterprises in Vietnam improve their solvency, manage financial leverage well, help avoid an imbalance between debt repayment obligations and cash flows, develop stably, and build solid trust with stakeholders. helping businesses listed on the Vietnam Stock Exchange to minimize the risk of bankruptcy.

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SHARING ECONOMY AND SHARING ECONOMY APPLICATION SOLUTIONS IN VIETNAM

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Summary: Sharing economy is a new economic model developing in the context of the 4.0 industrial revolution. Sharing economy has many different meanings and names, but the common point is cooperation, sharing, and promoting surplus and idle resources to enhance socio-economic value. The article summarizes the theoretical basis of sharing economy, introduces application models of sharing economy, as well as benefits, challenges in operation and suggests some solutions to apply sharing economy to exploit resources more effectively in Vietnam.

Keywords: Sharing economy, Vietnam, industrial revolution 4.0

INTRODUCTION

The world economy based on promoting consumption and mass production, which was popular throughout the 19th and 20th centuries, has exposed some problems in production costs, consumer waste, and use of production resources. Meanwhile, buyers and sellers increasingly tend to make better use of products and production resources of the economy. In fact, there are some resources that can be used without ownership, expensive things to maintain, things that are not really necessary, assets that are not used often,... should be rented rather than bought. The sharing economy (sharing economy, collaborative economy, or the mesh) is an economic system that promotes sharing and cooperation over private ownership based on technology and connectivity. Instead of owning to satisfy their needs, people will find resources in the community. The sharing economy is growing because it redistributes resources that are not being used effectively to where they are used more effectively. The sharing economic model is applied in many different production and business fields and brings great benefits to the economy, businesses and customers.

1. Overview of the sharing economy model

The sharing economy has many other names and synonymous concepts such as collaborative economy, on-demand economy, platform economy, access economy, app economy, etc. The sharing economy can be understood in many different ways:

According to Wikipedia, the Sharing Economy is a hybrid market model (between ownership and gifting) that refers to a peer-to-peer network based on shared access to goods and services. The model and activities of the sharing economy have been around for a long time in the world, but it was not until the fourth industrial revolution exploded with the development achievements of science-technology and information technology that this economic model had breakthrough developments, considered the core element of the current digital economy. The sharing economy is also considered an economic

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reconstruction activity, in which anonymous individuals can use idle assets and services (including intangible assets such as personal skills and free time), owned by other individuals through combined platforms on the Internet. It is a connection model for consumers to take advantage of each other's surplus resources. In business, the sharing economy is understood as a term referring to a business model that exploits the available resource elements of end users and combines them with technological elements to form a business model. Accordingly, this model is often initiated by startups - this entity does not own any factory or warehouse but has a whole pool of available resources globally and is always ready to join the system.

According to the Ministry of Planning and Investment, there are many different definitions and understandings, but in the most common understanding, the sharing economy model is an economic system in which assets or services are shared among individuals, either for free or without paying a fee, typically through Internet tools. This is a new method of connecting buyers (users) and sellers (suppliers) for an economic activity.

In Vietnam, recently, the term "sharing economy" has been discussed in many forums, with a number of business models based on digital technology platforms such as ride-hailing apps Grab, Be, Go Viet, tourism and hotel services, room sharing services such as Airbnb,.... In the context of Vietnam, "sharing economy" can be understood as a new business method of peer-to-peer business, an economic system in which assets and services are shared with many users in the market through the use of digital platforms.

Thus, the sharing economy is a market model that combines ownership and sharing, which refers to the peer-to-peer role based on the sharing of the right to use goods and services to increase benefits for the participants. Currently, there are three factors that facilitate the sharing of the right to use new goods and services such as: First, customer behavior towards many types of goods and services has changed from ownership to sharing. Second, connecting consumer networks through online social networks and electronic markets is easier. Third, the application of information technology through mobile devices and electronic services makes the use and sharing of goods and services more convenient.

2. Current status of applying the sharing economy model in Vietnam

2.1. Legal basis in applying the sharing economy model

Sharing economy is a new economic model but has been mentioned in many legal documents of the State. First of all, it can be seen that the Civil Code, Commercial Law, Investment Law, Enterprise Law, Competition Law, Tax Administration Law,... and other specialized laws on commercial business and the system of documents guiding the implementation of these laws are the fundamental legal basis for commercial business activities in general and business activities under the sharing economy model in particular. In addition to the above-mentioned normative documents, the Law on Electronic Transactions (2023) together with the Government's guiding Decrees on electronic transactions in business activities and related guiding documents are also considered important legal bases for business activities under the sharing economy model, because these business models all operate on the basis of digital technology to form electronic transactions to provide shared services. At the same time, it is possible to determine the legal basis of business activities in the sharing economic model depending on the specific field of operation.

From the perspective of policies and guidelines, it can be seen that our Party and State have recognized the inevitable development trend of the sharing economic model, and have also put forward guidelines and implementation projects to promote research and build appropriate legal institutions, creating favorable conditions for the development of sharing economic models. On August 12, 2019, the Prime Minister issued Decision No. 999/QD-TTg approving the Project to promote the sharing economic model with the goal of ensuring an equal business environment between businesses operating under the sharing economic model and the traditional economic model. Decision No. 999/QD-TTg demonstrates the "support" of the State to help technology companies operate under the sharing economic model, creating a common playing field, equal competition between traditional companies and technology companies.

2.2. Some current sharing economy models in Vietnam

Sharing economy model in online transportation

The sharing economy model in the field of online transportation, or online car booking service/transportation service using electronic contracts, is a way to request some types of transportation services through digital platforms on smart mobile devices. Since 2006, the world has seen the emergence and rapid development of transportation service businesses using electronic contracts such as Uber (USA), Grab (Malaysia), Go-Jek (Indonesia), Didi (China), Yandex (Russia). Vietnam is one of the first countries in ASEAN to allow a pilot model of technology-based transportation connection service applications (such as Uber, Grab) starting in 2014. However, after 4 years of operation, in April 2018, Uber withdrew from the Southeast Asian market and exchanged for 27.5% of Grab's shares. Immediately after Uber withdrew from the market, Vietnam witnessed a strong development, demonstrating that the sharing economy model is a potential market segment with the appearance of Grab, Go-Jek, Be,... creating a strong motivation for traditional businesses to change their business operations from manual to technology application.

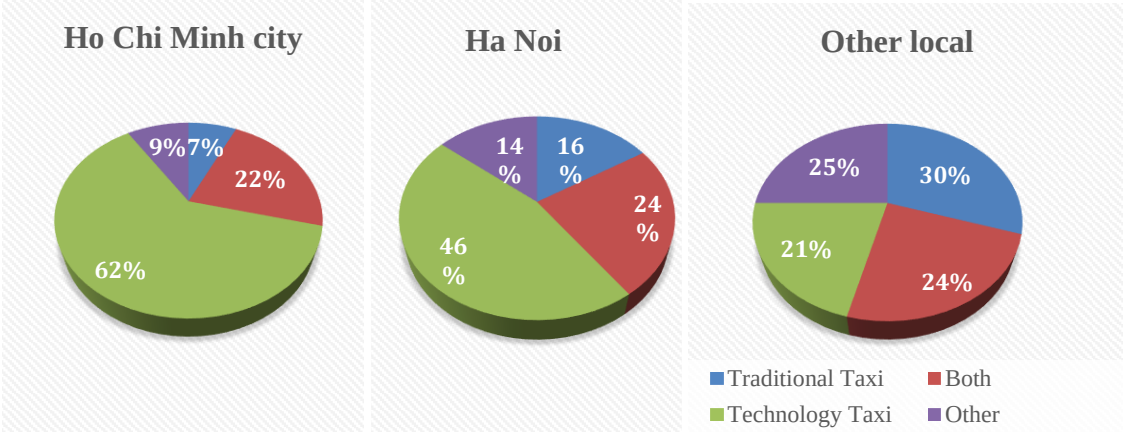

Figure 1. Level of use of taxi services in localities

(Source: Q$Me, 2021)

The sharing economy model in the online transportation sector allows for maximum utilization of surplus resources (idle cars and drivers) in society to create value. Helps utilize cars and motorbikes - assets and drivers - idle labor to create services. In terms of consumption, it helps maximize the capacity and travel distance of cars to serve the most

customers and create the greatest value, thereby helping customers save significant travel costs. In this model, digital platforms help significantly eliminate transaction costs and intermediary costs by helping buyers and sellers quickly find each other. Along with saving resources, the presence of digital platforms helps promote the sharing economy and increase the efficiency of the economy. For example, Grab helps reduce the empty rate of cars when Grab-connected cars have an occupancy rate of up to 70-90% (depending on the time), compared to the occupancy rate of traditional taxis of about 30-50%.

From specializing only in the transportation sector, businesses have expanded their business scope compared to the beginning such as (i) Passenger transport: GrabTaxi, GrabCar, GrabBike; (ii) Last-mile express delivery: GrabExpress; (iii) Food delivery: GrabGood; (iv) Shopping and grocery delivery: GrabMart; (v) Cooperating with Moca Technology & Services Joint Stock Company to provide Moca cashless payment solutions on the Grab platform. GoJek Company also expanded from two-wheeled transport (GoViet) to delivery services (Go Food), making cashless payments.

Sharing economy model in the field of room sharing

This is a type of service that helps people who book rooms and people who have vacant rooms or villas and apartments for rent connect with each other through an online booking application. This type of service is relatively new, operating on a decentralized platform model, all payments are made using credit cards only and through Airbnb. From here, this intermediary will collect a fee from both the person who needs to book a room and the homeowner. The fee for the homeowner is 3% of the total booking value, the fee for guests booking rooms is 6-12% and this fee will always be displayed during the process of guests using the service. This fee still ensures that the person pays less than booking a hotel room through traditional channels. In the world, this business model is developing strongly and has a high growth rate, the annual revenue growth rate in the period 2013 - 2025 is estimated at about 31%. In Vietnam, the sharing economy model in the accommodation sector has been formed and developed quite strongly in recent years, especially in big cities and tourist areas. Currently, the two platforms Airbnb and Luxstay are occupying a large market share in Vietnam. Airbnb is an American company founded in 2008, starting to approach the Vietnamese market in 2015. Here, Airbnb has grown strongly from 1,000 rooms for rent in 2015 and only focused on Hanoi and Ho Chi Minh City, by January 2019 it had increased to 40,804 rooms and the area has expanded to many provinces and cities across the country, especially tourist areas.

After the impact of the Covid-19 epidemic, by the end of 2023, Vietnam will have about 30,000 rental accommodations, mainly concentrated in big cities such as Ho Chi Minh City, Hanoi, Da Nang or tourist destinations such as Hue, Khanh Hoa, Ba Ria - Vung Tau,... and the Airbnb application is ranked in the top 10 applications chosen by Vietnamese tourists to book rooms the most in 2023 on Outbox.

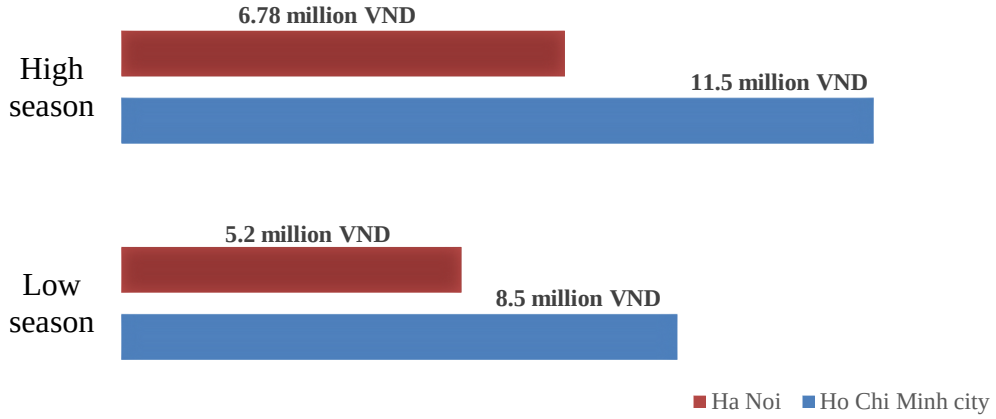

Figure 3. Average monthly income of hosts renting out accommodation on Airbnb in Hanoi and Ho Chi Minh City

(Sourse: Outbox Consulting, 2022)

Luxstay is a Vietnamese Star-up, born later, in 2016, this home-sharing platform is considered the number 1 in Vietnam operating on the apartment-sharing model and currently owns more than 15,000 accommodations mainly focused on large urban areas such as Hanoi, Ho Chi Minh City and tourist destinations such as Nha Trang, Sapa, Ha Long, Da Nang, Da Lat. The current size of the sharing economy market in the accommodation sector in Vietnam is about 174 million USD, but only accounts for about 2% of Vietnam's 8 billion USD tourism accommodation market.

Sharing economy model in finance

The peer-to-peer model is one of the six forms of the sharing economy model. The term "peer-to-peer lending" (P2P) is used to refer to interactions between two entities without the involvement of an intermediary. Peer-to-peer lending is a lending model based on an online platform to connect individuals and small organizations with idle funds with individuals or businesses in need of loans but not through traditional financial intermediaries (such as credit institutions, commercial banks, finance companies or credit funds, etc.). The peer-to-peer lending model also includes secured and unsecured lending forms similar to the forms currently applied by banks. The biggest difference between the traditional credit model and peer-to-peer lending is that the appraisal will be conducted online, and the lender has the right to choose a partner to lend to on the technology platform.

In Vietnam, peer-to-peer lending has appeared since 2015 and more and more companies are providing platforms for peer-to-peer lending. Currently, some companies have provided online platforms for peer-to-peer lending such as huydong.com, Tima, SHA, Mobivi, Mofin, Lenbiz. In which, Tima is considered a typical successful peer-to-peer lending model in the Vietnamese market.

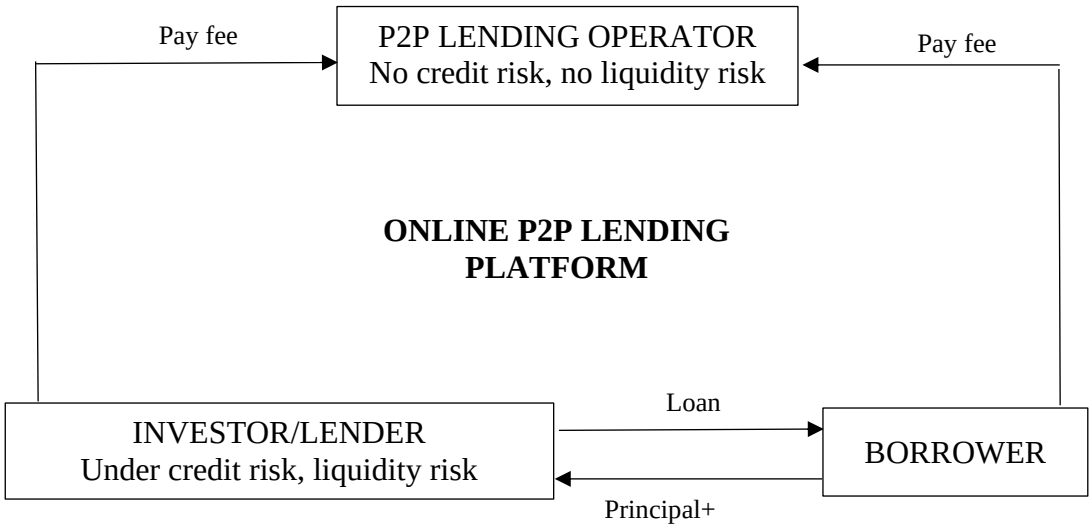

Figure 2. P2P Lending Model

(*Source:* *Committee on the Global Financial system (CGFS) and the Financial Stability Board (FSB) - Fintech Credit)*

Crowdfunding is the pooling of small amounts of capital from a large number of individuals to finance a new business. As defined in the Draft Law on Supporting Small and Medium Enterprises proposed by the Ministry of Planning and Investment in 2016, crowdfunding is a form of capital mobilization from a large number of individuals through an intermediary organization that provides information and consulting services, supporting online capital mobilization. The capital provider and the capital caller bear the risks and responsibilities for providing and repaying capital. The capital caller can repay in gifts, shares, loans or in other forms. Crowdfunding takes advantage of the ability to reach a large number of users through social networks and capital calling websites to bring investors and entrepreneurs together. This method increases business capacity by expanding the number of investors, beyond the traditional scope of owners, relatives and venture capitalists.

Through analysis of the activities applying the sharing economy model, it can be seen that the greatest benefit of the model is the saving of resources through the economical use of assets throughout their entire life cycle. Therefore, with the savings in the use of assets, machinery, equipment, saving resources, etc., sharing economy activities also have a positive impact on the environment through reducing greenhouse gas emissions and reducing the amount of waste released into the environment. Sharing economy helps reduce transaction costs in economic activities. Through online platforms, buyers and sellers quickly find each other, interact directly with each other; saving time finding partners, saving time negotiating and closing deals. The end result is that consumers benefit and production efficiency in the economy increases. The sharing economy also contributes to promoting the development of technology in general and information technology in particular, because the sharing economy itself has an increasing demand for the use and analysis of big data from customers.

With the method of operation being assets or services shared between individuals, helping to connect new buyers and sellers for an economic activity. So this model can be applied to many different types of services, especially those related to sharing resources and optimizing the use of assets such as sharing transportation; Sharing accommodation;

Sharing labor services, skills; Sharing finance; Sharing workspace; Sharing equipment, tools; Sharing personal belongings; Sharing knowledge and learning; Sharing food,....

3. Opportunities and challenges for developing the sharing economy in Vietnam

About opportunities

Firstly, change the mindset and methods of state management to improve the management capacity of the state apparatus in the context of the Fourth Industrial Revolution to meet management requirements and promote the development of the sharing economic model. At the same time, raise awareness and capacity of businesses, localities and people about the sharing economic model in production, business and consumption.

Secondly, exploit resources more effectively and protect the environment. The sharing economic model contributes to increasing the efficiency of exploiting and using surplus resources and idle resources; increasing production and business efficiency and capital turnover for businesses and business establishments; limiting the situation of excess capital/assets that are not or have not been used. For example, personal vehicles are used to provide services for Grab, Be, Gojek,... to save asset resources. Or like the rental service of expensive machinery and equipment, thereby helping those who need to use machinery pay lower costs.

Third, promote economic development and create jobs. The sharing economy changes and creates new markets, giving people new choices of services and anyone can start a business, helping to shorten the time for economic entities to enter the market, with low transaction costs and high business efficiency. Therefore, the sharing economy promotes economic development and contributes to expanding business opportunities, increasing the number of entities participating in the market.

Fourth, increase transparency. The sharing economy model promotes online transactions with publicly listed prices and online payments, thereby increasing market transparency.

Fifth, accelerate the digital transformation process. The sharing economy model is having a positive impact on promoting the comprehensive digital transformation process, especially contributing to promoting the Government's goals of "digital society" and "digital economy". In addition, the sharing economic model is also creating a positive motivation for improving the technological level of the management staff and reforming the management apparatus to ensure effective and synchronous management of the sharing economic model.

About the challenge

The sharing economy often operates on digital platforms, and in many cases, traditional legal regulations cannot keep up with this development, so there is no strict legal framework to manage the operating model of the sharing economy. Furthermore, the legal system on business activities in Vietnam such as the Investment Law; Law on Electronic Transactions; Law on Enterprises;... and current tax regulations have hardly mentioned the sharing economy model specifically. Therefore, tax management and tax collection are difficult, especially for businesses operating on sharing platforms in Vietnam but headquartered abroad due to the lack of a mechanism to control business activities and a legal framework regulating the payment of business taxes, tax rates, and types of taxes.

Management functions and management mechanisms for the sharing economy model are not clear. There are no specific regulations on the inspection, examination,

monitoring and sanctions for violations of business practices under the sharing economy model. This makes it difficult for state management of the sharing economy model.

Unfair competition in the market. Some traditional businesses may argue that sharing economy platforms are not subject to the same regulations or taxes, creating unfair competition. For example, traditional taxi services may face stricter regulations than ride-sharing services.

Challenges regarding security, privacy and liability. Sharing personal information and assets via online platforms can pose security and privacy risks. User data can be misused or leaked if not properly protected. Furthermore, the responsibilities between service providers, platforms and users are often unclear. This can lead to disputes over who is responsible when incidents such as fraud, substandard goods and services, vehicle accidents or property damage occur.

4. Sharing economy application solutions in Vietnam

First, state management agencies should soon research and build a legal corridor for the operation of the sharing economy model. It is necessary to clearly define the responsibilities between the parties as well as the responsibilities of state management agencies in the sharing economy. In terms of building mechanisms and policies to minimize risks, it is necessary to include early warnings for service providers; solving problems arising in the sharing economy such as labor, employment, social security; creating a market for all citizens to participate in sharing business activities including space, goods and skills.

Second, the operation of the sharing economy mainly focuses on exploiting available resources in the economy. Through the models of the sharing economy, the Government continues to direct the Ministry of Information and Communications, the People's Committees of provinces and centrally run cities to promote the development of information technology, creating a foundation and resources for the economy in general and the sharing economy in particular. Create opportunities for businesses to grasp and redistribute unused or underutilized resources. Expand and improve the quality of information technology in management, operation and exploitation of demand for both investors and consumers, one of the channels to stimulate increased demand for the economy, maximizing the exploitation of capital and idle human resources in our country today.

Third, in the context of Vietnam's economy increasingly integrating deeply into the world economy, it is a "playground" for global investors and businesses. Not only foreign investors, but also with the current level of information technology in the country, domestic businesses are also very interested in this new business method. Whether they want it or not, the form of business according to the sharing economy model has appeared and developed in Vietnam. Therefore, the Government needs to establish a specialized agency to manage sharing business activities according to the service business model. The subject of sharing economy service business does not provide services directly from the person with the resources but is provided through an information technology platform. Through software set up for service provision and meeting people in need of using the service. In essence, the service provider acts as a broker between the service provider and the person in need, so depending on the brokerage service, the manager has an appropriate form of management.

Fourth, the model of the sharing economy is a new model. In the process of Vietnam's international economic integration, applying this type of model is an objective necessity, and it has an impact on many classes of people and the economy. Therefore, it is necessary to exploit the potential and benefits of the sharing economy for each model, in order to manage and minimize the difficulties of the sharing economy, gradually raise awareness of the community, meet the needs of consumption, convenience and efficiency of the people.

CONCLUSION

The sharing economy is clearly showing its influence on the world economy in general and the Vietnamese economy in particular. The rapid development in scale and business sectors in recent times has demonstrated the potential of the sharing economy in our country. However, the sharing economy model also shows negative aspects and challenges, creating an unhealthy competitive environment with the traditional business model. The rapid and strong development of this model has set new requirements for State management to both control and encourage businesses following the sharing economy model to operate most effectively. To be able to develop the sharing economy requires the combination and participation of State management agencies - businesses - consumers and the whole society. On that basis, the new sharing economy model has the opportunity to develop strongly in Vietnam as an inevitable trend of the 4.0 industrial revolution.

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PROMOTING EFFECTIVE LABOR DISPUTE RESOLUTION BY ARBITRATION TO APPROACH THE REQUIREMENTS OF SUSTAINABLE DEVELOPMENT

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Abstract: In the context of international economic integration and open-door policies, labour relations have become dynamic and diverse. Conflicts of interest among stakeholders in labour relations are increasingly intense, and labour disputes are rising in quantity, scale, and complexity, affecting all economic sectors. Therefore, the need for labour dispute resolution has become urgent. Arbitration offers numerous advantages and is increasingly applied worldwide as an out-of-court dispute resolution method. This article examines the current situation of resolving labor disputes through arbitration and proposes several solutions to enhance the influence of this method in dispute resolution, improve the effectiveness of labor dispute settlement, and meet the requirements of Vietnam's sustainable economic development in the new context.

Keywords: *sustainable development, labor dispute, labor arbitration.*

1. Introduction

In the context of integration, Vietnam has joined numerous international conventions[2], and incorporating international labour standards into national legal documents has created a harmonious and stable labour environment. According to the International Labour Organization (ILO), an effective dispute resolution system aims to prevent disputes initially and resolve arising conflicts in an orderly and "peaceful" manner, mainly through the efforts of the disputing parties (International Training Centre of ILO, 2013). As a member of the ILO and next-generation trade agreements, Vietnam has been striving to develop and perfect the out-of-court labour dispute resolution system in general and the labour arbitration system in particular, ensuring higher quality to meet the deep international integration demands and to build harmonious, stable, and progressive labour relations.

Studying the practice of labor dispute resolution through arbitration and proposing solutions to enhance the effectiveness of this method is essential for improving the legal system and the mechanisms for implementing laws consistently and strictly. It also ensures the supremacy of the Constitution and laws as set out by the Party and State, while promoting sustainable economic development.

2. Theory and research methods

2.1. Research theory

With the aim of assessing the current labor dispute resolution mechanism through

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[2] Vietnam, as a member of the ILO, and through its participation in next-generation FTAs such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and the EU-Vietnam Free Trade Agreement (EVFTA), has committed to respecting and promoting fundamental principles and rights in labor. This reflects Vietnam's determination to ensure comprehensive development and enhance international integration.

arbitration in Vietnam and studying solutions to enhance the effectiveness of this method, the report will apply the model developed by Professors Budd and Colvin (2008). Budd and Colvin propose three criteria for evaluating a labor dispute resolution system: effectiveness, fairness, and the voice of the parties involved. The authors add an additional criterion: legal authority. These four criteria help evaluate Vietnam's actual compliance with international labor standards in resolving labor disputes.

An effective mechanism is one that ensures the efficient use of limited resources such as time and money, while also promoting work efficiency (Budd & Colvin, 2008). Therefore, an effective mechanism is one that is both quick and cost-effective, while minimizing strikes and other forms of disruption in labor and production.

A fair labor dispute resolution mechanism is one that is unbiased and achieves a high level of consensus. Therefore, it is trustworthy. Budd and Colvin explain that the outcome of a fair system is: *"similar to the judgment of a rational person who is not influenced by the interests of any disputing party, and the result is based on objective evidence"* (Budd & Colvin, 2008).

A labor dispute resolution system that ensures the voice of the parties is one that provides the opportunity for all individuals to express their opinions and present their views on the case. This includes fair litigation for both sides (including the ability to present evidence and to be represented). Another aspect of the voice of the parties is allowing representation during the dispute resolution process; for example, labor and employer organizations can designate members of an arbitration panel.

One criterion that the Budd and Colvin model does not address is legal authority, which refers to the scope of disputes that one or more bodies or organizations are authorized to resolve. These disputes can be rights disputes, interest disputes, or both. The issue of dispute also relates to the scope of resolution because a single organization may need to address multiple types of disputes, such as wages, termination of employment, collective bargaining, social security, and workplace safety. Additionally, a system can be designed where multiple organizations resolve various types of disputes. The most important point is not the number of organizations involved (although cost and complexity considerations are relevant), but the extent to which the dispute resolution system covers all potential types of labor disputes that may arise.

Table 1: Evaluation Criteria Related to Labor Dispute Resolution

Criteria	Description
Jurisdiction/Adjudication	- Universal Scope: Different types of disputes fall under the jurisdiction of one or more organizations. - Reducing Technical Barriers: Workers are not excluded due to legal technicalities.
Effectiveness	- Cost: The financial cost involved in the dispute resolution process, aiming to keep it affordable for all parties involved. - Speed of Resolution: The time it takes to resolve a dispute, emphasizing quick resolution to minimize disruptions in labor and production. - Reducing Conflict: The system's ability to prevent or resolve disputes in a way that promotes productivity by

	reducing ongoing or future conflicts. This helps maintain a stable work environment.
Fairness	- Reliability: Unbiased, consistent, and based on evidence. - Protection: Allows for appeals and measures to ensure decisions are made consistently. - Enforceability: Solutions are binding and enforceable. - Accessibility: Expanded access to ensure that a broad range of individuals can practically access the system. - Transparency: Widely communicated and publicly available information about the process.
Voice of parties	- Fair Hearing: Both parties have the opportunity to present their case. - Representation: The involvement of representatives in the dispute resolution process.

2.2. Research Methodology

The results of this report primarily rely on secondary data collected through books, newspapers, journals, websites, and other relevant documents related to labor dispute resolution through arbitration in Vietnam.

In the research process, a synthesis method is used to consolidate the activities of the current labor dispute resolution system in Vietnam in general, and the labor arbitration system in particular.

Analysis, statistical, and comparative methods are employed to clarify the practical application of labor dispute resolution through arbitration in Vietnam. From this, proposals and recommendations are made to enhance the effectiveness of this method in resolving labor disputes, in order to meet the requirements for the sustainable economic development of Vietnam in the new context.

3. Results and discussion

3.1. Overview of Labor Dispute Resolution through Arbitration

3.1.1. Concept of Labor Arbitration

Depending on each country's conditions, most legal systems worldwide establish mechanisms for labour dispute resolution (LDR). In Vietnam, labour disputes are resolved through labour mediators, labour arbitration councils, and the people's courts. Labour dispute resolution via arbitration has been mentioned since the 1994 Labor Code enactment. Still, it has only gained attention and encouragement for use in recent years, particularly with the 2019 Labor Code (LC 2019). However, labour arbitration remains underutilised and unfamiliar to disputing parties, resulting in unemployment or underemployment for most labour arbitrators within labour arbitration councils across the country. In contrast, arbitration is a widely used and highly effective labour dispute resolution method in many countries worldwide.

Currently, Vietnamese labour law does not provide any specific definitions for "arbitration" or "labour arbitration." Generally, arbitration refers to a dispute resolution process agreed upon by the parties, wherein the dispute is submitted to one or more arbitrators to make a binding decision. It is a form of Alternative Dispute Resolution (ADR) outside the court system. According to foreign legal references, labour arbitration

is “a third party with decision-making authority to resolve labour disputes” (Ministry of Labor, Invalids, and Social Affairs [MOLISA], 2010). Labour arbitration is a method of resolving labour disputes wherein a sole arbitrator or an arbitration council has the authority to resolve disputes based on specific rules agreed upon by the parties or as prescribed by law (Nguyen, 2004)

3.1.2. Principles of Labor Dispute Resolution through Arbitration

In resolving labour disputes, arbitration must adhere to the principles of arbitration proceedings (LC 2019, article 180). In addition to complying with general principles in labour dispute resolution, labour arbitration must follow several specific tenets as follows:

First, respect the agreement of the parties.

The agreement between the parties is reflected primarily in their right to choose labour arbitration for dispute resolution, including selecting arbitrators, the time, and the location for the arbitration process. In many countries, arbitration is typically pre-agreed by the parties before a dispute arises and is documented in contracts. The chosen arbitrators must ensure independence and impartiality, meaning pressure or relationships with either party should not influence them. Arbitrators must also have knowledge and experience in labor law and related regulations to ensure that the arbitration decision protects the legal rights and interests of the disputing parties (Tran&Phan, 2024).

Second, comply with arbitration procedures.

When parties participate in arbitration proceedings, they must adhere to the rules and procedures of arbitration to ensure fairness and efficiency in resolving labor disputes. These requirements may include notifying about the disagreement, selecting arbitrators, gathering evidence, and issuing an arbitration decision.

Third, ensure the enforcement of arbitration decisions.

An arbitration decision represents the resolution of a labor dispute. The disputing parties must respect and comply with the arbitration decision, including fulfilling obligations such as compensation, adhering to agreed-upon terms in employment contracts, improving labour conditions, or taking other actions requested by the parties.

3.1.3. Procedures for Resolving Labor Disputes through Arbitration

Research, verification, and evaluation of the case:

The research, verification, and evaluation of the case are the first steps in arbitration proceedings, and they apply to all disputes. When accepting a case, arbitrators must take time to study the dispute. Typically, parties requesting arbitration will provide as much information and evidence favourable to their position as possible. However, verifying this evidence can be difficult, and in many cases, it may prolong the dispute. Therefore, arbitrators must adhere to labour arbitration principles to objectively analyse and evaluate the case.

Most countries empower arbitrators to collect, review, and assess evidence. For example, in Australia, arbitrators can require parties to provide written evidence and decide whether to accept or gather additional evidence. In the Philippines, the arbitration board may assign experts to analyse the case, and the expert’s report can serve as evidence in dispute resolution (MOLISA, 2006).

Issuing decisions and arbitration awards:

The arbitration board is only authorised to decide on issues requested by the disputing parties. These issues may be included in the parties' application, the arbitration

agreement, or a decision by a competent state authority appointing arbitration for the case. When deciding, the arbitration board must adhere to principles of justice, equality, fairness, and good conscience, considering the nature of the dispute.

In some countries, arbitrators must also consider the broader interests of society. For instance, in Singapore, in addition to the direct interests of the parties, arbitrators must also consider public interests and the national economic conditions. Typically, the arbitration board issues a decision immediately after investigating the dispute or hearing the parties' final arguments. Decisions are made by majority vote. In the absence of a majority, the decision of the arbitration chairperson prevails. This principle is applied in most countries worldwide.

3.2. Practical Application of Labor Dispute Resolution Through Arbitration

3.2.1. Labor dispute resolution by arbitration in Vietnam

Labor arbitration is considered a dispute resolution method with many advantages, providing a fair and effective solution. The resolution of labor disputes through arbitration is carried out through activities such as: establishing an arbitration agreement, forming the labor arbitration council (LAC), providing relevant documents and evidence related to the dispute, and enforcing the arbitration award.

Establishing Arbitration Agreements

According to current regulations (LC 2019, articles 189, 193, 197), based on mutual consent, disputing parties may request the Labor Arbitration Council to resolve disputes when mediation is not mandatory (for individual disputes) or when mediation fails or is not conducted within the required time. Thus, the “mutual consent” of the parties determines whether labor arbitration will be used. If the employer disagrees, the dispute must be resolved through other methods, such as mediation or litigation. Like Vietnam, in the United States - where labor arbitration is widely used - labor arbitration is applied when employees and employers sign an “arbitration clause”. However, an arbitration agreement will be invalid if it is not made in good faith, is unethical, or results from coercion or fraud by one or both parties to the employment contract (Lisa M. Eaton, 2002).

Current Vietnamese labor law does not specify the form of an arbitration agreement, which creates difficulties for both employees and employers in establishing one. It is unclear whether the agreement should be in writing (as an arbitration clause in the employment contract or a separate agreement) or verbal. This ambiguity makes it challenging to determine the validity of arbitration agreements.

Establishment of the Labor Arbitration Council

The Labor Arbitration Council (LAC) is established in each province/centrally governed city under the decision of the Chairman of the Provincial People's Committee, with a minimum of 15 members and a term of 5 years. Members of the LAC are individuals with in-depth knowledge and expertise in labour matters, and the council is formed on a tripartite basis by ILO principles (State - Employees' Representatives - Employers' Representatives) (LC 2019, article 185). However, in practice, the nomination of arbitrators for the LAC poses difficulties for the employers in selecting their five representatives due to the lack of consensus among employers' representative organisations in the area. Some organisations that can nominate representatives to the LAC include provincial/city Cooperative Alliances, branches of the Vietnam Chamber of

Commerce and Industry (VCCI), etc. The question remains as to how these organisations can achieve consensus, who will coordinate and unite these employers' representative organisations to nominate LAC members at the provincial level, and what solutions exist if consensus cannot be reached. Therefore, the role of employers' organisations in establishing the LAC at the local level is significant and determines whether the LAC can be established to resolve labor disputes.

Implementation of Arbitration Procedures

According to Vietnamese labor law, employees and employers are the two main parties involved in resolving labour disputes alongside the Labor Arbitration Panel. Arbitration procedures are carried out through meetings to resolve conflicts. At least 5 days before the meeting, the Labor Arbitration Panel must issue a written summons to the disputing parties (employees and employers), specifying the time and venue of the meeting. Upon receiving this notice, the employees and employers must confirm their attendance. If a party has valid reasons for not attending, they may request a rescheduling, and the Labor Arbitration Panel makes the final decision. At the meeting, representatives of the disputing parties or their authorised agents must be present. If one party is absent, even if a rescheduling request was denied, the Labor Arbitration Panel will proceed with the meeting. During the meeting, the parties present the details of the case, which are recorded in minutes signed by all arbitrators and the disputing parties in attendance.

Submission and Presentation of Evidence

Under current regulations, the Labor Arbitration Panel is responsible for collecting evidence within its authority. It has the right to request the disputing parties, agencies, organisations, or individuals to provide documents, evidence, expert opinions, and summon witnesses or other relevant individuals (LC 2019, article 183). Employers, when requested, are obligated to provide relevant evidence and documents to facilitate dispute resolution. When labor disputes are resolved through the court system, clear regulations exist regarding the procedures for submitting evidence (Civil Procedure Code 2015, article 96,97). Evidence collection begins at the initiation of a lawsuit, and parties must attach supporting documents to their claims. Defendants and other parties must submit written responses and supporting evidence to the court (Le&Nguyen, 2022).

However, Vietnamese labor law lacks clear regulations on collecting and submitting evidence by employees and employers in disputes resolved through arbitration. This absence creates difficulties for employers in fulfilling their obligations to provide evidence during the arbitration process.

Enforcement of Arbitration Decisions

According to the 2019 Labor Code, the Labor Arbitration Panel must be established within seven working days from the date of the request to resolve a dispute. Within 30 days of its establishment, the Labor Arbitration Panel must decide to resolve the dispute and notify the disputing parties. If the panel is not established or fails to settle within the stipulated time, the parties can request the court's intervention (LC 2019, article 189, 193, 197). Additionally, if one party refuses to comply with the arbitration decision, the other party has the right to seek court resolution or initiate strike procedures.

Notably, the 2019 Labor Code lacks provisions for enforcing arbitration decisions in labour disputes. The implementation of arbitration decisions relies solely on the parties' voluntary compliance. In other words, arbitration decisions are merely advisory and lack

enforcement mechanisms (Khuc&Nguyen, 2022). Therefore, the role of employers in complying with arbitration decisions is significant. Without legal provisions or enforcement measures, the effectiveness of arbitration depends entirely on employers' willingness to comply. If they refuse to comply, the dispute remains unresolved.

3.2.2. Evaluation of labor dispute resolution activities by arbitration in Vietnam

General evaluation

In practice, labor arbitration has not fully realized its potential in labor relations, and this mechanism for resolving labor disputes has not been widely chosen by the parties involved. The activities of labor arbitration councils have not shown significant improvement compared to the previous period. Meanwhile, opting for arbitration to resolve labor disputes aligns with global trends and the context of international economic integration.

When compared to some countries in the region with similar political and legal systems to Vietnam (such as China), we see notable differences. Before 2007, China operated a dispute resolution system quite similar to Vietnam's (Cooney et al., 2013). However, after labor disputes, particularly in the construction sector, became widespread, China implemented significant reforms to its system of resolving individual labor disputes. These reforms included the reorganization of provincial labor dispute resolution boards into specialized agencies with legally binding authority (as per the Labor Dispute Mediation and Arbitration Law of the People's Republic of China 2007). Access to arbitration services was facilitated, including the prohibition of fees. The number of cases more than doubled in 2008 (when the new system was implemented), and the trend has continued to rise since then.

While the courts are actively operating, according to the Ministry of Labor, Invalids, and Social Affairs (2018), the courts have received a large number of labor disputes, mainly related to social insurance (43%), wages (21%), and termination of employment (19%), with only about 0.04% involving collective bargaining or disputes related to trade unions. The labor arbitration councils have rarely been used since the Labor Code came into effect. According to data from the Ministry of Labor, Invalids, and Social Affairs, 24 provinces and cities have established and organized labor arbitration teams, and some localities have issued regulations on the operation of labor arbitration councils, clearly defining their authority, procedures, and steps for resolving disputes based on the agreement of both parties. Decisions made by the arbitration council are enforceable for the parties involved (Duc Duong, 2022).

To date, some of the most active regions in resolving labor disputes through arbitration include Ho Chi Minh City, Binh Duong, and Dong Nai. Among them, Dong Nai is one of the first regions to establish a labor arbitration council under the framework of the 2019 Labor Code. The Dong Nai Labor Arbitration Council received its first case on October 11, 2022 - a labor dispute that could not be resolved through mediation. The first hearing took place on November 7, marking the first case brought to arbitration in Vietnam (ILO, 2022). This is considered an important step in the development of the labor dispute resolution system using arbitration.

However, in practice, the choice to apply this method is not yet widespread, and labor arbitration in many localities is still facing the issue of "unemployment and lack of cases". Most of the time, when a labor dispute arises, both parties tend to choose mediation or

the courts to resolve the issue, with arbitration being almost never chosen. This is due to the habit of the parties, particularly employers, in choosing dispute resolution methods, and additionally, the parties have not yet fully recognized the authority of the labor arbitration councils, so they do not prioritize this method.

Evaluation Based on Criteria:

Criterion 1: Legal Authority

The 2019 Labor Code distinguishes between individual labor disputes, collective labor disputes over rights, and collective labor disputes over interests. Furthermore, with the expanded jurisdiction for labor arbitration councils, these councils now have the authority to resolve all three types of disputes. Therefore, it can be concluded that the labor dispute resolution method through arbitration meets the criterion of legal authority.

Criterion 2: Effectiveness

The arbitration mechanism is not functioning effectively in practice and, therefore, does not contribute to resolving disputes efficiently. Furthermore, the arbitration process does not seem to result in a significant reduction in illegal strikes or the losses caused by these strikes. The decrease in the number of illegal strikes since 2012 can be attributed to the tightening labor market: this means that employers need to retain workers and are more willing to seek quicker solutions rather than following the more formal procedures.

Criterion 3: Fairness

Firstly, the current system lacks trustworthiness due to the absence of professional, full-time arbitrators (although some experienced part-time arbitrators work in certain provinces). Arbitrators are paid very low allowances for their work. While many show dedication to their roles, the meager compensation is discouraging rather than motivating them.

Secondly, the decentralized nature of the system means there are mechanisms that limit the consistency across the country. There are significant differences between provinces, which is problematic because it can lead to arbitrators in some provinces producing outcomes that do not align with the obligations under the Conventions.

Thirdly, the lack of authority for arbitrators to issue legally binding orders and require mandatory participation from the parties (such as in cases involving unfair labor practices) diminishes the credibility of the process and may render it ineffective for many workers and/or employers.

Fourthly, there is a lack of institutional independence for arbitrators within the Department of Labor, Invalids, and Social Affairs (DOLISA). The ILO emphasizes that dispute resolution bodies must be "impartial/unbiased" and, in cases involving disputes over representation in collective bargaining, must be "independent... and free from political interference." However, since the labor arbitration councils are located within the DOLISA, they lack sufficient independence if the members of these bodies also work part-time (or overlap) in dispute resolution activities within the same department.

The fifth issue related to the fairness criterion is that arbitrators from worker representative organizations are currently only selected from organizations affiliated with the Vietnam General Confederation of Labor (VGCL). This could lead to bias if, in the future, a dispute arises between two labor representative organizations, one of which is a member of the VGCL and the other is not.

Criterion 4: Voice of the Parties

In accordance with the prescribed legal procedures, the labor arbitration council organizes a meeting to resolve the dispute. Through this meeting, both parties have the opportunity to present evidence, prove their case, and explain the relevant issues in a fair manner.

Table 2: summary evaluation of the current labor arbitration system

Criteria	Description
The legal authority	- The legal authority to resolve labor disputes is clear. - The Labor Arbitration Council has the jurisdiction to resolve all types of labor disputes.
Effectiveness	The arbitration system operates ineffectively.
Fairness	- The current system lacks credibility due to its lack of professionalization. - There is a lack of mechanisms to ensure consistency nationwide. - There are no binding measures within the arbitration system unless both parties agree. - Access is difficult due to a lack of public awareness (no dedicated office or website). - There is insufficient autonomy.
Voice of parties	Although there are regulations regarding the organization of dispute resolution meetings, the arbitration system is not operational or is minimally functioning in practice, which means there are limited opportunities to hold fair hearings within the labor arbitration framework.

4. Conclusion and Policy Implications

In the context of international integration, effectively resolving labor disputes and building harmonious, stable, and progressive labor relations plays a crucial role in meeting the requirements for the sustainable development of Vietnam's economy. In the future, it is essential to implement a comprehensive set of solutions to enhance the effectiveness of labor dispute resolution through arbitration, making arbitration a widely accepted and trusted method for resolving labor disputes.

To improve the effectiveness of labor dispute resolution through arbitration, the author proposes the following recommendations:

Firstly, regarding arbitration agreements, regulations should clarify their form, specifying whether they must be in writing or verbal and whether they can be included as a clause in employment contracts or established as separate documents. This will provide a clear legal basis for valid arbitration agreements.

Secondly, regarding establishing the Labor Arbitration Council, the lack of consensus among employers' representative organisations can hinder the council's formation in some localities. In cases where consensus cannot be reached, the Chairman of the Provincial People's Committee should appoint members from a list of nominees based on legally defined criteria to ensure the timely establishment and functioning of the LAC. Furthermore, to provide the highest effectiveness, labour arbitrators must be impartial, objective, independent, and neutral, with no bias or prejudice toward either

party, especially toward employers (as there is often a perception that employees are the weaker party and need protection).

Thirdly, regarding the submission and presentation of evidence, legal provisions should be introduced to establish procedures for collecting and submitting evidence during arbitration proceedings. This will facilitate the parties' ability to fulfil their rights and obligations, expedite dispute resolution, and enhance its effectiveness.

Fourthly, regarding the enforcement of arbitration decisions, the non-binding nature reduces their appeal. Legal provisions should be introduced to ensure that:

(i) Arbitration decisions in labour disputes are final and binding;

(ii) The court may only review the arbitration process and annul decisions in cases of serious procedural violations. Under no circumstances should the court re-adjudicate disputes already resolved by arbitration.

Fifthly, information confidentiality is a key feature of labour arbitration and is critical for the disputing parties. Public disclosure of dispute-related information could damage the employer's reputation, brand, and image. Therefore, labour laws should impose confidentiality obligations on the disputing parties and the Labor Arbitration Panel.

Finally, raising awareness of arbitration as a dispute resolution method is essential. One reason arbitration is underutilised is a lack of public awareness. Effective communication is needed to inform the public about the Labor Arbitration Council's jurisdiction. This includes publicising labour arbitrators' expertise, professional capacity, and dispute resolution track record to build trust in the arbitration mechanism and encourage its use.

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RESEARCH MODEL ON FACTORS AFFECTING CUSTOMERS' INTENTIONS TO CHOOSE FULL-PACKAGE TRAVEL PRODUCTS

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Abstract: Tourism development is a crucial economic activity that contributes to the economic growth of many countries and regions. Among these activities, the development of full-package travel products is the primary focus of travel companies. They aim to provide diverse and safe travel experiences for customers while ensuring the efficiency of their operations, thereby enhancing the tourism sector's contribution to overall economic growth. With the advantages it offers, full-package tourism at travel companies has become the optimal choice for travelers seeking safe journeys and diverse experiences both domestically and internationally. However, the strong impact of the Covid-19 pandemic has led to a decline in customer preferences for full-package travel products. This has had a significant impact on the revenue of travel companies. Therefore, the objective of this study is to propose a research model aimed at determining the direct influence of factors affecting the intention to choose a travel company for full-package travel products among tourists in Vietnam. The study used convenience sampling method to approach and survey 285 tourists. Then, the linear structural model was used to test the cause-and-effect relationship in the study. The results show that all four factors: Destinations Information; Differentiation of Service; Convenience of access to a travel; Influence of Society positively influence tourists' intention to choose package travel products in Vietnam. The findings from this study are the basis for providing implications for surveying and evaluating relationships. From there, identify relationships, links, and cooperation between travel businesses and tourism suppliers to create package tourism products with more value for tourists, at the same time, it also brings about business efficiency for travel companies.

Key words: *Package tours, intention to use, products of tourists, travel agencies*

1. Introduction

Tourism is a great industry and one of the key exports of most countries bringing foreign currency savings and employment (Niekerk & Saayman, 2013). Increasing trends of foreign travels and development of various touring packages indicate a boost in tourism even despite global economic crisis. On the other hand, increasing rivalry among various travel destinations, and an increase in tourism information sources have created the need, on the part of travellers, for an understanding of information search methods. Understanding tourists' information search provides useful information for the practitioners in this industry for the purpose of planning their marketing activity (Erawan, Krairit, & Khang, 2011)

The Covid-19 pandemic has changed every facet of human life, including tourism (Wachyuni & Kusumaningrum, 2020). According to preliminary statistics provided by

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the Department of Tourism (VNAT), when the Covid-19 epidemic returned, about 32,000 tourists canceled domestic tours in Hanoi; in Ho Chi Minh City, more than 35,000 travel programs were canceled, including package tours, optional tours, services (hotels, ai tickets, attractions). As of 2021, there were only 2,111 internatrional travel businesses in the country. Not only that, Covid-19 also changed the tourism trend of Vietnamese people. It can be seen very clearly that the trend of "self-organizing, self-go" of Vietnamese customers is increasing. The survey results of more than 10,000 participants on tourism trends when reopening by the Travel Advisory Board (TAB) show that from September 2020 to December 2021, the trend of booking services through the public travel agencies decreased from 12.4% to 8.7% and direct booking increased by 39.9% to 41.2%. With the help of technology, tourists now have a lot of convenience in organizing their own trips and the role of tour operators is under threat. While self-guided tours offer travelers exciting and exploratory experiences, they also present some disadvantages to tourists. These may include a lack of knowledge of the local language, absence of guidance from a tour guide, resulting in difficulties in navigation, accommodation choices, as well as unfamiliarity with the local natural and cultural conditions. These challenges can make the travel experience, especially for first-time or elderly travelers exploring new destinations or traveling abroad, less appealing and potentially serve as barriers to future trips. Therefore, opting for full-package tours from professional travel companies can help customers save time and mitigate risks during self-guided travel. Accordingly, numerous studies have examined the reasons people choose travel companies and opt for full-package tours, the attitudes of vacationers towards specific travel companies, and how a travel company should promote their tour packages. These studies have been conducted in various countries such as Hong Kong, Singapore, China (Heung & Chu, 2000; Hui & Wan, 2006; Heung & Zhu, 2006). However, the findings from previous research are all pre-Covid-19 outcomes. Prior to the impacts of the Covid-19 pandemic, the tourism operations of travel companies were severely affected. In order to attract tourists back to using full-package travel services provided by travel enterprises as they did before the Covid-19 pandemic and to enhance the potential for market development in the coming period, it is necessary to implement comprehensive solutions involving various stakeholders. Particularly, there is a need to research the factors influencing the intention to choose full-package travel services offered by professional travel companies. This will enable travel companies to adjust their marketing strategies and improve the quality and pricing of their services to better serve consumers. Consequently, this will aid travel companies in recovering their business operations after the significant impact of the Covid-19 pandemic.

2. Literature Review

2.1. Full-package Tourism and Its Benefits

Package tours refer to an assembly of tourism products and services (Räikkönen, 2014) offered by tour operators and travel agencies in a destination (Caber & Albayrak, 2018). It encompasses services including pre-tour briefing, airport/plane, hotel, restaurants, coach, sightseeing, shopping opportunities, optional tours, and other services offered in the destination (Wang, Hsieh, & Huan, 2000). Bowie and Chang (2005) further included in package tours the services of the tour leader and natural or cultural attractions. Overall, these components of package tours create experience in the destination for

tourists (Stamboulis & Skayannis, 2003) which is known as “subjective experiences” (Komppula, 2006). During the package tour, tourists visit some places in a limited time, and they experience different products and services in the destination (Enoch, 1996). Package tours may develop tourism destinations by improving its attractiveness to international visitors (Liao & Chuang, 2020). Furthermore, package tours are essential for the long-term success of the destination and the increasing profit of the tour operators (Leguma, 2013). To make it continuousness, they should ensure package tourists to be satisfied from the destination and their experience because satisfied tourists package tour can play a pivotal role in revisiting the destination and repurchasing the same package tour product as well as recommending it around of them (Bowie & Chang, 2005).

Package tours presented by travel agencies offer numerous advantages to customers (Askari, 1971; Schmidt, 1979). First, predetermined expenses permit travelers to budget the majority of their expenses in advance. Second, the primary benefit of a package tour is its convenience. Customers who purchase tours will not need to be concerned about the quality of service, as the travel agency will ensure that the suppliers provide services of the highest quality (Askari, 1971). Third, in terms of geography and physics, organized tours address what to see in a limited amount of time. The tour itineraries assist tourists in visiting the city's or country's outstanding attractions. Fourth, parties who are unable to agree on what to see may find that a guided tour is the solution to their problems. Fifth, package tours also assist in combining opportunities for adventure, novelty, escape, and educational experiences in a safe condition. Finally, a tourist not only sees the local attractions, but also receives additional information about them from the tour guide (Schmidt, 1979).

Sheldon and Mak (1987) indicated that visitors who are older, want to go to several places, have few people in their group, and only want to stay for a short time are more likely to buy package tours than to travel on their own. The study also found that travelers like the fact that package tours can save them money. Similarly to Sheldon and Mak, Hsieh, Morrison and O'Leary (1994) believed that package tourists are middle-aged, married, women who like to travel in small groups (typically two to four people) to visit relatives or friends. On the other hand, according to research conducted by Sheldon and Mak, Hsieh, O'Leary, and Morrison (1994), it was found that tourists, whether they booked their trip through a package or independently, relied largely on their travel agency as their major source of information. Both package and non-package travelers want to see as much as possible and experience new cultures. Package tourists prefer high-end restaurants, hotels, resorts, and guided tours to see everything.

The choice of full-package tourism is provided by travel agencies and is essential. According to Kozlova (2014), a travel agency’s role is to provide customers with holiday packages that include interaction with a customer. The travel agency must present the consumer with a choice, a description, and confirmation of the trip arrangements. Vietnamtourism (2014) stated that as a bridge between tourists and local service providers, travel agencies have an effect on management and use of resources at the destination by influencing on decision/service choices of tourists, performance of service providers and ways of development of destinations. Therefore, with Vietnam, travel agency can influence a large proportion of international tourists in terms of the choice of accommodation facilities, attractions, means of transportation, level and form of travel. interactions with

local residents and the natural environment. The experienced travel agent is a specialist who helps the client save both time and money (Goeldner and Ritchie, 2009). Conant et al. (1988) extended this idea, noting that travel companies are fundamentally service-intensive suppliers, and they frequently advertise their own services.

According to Chang (2007), the decision of the travel agency was heavily affected by trip companions, such as friends, coworkers, and family members. Eric Ng, Cassidy, and Brown (2005) also agreed that the selection of travel agents was heavily influenced by recommendations from friends and family members. They engage in frequent and continuous interactions with friends and relatives, who may have a substantial impact on their beliefs and behaviors. Hui and Wan (2005), and Heung and Zhu (2005) mentioned that consumers were most concerned with intangible variables such as travel agency reputation, staff attitude, tour security and safety, and staff effectiveness. In terms of ranking, the results were slightly different from Heung and Chu's (2000) study. Among the total of 29 qualities, Hong Kong consumers ranked the agency's reputation as the most important. The attitude of the employees was the third most significant aspect of their business, following word-of-mouth as the second most important aspect. In Hui and Wan (2005) situation, word-of-mouth was placed fifteenth out of twenty-seven qualities. Hui and Wan (2005) also commented that when picking a travel agency, customers are understandably more attentive to pricing and total value. Eric Ng, Cassidy, and Brown (2006) assumed that personal experience was a crucial factor in their selection of travel agencies. Travelers valued their prior travel experiences and typically use them as a benchmark to evaluate if they will use the same travel agency again. In another paper, Graham Brown and Michael J. Gross (2006) knowledgeable and experienced travel consultants were the factor that had the greatest impact on the decision of a travel agency. The consumers believed that qualified and knowledgeable travel agents might support them in making more accurate decision regarding their desired vacation itinerary and packages. This could enhance their entire travel experiences and increase their post-purchase pleasure, which could lead to additional purchases (Kotler, 2003). A travel agency's positive reputation draws both returning and new consumers.

2.2. Customer Perception

The perception that a person has towards the occurrence of a particular behavior is their intention. Customers' perceptions of service providers' serving performance are reflected in their behavior intentions. Behavior intentions describe whether buyers want to buy from more than one business or to cut back on their purchases. It can be divided behavioral intentions into two groups: economic behaviors and social behaviors (Haery, Ghorbani & Zamani, 2014). Purchase intent is defined as "the likelihood that a consumer will actually make a purchase" by Younus, Rasheed, and Zia (2015). In other words, purchase intent encompasses a consumer's final decision to purchase a thing following consideration and deliberation. Shah, et al. (2012) defined intention to purchase is a type of decision that investigates why a customer purchases a particular brand. A research by González, Comesaña and Brea (2007) showed that service quality and customer satisfaction have a positive and considerable influence on behavioral intentions in the tourism industry. Similarly, customers' perceptions of service quality and their repurchase intentions and willingness to recommend were found to be positively correlated by Boulding et al (1993). According to Williams and Soutar. (2009), this is critical in tourism because new business is primarily developed through word-

of-mouth. Word of mouth communications are regarded as more reliable and trustworthy due to the experiential character of services.

3. Methodology

3.1. Factors Influencing the Intention to Choose Full-Package Travel Products at Travel Companies

Building upon prior research by Kim (2013), Heung and Zhu (2005), Meidan (1979), Buhalis (1998), and Van (2019), who conducted comprehensive literature reviews on various studies related to the criteria for choosing full-package travel products at travel companies, including four fundamental factors as follows:

(i) Destination Information (concluding *Natural Environment and Climate, General Infrastructures, Safety*, and *Hygiene* is one of the significant factors that has impacts on selection of travel agency. In Heung and Zhu (2005) research *Tour Security and Safety* are the most important attributes and *Tourism Environment and Atmosphere* are also worth considering factors which could affect customers' selection for travel agency. A person's preconceived notions about a destination, whether favorable or unfavorable, shape their expectations for a trip there, and ultimately influence their decision about where to vacation. According to Almeida-Garica et al. (2020) much of a tourist's knowledge about a destination can only be obtained by personal experience, meaning that information is uncertain until validated by firsthand observation.

(ii) The Differentiation of Service. Based on the findings of Kim's previous research (2013), the differentiation of Service was found to have statistically significant impacts on one's willingness to select a tour package of a travel agency. Specifically, according to his research, this is the second most influential factor to customers' selection for travel agency. Moreover, the literature stated that *Appropriate price* is one of the vital attributes that distinguish one travel agency with another (Kim, 2013). In the travel agency business, this attribute plays an important role because customers have a tendency of choosing the tour package which is cheap and reasonable. By this attribute, the customer may reduce the cost of a package tour holiday to an acceptable minimum and then optimize the quality of the component parts of the tour. Moreover, *Freetime during tours and Advance booking requirements* are also important in differentiating product and service of each travel agency. Two attributes help customers consider the use of information and suggestions provided to evaluate alternatives prior to making the purchase.

(iii) Convenience of access to the travel agency. According to Meidan (1979), convenience of access to the travel agency (which includes travel agency location, number of branches, travel agency office layout, and travel agency interior decoration) is an important factor influencing travel agency customers. The convenience of having access to a travel agency is about 40% more important for older travelers than for younger people. Medlik and Middleton (1973) noted that accessibility and convenience appear to be one of the three most important characteristics that define a tourism product. In contrast, Hui and Wan (2006) discovered that the least significant attributes in their study were those pertaining to the physical aspects of the agency offices (e.g., number of offices/branches, operating hours). The results of LeBlanc (1992) also show that physical evidence is one of three factors that does not significantly affect customers' decisions to purchase tours.

(iv) Social influences, *including knowledgeable and experienced travel consultants, advice from friends and relatives* or *advice from social networks* were important to consumers, where they can consider using information, opinions and suggestions to evaluate alternatives prior to purchase (Gitelson and Crompton, 1983; Buhalis, 1998). Besides, Van (2019) also stated the same perspective that social influence is considered a free advertising tool for businesses and a reliable source of information for customers. In the research of Heung and Chu (2000), word-of-mouth communication was the top priority of Hong Kong consumers when they consider the criteria for choosing a tour operator. Many people who went on tours said that word-of-mouth from friends and family was what first got them interested in going (Chang, 2007).

3.2. Proposed Research Model

Building upon prior research by Kim (2013), Heung and Zhu (2005), Meidan (1979), and Buhalis (1998), who conducted comprehensive literature reviews on various studies related to the criteria for choosing full-package travel products at travel companies, including four fundamental factors as follows: Customers' selection of full-package travel products at travel companies is influenced by four factors, including: (i) Destination information, as reflected in travel companies providing comprehensive and accurate information about the natural environment, climate, general infrastructure, safety, and hygiene of the travel destination, which will attract customers to choose full-package travel products offered by travel companies; (ii) Service differentiation, demonstrated by travel companies creating differentiation in their full-package travel products, differentiation in pricing, and utility, as well as offering convenience in service booking for customers; (iii) Convenience in accessing the travel company, indicated by the ease of finding the travel company's location, the diversity of the number of the company's branches for customer access, and the convenience of finding information about the travel company; (iv) Social influence, as evidenced by information about the travel product experiences of friends, family, social networks, or experienced travel advisors.

From analyzing the factors affecting the intention to choose package tourism, the following research model can be proposed:

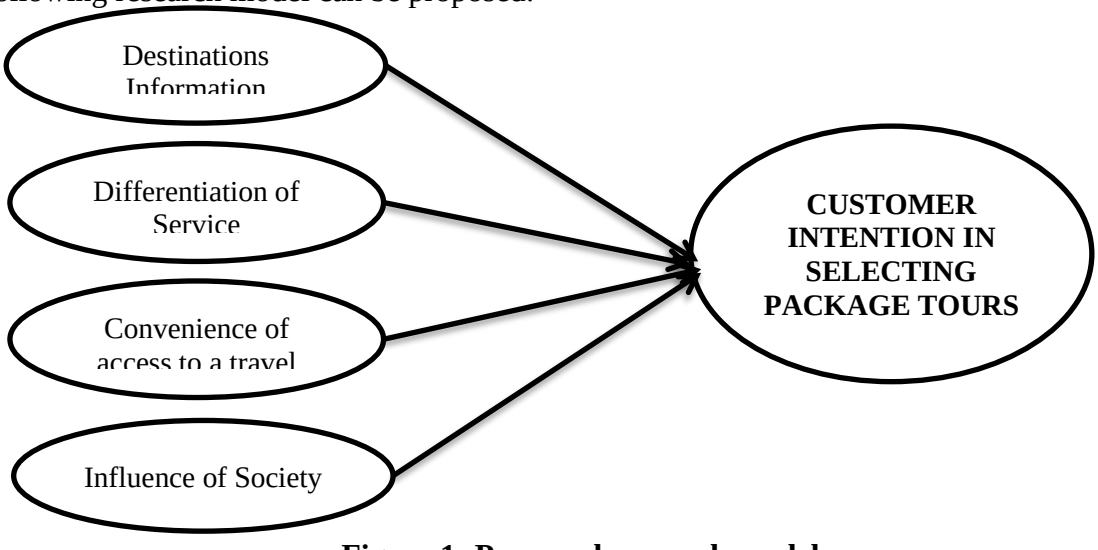

Figure 1: Proposed research model

Source: Author's recommendation

3.3. Demographic Characteristics of the Respondents

The authors conducted a survey of 300 customers who booked package tours at travel companies in Northern Vietnam about demographic information, age, gender, education level and travel habits... After conducting the survey, the results collected from the questionnaires will be cleaned and entered into the database. Incomplete or error-containing answer tables have been removed to ensure that the cleaned data is highly reliable and informative for analysis. The remaining results of the qualified sample were 285 customers included in the analysis. The demographic profile of the respondents is shown in Table 1. There were 133 (46.7%) females and 152 (53.3%) males among the respondents. The main age group was between 18-40 (the 18-30 age group had 30.8%, the 31-40 age group had 58.9%; the 41-50 age group 10.3%). Almost 81 per cent (81.4%) of the respondents had university degree, 12.6% were college and below, and the others were master degree and above. The majority of the respondents (56.8%) had 1-2 times travelled outside their country. Rarely times 28%, 2-3 times and more than 5 times represented 14.7% and 0.035% respectively.

3.4. Validity and reliability analysis

The validity and reliability of measurement variables for main components were examined by exploratory factor analysis (PCA (Principal Component Analysis) with Varimax rotation) and reliability analysis. Extraction from factors was performed using principal component analysis (PCA) and varimax, and reliability analysis results were double-checked using Cronbach's. One item (DS03) measuring the differentiation of service aspect was eliminated during EFA and Cronbach's alpha analysis because of low item-total correlation and the Cronbach's alpha of DS03 being higher than Cronbach's alpha of the scale DS, but after DS03 was eliminated, the reliability of DS became effective. The data analysis outcomes are shown in Table 1. Results from principal component analysis (PCA) on 17 variables identified as selection attributes of travel agents revealed a KMO value (.730) for determining validity; Bartlett's Sphericity (459.587) revealed a level of significance at 000 (.01); Cronbach's (greater than.6) revealed a level of effectiveness. The principal components analysis revealed that the 16 variables were best understood as 4 distinct categories: traveler background knowledge, service differential, accessibility, and social impacts. Items assessing four independent factors and a single dependent variable were subjected to EFA. The conclusive EFA results provided strong evidence for the convergent and discriminant validity of the measures employed in this study. Each scale's Cronbach alpha is calculated, and they range from 0.698 (influence of society) to 0.849. (for customer intention). These numbers are within the allowable margin of error, therefore we can feel safe making this claim.

TABLE 1: Result of Validity and Reliability Analysis on Selection Attributes of Tour Products

Component name	Measurement Parameter	Factor Loadings	Cronbach's alpha
Destination Information (DI)			

DI01	I often choose a travel agency that organizes tours at a travel destination which has a good development of general infrastructures (transport, connections, health, safety, etc.)	.810	.810
DI02	I often choose a travel agency that organizes tours at a travel destination which has a non-polluted/ non-congested environment	.777	
DI03	I often choose a travel agency that organizes tours at a travel destination which offers personal security	.764	
DI04	I often choose a travel agency that organizes tours at a travel destination which presents proper cleaning and general hygiene	.779	
Differentiation of Service (DS)			
DS01	I prefer the travel agency that organizes the tour with a lot of free time so that I can do activities according to my own interests	.829	.760
DS02	I often choose a travel agency that allows advance booking requirements based on my preferences	.879	
Convenience (C)			
C01	I often choose the travel agency that conveniently locates near home/office	.754	.816
C02	I often choose the travel agency that has pleasant decor in office	.789	
C03	I often choose the travel agency that is available evenings/weekends	.747	
C04	I often choose the travel agency which has many branches	.829	
Influence of society (IS)			
IS01	I often consult on social networks before using the services of a travel agency	.640	.698

IS02	I often consult friends and relatives before using the services of a travel agency	.878	
IS03	I often listen to the advice of the counselor before using the services of a travel agency	.708	
Customer Intention (CI)			
CI01	I intend to continue using the package tour service of a travel agency in the future.	-	.849
CI02	Choosing a package tour service is the most suitable option for me.	-	
CI03	I would strongly recommend others to use a package tour service of a travel agency.	-	

3.5. Test of hypotheses

Our study framework requires averaging scores on each element to create a variable with which to test hypotheses. The impact of moderation was analyzed by multiplying the independent variables to obtain multipliers. We sought to concentrate the independent variables just before completing the multiplication in order to cut down on spurious correlations between the multiplier and the variables causing them. Multiple regression analysis findings for hypothesis testing are shown in Table 2. The test outcomes are presented below. The $p<.1$ conditional significance level (completely supported) is higher than the traditionally used $p<.05$ threshold since this exploratory study looked at associations between selection attributes of tour agents, decisions for the purchase of trip packages, and evaluations of travel agencies.

TABLE 2: Regression results with Customer Intention as dependent variable

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.501[a]	.251	.217	.68094

a. Predictors: (Constant), IS, DI, DPS, C

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.958	4	3.489	7.525	.000[b]
	Residual	41.731	90	.464		
	Total	55.689	94			

a. Dependent Variable: CI

b. Predictors: (Constant), IS, DI, DPS, C

Coefficients[a]

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.

		B	Std. Error	Beta		
1	(Constant)	1.749	.707		2.475	.015
	DI	-.193	.130	-.146	-1.482	.142
	DPS	.138	.108	.125	1.275	.206
	C	.212	.083	.266	2.537	.013
	IS	.383	.134	.298	2.853	.005

a. Dependent Variable: CI

Customer intent was used as the dependent variable, and four independent ones (DI, DS, C, and IS) were examined. The availability of a travel agency and psychosocial factors were found to have statistically significant beneficial effects on the likelihood that a tourist would select for a package tour, as determined by a multiple regression analysis. Also important are details about the intended location and any special services that may be available. With a t value of -1.482, the test result for H1 demonstrated that destination information had a significant probability of.142 ($\rho<.1$, $\beta=-.146$) when the t value was -1.482. A customer's intention to book an all-inclusive package vacation with a specific travel agency is more likely if they have access to information about specific destinations, but this does not support the null hypothesis: Destinations Information has a positive impact on customer intention in selecting a travel agency for all-inclusive package tours.

When the t value was 1.275, the test result for differentiation of service indicated that there was a sig.206 ($\rho<.1$, $\beta=.125$) when t value was 1.275. Customers' intentions to book an agency for all-inclusive package vacations are positively affected by product and service differentiation is not supported.

To back up convenience of access, a t-value of 2.537 indicated that the convenience of access to a travel agency had the significance probability of.013 ($\rho<.05$, $\beta=.266$). a travel agency convenience access influences customers' decisions to book an all-inclusive vacation package with that agency.

The t value of 2.853 indicated that the probability that the sociocultural effect was.005 ($\rho<.05$, $\beta=.298$). Customers' intentions to choose a travel agency for all-inclusive package vacations are positively affected by societal influence.

The results of the test that, in support of convenience of access, the proximity of a travel agency to the customer was a major factor in deciding on a certain travel agency to book the vacation package. This finding lent credence to the hypothesis that buying a vacation package was inextricably linked to factors like the location, number of branches, office layout, and decor of a travel agency. The results for influence of society showed that people's social networks had a substantial effect on which travel agency and brand they ultimately chose. The factors that most affected which travel agency was chosen and whether or not a tourist was willing to buy a package deal from a specific brand were the extent to which the potential customer was satisfied with the availability of travel agencies and the impact that society had on their decision.

4. Results, Discussion & Conclusion

Testing hypotheses, we discovered that two of the four selection variables of tour agent selection significantly influenced people's propensity to acquire a tour package. Accessibility and social conditioning have a role in shaping potential customers' decisions to book international travel through a travel agency. The study's findings, interpreted from a business viewpoint, suggest that tour operators should highlight unique aspects of their

operation and look into how people generally travel as part of the tour product development process.

The results of this research showed that a customer's prior positive experience choosing a travel agency and a travel agency brand was the strongest predictor of future satisfaction with both. In particular, there is a substantial causal link between satisfied customers and excellent brand ratings for travel agencies. These findings show that happy tourists are more likely to recommend their tour company to others and have a favorable effect on the company's reputation, as well as more likely to make a repeat purchase of tours themselves.

In conclusion, customers select tour agencies for tour packages based on a number of factors, including an assessment of the entire tour experience and an evaluation of the travel agency that provided the package. Further, they get help navigating life from their friends, relatives, and the online communities they've found there. Therefore, from the birth of the tour agency through the acquisition of loyal clients, there should be a "loyal customer management system" in place. There has been a rise in the diversity of promotional activities carried out by travel companies in recent years. The importance of travel websites and the necessity of travel businesses to use them have been more apparent in recent years due to the proliferation of online travel firms.

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STANDARDS AND NORMS FOR THE USE OF EQUIPMENT AT PUBLIC SERVICE UNITS IN THE FIELDS OF EDUCATION AND HEALTHCARE IN NGHE AN PROVINCE

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Summary: Standards and norms for the use of equipment at public service units are the basis for planning and budgeting; assigning, investing, purchasing, leasing, and allocating funds for the use of equipment; and managing the use of equipment. Decision No.50/2017/QD-TTg regulating standards and norms for the use of equipment is an important document in the management of public property at public service units, but standards and norms that are not specific to each field will make the management of using equipment ineffective, prone to loss and waste. This article will focus on the current status of standards and norms for the use of equipment at public service units in the fields of education and health in Nghe An province, thereby providing a number of recommendations and solutions to develop standards and norms for the use of equipment in these units.

Keyword: *standards, norms, equipment, healthcare, education, public property*

1. Current Status of Implementing Documentation on Standards and Norms for the use of Equipment in Public Educational and Healthcare Service Units in Nghe An Province

Public property is property owned by the entire people, represented by the State as the owner and uniformly managed, including public property serving management activities, providing public services, ensuring national defense and security at agencies, organizations and units; infrastructure property serving national interests and public interests; property whose ownership rights are established by the entire people.

Below are the legal documents on standards and norms for the use of equipment for public service units in the fields of education and healthcare in Nghe An province on the management and use of specialized equipment.

Decision No.50/2017/QD-TTg dated December 31, 2017 of the Prime Minister stipulating standards and norms for the use of equipment in public service units stipulates that there are 3 types of equipment: (1) common office equipment, (2) equipment serving general activities and (3) specialized equipment. In public service units of education and healthcare, equipment invested from the state budget and providing public services are public property. Decision No.50/2017/QD-TTg stipulates the agency that issues detailed regulations guiding the standards and norms for the use of specialized equipment serving the activities of the healthcare and education sector. Specifically as follows:

The Ministry of Health and the Ministry of Education and Education

The Ministry of Health and the Ministry of Education and Education shall provide detailed regulations guiding the standards and norms for the use of specialized equipment serving the activities of the healthcare and education sector under the state management of the Ministry of Health and the Ministry of Education and Training

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Based on the detailed regulations guiding on the standards and norms for the use of specialized equipment in the fields of healthcare and education, ministries and central agencies shall promulgate or delegate the authority to promulgate standards and norms for the use of specialized equipment in the fields of healthcare and education to agencies, organizations and units under their management;

The Provincial People's Committee

After receiving written consensus from the Standing Committee of the People's Council at the same level, shall issue or delegate the authority to issue standards and norms for the use of specialized equipment in the fields of healthcare and education to agencies, organizations and units under its management; the head of a public service unit shall self-insure regular and investment expenditures to issue standards and norms for the use of specialized equipment in the fields of healthcare and education at the unit. The decision to promulgate standards and norms for the use of specialized equipment shall be made public on the electronic information portals of ministries, central agencies, and provincial People's Committees and shall be sent to the State Treasury to implement expenditure control in accordance with the provisions of law.

Decision No.50/2017/QD-TTg stipulates that the issuance of standards and norms for specialized equipment as prescribed in Clause 1 and Clause 2, Article 8 shall be applied to equipment that meet the standards of fixed assets according to the regulations on the management and depreciation of fixed assets at agencies, organizations and units. But for specialized equipment that do not meet the fixed asset standards, the agency or person with authority to decide on assignment, investment, purchase, transfer, or lease in accordance with the provisions of law shall decide on the equipment in accordance with the functions, tasks, nature of work, usage needs, and the permitted funding sources, ensuring savings and efficiency.

Circular No. 16/2019/TT-BGDDT of the Ministry of Education and Training provides guidance on standards and norms for the use of specialized equipment in the field of education and training. Based on this Circular, educational institutions and training establishments shall develop standards and norms for the use of equipment of their units and educational institutions and training establishments under their management.

Circular No. 08/2019/TT-BYT dated May 31, 2019 of the Ministry of Health guiding standards and norms for the use of specialized equipment in the medical field

Decision 3518/QD-UBND of Nghe An province dated September 28, 2021 promulgating additional standards and norms for the use of specialized equipment (types, quantity) in the medical field of public service units in Nghe An province; Decision No. 4555/QD-UBND dated November 26, 2021 of the People's Committee of Nghe An province promulgating additional standards and norms for the use of specialized equipment for 4 specific units in Nghe An province, namely Nghe An Radio and Television Station, Nghe An Irrigation Sub-Department, Nghe An Center for Farmers' Support and Vocational Education, Nghe An Center for Standards and Quality Measurement, Nghe An Social Protection Center, Nghe An Provincial Cultural Center, Nghe An Lung Hospital...

Decision No. 3606/QD-UBND of the People's Committee of Nghe An province dated August 8, 2017 promulgating standards and norms for specialized equipment (types, quantity) of state agencies, public service organizations and units in Nghe An province. The content of the Decision includes:

Standards and norms for specialized equipment with purchase prices above and below 500 million VND/unit of assets provided to state agencies, organizations, and public service units in Nghe An province. The standards and norms stipulated in the Decision are the basis for competent authorities to consider and decide on policies to allow the transfer, replacement equipment or purchase of new specialized equipment. For specialized equipment that have exceeded the prescribed usage period and cannot be used again or have been damaged but the repair for continued use is ineffective, they shall be liquidated. The replacement of liquidated specialized equipment (or new purchase) must not exceed the quantity and type according to the prescribed standards and norms for specialized equipment.

Table 1: Standards and Norms for SpecializedEquipment with a Purchase Price Below 500 Million VND per Asset Unit for Public Institutions in Nghe An Province

No.	Type of Equipment	Unit	Maximum Norm	Note
I	**Nghe An Oncology Hospital**			
1	Tracheostomy Kit	Set	5	
2	Endoscopic Prostate Tumor Resection Kit	Set	3	
3	Surgical Instrument Sets	Set	60	
4	Electrophoresis Devices	Unit	10	
5	….			
II	**Vinh City Medical Center**			
1	Specialized Vaccine Storage Cabinet	Unit	2	
2	Binocular Microscope with Desk and Chair	Set	3	
3	Light Intensity Meter	Unit	1	
4	Portable Ultrasound Machine with Printer	Set	1	
5	Biochemical Analyzer	Unit	1	
6	…..			
III	**Nghi Loc 4 High School**			
1	**Physics Teaching Equipment**			
-	Air Cushion Kit	Set	4	
-	Newton's Tube	Set	4	
2	**Chemistry Teaching Equipment**			
-	Fume Hood	Unit	3	
3	**Thể dục**			
-	Foam Mat (for High Jump)	Set	2	
	…			
IV	**Vocational and Electrical Technical School**			
1	Refrigeration Practice Equipment	Set	80	
2	Automotive Practice Equipment	Set	80	
3	Industrial Overlock Sewing Machine (5-thread)	Set	2	
4	Industrial Sewing Machine	Set	29	
5	Practical Electrical System Training Kit	Set	1	
6	…..			

(Source: Decision No. 3606/QD-UBND by the People's Committee of Nghe An Province, dated August 8, 2017)

Standards and norms have been specifically established for many public service units across the province, including health and education public service units. Standards and norms are supplemented and adjusted during operation. Public service units base on standards and norms to purchase and invest in assets. However, not all public service units have these specific regulations, and the regulated assets have not been coded.

Every year, agencies, organizations and units assigned to manage and use public property shall report on the management and use of public property in the previous year for the assets specified in Clause 2, Article 125 of Decree 151/2017/ND-CP and make ad hoc reports at the request of competent state agencies. For the following types of public property, agencies, organizations and units assigned to manage and use them shall report to superior management agencies and financial agencies for unified and centralized management nationwide: (1) Public property at agencies, organizations and units include: Offices; land use rights to build office buildings and public service facilities; automobiles of all types; other fixed assets, except for special assets at people's armed forces units; (2) Public property assigned by the State to enterprises for management, excluding the State capital component at enterprises (except for special assets serving defense and security tasks at enterprises under the Ministry of National Defense and the Ministry of Public Security); (3) Infrastructure assets; (4) Assets serving the activities of projects using State capital; (5) Assets with public ownership rights

Nghe An Provincial People's Committee issued Official Dispatch No. 1136/UBND-KT dated February 23, 2023 on strengthening the management and use of public property at agencies, organizations and units. Units comply with documents related to standards and norms for the use of equipment in the fields of education and health. However, the synthesis of data and information reporting on the management and use of public property is sometimes not timely. Inspection and examination work has not been strengthened.

2. Solutions for building standards and norms for the use of equipment in public educational and healthcare service units

Firstly, based on the report on the management and use of public property in the unit, fully summarize the increase and decrease, and the rental of equipment in each field. Assess the suitability of the standards for the use of equipment in the units, issue documents to adjust and amend regulations to ensure the effective use of equipment in public service units in the fields of education and health, without waste or loss. The document requesting approval of the standards for the use of specialized equipment in the field of education and training should be accompanied by an explanation of the need for each type of equipment in the following years, statistics on the use of existing equipment, and an assessment of the effectiveness of the use of existing equipment.

Second, encode all specialized equipment in the fields of education and healthcare. Develop and apply equipment management software in all public service units in the fields of education and healthcare so that superior agencies can promptly, quickly and fully grasp the situation of investment, new purchases, liquidation, sale and lease of equipment.

Third, strengthen inspection and examination of the use of public property at public service units and organizations under management for business purposes, leasing, joint ventures and associations. Based on the results of the inspection, the inspectors advise the Provincial People's Committee to strictly handle violations and immediately terminate cases of business, leasing, joint ventures and associations that are not in accordance with

the law. The results of the inspection and examination are also the basis for adjusting the norms and standards for the use of specialized equipment.

Fourthly, coordinate with the Provincial National Assembly Delegation, Provincial People's Council, Provincial Fatherland Front Committee and socio-political organizations and mass organizations to monitor the implementation of the law on the management and use of public property.

3. Conclusion

Developing and issuing documents related to standards and norms for the use of equipment in the fields of education and healthcare for public service units in Nghe An province contributes to the effective and economical management of these assets. However, analytical reports on the demand for equipment, reports on the annual use of equipment are important bases for developing standards and norms suitable for the actual operations of public service units in the fields ofeducation and healthcare. Applying information technology systems to the development of standards and norms for specialized equipment in the fields of healthcare and education will contribute to the increasingly economical and effective management and use of public property.

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CIRCULAR ECONOMY POLICIES OF VIET NAM AND SOME RECOMENDATIONS

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Abstract: Transforming a linear economy into a circular economy is an urgent task for each country, each economy and the world. In the context of general economic integration, Vietnam has made a strong commitment to achieving zero net emissions by 2050. This is a long-term and very difficult process; so many different solutions are needed from both macros to micro. Macro solutions must first come from government policies and strategies to local policies. This study aims to systematize Vietnam's circular economy development policies, thereby proposing some recommendations to improve policies in the coming time. From secondary sources of information and desk research methods, the article has summarized 8 circular economy policies of Vietnam from 2020 to present. From there, the article has pointed out 5 successes, 6 limitations of the policies and proposed 7 recommendations to improve Vietnam's circular economy development policies.

Keywords: *Circular; Policy; Recommendation; Viet Nam*

1. Introduction

Circular economy is a concept first used in 1990, by the co-authors (Pearce, Turner) of the book "Economics of Resources and Environment" (Nguyen Nham, 2021). The concept of circular economy was born in the context of modern social development, increased consumption causing many negative impacts on human health, ecosystems, environmental hazards and sustainable development. Converting a linear economy to a circular economy to reduce greenhouse gas emissions, protect the environment, and combat climate change is an urgent task for each country, each economy and the world. In Vietnam, the term Circular Economy was known quite late compared to the world but was strongly promoted. In the context of general economic integration, Vietnam has made strong commitments at global climate summits, with the goal of achieving net zero emissions by 2050. At COP26 in 2021 and COP28 in 2023, Vietnam reaffirmed its commitment to the world on reducing greenhouse gas emissions. Vietnam participates in many new-generation free trade agreements (FTAs) with many countries and economic regions, including commitments on ecological safety standards, so the application of the circular economic model in Vietnam is an inevitable trend towards sustainable development. The transition from a linear economy to a circular economy is a long-term and very difficult process; so many different solutions are needed from both macros to micro levels. Macro solutions must first come from government policies and strategies to local policies. Micro-solutions are implemented through implementation, policy improvement, training, coaching, communication, promotion, building and replicating models in practice... In the long-term context of the transition to a Circular Economy,

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many different aspects need to be studied. This study only focuses on the policy aspect with the aim of systematizing Vietnam's Circular Economy policies, thereby proposing some recommendations for policy improvement in the coming time.

2. Some theories and research methods

2.1. Some theories in research

(1) Circular Economy

Until now, the origin of Circular Economy is still unclear, but since the 1970s, some authors have contributed to the formation of this issue such as John Lyle, William McDonough, Michael Braungart, Walter Stahel Rachel Carson's Silent Spring…(K. Winans et all, 2017). The concept of circular economy was first officially used by Pearce and Turner in 1990. It refers to a new economic model based on the basic principle that "everything is an input to something else", which is completely unlike the traditional linear economy (ICED, 2024). From there, many more concepts have been proposed by different authors. Some of them:

According to European Parliament (2023):Circular economy is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the life cycle of production is extended. In practice, it implies reducing waste to a minimum to a minimum

According Ellen MacArthur Foundation (2024): The circular economy is a system where materials never become waste and nature is regenerated. In a circular economy, products and materials are kept in circulation through processes like maintenance, reuse, refurbishment, remanufacture, recycling, and composting. The circular economy tackles climate change and other global challenges, like biodiversity loss, waste, and pollution, by decoupling economic activity from the consumption of finite resources. The circular economy is based on three principles, driven by design: Eliminate waste and pollution; Circulate products and materials (at their highest value); Regenerate nature

RTS (2024) explains circular economy based on World Economic Forum as: a circular economy is "an industrial system that is restorative or regenerative by intention and design."

In Vietnam, the concept of Circular Economy is officially stipulated in the Law on Environmental Protection 2020: "Circular economy is an economic model in which design, production, consumption and service activities aim to reduce the exploitation of raw materials and materials, extend the product life cycle, limit waste generation and minimize negative impacts on the environment".

(2) Distinguishing between circular economy and linear economy

Linear economy and circular economy are two economic models with similarities and differences related to resource exploitation and the environment (Institute of Rural Development Science, 2024). The similarities of the two economic models include: Both aim to create products associated with socio-economic development; both are based on a technology platform for production according to human needs; both agree on the steps in the product manufacturing process. The differences are shown in Table 1

Table 1. Some differences between the two economic models

Indicators	Leaner Economy	Circular Economy
1. Use resources	once	Repeat many times
2. Process old products, waste	Discard/destroy	Transfer to other uses
		Repair into other uses
		Recycle into raw materials for the next cycle
3. Main goals	Short-term growth and profit	Sustainable development and environmental protection
4. Consequences	Waste, resource depletion, ostentatious consumption	Save resources, protect the environment, responsible consumption, just enough
5. Economic forms	One form: produce - consume - throw away	3 forms: Partial; Each cycle; Continuously many cycles, only stopping when it is impossible to recycle further

2.2. Research method

Research information is collected from secondary sources such as policy documents, reports of agencies, scientific research results, conference documents and related websites. Primary information from surveys, field visits and research results of the author.

The main method of analysis and evaluation is desk research to read, select, analyze and synthesize collected documents and information.

3. Research results

3.1. Summary of circular economic development policies in Vietnam

Sustainable development strategy associated with green growth, green economy, environmental protection, climate change response, low emissions, ecosystem protection, resource saving, waste exploitation... all show contents related to circular economy. This is reflected in many documents such as the Law on Environmental Protection, the Law on Chemicals, the Law on Product and Goods Quality, the Law on Energy Saving and Efficiency, the Law on Minerals, the Law on Water Resources, the Law on Food Safety, Vietnam's renewable energy development strategy to 2030, vision to 2050, the national strategy on integrated solid waste management to 2025, vision to 2050, the national action program on sustainable production and consumption to 2020, vision to 2030, the national strategy on green growth for the period 2021-2030, vision to 2050, the Prime Minister's directive on strengthening the management, reuse, recycling, treatment and reduction of plastic waste, the environmental protection strategy to 2030 with a vision to 2050. Although the documents are all related, only until 2020 the phrase Circular Economy has just been officially included in Vietnam's policy documents. The table below shows some documents collected in chronological order.

Table 2. Circular economy policies in Viet Nam from 2020 to now

No	Time	Name of Document
1	24/6/2020	Decision No. 889/QD-TTg: National Action Program on Sustainable Production and Consumption for the 2021-2030 period
2	17/11/2020	Law No. 72/2020/QH14: Law on Environmental Protection
3	1/2/2021	Resolution of the 13th National Congress of the Communist Party of Vietnam
4	1/10/2021	Decision No. 1658/QDTTg: National Strategy on Green Growth 2021-2030 with a vision to 2050
5	10/1/2022	Decree No. 08/2022/ND-CP: Detailed regulations on a number of articles of the Law on Environmental Protection.
6	8/2/2022	Decision No. 167/QD-TTg: Program to support private sector enterprises to conduct sustainable business in the period 2022-2025
7	7/6/2022	Decision No. 687/QD-TTg: Circular Economy Development Project
8	2023	Decision No. 687/QD-TTg: Circular Economy Development Project

Source: Author's synthesis

Some main contents of the documents:

(1) National Action Program on Sustainable Production and Consumption for the period 2021-2030

The Program is based on 3 viewpoints, the first of which is Sustainable Production and Consumption for effective economic development; Environmental protection, poverty reduction and economic restructuring; Promoting circular economy and sustainable development. The overall goal of the Program includes many aspects aiming at developing a circular economy in Vietnam. Specific goals are identified for the period 2021-2025 and up to 2030. The Program has 12 main tasks. One of them is Promoting the application of circular economy for waste with 3 groups of contents: (1) Promoting the application, dissemination and replication of models of classification, collection, reuse, recycling of waste and scrap; Develop documents, train, disseminate, and guide the implementation of circular economic models for waste, specifically waste in the fields of agriculture, aquaculture, electronics, chemicals, thermal power, plastics, paper, construction materials and waste from other economic sectors; (2) Promote supply-demand connection, develop markets for environmental products and technologies, recycled products and technologies and low-carbon technologies; (3) Gradually build and apply circular economic models in the consumer sector, encourage the shift from consuming and owning goods to consuming and using services in life. The program identifies a list of 15 priority tasks and activities, of which the most priority for the Circular Economy is to promote the circular economy with waste to contribute to the efficient use of energy and raw materials, and protect the environment. The three contents of this priority are: (1) Developing documents, training, disseminating, and guiding the implementation of circular economic models that efficiently use energy and raw materials used in the fields of food processing, beverages, textiles, footwear, plastics, paper, and

electronics; (2) Disseminating and replicating good practices in waste collection, reduction, and reuse; (3) Connecting supply and demand, developing markets for products, environmental technology, recycled technology products, and low-carbon products. The Ministry of Industry and Trade presides over task 1, the Ministry of Natural Resources and Environment presides over task 2, the Environmental Industry Association presides over task 3.

(2) Environmental Protection Law

Vietnam has promulgated the Environmental Protection Law three times (2005, 2014 and 2020), but it was not until the 2020 Law that the Circular Economy was officially included in the Law in Article 142. Article 142 includes 4 contents: (1) Introducing the concept of "Circular Economy is an economic model in which design, production, consumption and service activities aim to reduce the exploitation of raw materials and materials, extend the product life cycle, limit waste generation and minimize negative impacts on the environment"; (2) Assigning tasks to ministries and provincial-level ministerial-level agencies to integrate the circular economy right from the stage of formulating strategies, planning, plans, programs and development projects; managing, reusing and recycling waste; (3) Assign responsibility to production, business and service establishments to establish a management system and implement measures to reduce resource exploitation, reduce waste, increase the level of reuse and recycling of waste right from the project construction stage, product and goods design to the production and distribution stage; and (4) The Government stipulates criteria, roadmap and incentive mechanisms for implementing circular economy in accordance with the socio-economic conditions of the country. The Law on Environmental Protection sets out 11 environmental protection policies (Article 5), of which the 11th policy specifically for Circular Economy is Integrating and promoting circular economy and green economy models in the development and implementation of strategies, plans, programs, projects and socio-economic development projects.

(3) Resolution of the 13th National Congress of the Communist Party of Vietnam

The 13th National Congress of the Communist Party of Vietnam convened from January 25, 2021 to February 1, 2021. The resolution of the congress pointed out the orientation for national development in the period of 2021 - 2030, including 12 contents, of which the 6th content pointed out "Proactively and effectively adapting to climate change, preventing and mitigating natural disasters and epidemics, managing, exploiting, using resources rationally, economically, effectively and sustainably; Taking the protection of the living environment and people's health as the top goal; Resolutely eliminating projects that cause environmental pollution, ensuring the quality of the living environment, protecting biodiversity and ecosystems; Building a green economy, a circular economy, and being environmentally friendly".

(4) National Strategy on Green Growth 2021 - 2030 with a vision to 2050

The overall objective of the Strategy is: Contributing to promoting economic restructuring associated with growth model innovation, aiming to achieve economic prosperity, environmental sustainability and social equity; towards a green, carbon-neutral economy and contributing to the goal of limiting global temperature rise. Of the four specific objectives, the second objective on Greening the

(5) Decree detailing a number of articles of the Law on Environmental Protection

This Decree details many articles and clauses in the Law on Environmental Protection 2020 through the detailed content of Articles 138, 139, 140 with 3 groups of regulations such as: (1) Regulations on 3 general criteria on Circular Economy including: Reducing the exploitation and use of non-renewable resources, water resources; Increasing the efficiency of using resources, raw materials, materials; Saving energy; Extending the use of materials, equipment, products, goods, components, structures; Limiting waste generation and minimizing negative impacts on the environment. Thereby, regulating the methods for investors, production and business establishments, production zones, industrial clusters, urban areas, residential areas to implement to achieve circular economy criteria; (2) Regulations on responsibilities, implementation roadmap, action plans for implementing Circular Economy for the Ministry of Natural Resources and Environment, ministries and ministerial-level agencies, provincial People's Committees, sectors, fields, and products; (3) Regulations on priorities for support and development incentives. Support priorities include scientific research, application development, technology transfer and equipment manufacturing, human resource training, providing information sharing platforms, linkages, cooperatives, industrial symbiosis, markets for reuse of discarded products, and waste recycling.

(6) Program to support private sector enterprises in sustainable business for the period 2022-2025

Developing a circular economy is one of the contents of sustainable development. This program is dedicated to promoting the private economic sector. Supported subjects include: Private sector enterprises implementing sustainable business, promoting organizations, agencies and organizations assigned to implement the program. Sustainable business includes models such as circular economy business, inclusive business, and other sustainable business. The program includes 3 groups of activities: Developing a sustainable business ecosystem, supporting sustainable business enterprises, and program management activities. Circular No. 13/2023/TT-BKHĐT issued by the Ministry of Planning and Investment on December 12, 2023 guiding the mechanism for organizing the implementation of the Program

(7) Circular Economy Development Project in Vietnam

Vietnam has many projects, but this is the first time the Circular Economy Development Project has been approved with the following main contents: (1) State 5 viewpoints on developing the Circular Economy: Inevitable, in line with the general trend; Open approach; Urgent, practical; Focusing on issuing long-term policies; Sustainable; (2) State 4 specific goals: Contribute to concretizing the goal of reducing greenhouse gas emissions by 2030 and 2050; Raise awareness and interest of businesses and investors; Support the development of a green lifestyle, encourage waste classification and promote sustainable consumption; Improve people's quality of life and resilience to climate change; (3) Identify 10 specific groups of tasks and solutions such as: Timely implementation of relevant legal documents; Propagating to raise awareness; Developing a separate or integrated circular economic development plan; Researching, proposing or integrating policies; Planning to collect, process and analyze information; Seeking opportunities from abroad to build pilot projects; Strengthening public-private dialogue; Building mechanisms and policies to attract investment, develop human resources and develop industry and environmental services.

(8) Draft national action plan for implementing circular economy by 2030

The draft was developed in 2023 and has been consulted several times but has not yet been approved by the Government. The draft sets out general goals and many specific goals by 2030. Tasks and solutions for implementing circular economy include 5 topics, 17 task groups and 56 specific tasks. The draft plan assigns the responsibility of leading to the Ministry of Natural Resources and Environment and central ministries, provincial People's Committees and identifies a list of priority materials, products, sectors and industries.

Circular economy development policies are applied to all sectors, fields and products. Some of these contents will be mentioned more specifically for each sector and field.

3.2. Successes and limitations in Vietnam's circular economic development policy

(1)Successes

First, the Party and the State have affirmed Vietnam's determination to transform from a linear economy to a circular economy, contributing to environmental protection, combating climate change, and implementing the declaration of reducing net greenhouse gas emissions according to the roadmap committed to the world. The leaders' affirmation has been tested through a long-term process at the macro level such as the Law on Environmental Protection, the Circular Economy project, and at the micro level such as the program to support the private sector in sustainable development (circular business is one of the three types of sustainable business models).

Second, the Circular Economic Development Policy has been systematically developed for production, consumption, and consumption. Policies may or may not clearly state the content of circular economy, but in the content design, they can all be integrated for implementation. This creates awareness that policy implementation must be associated with the circular economy aspect.

Third, Circular economy related policies have been issued in a focused and clear manner in the period from 2020 to present. Although the time is short, the documents have clearly assigned the responsibilities for implementation, so the central ministries and branches, and provincial people's committees have grasped the basic content of the policy to direct their subordinates.

Fourth, Circular economy policies in general and in each field in particular have created a policy framework and opportunities to promote circular economy, raise social awareness, attract the attention of international organizations, form product and input markets, and promote the formation of new types of production and business units

Fifth, in implementing the circular economy development policy, a number of successful models have emerged in different fields. The models are all based on the principles of circular economy combined with the innovation of business units, so they are very diverse. The scale of the model can be very large with a corporation, a general company, a symbiotic industrial park, but it can also be very small with a cooperative, a household, a processing factory. The different models have formed 4 groups of circular economic models: the energy-oriented model group, the non-energy-oriented model group, the combined model group and the ecological industrial park model group.

(2) Limitations

First, the linear economy has existed for a long time and is widespread, so the old-fashioned thinking has been deeply ingrained in the subconscious of all social classes from producers to consumers and other classes. Changing the thinking and thinking of an entire society is very difficult and long-term. Furthermore, the thinking and thinking of different social classes are not the same, so it is difficult to change in the short term.

Second, Circular Economy policy documents or those related to Circular Economy have many different levels from Laws, Resolutions, and Decrees. Policy documents are issued by many agencies at different stages, so some concepts, phrases, and terms are not explained in a unified manner, causing misunderstandings and misconceptions in direction or implementation.

Third, Circular economy policies are still scattered, lacking in synchronization, at the level of legal frameworks that are not specific, and are not accompanied by enforcement mechanisms, so they only stop at disseminating policy documents and have not reached the level of implementation, evaluation of results, and monitoring of implementation. Implementation resources are also only general regulations that are not clear, so they cannot be implemented.

Fourthly, the legal regulations on circular economy are not yet unified and appropriate, lacking feasibility because they are related to many regulations, many specialized documents such as taxes, fees, and credits, so they bind, trample, and neutralize each other (Lai Van Manh, 2024).

Fifth, New policies at the general level issued by the state or central ministries and branches, localities passively receive, wait for mechanisms from the central government, so the transition to circular economy is slow and reactive.

Sixth, Support from policies for the construction and dissemination of circular economic models is often small-scale, discontinuous, and unsustainable in small-scale production conditions, causing waste of resources.

3.3. Recommendations for improving circular economic development policies in Vietnam

First, Strengthen propaganda and explanation of circular economic development for the whole society. Circular economy is an orientation, strategy, approach and viewpoint but cannot force society to comply and transform. Therefore, propaganda and explanation work must be given top priority to change social awareness. Propaganda about the benefits of Circular Economy for sustainable development. Propaganda in many ways, popularizing models, policies and support sources. Regular and continuous propaganda for generations that are operating production, consumption and will operate production and consumption. Focus on propaganda and popularization of circular economy laws for businesses, cooperatives, production households and communities to ensure enforcement of economic laws.

Second, Strengthen propaganda and explanation of circular economic development for the whole society. Circular economy is an orientation, strategy, approach and viewpoint but cannot force society to comply and transform. Therefore, propaganda and explanation work must be given top priority to change social awareness. Propaganda about the benefits of Circular Economy for sustainable development. Propaganda in many ways, popularize models, policies and support sources. Regularly and continuously propagate to generations who are operating production, consumption and will operate

production and consumption. Focus on propaganda and dissemination of circular economic laws to enterprises, cooperatives, production households and communities to ensure unified and effective implementation of circular economic laws. - It is necessary to review, unify and link related documents from the past to eliminate expired documents. The documents that are still in effect need to be integrated and linked so that the definitions, phrases, terms, and instructions at different times are consistent with the new documents today. This helps to eliminate misunderstandings in practice about the principles of the Circular Economy.

Third, in the coming time, it is necessary to review and systematize the environmental legal system and the legal system related to the circular economy because this is an issue related to many fields and industries, thereby creating a basis for effective conversion and implementation. To create a basis for unified application, it is necessary to soon develop and promulgate a legal document with high legal effect, with focused and comprehensive regulations on circular economic development issues because this is a new economic model, the transformation faces many difficulties and challenges, so it is necessary to have a comprehensive and synchronous system of policies and promotion tools, with a roadmap, specific goals and tasks (Lai Van Manh, 2024)

Fourthly, new policies stop at the macro level of promulgation, so there need to be detailed steps, concretized through guiding documents. The instructions need to be specific, easy to understand, easy to apply. Implementation documents need to be linked to resources and implementation conditions. Instructions need to be linked to types of production and business such as enterprises, cooperatives, households, ecological industrial parks, urban areas, and consumer groups.

Firth, In order for regulations related to the obligations of producers when using natural resources not to hinder the application of Circular Economy, the relevant agencies need to review the regulations on resource taxes, environmental protection fees, and waste management fees to eliminate inadequacies and overlaps in content related to licenses for natural resources, rights and obligations of organizations and individuals in exploiting and using natural resources (Lai Van Manh, 2024)

Sixth, Encourage and assign responsibility to localities to implement central policies and mechanisms on the one hand, and on the other hand, for longer-term and more sustainable implementation, there should be specific local policies and mechanisms. That helps to develop a more suitable and effective circular economy under the conditions of permitted resources.

Seventhly, Strengthen support for the development of circular economic models for widespread dissemination in each field. Models must be diverse according to the resource characteristics of each industry and each region, not stereotyped in the same form. There should be models in all 4 forms as indicated above so that production and business models from micro to small, large and very large can be replicated.

4. Conclusion

Circular economy was known in Vietnam quite late but has received attention from many sides, especially policies. Based on a preliminary explanation of concepts related to circular economy, the author has summarized 8 circular economy development policies from 2020 to present. The study also points out the successes and limitations in the policy and proposes some recommendations to improve the policy in the coming time.

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SOME EXPERIENCES FOR ENTITIES PARTICIPATING IN INTERNATIONAL PAYMENT ACTIVITIES BY LETTER OF CREDIT IN THE INTEGRATION PERIOD

Dinh Thi Chien[1], Dr. Vu Thuy Linh[2]

Abstract: Letter of Credit (L/C) is a letter issued by a bank at the request of the importer, committing to the exporter to pay a certain amount of money, within a certain time, if the seller presents a set of valid documents, in accordance with the provisions in the L/C. This is one of the safest international payment methods for importers and exporters, because it has the support of established financial institutions such as banks as intermediaries and a certain level of commitment from both sides. beside. The L/C method also balances the interests of both parties and resolves conflicts of distrust between exporters and importers. Although it has many outstanding advantages, L/C is not a perfect and absolutely safe payment method, because this method also has many potential risks.

Using qualitative research method, the author conducted this study to synthesize and understand the causes of risks that Vietnamese enterprises encounter in some import-export transactions, thereby drawing conclusions. provide lessons for other businesses in the market. The results of this study will help business administrators accumulate experience to improve the efficiency of international payment activities during the integration period.

Keywords: risk, L/C, business, banking, international payment.

1. Introduction

Vietnam is one of the countries that proactively integrates economically, when basically forming a network of 17 free trade agreements (FTAs). The FTAs have been and are opening the market door for Vietnam's exports. The increasingly deep opening of international economic integration has been and is opening many trade opportunities for Vietnamese import-export enterprises. Many of Vietnam's export industries are currently in the world's leading position, enterprises are actively promoting new markets, expanding trade relations. Currently, the L/C method is quite popular in international import and export to help both exporting and importing parties feel more secure about their rights. However, besides the benefits achieved, domestic enterprises also have to face fraudulent tricks of offering, purchasing goods, signing international trade contracts with diverse, sophisticated, difficult-to-detect tricks, causing heavy financial losses. Therefore, it is necessary to have lessons learned from international payment activities using L/C method in the context of the global economy facing a series of difficult problems.

2. Theoretical basis of letter of credit method in international payment

International payment by letter of credit (L/C) is a method commonly used by import-export enterprises in international payment transactions. L/C helps optimize cash flow and is considered the safest international payment method for exporters and

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importers. Accordingly, the bank commits to pay the exporter if the seller presents to the bank a set of payment documents in accordance with the provisions of the L/C. The importer is guaranteed by the bank that the goods will be delivered in accordance with the requirements stated in the L/C opening request sent to the bank.

In this method, payment is made through both the exporter and the importer's bank. After confirming the terms and conditions of trade, the importer requests his bank to pay the agreed amount to the exporter's bank. The importer's bank then sends the L/C as evidence of sufficient and legal funds to the exporter's bank. Payment is only made after both parties have met all the stated conditions and the shipment is shipped.

3. Some risky international payment transactions of Vietnamese import-export enterprises

3.1. Risks for export enterprises

(i) Transaction 1: Cashew nut export transaction of T.M Company to UAE partner

T.M Company exported cashew nuts to Bab Al Rehab Foodstuff Trading LLC and Ajman Bank PJSC in Dubai, United Arab Emirates (UAE). In this case, the importer had access to the original set of documents of the shipment when he had only paid 15% of the total value of the shipment, and at the same time cut off contact with T.M Company, leading to the loss of the company's shipments before receiving the full payment. Although the goods had arrived at Jebel Ali port (UAE) and were paid to the importer, T.M Company was not paid the remaining 85% of the shipment. The Vietnamese bank sent 2 telegrams (Swift) to the buyer's bank, Ajman Bank PJSC, requesting payment and return of the set of documents, but this was not done. Through inspection, T.M Company learned that the documents of the shipment had been delivered by DHL to a security officer of Ajman Bank PJSC but did not know where the documents went afterwards. The shipping company confirmed that it had delivered the goods when it had all the required documents.

(ii) Deal 2: Seafood export deal of the company in Vietnam with a New Zealand partner

Dozens of Vietnamese seafood exporting enterprises were scammed by a common foreign partner, Echopack (represented by Jason Brown), into signing a purchase contract but refused to pay. These enterprises tried to contact the partner but the partner blocked the communication. The payment was made through General Equity Bank in New Zealand. The parties agreed that Echopack's signature at General Equity must match Echopack's signature on the commercial contract. However, when the Vietnamese enterprise sent the documents, requesting General Equity to pay, the bank was 100 days late in responding. Then General Equity Bank claimed that the signature on the contract and Echopack's signature at General Equity did not match, so it refused to pay the seafood exporter.

Vietnamese enterprises investigated and discovered that the importer had submitted to the bank a contract with a different signature than the signature on the contract between the two parties. Vietnamese enterprises determined that the importer, Echopack, and General Equity Bank colluded to take the goods and not pay for them. Echopack had the intention to defraud because it used a contract with a different signature than the one signed between the two parties to open an L/C and included a signature clause in the L/C.

General Equity Bank intentionally violated the payment regulations of the L/C. There is information that General Equity Bank in New Zealand closed in 2014 but was still able to open an L/C and transfer electricity to Vietnam.

(iii) Deal 3: Export deal to Canada

The Vietnam trade deal in Canada involves a number of individuals accessing the business registration documents of large Canadian enterprises and using this cover to defraud Vietnamese enterprises. Accordingly, common forms of fraud are direct phone calls, emails (free email extensions such as gmail, hotmail...) or through applications such as Whatsapp, Viber to send business registration documents, even sending bank certificates (accounts, balances); tax payment certificates... to confirm reputation; then exchanging orders, sending contracts (usually requiring CIF prices), fully stamped. When Vietnamese enterprises request to transfer a deposit, the subject will request some type of certificate (usually non-existent) and send a sample of this certificate to the Vietnamese enterprise. The scammers claim that this is a mandatory requirement of the Canadian Government or province or state before transferring money. Then, the subjects will introduce a "lawyer" or broker to support or represent the Vietnamese enterprise to make this certificate at the Canadian public authority. These "lawyers" can proactively contact, state the fee or the scammer himself states the fee, saying that this is a special fee that his enterprise has agreed with the exporting enterprises of other countries, and at the same time uses a free email to provide the account number to transfer the fee, usually around $1000 CAD/certificate (express price within 3 days). When the Vietnamese enterprise is suspicious and suggests deducting this fee directly from the transaction value of the contract, to increase credibility, the scammer also accepts to sign an FOB contract, handle disputes In Vietnam, according to Vietnamese law, 50% payment in advance and the remaining payment upon receipt of documents certifying that the goods have been loaded on board; accepting bank approval letter or standby letter of credit.

Causes of risks for Vietnamese export enterprises when using L/C method:

First, Vietnamese exporting enterprises tend to be subjective, leading to loopholes and lack of rigor when approaching and drafting contracts and falling into the trap of commercial fraud, scams or legal problems.

Specifically, the risk occurs to exporting enterprises when importing enterprises deliberately set traps by including in the L/C regulations one or several requirements that the seller cannot fulfill. In this case, the L/C requires the seller to present, in addition to the Bill of Lading (B/L), a certificate signed and stamped by the shipping company. The problem is that when delivering the goods, the shipping company only issues the signed certificate without the stamp, with the reason being that it is in accordance with the provisions of international law applicable in the field of maritime transport.

Second, some Vietnamese exporting enterprises have put too much trust in brokers: the contract is drafted very simply, lacking many important terms, but the enterprise still accepts it. Fraudsters often offer large orders worth millions of USD, requiring Vietnamese exporting enterprises to pay in advance contract issuance fees, legal fees, and brokerage fees.

Third, these enterprises have also skipped the partner verification step while this is a mandatory requirement when dealing with new partners.

Fourth, although many of Vietnam's export industries are currently leading in the

world, most Vietnamese enterprises are small and medium-sized enterprises, and when risks arise, they lack knowledge and experience in international trade disputes.

3.2. Risks for importing enterprises

The risk only occurs to the importing enterprise when the exporting enterprise falsifies the delivery documents but the bank does not detect it.

(i) PET plastic purchase deal from UAE partner

From January 2024 to February 2024, Vietnamese enterprises signed 3 purchase contracts with UAE partners, with a total purchase volume of 1,000 tons of PET plastic, the contract value was 665,500 USD, delivered in Hai Phong. By March 13, Vietnamese enterprises had paid their partners 526,257 USD. After receiving the deposit, the UAE partner delivered 25 containers of goods. However, after opening the declaration and importing the goods into the warehouse, Vietnamese enterprises discovered that the actual weight of goods in each container was only 15-20% of the invoice.

(ii) Import of raw materials for seafood processing from Pakistani partners

Company A in Vietnam has a need to import raw materials for seafood processing. In May 2024, Company A received a letter offering high-quality seafood raw materials at attractive prices from customer X, a representative of Company Y (in Pakistan). Checking the information on the website address of Company Y (Pakistan), Company A (Vietnam) assessed that this is a large and reputable seafood exporting enterprise in Pakistan. Company A immediately signed a contract and transferred a deposit of 5,000 USD. However, after receiving the deposit, customer X (Pakistan) did not deliver the goods within the contract term and did not clearly answer questions from Company A (Vietnam). Doubting the reliability of customer X (Pakistan), on June 12, 2024, Company A (Vietnam) sent a letter requesting support from the Vietnamese Embassy in Pakistan and the Trade Office.

Causes of risks for Vietnamese import enterprises when using L/C method:

There are no clear regulations on the requirements for delivery time, time for presenting documents after delivery, types of documents to be provided, and validity of documents. In addition, the seller's packaging and delivery process is not closely followed, requiring the L/C issuing bank to retain a certain fee to receive the goods and confirm the stable condition of the goods before making full payment.

3.3. Risks for banks serving export enterprises

Rubber export deal to Pakistani partner

A company in Thua Thien Hue signed a contract to export rubber to Pakistan and agreed with the customer to use the L/C payment method. After delivery, the company completed the payment procedures but the bank serving the importer refused on the grounds that the set of documents did not comply with the regulations. At that time, the company contacted the customer directly, requesting to accept the payment but was also refused.

After trying to sell to a new customer but failing, the company wanted to transfer the shipment back to Vietnam but could not do so because it did not meet the condition of having the approval of the old customer according to the regulations of the host country (Pakistani law only allows the re-export of an imported shipment with a customs declaration if there is approval from the buyer).

Causes of risks for banks serving export enterprises:

In this case, the staff in charge of international payment activities of the bank serving the exporting enterprise was irresponsible in the following situations:

❖ Not fully checked the contents of the L/C

Normally, when receiving an L/C, the international payment officer must carefully study the content down to every dot and comma to determine all the regulations for the payment documents and notify the relevant departments in the company to prepare the required documents. After determining all the regulations of the L/C for the payment documents, the international payment officer must notify all other departments of the company to ensure that the charter contract signed with the shipping line is in accordance with the regulations of the L/C, the insurance contract, the certificate of survey, the certificate of origin, etc. must also be in accordance with the regulations of the L/C.

❖ No experience in international payments

In the above transaction, when the relevant department responded that it was impossible to comply with the L/C regulations, the staff in charge of international payments did not report promptly and suggest that the company's leaders request the customer to adjust the L/C. If the customer does not accept the L/C adjustment, the exporting enterprise is forced to refuse to deliver the goods to avoid the risk of payment refusal. In addition, the staff in charge of international payments did not comply with the time regulations because the L/C stipulates the delivery period and the period for presenting the payment documents at the bank.

❖ No tight control of collateral

The risk of payment via L/C is often skewed towards the exporter (beneficiary) because the enterprise may be rejected for reasons such as invalid documents... or disputes may arise when the parties request to reclaim the deposit. However, in reality, there are transactions in which the bank - the issuer of the L/C - is the party that suffers heavy losses due to not strictly controlling the collateral.

3.4. Risks for banks serving import enterprises

(i) Deal 1: Deal between Khanh An Company and Win Faith Trading Limited (headquartered in Hong Kong)

On January 11, 2017, Khanh An Company signed a contract with Win Faith Trading Limited (headquartered in Hong Kong) to purchase color-coated steel. The contract value is more than 1.5 million USD. To ensure the purchase and import of the shipment, on January 12, 2017, Khanh An Company sent a letter of credit (L/C) to the bank to open an irrevocable letter of credit (L/C) and mortgage the future assets, which are the above color-coated steel shipment. According to the agreement, Khanh An Company is obliged to preserve and maintain the mortgaged assets and can only release them from the warehouse with the written approval of the bank. On the 5th of each month, the company must report in detail the color-coated products released from the warehouse to the bank. In particular, the company is not allowed to sell, exchange, donate, lease, lend, contribute capital to a joint venture of the mortgaged assets or use the assets to secure other obligations, except in cases where the bank has written approval. On January 17, 2017, the bank agreed to open a 180-day deferred payment L/C from the date of the bill of lading and signed a credit contract for Khanh An Company to borrow a maximum of more than 1.2 million USD. By the end of March 2017, Khanh An Company imported a shipment worth 838,539.3 USD. The bank disbursed and paid for the shipment. By the

committed deadline, Khanh An Company had only paid a portion of the interest, with the remaining principal of more than 19 billion VND.

Causes of risks for banks serving import enterprises:

The bank's appraisal officer serving the import enterprise admitted that he did not physically inspect the goods before disbursing and managing them, and did not know where Khanh An Company stored the goods after customs clearance. It was not until the end of 2018 that the bank discovered that the enterprise had sold the goods. In their role of controlling and approving the process of signing and opening L/C and disbursing loans, the head of the credit department and the bank branch director did not control or require credit officers to manage, supervise, and report on the status of the goods. This violated the lending, disbursement, and post-loan inspection procedures, causing the bank to suffer a loss of more than VND 19 billion. *(ii) Deal 2: Deal to buy grouper from Pakistani partner*

Company A (Vietnam) signed a contract with Company Z (Pakistan) to buy 1 container of high quality grouper (mostly size 1000-up) worth 81,900 USD, and paid 71,900 USD. Company Z (Pakistan) delivered the goods but then did not send the delivery documents and cut off communication. In fact, Company Z opened a bank account under the name of a reputable and large-scale import company in the host country, signed a contract with Company A and then withdrew all the advance payment and the goods money that Company A transferred.

Reason:

The bank serving company A made a mistake in international payment operations. Specifically:

- Instead of sending the set of documents to the international payment center of the Pakistan bank as prescribed, the set of documents was sent to the bank branch where the buyer opened an account;
- Instead of sending the set of documents to the Pakistan bank as prescribed, the recipient's name was recorded as the buyer.

Because of these loopholes, the buyer colluded with the director of a Pakistani bank branch in a remote, insecure area to receive the documents without paying the bank and used the documents to receive the goods and then disappeared.

4. Lessons learned for entities participating in international payment transactions

4.1. For export enterprises

First, select and carefully assess the partner's capacity.

In the process of conducting international trade transactions, enterprises need to pay special attention to verifying the information of their partners. The assessment of the partner's capacity includes the business license, ID of the business owner, reputation, financial situation, actual credit capacity, similar contracts signed... In addition, it is necessary to be vigilant with businesses that are new to them or have not yet conducted transactions, and pay attention to checking the reliability when there are orders with prices that are too high or too low compared to the general level. At the same time, when signing a contract with a broker, the exporting enterprise needs to clarify the responsibility of the broker in recovering the goods or the terms of payment of commission. If working with a broker and the seller does not know the information of the buyer, there should be a

clause that "the broker is responsible for verifying the buyer's credibility", these terms need to be strictly and clearly defined in the brokerage contract.

Second, carefully consider the terms before signing the contract.

Exporting enterprises need to pay attention to the provisions on sanctions in the signed contract, taking into account the risks that may arise during the transaction process, and be certain in the contract terms, payment methods, etc. to avoid "traps"; at the same time, negotiate all documents in the contract, limiting additional issues after the contract has been signed. In addition, it is necessary to clearly state in the contract other provisions such as applicable law, applicable court or arbitration, time of transfer of original documents, time of transfer of ownership of the shipment, effective contract term, time of confirmation of goods quality and not accepting complaints about goods quality.

Third, it is necessary to take precautions at the stage of organizing and implementing L/C.

To prevent at the stage of organizing and implementing L/C, exporting enterprises need to:

(i) Carefully study the regulations on L/C payment and regulations on document sets, strictly control the risks that may arise when using L/C, and clearly discuss with the importer about the regulations on the contents shown on the L/C. When the importer sends a draft L/C, it is necessary to carefully check the information mentioned on the L/C to avoid the situation where the importer adds unfavorable information.

(ii) Based on the reasonable time to prepare documents for negotiation on the day of opening the L/C, limit opening too early or opening on the day the goods are loaded on the ship if the exporter has not yet prepared the L/C.

(iii) Clearly confirm the importer's L/C issuing bank: The reputation of the bank should ask the bank to notify the service for further consultation.

(iv) Choose a suitable payment method:

It is necessary to study international principles and practices to clearly understand the roles and responsibilities of the parties involved, thereby considering the selection of reasonable payment methods and conditions, ensuring the interests of the enterprise, and at the same time purchasing exchange rate insurance to prevent complicated and unpredictable exchange rate fluctuations. In addition, it is necessary to clearly understand the terms of the contract and study and supplement strict payment terms, recommend that partners use irrevocable L/Cs opened at reputable international banks, and at the same time limit customers from paying late.

(v) Prepare complete documents, when making L/C payment, need qualified personnel to avoid the case of amending L/C many times, only deliver goods to the importer when receiving the officially issued L/C. In addition, when the partner opens L/C, it is necessary to request the Vietnamese bank to check the authenticity of the L/C before delivering the documents, and at the same time verify the reliability of the partner's payment through the representative agencies of Vietnam in their country.

(vi) Take advantage of the bank's document discounting service to avoid risks at the lowest level.

Fourth, it is necessary to improve knowledge about transactions in import and export activities.

Exporting enterprises need to join international associations to update information

and receive warnings about common or newly emerging forms of fraud and trade fraud. At the same time, they need to enhance professional training, knowledge of law, trade, international finance, and international transaction skills to improve their capacity in international trade transactions and avoid unwanted losses.

Fifth, buy export insurance for goods.

Export cargo insurance helps businesses be insured against risks that may cause losses and costs incurred for goods such as collisions, fires, explosions, rough seas, storms, general average sacrifice, loss of goods, etc. during international transportation. In particular, the combination of domestic and export cargo insurance in the same insurance policy will help customers save time, effort, speed up procedures and reduce costs. Participating in export cargo insurance, free support and advice on cargo insurance including support for looking up ship information will be a useful information channel to help customers use appropriate insurance terms and conditions, preventing potential disadvantages related to the transport vessel, especially for high-value full-trip shipments.

4.2. For import enterprises

To limit risks when using L/C in international payments, importing enterprises need to:

(i) Clearly specify requirements on delivery time, time for presenting documents after delivery, types of documents to be provided, validity of documents

(ii) Add a contract performance guarantee clause (Performance Bond)

Performance Bond - the contract performance guarantee will be a solution to ensure the performance of the seller's obligations after the import process is completed, corresponding to the deposit of the buyer. The seller/exporter's compensation and penalty obligations will be guaranteed by a reputable commercial bank, committed to paying on behalf of the seller/exporter all obligations arising in the event of a breach even after the import process has been completed. On that basis, all compensation and contract penalties become feasible and certain. This is a quite effective choice for Vietnamese enterprises because it not only ensures the performance of compensation and penalty obligations but also other responsibilities of the seller/exporter to the buyer/importer such as: compliance with quality standards, deposit refund, on-time delivery, etc. The advantage of the contract performance guarantee clause is transparency, objectivity and safety because of the participation of a third party - a reputable bank with financial capacity. However, reaching an agreement on this guarantee clause is not easy. Because the seller will have to consider the profit compared with the bank fees and the interest that they have to bear from the amount that the bank has paid on their behalf. Therefore, the most optimal solution for Vietnamese enterprises is still to carefully assess the capacity, legal documents of the partner and imported goods to reduce the possibility of being detected in violation by the post-clearance inspection procedures of competent state agencies. (iii) Use a backup L/C, confirm payment to ensure the buyer's rights in case the seller fails to deliver the goods as required

(iv) Closely monitor the seller's packing and delivery process, request the L/C issuing bank to retain a certain fee to receive the goods and confirm the stable condition of the goods before making full payment.

4.3. For banks serving export enterprises

After the exporting enterprise submits the payment documents to the bank (this is

the payment bank in the seller's country, often called the Notifying Bank), this bank is responsible for checking the documents. If the documents comply with the regulations of the L/C, it will proceed to pay the seller and send the documents to the L/C opening bank and request the L/C opening bank to refund the amount paid to the enterprise. During this entire process, the notifying bank needs to:

(i) Carefully control the contents of the regulations on the L/C regarding the payment documents

(ii) Strictly manage the regulations on the L/C in cases of violation, it will refuse to pay if there is no other request from the L/C issuer

(iii) Require the L/C issuer to have collateral, mortgage, and control of collateral must be carried out in accordance with strict procedures to minimize bad debts to the bank.

(iv) Protecting the interests of enterprises is also the bank's responsibility towards customers and contributes to building the bank's reputation. Therefore, L/C payment should be assigned to experienced and reputable banking specialists.

4.4. For banks serving import enterprises

Nowadays, international economic integration leads to an increasing demand for international payment transactions. Therefore, providing good quality services helps retain old customers while attracting new customers, contributing to increasing productivity, expanding market share, reducing operating costs, and improving financial efficiency and bank profits. To limit risks in the payment process, banks serving import enterprises need to:

(i) Continuously improve processes and technology to optimize customer experience when using the service.

(ii) Organize training courses to improve the qualifications of bank staff performing international payment activities. Staff need to be fully equipped with information about products, services and the ability to advise and support customers professionally.

(iii) Listen to customer feedback and use this information to improve their services. This can be done through direct contact with customers, conducting surveys or using customer feedback tools to evaluate and improve the quality of international payment services.

5. Conclusion

Up to now, Vietnam has signed a total of 15 Free Trade Agreements (FTAs), helping to open the door to enter large markets around the world, thereby creating a solid foundation for Vietnam's export growth. The remarkable growth of international trade in recent years has led to the diversification of international payment methods suitable for Vietnam's import and export transactions with trading countries around the world, in which L/C is a commonly used payment method. However, besides the advantages of L/C, Vietnamese enterprises also face many risks when using this payment method when participating in trade transactions with foreign partners. Therefore, based on a synthesis of some risky transactions in international payments using L/C, the article has deeply investigated the causes of risks and drawn useful lessons for export and import enterprises, banks serving export enterprises, and banks serving import enterprises to limit risks during operations.

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ENHANCING STATE MANAGEMENT EFFICIENCY TO FURTHER IMPROVE THAI BINH'S INVESTMENT ENVIRONMENT IN THE NEW CONTEXT

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Abstract: Investment environment not only plays an exceptionally important role in promoting investment but also contributes to the socio-economic development of Thai Binh province. An improved investment environment is likely to help businesses invest effectively, forecast market development and competitors, as well as make reasonable decisions to increase their value. To improve its investment environment, Thai Binh province has always been responsible for both building and managing the investment environment with the aim of creating favorable conditions for market development, maintaining discipline, ensuring that the market operates within regulations and laws, and encouraging market participants to engage constructively. Therefore, it helps the market operate on the principles of fairness, integrity, and efficiency. The article analyzes the current situation of state management regarding investment environment improvement in the province, thereby evaluating successes and limitations, laying foundations for the proposal of feasible solutions for further improving the investment environment in the new context, contributing to sustainable economic development in Thai Binh province.

Key words: Competitiveness, Business Environment, State management, Investment attraction, Management efficiency.

1. Introduction

Thai Binh is a coastal province located in the Red River Delta, within the influence of the Hanoi-Hai Phong-Quang Ninh economic growth triangle. Thai Binh has a gas field in Tien Hai, which has been exploited since 1986 with an average annual production of tens of millions of cubic meters of natural gas used for producing porcelain, glass, ceramic tiles and white cement in the Tien Hai industrial zone. The soil in Thai Binh is fertile for being enriched by the sedimentation of the Red River and Thai Binh river systems. In addition, the province has an advantageous irrigation and drainage system. The total natural area is 153,596 hectares. According to the 2023 population and housing census, Thai Binh has a population of around 1,883,200 people, ranking fourth among 11 provinces and cities in the Red River Delta. In particular, the working-age population accounts for 52.16% of the total population, with the highest proportion of 46.98% working in the construction industry. Moreover, the transport infrastructure connecting Thai Binh with other provinces and cities in the region has received significant attention and investment, with efforts to complete it quickly. Meanwhile, industrial infrastructure in the Thai Binh Economic Zone has been focused on with full resources for investment. The province has attracted and selected reputable investors with the capacity and experience to invest in the construction and development of the Thai Binh Economic Zone.

In recent years, the People's Committee of Thai Binh province has paid great

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attention to improving the investment environment, continuing to implement the Party and State's policy of developing the economy while strengthening and ensuring national defense and security and always maintaining public order and social safety. Despite many difficulties and challenges, Thai Binh has continuously made efforts to reform administrative procedures, apply scientific - technological advances and digital transformation to production and business operations. The province has also developed policies and mechanisms to attract and offer investment incentives, as well as support businesses to improve the investment environment in the province. Therefore, Thai Binh has always been an attractive destination for investors, contributing to making Thai Binh one of the leading localities in terms of economic growth in the Red River Delta region.

However, alongside the general context of the economy still facing many difficulties with fluctuations from both the global and domestic economies, the growth of industrial production value is not yet sustainable, ranging from state-owned enterprises, foreign-invested enterprises, individual household economies to sectors producing metal products, construction materials, and ceramics. With the perspective of always accompanying businesses, Thai Binh province has consistently implemented many policies to improve the investment environment, helping to support business development. It continues to consider the removal of barriers and difficulties for businesses as an important task, while improving the synchronized and modern socio-economic infrastructure system, promoting regional linkages to lay the foundation for attracting investment and developing the local economy.

The article "Enhancing state management efficiency to further improve Thai Binh's investment environment in the new context" is urgent to further clarify the economic values achieved once investment environment is improved.

2. Research methodology

The article uses qualitative research methods to analyze secondary information on socio-economic issues, management policy mechanisms, and the results achieved in the province's management efforts to improve the investment environment.

It also employs statistical, analytical, and comparative methods to assess state management practices aimed at improving the investment environment from 2021 to 2023. The research results from these methods contribute to forming a picture of Thai Binh's investment environment during the integration process. The quantitative data will reflect economic results, serving as an important basis to identify strengths that need to be further promoted as well as limitations that need to be addressed in the future. Moreover, these results provide objective evidence to propose specific, practical, and suitable solutions to enhance the effectiveness of state management in continuously improve the investment environment in Thai Binh province in the coming time.

3. The current situation of state management to improve the investment environment in Thai Binh province

As of 2020, for five consecutive years, Thai Binh was one of the leading provinces in the Red River Delta region in terms of economic growth rate. In 2020 alone, due to the severe impact of the COVID-19 pandemic on nearly all sectors, the province's economic growth rate only reached 3.2% - the lowest growth rate in recent years, but still above the national average. From 2021 to 2023, Thai Binh has consistently maintained a fairly strong growth rate within the region.

Table 1: Thai Binh's economic growth rate during 2021 - 2023

Year	2021	2022	2023
GRDP growth rate (%)	6,68	9,52	7,37
Ranking compared to the country	14/63	22/63	20/63
Ranking compared to Red Delta River region		8/11	7/11

(Source: Thai Binh Statistical Office)

In terms of road and waterway transportation, Thai Binh is among the provinces whose networks have the earliest and most rapid development nationwide. Regarding waterway transportation, with a 54 km coastline, the Diem Dien port and five major rivers, the province's road network has a total length of over 9,300 km, including 151 km of national highways with four routes and 25 bridges; provincial roads are over 340 km long with 34 routes, making it convenient for social welfare and production as well as attractive to FDI investors.

Regarding industrial zones, according to Decision No. 1735/QD-TTg dated December 29, 2023 of Prime Minister approving the master plan for Thai Binh province for the 2021-2030 period with a vision to 2050, Thai Binh province is projected to have10 industrial zones (IZs) with a total area of 2,560 hectares, a 2.1-time increase compared to the 2017 period. Among these, 6 industrial zones have been put into operation with a total area of 1,146.79 hectares, and the Thaco - Thai Binh industrial zone is expected to operate in 2025.

For the period 2024-2030, Thai Binh plans to develop 24 new industrial clusters with a total area of 1,674 hectares. They are considered as supporting areas for current industrial clusters, attracting small and medium-sized enterprises to invest, thereby creating an industrial network with a complete and economic- efficient supply chain.

Table 2: Statistics of industrial zones and economic zones in Thai Binh province in 2023

No.	Industrial/ Economic Zones	Address	Area (ha)	Note
1	Phuc Khanh	Thai Binh city	159,03	
2	Nguyen Duc Canh	Thai Binh city	75,06	
3	Tien Hai	Tien Hai district	466,00	
4	Gia Le	Dong Hung district	84,70	
5	Cau Nghin	Quynh Phu district	211,52	
6	Song Tra	Thai Binh City	150,48	
7	Thaco - Thai Binh	Quynh Phu district	194,36	Projected to operate in 2025
8	Economic Zone	Thai Thuy & Tien Hai district	30.583	
8.1	Lien Ha Thai Industrial Zone (Green iP-1)	Thai Thuy district	588,84	Pioneering, key IZs within the EZs, currently in the infrastructure construction phase.
8.2	Hai Long Industrial Zone	Tien Hai district	296,97	Approved by Prime Minister for new

8.3	VSIP Thai Binh Industrial Zone	Thai Thuy district	333,40	construction

(Source: Decision No. 1735/QD-TTg dated December 29, 2023 by Prime Minister)

Recognizing industrial development as one of the four pillars of growth in the socio-economic development of the province, Thai Binh has been focusing on building road networks connecting economic zones, industrial zones and industrial clusters. Notable projects include the coastal road project running through Thai Binh province with over 43 km and the investment project to construct trunk roads connecting with functional zones in the Thai Binh Economic Zone (connecting trunk road). This is a large-scale project, spanning across three districts: Thai Thuy, Tien Hai, and Kien Xuong. With a total estimated investment of over 2,500 billion VND, the project is prioritized for investment to lay the foundation for the construction, formation and development of the economic zone in the coming years.

3.1. Several policies to attract investment in Thai Binh

According to Decision No. 13/2020/QD-UBND dated June 29, 2020 by the People's Committee of Thai Binh Province, some investment incentives and support policies in the Thai Binh Economic Zone for the period 2020-2030 are as follows:

(1) Land Incentive Policies (Article 4)

The State leases land on an annual payment basis without using the auction method as prescribed by law. The annual land lease rate is determined by multiplying the percentage (%) by the specific land price used to calculate the land lease payment. The land price adjustment coefficient to determine the specific land price is issued annually by Province People's Committee based on the location, area and road section corresponding to each land use purpose. It is publicly announced during implementation and applied starting from January 1st of each year.

(2) Infrastructure Support Policy to the Fence Line (Article 5)

Thai Binh Province invests in the construction of the road system and the treated sewage drainage system up to the fence line of industrial zones and other functional areas within the Thai Binh Economic Zone. The province facilitates investors in construction to ensure the complete provision of electricity, communication and water supply system up to the fence line of the industrial zones and other functional areas within the Thai Binh Economic Zone.

(3) Land Reclamation Support Policy (Article 6)

The province provides financial support for land reclamation at a rate of 40,000 VND/m² for investment projects in industrial zones, industrial clusters, high-tech projects, and high-tech product manufacturing projects with a total investment capital of 200 billion VND or more (excluding working capital). The support is increased to 80,000 VND/m² for the total area of land to be reclaimed. The province supports investors for a period of 5 years, starting from the date the investor submits a request and meets the necessary conditions to receive the support.

(4) Support Policy for the Construction of Centralized SewageTreatment Systems in Industrial Zones and Industrial Clusters (Article 7)

Investment projects for the construction of centralized sewage treatment systems in industrial zones and industrial clusters will receive 50% support for the investment costs of building the sewage treatment system with the following limits: no more than 7 billion

VND for an industrial cluster, no more than 20 billion VND for an industrial zone with an area of less than 300 hectares, no more than 25 billion VND for an industrial zone with an area from 300 hectares to less than 500 hectares and no more than 30 billion VND for an industrial zone with an area of 500 hectares or more. The support will be provided to investors within 5 years from the date the investor submits a request and meets the necessary conditions to receive the support.

(5) Labor Training Support Policy (Article 8)

Enterprises will receive support if they are eligible to submitting their plan and support request to the Management Board of the Thai Binh Economic and Industrial zones. The support applies to employees hired after January 1, 2020, who are enrolled in social insurance, have complete documentation as per the guidelines of the relevant authorities, and have a commitment to employ workers for 60 months or more between the employer and the employee.

The workers who are permanent residents of Thai Binh province with self-taught vocational skills (at least at the intermediate level) and are working at a company in the Thai Binh Economic Zone will receive training support of 5 million VND per person. This funding is directly provided to the employee. Each worker is eligible for support only once under this policy.

(6) Administrative Procedure Support Policy (Article 9)

Enterprises with investment projects in the Thai Binh Economic Zone will be supported in carrying out administrative procedures related to investment, business, land, construction, environment, labor and trade through the "One-stop-shop" mechanism at the One-stop Administrative Center of the Management Board of the Thai Binh Economic and Industrial Zones.

Investors will be able to complete administrative procedures efficiently through a single point of contact, available 24 hours a day, 7 days a week.

3.2. Results of improving the investment environment in Thai Binh province

In recent years, despite facing many difficulties and challenges, Thai Binh has consistently made efforts to reform administrative procedures, apply scientific-technological advances and digital transformation to production and business, and develop mechanisms and policies to attract and offer investment incentives, as well as support businesses to improve the investment and business environment in the province. Currently, the province provides a total of 1,607 public services, including 1,006 full-process public services and 601 partial public services. Departments, sectors and localities have reviewed, simplified and reduced an average of 40% of the time required to complete administrative procedures, creating maximum convenience for residents and businesses. Investment attraction and business development in local areas have shown significant positive changes.

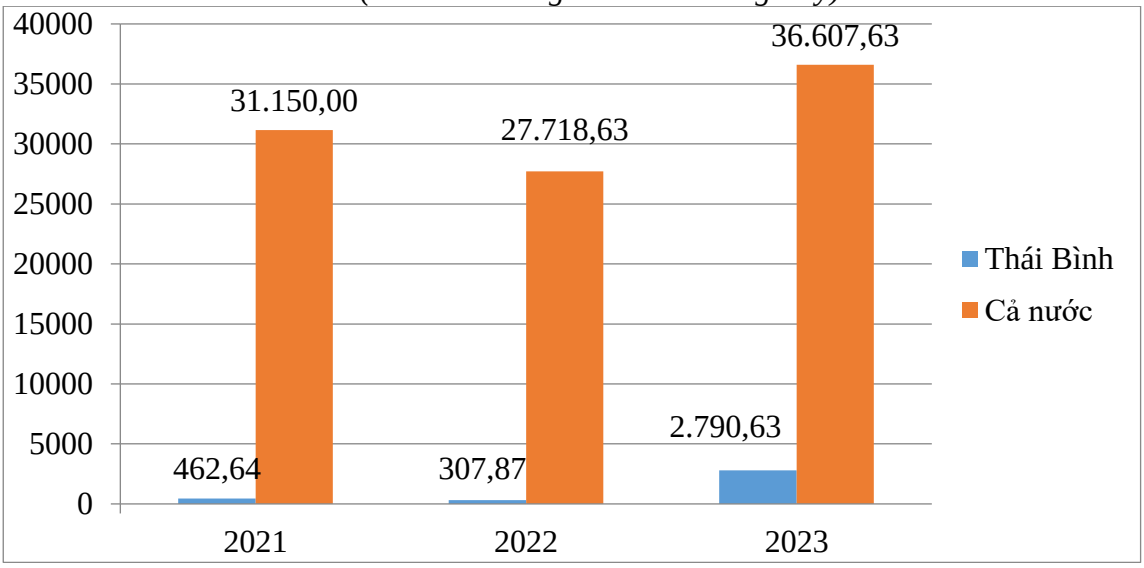
Investment attraction activities, especially foreign direct investment attraction (FDI), only truly began in Thai Binh in the early years of the 21st century. Since the first project was introduced to the province, the total FDI attracted by the province had reached nearly 800 million USD by 2020. Thai Binh's FDI attraction started to show positive signs from 2021 and saw significant growth in the following years.

Table 3. Viet Nam and Thai Binh's FDI attraction during 2021-2023

Year	Number of projects	Registered capital (million USD)

	Thai Binh	Viet Nam	Percentage (%)	Thai Binh	Viet Nam	Percentage (%)
2021	5	1,738	0.28	462.64	31,150.0	1.48
2022	8	2,036	0.39	307.87	27,718.13	1.11
2023	34	3,188	1.07	2,790.63	36,607.63	7.62
Tổng	**47**	**6,962**	**0.67**	**3,561.14**	**95,475.76**	**3.73**

(Source: Foreign Investment Agency)



Graph 1. Viet Nam and Thai Binh's FDI registered capital during 2021-2023

Soon after the Government issued Resolution No. 01/NQ-CP dated January 6, 2023, the People's Committee of Thai Binh Province issued Action Program No. 01/CTHĐ-UBND dated January 20, 2023. Accordingly, the province has accelerated the implementation of administrative reform programs, focusing on removing "bottlenecks" and "obstacles" in attracting investment to develop manufacturing and business in a practical and effective manner, creating the most favorable conditions for businesses and investors. Investment attraction activities have been closely monitored and guided by the province with a unified approach from the Provincial Party Committee, the Provincial People's Council, the Provincial People's Committee to local government levels. The province has issued and implemented many mechanisms and policies to encourage and support investment attraction while reviewing and adjusting fields and industries for investment in industrial zones and clusters to align with practical conditions. Promotional activities to introduce the environment, policies, potential and investment opportunities have been flexibly implemented, and the Provincial People's Committee is always proactive in engaging with investors and inviting investment. The province is ready to accompany businesses throughout the project implementation process.

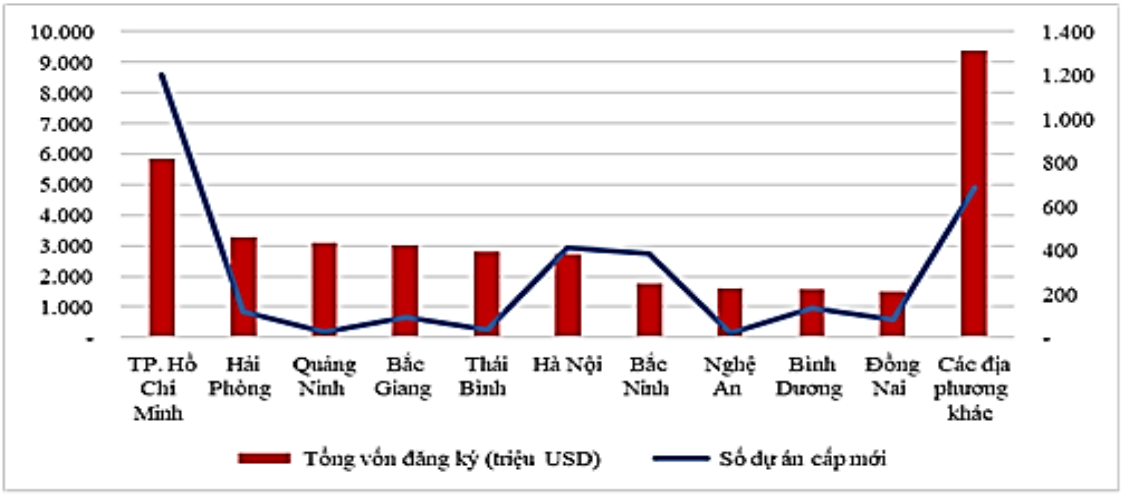
Therefore, the year 2023 marked a breakthrough with impressive results: for the first time in history, Thai Binh province joined the 'billion-dollar' group in attracting foreign direct investment (FDI) with a total investment of 98,256.6 billion VND, 4.6 times higher than in 2022, ranking 5th nationwide (Table 5.3). The province has attracted several large and particularly significant projects such as: the VSIP Industrial Park project (investment capital of 212 million USD); the Pegavision factory project (investment capital of 200

million USD); the beverage production plant project by a South Korean investor in the Lien Ha Thai Industrial Park, Thai Thuy district with a total investment of 100 million USD; the project for manufacturing switches, connection devices, and computer equipment with a total investment of 45 million USD by Goodway Cayman Co., Ltd.; the factory project for manufacturing and assembling LED lights and LED components with a total investment of 25 million USD by Longstar Lighting Ha Mon Co., Ltd... Notably, in 2023, Thai Binh marked the milestone of the LNG Gas Power Plant project with a total investment of 1.99 billion USD by a consortium of Tokyo Gas, North Kyuden Electric Power Company (Japan), and Truong Thanh Group (Vietnam). This project is of great significance as it will promote the socio-economic development of the province enhance the scale of the economy and elevate the province's position while contributing to ensuring national energy security.

Table 4. Top 10 provinces and cities with the highest FDI total capital in 2023

No.	Provinces & Cities	Number of approved projects	Total registered capital (million USD)
1	Ho Chi Minh city	1,202	5,851.95
2	Hai Phong	119	3,262.31
3	Quang Ninh	26	3,110.57
4	Bac Giang	92	3,015.64
5	Thai Binh	34	2,790.63
6	Ha Noi	408	2,732.98
7	Bac Ninh	384	1,769.74
8	Nghe An	19	1,603.29
9	Binh Duong	136	1,573.93
10	Đong Nai	85	1,514.18
11	Others	683	9,382.40

(Source: Foreign Investment Agency)



Graph 2. FDI investment structure by locality in 2023

Investment attraction in Thai Binh has gradually shifted from "quantity" to "quality", meaning it has moved from a passive mechanism to an active one, focusing on preventing,

controlling and monitoring the environment of investment projects.

Thai Binh province focuses on prioritizing investment in the following sectors: manufacturing and processing mechanical equipment, components, and electronic parts; manufacturing supporting industrial products; constructing industrial park and industrial cluster infrastructure; developing high technologies and high-tech products; investing in the construction and operation of infrastructure for industrial parks, industrial clusters, and their centralized sewage treatment systems; large-scale industrial projects applying modern technologies with minimal environmental impact; investment projects in trade and services including building wholesale markets for agricultural products and food, grade 1 markets, grade 1 and grade 2 supermarkets, grade 1, 2, and 3 shopping centers; hotels, resorts, and entertainment areas that meet the standards set by current government regulations; agricultural projects applying high technology as specified in Decision No. 738/QD-BNN-KHCN dated March 14, 2017 of the Ministry of Agriculture and Rural Development on criteria for determining hi-tech and clean agriculture programs and projects and the list of high technologies applied to agriculture.

Additionally, Thai Binh province has identified and prioritized key areas such as the coastal districts of Tien Hai and Thai Thuy - focusing on attracting investment for the construction and operation of industrial park (IP) and industrial cluster (IC) infrastructure, and coastal economic zones; Thai Binh city and surrounding areas - attracting investment projects in the fields of commerce, tourism, education and training for high-quality human resources, clean industry, and hi-tech agriculture.

Regarding investment partners, Thai Binh province focuses on attracting large investors with strong potential and experience, particularly multinational corporations from EU member countries, the United States, Japan, South Korea, etc., aligning investment sector priorities with investment partners.

4. Evaluation of successes and limitations

4.1. Successes

Recently, Thai Binh province has continuously made efforts to remove the "bottlenecks" related to legal policies, creating a favorable, transparent, equal, safe and friendly business and investment environment for enterprises.

The development and improvement of the tax incentive system and other preferential policies have had a very positive impact on the socio-economic development of the province. The structure of industries has undergone positive changes with strong growth, contributing significantly to solving employment issues, shifting the labor structure, increasing productivity and improving inhabitants' living standards.

The strengthening of tax incentive policies for investment projects in certain industries, areas, and investment scales has created favorable conditions for enterprises to increase capital accumulation, expand production and promote economic growth in Thai Binh province over the past years.

The number of businesses that have registered for taxes and are currently operating has increased over the years thanks to preferential policies for industrial zones. The number of industrial zones in Thai Binh has significantly increased.

FDI flows into Thai Binh have continuously grown, making a significant contribution to the provincial socio-economic development and budget revenue.

4.2. Limitations

Although Thai Binh is an attractive destination for foreign investors and the results of attracting investment have increased over the years, the FDI attraction still does not correspond to the province's potential and strengths. The majority of FDI enterprises operate on a small and medium scale regardless of capital, labor, or revenue.

In addition, the FDI capital flowing into Thai Binh lacks sustainability and still overdepends on a few large-scale projects. The proportion of FDI attracted into various industries and localities is uneven.

The investment and business operations of enterprises in the province have faced many difficulties due to the aftermath of the Covid-19 pandemic, disruption of many supply chains, rising energy prices, some raw materials, increased interest rates, and prolonged inflation, which pose significant challenges to enterprises' production and business recovery in general.

The investment incentive policies in Thai Binh are not diverse, focusing mainly on incentives based on income while there are hardly any incentives based on expenses. As a result, they have not effectively encouraged substantial investments with long-term benefits.

There are still legal obstacles regarding investment procedures (There are no transitional provisions for projects that were approved by competent state authorities before the Investment Law 2020 came into effect).

The implementation of inspection, audit, supervision and administrative penalties as for legal violations of businesses during the investment project implementation is still limited and poorly effective. The inspection and punishment of industrial zones are still inadequate as their management boards are responsible for monitoring and supervising investment projects. However, upon the discovery of violations, they do not have the authority to handle them directly, but report, collaborate with other agencies, or request the Provincial People's Committee to review.

5. Some solutions to enhance state management effectiveness to continue improving the investment environment in Thai Binh province in the new context.

Continue to promote administrative reform, especially in the areas of investment, construction, planning and land management; create favorable conditions for businesses to easily access information and attract investment. Regularly listen, understand and promptly address the difficulties and obstacles faced by the business community. Strengthen communication about administrative reforms, as learned from lessons, focusing on practical challenges and difficulties, effective solutions and international experience in administrative reform.

In addition, continue to complete the system of synchronous and modern socio-economic infrastructure, promote regional linkages to lay a foundation for attracting investment. Focus on planning and investing in developing industrial zone and industrial cluster infrastructure. Furthermore, investment activities should be aligned with the goal of sustainable development, prioritizing high-quality projects, products with added value and high competitiveness. Specifically, this includes modern technology-based supporting industries, environmentally friendly activities, research and development, financial services, banking, high-tech agriculture, and urban infrastructure development.

Continue to create a favorable environment to mobilize and attract social capital for development investment. Implement a coordinated approach to establish an investment

environment, complete mechanisms and policies to attract investment, and encourage industrial development.

Promote comprehensive and synchronized digital transformation associated with the development of digital government with a focus on citizens and businesses. Regularly review, promptly detect and strictly handle violations by organizations and individuals, while enhancing the accountability of public officials, civil servants and employees in fulfilling their duties, ensuring no difficulties or inconvenience for citizens and businesses.

Continue to strengthen and improve the quality of service activities that support socio-economic development such as insurance, finance, banking, healthcare, education, postal and telecommunications, electricity, water… and industrial support services.

Encourage and attract businesses and economic sectors to invest in the construction and operation of in industrial zone and cluster infrastructure according to the approved planning. Complete and effectively leverage local advantages; prioritize the development of industries such as electronics, mechanics, software, textiles, supporting industries, and other processing industries...

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GREEN GROWTH IN VIETNAM: BARRIERS TO OVERCOME

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Summary: The primary objective of the article is to study green growth policies, assess the current state of Vietnam's socioeconomic development in the context of green growth, and identify the barriers that Vietnam must overcome. Based on this analysis, the article will propose several solutions to promote green growth and contribute to the sustainable development of Vietnam and the world at large

Keywords: *Green growth, green economy, Vietnam*

1. Introduction

Green growth has emerged as a global priority, especially in Vietnam. This approach balances economic prosperity with environmental sustainability, enhancing quality of life while reducing emissions. It also builds resilience against climate change and pandemic Covid-19. Countries, regions, and localities worldwide now recognize the need to align development with this trend, ensuring a more sustainable and resilient future for all.

After nearly 40 years of renovation, Vietnam's development has been remarkable, from one of the poorest countries in the world to a low-middle-income country. From 2002 to 2023, GDP per capita increased 6.83 times, reaching over 4,284 USD in 2023. However, economic growth so far consumed Vietnam's natural capital at an unsustainable rate, leading to a gradual depletion of natural resources.

In addition, Vietnam is one of the most vulnerable countries to climate change in the world. Climate change is increasingly disrupting Vietnam's economy, impacting human health, livelihoods and ecosystems. Therefore, Vietnam's pursuit of green growth is the right direction in line with the objective trend and development orientation of many countries around the world.

2. Research Methodology

This study employs a qualitative research method to analyze secondary data on green growth and green economy issues in various countries worldwide, along with examining the actual situation in Vietnam.

Quantitative methods such as statistics, comparison, analysis, and synthesis are utilized to assess Vietnam's green growth performance during the period from 2011 to 2020 and the early years of 2021-2030. The evaluation will focus on identifying achievements, challenges, and obstacles encountered in Vietnam's green growth journey. Based on the findings of this assessment, the research team will propose solutions to

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promote green growth and contribute to the sustainable development of Vietnam and the global community.

2. Discussion content

2.1 Definition of Green Growth

Currently, green growth is defined by many different organizations.

According to the United Nations Commission on Socio-Economic Affairs in the Asia-Pacific Region (UNESCAP, 2012), green growth is an economic process that creates sustainable development in the environment, low carbon content and social inclusion. Green growth consists of 6 main contents: (1) Sustainable production and consumption; (2) Greening the market and production and business activities; (3) Building sustainable infrastructure; (4) Tax reform and green banking; (5) Private, financial protection of nature and ecosystems; (6) Develop and implement ecological efficiency indicators.

According to the United Nations Environment Programme's Green Economy Initiative, green growth is the process of restructuring economic activities and infrastructure to get better results from investments in finance, human resources and finance, and reduce greenhouse gas emissions, Exploit and use fewer natural resources, generate less waste, and reduce social injustice. Green growth is not only the integration of environmental issues in economic development, but it has been understood more deeply, referring to balanced development, harmony between goals (UNEP, 2008).

According to the European Union, green growth is building a highly competitive economy, using financial efficiency, taking advantage of Europe's pioneering position in the development of new processes and technologies, including green technology, extensive application of smart grids, etc use information technology, take advantage of the EU-wide network and strengthen the competitiveness of small and medium-sized enterprises in business, as well as support customers to properly assess the importance of saving resources.

Meanwhile, the World Bank (WB) believes that green growth is effective in the use of natural resources, minimizing pollution and environmental impacts, being able to adapt to natural hazards and the role of environmental management and natural capital in natural disaster prevention...

Thus, it can be said that green growth is economic growth associated with the transformation of a growth model based on science and technology and innovation, environmental sustainability and social justice.

2.2 Vietnam's green growth policy

Vietnam embraces sustainable development, balancing economic, social, and environmental concerns. The country's National Strategy on Green Growth yields notable achievements, aligning with global climate change efforts. This comprehensive approach bolsters Vietnam's progress while contributing to international environmental initiatives.

To lay the groundwork for a more sustainable economy, the Prime Minister has rolled out two national strategies on green growth. These strategies are tailored for two distinct eras: the first covers 2011 to 2020, while the second looks ahead to 2021 to 2030. During the 2011-2020 phase, various mechanisms have been established to bolster the Green Growth Strategy. This support framework features: (1) Clear policies and guidelines from the Party, alongside laws and resolutions set forth by the National Assembly; (2) Specific resolutions and decrees from the Government, enriched by circulars and directives. Together, these elements form a cohesive approach to fostering a greener future.

On September 25, 2012, the Prime Minister issued Decision No. 1393/QD-TTg approving the National Strategy on Green Growth for the period 2011-2020 with a vision to 2050. In particular, two strategic tasks are proposed: (i) greening production; implement a clean industrialization strategy through reviewing and adjusting existing sectoral planning; economical and efficient use of resources; encourage the development of green technology and green agriculture; (ii) greening lifestyles and promoting sustainable consumption; combining a beautiful traditional lifestyle with modern civilized means.

Subsequently, on March 20, 2014, the Prime Minister issued Decision No. 403/QD-TTg approving the National Action Plan for Green Growth for the period of 2014 - 2020, in which, 4 main topics were proposed, including: (1) Building institutions and green growth plans in localities; (2) Reduce the intensity of greenhouse gas emissions and promote the use of clean and renewable energy; (3) Greening production; (4) Implementing green lifestyles and sustainable consumption, with 66 activities assigned to ministries, sectors and localities.

With the viewpoint "Green growth is an important method to implement sustainable development; Green growth is people-centered, helping to reduce human vulnerability to climate change; encourage the responsible lifestyle of each individual to the community and society, orient future generations on a green living culture, form a civilized and modern society in harmony with nature and the environment; Green growth is oriented to invest in advanced technology, digital transformation, smart and sustainable infrastructure; creating motivation for private investment to play an increasingly important role in the green economy..." on October 1, 2021, the Prime Minister signed Decision No. 1658/QD-TTg approving the national strategy for green growth for the 2021-2030 period, with a vision to 2050. The general objectives set out in the Decision are: "Green growth contributes to promoting economic restructuring in association with the renewal of the growth model, in order to achieve economic prosperity, environmental sustainability and social justice; towards a green, carbon-neutral economy and contribute to the goal of limiting the increase in global temperature". In order to achieve the general objectives, specific targets for each period 2021-2030 and the vision to 2050 refer to the contents of: Reducing the intensity of greenhouse gas emissions per GDP; Greening economic sectors; Greening lifestyles and promoting sustainable consumption; Greening the transition process on the principle of equality, inclusiveness, and improving resilience.

Specifically, to operationalize the Green Growth Strategy, the Prime Minister has issued Decision No. 882/QD-TTg dated July 22, 2022 approving the National Action Plan on Green Growth for the period 2021 - 2030. Accordingly, the Green Growth Action Plan includes 18 themes, 57 groups of tasks and activities and 134 tasks.

At the 26th Conference taking place from November 1 to 12, 2021 (Glasgow, Scotland, United Kingdom) of the parties to the United Nations Framework Convention on Climate Change (COP26), Vietnam committed to developing and implementing strong measures to reduce greenhouse gas emissions with its own resources, along with the cooperation and support of the international community to strive to achieve net zero emissions by 2050.

Resolution No. 29-NQ/TW dated November 17, 2022 of the XIII Party Central Committee on continuing to promote the country's industrialization and modernization to

2030, with a vision to 2045, has determined that the core content of the industrialization and modernization process in the 2021-2030 period is "promoting the strong application of science and technology, innovation, especially the achievements of the Fourth Industrial Revolution, creating breakthroughs in productivity, quality, efficiency and competitiveness of sectors, fields and the whole economy; implement comprehensive, substantive, effective and sustainable digital transformation; improve the capacity of autonomy in production, technology and market, protect and promote the domestic market. To shift the internal structure of the industry to industries that are fundamental, prioritized, spearhead, with high technological content and added value; transforming resource-intensive industries, bright energy, green industries, and low-carbon emission industries".

At the Plenary Session of the High-level Forum and Exhibition on Industry 4.0 in 2023 on June 14, 2023, Prime Minister Pham Minh Chinh emphasized that the Party and State of Vietnam attach great importance to digital transformation, green transformation and sustainable development as key tasks in the process of industrialization. modernization. The Government of Vietnam is committed to actively accompanying and cooperating with countries and international organizations to strongly promote digital transformation, enhance green growth, and strongly promote the industrial revolution 4.0 to bring peace and common prosperity to the peoples of the world.

2.3. Green Growth Statistical Indicators

Decree No. 10/2023/TT-BKHĐT dated November 1, 2023, issued by the Ministry of Planning and Investment, stipulates a set of 72 green growth statistical indicators, categorized into four specific objectives. Among these, Objective 2, "Greening economic sectors," places a strong emphasis on sectors requiring inventory, including: energy, transportation, agriculture, technology, investment, bonds, credit, and commerce-services. This is a crucial objective for promoting the development of green and circular livestock models. Localities such as Kon Tum, Thanh Hoa, Binh Thuan, and Bac Lieu have also issued programs and action plans to implement the national green growth strategy in line with their respective socioeconomic contexts. This demonstrates Vietnam's commitment to green growth as a significant orientation for its socioeconomic development in the coming period. All stakeholders have a responsibility and obligation to participate in the green growth process of the national economy. The four green growth statistical objectives include:

- **Objective 1: Reducing greenhouse gas intensity in GDP:** Sectors subject to greenhouse gas inventories include energy, transportation, construction, industrial processes, agriculture, forestry, and land use, and waste.
- **Objective 2: Greening economic sectors:** For the transportation sector, indicators include the ratio of green buses to the total number of buses in operation in special cities and type I cities; the ratio of road motor vehicles using green energy to the total number of road motor vehicles in operation; and the number of charging stations and charging ports for electric vehicles. For the agriculture sector, indicators include the average amount of chemical fertilizer used per hectare of cultivated land; the proportion of agricultural land with efficient and sustainable production; the area of degraded land; the area of crops certified for good agricultural practices (VietGAP) and equivalents; and the proportion of pig farming establishments in the area that treat waste using biogas or other efficient and clean technological solutions. For the forestry sector, indicators

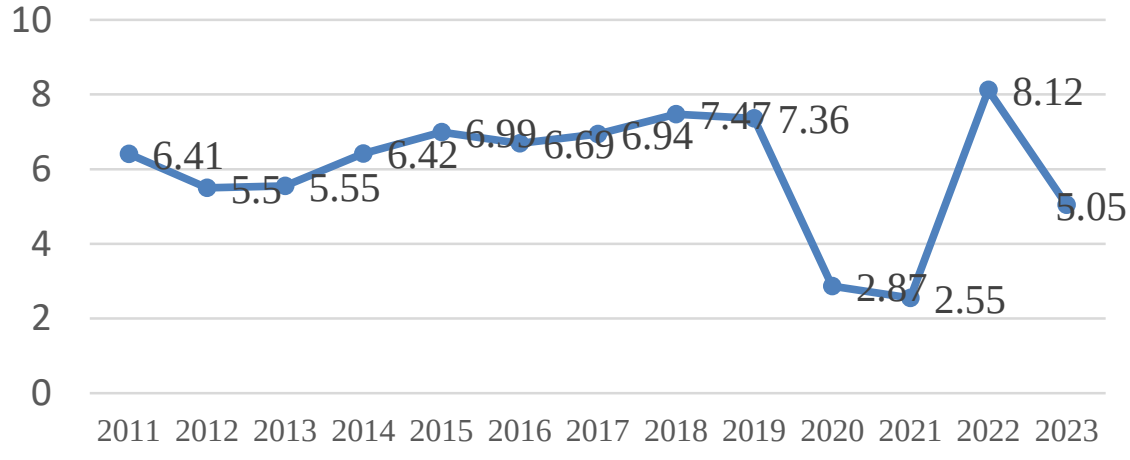
include forest cover rate; the proportion of degraded natural forest ecosystems restored; and the proportion of production forests certified for sustainable forest management.

- **Objective 3: Greening lifestyles and promoting sustainable consumption:** For the environment and society sector, indicators include the proportion of household waste collected and treated; the proportion of household waste treated by direct landfill; and the proportion of urban wastewater collected and treated to meet environmental technical standards. For the urban sector, indicators include the average area of public green space per capita in urban and suburban areas; and the proportion of cities meeting green growth standards towards smart and sustainable cities compared to the total number of cities.
- **Objective 4: Greening the transition process based on the principles of equality, inclusiveness, and enhanced resilience:** Indicators for this objective include the proportion of the urban population supplied with clean water through centralized water supply systems; the proportion of the rural population using clean water that meets standards; the proportion of the population using hygienic latrines; the proportion of the population living in temporary housing; and the proportion of people participating in health insurance.

2.4. Vietnam's achievements in implementing the Green Growth Strategy

During the course of more than 10 years of implementing the green growth strategy, with the direction of the Party and the State along with the awareness of the social community about the importance of the green economy, so far Vietnam's economy has made great progress:

- Regarding the economic growth rate: In the period 2011-2021, Vietnam's economic growth rate reached an average of 5.65%. Due to the impact of the Covid-19 epidemic, Vietnam's economic growth in 2020 and 2021 has a considerable decline, only reaching 2.87% and 2.55%. However, 2022 recorded a strong recovery of Vietnam's economy with a growth rate of 8.12%. Although the GDP growth rate in 2023 is only 5.05%, it does not achieve the set target as well as is only higher than the growth rates of 2.87% and 2.55% in 2020 and 2021 in the period 2011 - 2023 (when the economy is heavily affected by the Covid-19 Pandemic), but it is a great effort in the context of a very difficult global economy. helping our country's economy remain in the group of high-growth countries in the world (world economic growth is forecast to be only about 2.1-3%).



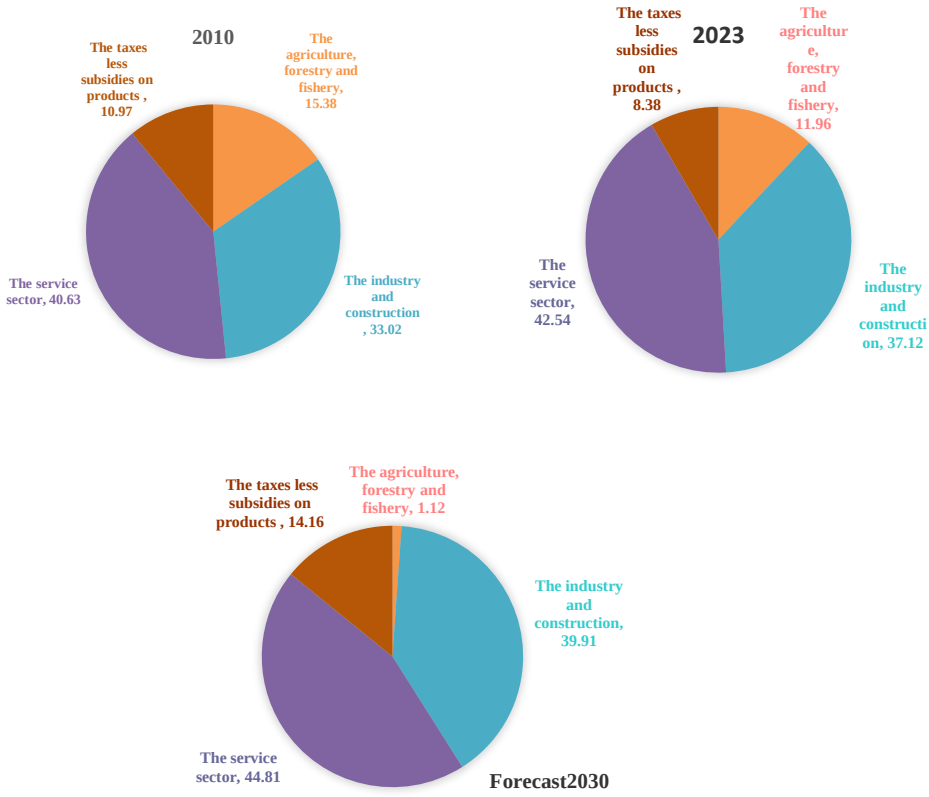
(Source: General Statistics Office)

- Regarding economic restructuring: Vietnam's economic structure has shifted in the direction of modernization:

The proportion of agriculture, forestry and fishery sectors decreased from 15.38% in 2010 to 11.96% in 2023 and is forecast to decrease to 1.12% by 2030.

The proportion of the industry - construction increased from 33.02% in 2010 to 37.12% in 2023 and is forecast to account for 39.91% by 2030.

The proportion of the service industry increased from 40.63% in 2010 to 42.54% in 2023 and is forecast to account for 44.81% by 2030.



(Source: General Statistics Office)

The development of the green economy has had a positive impact on the domestic workforce, Vietnam's labor structure tends to reduce the proportion of workers in the agriculture, forestry and fishery sectors and increase the number of workers in the group of non-agricultural sectors in which the industry - construction industry tends to attract the highest labor. specifically: According to data from the General Statistics Office, the percentage of workers working in the construction industry increased by 31.3% and the service industry increased by 6.9%. Meanwhile, in urban areas, the labor structure shift of these 2 industry groups tends to increase, however, the labor rate gradually increases over the periods. In the period 2019-2023, the proportion of workers working in the urban industry - construction industry increased by 6.7%, the service industry group increased by 1.3%. This trend is in line with the goal of greening the economy, contributing to the supplementation and development of high-quality human resources for the application of the achievements of the Fourth Industrial Revolution to national economic development.

- Regarding the implementation of the target to reduce greenhouse gas intensity in GDP

From 2011 to now, national programs and objectives on economical and efficient energy management have been implemented. Currently, the proportion of renewable energy in operation accounts for nearly 27% of the total installed capacity of the whole system. To implement the Net-Zero commitment at the 26th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP 26), Vietnam has determined to strongly develop this type of energy by 2030 and 2050. Power Plan VIII approved in May 2023 is expected to increase the capacity of solar power sources by 4,100 MW by 2030, reaching 168,594 - 189,294 MW, producing 252.1 - 291.5 billion kWh by 2050; it is expected to develop 21,880 MW of onshore wind power, 6,000 MW of offshore wind power by 2030 and 70,000 - 91,500 MW by 2050

Regarding the goal of greening lifestyles and promoting sustainable consumption: Vietnam has been undergoing a transformation in its production model and shifting towards green consumption trends, driven by consumers' growing interest in intelligent, sustainable consumption, as well as environmentally friendly products and services from production to consumption and use. Consumer behavior is no longer solely determined by product quality but also demands a deep understanding of the social and humanitarian aspects of each product. Particularly in the context of the COVID-19 pandemic, individuals and investors have gradually shifted their shopping habits towards "green" consumption channels and prioritized health protection. The green consumption trend has led to the proliferation of clean food stores, catering to consumers' demand for clean and traceable products. Many supermarkets and businesses in the food and beverage industry have prioritized producing and distributing "green" products, while using environmentally friendly packaging materials instead of single-use plastics...

- Regarding the implementation of the goal of greening the economy

+ In the field of construction and transportation, as of the second quarter of 2023, Vietnam has approximately 300 green projects evaluated and certified by various green building criteria systems such as Lotus (VGBC), Edge (IFC-WB), LEED (US Green Building Council), and Green Mark (Singapore). These projects cover a total floor area of about 7 million square meters and rank 28th in the world in terms of LEED-certified green buildings.

According to statistics, transportation is one of the sectors with the third largest greenhouse gas emissions (after energy and agriculture), accounting for approximately 18.4% of the total annual atmospheric emissions. If in 2020, the CO2 emissions from the transportation sector were about 47,680 thousand tons, it is projected to reach 89,119 thousand tons by 2030.

In terms of international rankings, according to the 2023 Green Growth Index, Vietnam ranks 73rd out of 245 countries globally and 16th out of 50 countries in Asia, with a score of 56.44. Meanwhile, according to the 2023 edition of the Future Green Index, Vietnam ranks 53rd out of 76 economies and 9th out of 16 economies in Asia, achieving a score of 4.13. Vietnam falls in the middle in terms of energy transition categories but ranks low in carbon emissions and climate policy categories.

2.5 Vietnam's green growth - barriers to overcome

In recent times, the issue of green growth and sustainable development has been of particular concern to the Government and the Prime Minister of Vietnam. Various ministries and localities have made significant efforts and actively participated in implementing initiatives, resulting in positive achievements in promoting green growth and development. These efforts strongly affirm Vietnam's commitment towards achieving the Netzero goal by 2050. However, alongside these accomplishments, Vietnam also faces certain specific challenges and obstacles in implementing green growth policies.

First, the public's awareness of green growth and green economy is still relatively new, which is why it requires all levels and sectors to research and disseminate knowledge about green development and green economy, from leaders and policy makers to businesses and citizens.

Second, the green growth strategy requires significant resources to implement investment projects for technological innovation, planning, and infrastructure development in order to serve the strategy's implementation. However, domestic resources, especially state budget funds for green growth, are very limited. According to research by the World Bank and the United Nations Development Programme on mobilizing capital for climate change and green growth, Vietnam's public investment resources for climate change mitigation and green growth currently account for only 0.1% of GDP.

The preliminary calculations by the Ministry of Planning and Investment and the World Bank indicate that in order to implement the Green Growth Strategy by 2030, Vietnam is estimated to need around 30 billion USD. Of this, the state budget can only cover a maximum of 30% of the resources, with the remaining 70% needing to come from other sources, primarily the private sector.

Third, the quality of the labor force for Vietnam's green economy has not yet met the requirements for high scientific and technological standards in the development strategy. Compared to the world, Vietnam's production lines and technology are mostly outdated and inefficient, consuming a significant amount of fuel and energy. Therefore, the application of modern production lines and advanced technology in the green economy poses a significant challenge for Vietnam, requiring a highly skilled workforce.

Fourth, the legal framework, although the Government has also issued and approved national strategies for green growth and sustainable development for each period. However, the legal system is still not truly consistent, there is no specific legal document regulating green energy and renewable energy; new laws on industrial development and environmental protection need to be enacted... In addition, the management of implementing green economic development strategies in various sectors, regions, and localities nationwide is not truly interconnected and unified.

Fifth, in 2020, Vietnam's technological development capacity remains low, with outdated production technology, low labor productivity, and limited competitiveness. Renewable energy production technology is still underdeveloped, and the utilization of scientific and technological resources is inefficient.

Finally, natural resources are severely depleted due to unsustainable growth methods, reliance on fossil fuels and raw materials, and inadequate resource management.

2.6 *Some countries' experiences with green growth*

<1> Singapore's experience

From early on, the Singaporean government has implemented policies for green economic development. Specifically, in 1992, Singapore launched the Green Plan, followed by revisions in 2012 and most recently in 2021, with the Green Plan aimed towards 2030.

The Green Plan outlines ambitious and specific goals for the next decade, reinforcing Singapore's commitments under the United Nations' 2030 Sustainable Development Agenda and the Paris Agreement. Singapore's Green Plan has five main pillars, overseen by five agencies: Education, National Development, Environment and Sustainability, Trade and Industry, and Transport. It is supported by the entire government and encompasses the following content: (i) The city in nature aims to create green, livable, and sustainable homes for the residents; (ii) Sustainable living aims to reduce carbon emissions, keep the environment clean, conserve resources, and make energy efficiency a lifestyle; (iii) Energy regeneration aims to use cleaner energy and increase energy efficiency to reduce carbon emissions; (iv) Green economy seeks opportunities for green growth, new employment, industry transformation, and sustainable exploitation as a competitive advantage; and (v) Resilient future aims to build climate resilience and enhance food security.

<2> China's experience

In 2021, China emitted 14.3 billion tons of CO2 equivalent (CO2e - the unit for measuring all greenhouse gases), making it the largest emitter in the world currently. In China, adherence to low carbon consumption is described through the 6R principles (Reduce-Reevaluate-Reuse-Recycle-Rescue-Recalculate). To comply with these principles, China has enacted laws such as the Sustainable Consumption Law and the Green Procurement Law. Notably, China has also established a green tax system, increased budget spending for low-carbon economic development, and gradually replaced pollution fees with various pollution taxes, ensuring that polluters pay.

In addition, China has provided funding for green investment through prioritizing the development of green financial systems, particularly focusing on green credit policies, as well as the development of green bonds.

<3> South Korea's experience

South Korea is one of the countries with notable initiatives in green growth, timely issuing a comprehensive policy framework for green growth in both the short and long term. Specifically, this includes setting green growth targets in South Korea, such as: (1) Efficient environmental and resource management, including CO2 emissions, energy efficiency, and domestic resource consumption; (2) Environmental quality indicators for quality of life, including wastewater treatment rates, access to safe drinking water, urban green spaces, and air pollution levels that urban residents must bear; (3) Economic opportunity and policy impact indicators, including spending on green growth-related research and development, and the proportion of green ODA.

2.7. Proposed Solutions to Promote Green Growth in Vietnam

To promote green growth in Vietnam, in the coming period, Vietnam needs to implement a comprehensive set of solutions, specifically:

Firstly, it is necessary to enhance the awareness of businesses and relevant individuals regarding green growth. Businesses should also thoroughly understand the favorable policies that the State is offering for development and green growth. This requires the responsibility of state agencies in disseminating, promoting, and guiding businesses to meet the criteria and principles that will be applied for sustainable development and green growth.

Secondly, there is a need to shift the growth model from breadth to depth. Vietnam has officially entered the process of transitioning from a growth phase primarily based on resources to one focused on efficiency. It is necessary to gradually increase investment in economically efficient sectors that have minimal environmental impact and conserve natural resources, such as services, eco-tourism, and information technology.

Thirdly, Vietnam needs to promptly promulgate a comprehensive policy framework for green growth in both the short and long term; develop and enact mechanisms to encourage and promote research, the use of new technologies that consume less fuel, reduce greenhouse gas emissions, and are environmentally friendly. Additionally, enact policies to guarantee prices and provide incentives for the development of renewable energy. These new mechanisms will serve as powerful levers for production enterprises, especially local enterprises, to boldly replace old, outdated, and polluting technologies with new technologies that offer higher productivity and efficiency in the use of resources.

Fourthly, it is necessary to establish a green public procurement market and a green value chain. The state is an important consumer (public procurement typically accounts for up to 20% of government spending) in implementing green growth. Therefore, there needs to be a legal framework regulating the government's purchasing behavior towards environmentally friendly products and services. These regulations should be systematic, consistent, starting from the Green Procurement Law and the documents under the law to specify it. The legal framework for green procurement also needs to integrate environmental protection issues.

Fifthly, it is necessary to mobilize resources and financial mechanisms both domestically and internationally, with a priority for green growth. Specifically, it is important to actively promote public-private partnership models and proactively access private capital sources, as well as implement market-based financial tools such as trading and exchanging green bonds to ensure sustainability and stable financial resources for green growth. The State Bank of Vietnam needs to continue developing and perfecting the legal framework to guide green banking and green credit for credit institutions; and to collaborate with organizations and agencies to determine the criteria and standards for green projects. At the local level, it is essential to clearly allocate financial resources from central and local levels for green growth, as well as diversify methods of attracting and mobilizing financial resources for green growth, such as issuing green bonds at the local level.

3 Conclusion

Green growth is a common development trend in the world, and Vietnam cannot be left out of that trend. Implementing the Party's viewpoint, direction, and overall strategy, green growth policies have been issued and implemented with the foundational document being Decision No. 1393/QD-TTg, dated September 25, 2012, approved by the Prime Minister regarding the National Strategy on green growth.

The implementation of green growth policies during the period 2012-2020 has achieved certain results, but there are still many challenges and limitations due to deficiencies in policy content and other factors. To further enhance Vietnam's green growth policy in the coming time, in addition to continuing to issue the National Strategy for Green Growth for the period 2021-2030 and the vision towards 2050, it is necessary to focus on transitioning the growth model from breadth to depth; establishing and implementing mechanisms to encourage and promote environmentally friendly technologies; creating a green public procurement market and green value chains; mobilizing domestic and foreign financial resources, with priority given to green growth.

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ATTRACTING FOREIGN DIRECT INVESTMENT WITH SUSTAINABLE DEVELOPMENT IN VIETNAM

Dinh Thi Vung[1]

Abstract: Vietnam has achieved significant progress in attracting foreign direct investment (FDI) in recent years, contributing to socio-economic development. However, the relationship between FDI attraction and sustainable development is not a straightforward, linear story. Vietnam needs more suitable policies to fully capitalize on the benefits of FDI while minimizing its negative impacts on social inequality and the environment. Vietnam should selectively attract FDI projects with clean and efficient technologies. The article focuses on analyzing the achievements while also highlighting issues that need to be addressed in the process of attracting FDI into Vietnam. Based on the research findings, the authors propose several suggestions for attracting FDI into Vietnam to promote sustainable development.

Keywords: *FDI, sustainable development, Vietnam*

1. INTRODUCTION

The Foreign Direct Investment (FDI) Law in Vietnam was passed by the National Assembly in 1987, and Vietnam officially began attracting foreign direct investment in 1988. Vietnam implemented the FDI law in the context of a low level of socio-economic development. Infrastructure conditions were still poor, technology was outdated, and a large portion of the workforce had not been trained. Meanwhile, the demand for development had to cope with the pressure to attract investment, advanced technologies, and enhance exports in order to exploit comparative advantages and achieve high growth rates, solve unemployment, and stabilize social life. Especially, from the late 1980s to the end of the 1990s, the international investment trend in developing countries focused mainly on extractive industries, manufacturing, and labor-intensive sectors. In this development context, Vietnam found it difficult to attract FDI into high-tech industries or sectors producing high-value-added products or those needing to meet strict environmental standards. Therefore, the orientation to attract FDI into sectors where Vietnam has natural advantages is suitable for its development level and can catch up with international investment trends is quite appropriate.

The opening to attract FDI is a major and correct policy of the Party and the State, contributing to the achievement of numerous important socio-economic development goals of the country over the past 30 years. From 1988 to 1990, the results of attracting FDI were limited, with only 211 projects and total registered capital reaching 1.603,5 million USD. However, in just 2023, Vietnam attracted 3.314 projects with a total registered capital of 39.390,34 million USD and implemented capital reached 23.183 million USD. The FDI sector now plays an important role in the Vietnamese economy. FDI has contributed to increasing Vietnam's economy's competitiveness, creating more people's jobs, and boosting the state budget revenue. In addition, the participation of FDI enterprises has contributed to creating the necessary competition to push Vietnamese enterprises in all sectors to invest more deeply, renew machinery and equipment, apply

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modern technologies to reduce production costs, and improve product quality, meeting the growing demands of both the domestic and export markets. For localities, FDI projects have contributed to effectively improving the investment and business environment, creating a workforce capable of transferring and absorbing modern technology, enhancing management skills, contributing to local budgets, creating jobs, and increasing labor productivity in the region.

Over time, with the development of the economy and technology, enhancing the quality of FDI has become an urgent issue and is of great concern to many countries, including Vietnam. Although it brings many benefits, the activities of FDI enterprises in Vietnam also reveal significant limitations. Environmental pollution caused by some FDI enterprises is a major issue. Untreated waste discharge and the use of harmful chemicals have seriously affected water, air, and soil quality, causing long-term consequences for the environment and public health. Some enterprises have imported outdated technologies into Vietnam. Especially, the sustainability of employment in FDI enterprises has not been guaranteed. Therefore, this study aims to analyze the achievements, as well as point out the issues that need to be addressed in the process of attracting FDI, contributing to the sustainable development of Vietnam.

2. RESEARCH RESULTS

2.1. Attraction Policies

Based on development orientations, Vietnam has issued both direct and indirect policies related to attracting Foreign Direct Investment (FDI).

Investment incentive policies play a crucial role in attracting FDI. With the goal of directing FDI into targeted sectors and areas, various policies on corporate income tax, import- export taxes, land use incentives, etc., have been clearly defined in Vietnam's legal framework. The 2020 Investment Law contains detailed provisions on investment incentives to encourage foreign investors to participate in Vietnam's socio-economic development process in a selective and high-quality manner. According to Article 16 of the 2020 Investment Law, the sectors eligible for investment incentives include: high-tech activities, high-tech industrial support products; production of new materials, new energy, clean energy, renewable energy; production of information technology products, software, and digital content; investment in education, healthcare, etc. Incentive areas include regions with difficult or extremely difficult socio- economic conditions, industrial parks, export processing zones, high-tech zones, and economic zones.

Regarding the level of incentives: According to Article 13 of the Law on Amendments and Supplements to Some Articles of the Corporate Income Tax Law of 2013, the following provisions apply: (1) A 10% tax rate for 15 years on income from new investment projects in areas with particularly difficult socio-economic conditions, economic zones, and high-tech zones; income from new projects related to scientific research, technology development, and high-tech application. (2) A 10% tax rate on income from social activities in the fields of education, healthcare, sports, culture, environment, etc. Throughout different periods, the

Corporate Income Tax Law has contributed to creating an equal environment for various subjects, in line with international practices. ASEAN countries have agreed on the lowest corporate income tax rates. To maintain its competitive advantage in attracting foreign investment while avoiding tax revenue loss, the government needs to reconsider domestic tax regulations and design policies that encourage new investments, considering the global minimum tax rate.

Land incentives are one of the policies that encourage and attract investment. Before

June 30, 2014, land incentives were divided into two forms: land allocation with payment for land use rights and land leasing, with reductions in the amount payable or exemptions for periods of 7, 11, and 15 years. On April 3, 2017, the government issued Decree No. 35/2017/ND-CP regulating the payment for land use rights, land leasing, and water surface leasing in economic zones and high-tech zones, offering higher incentives than those for regular investment projects. Currently, the 2024 Land Law provides detailed regulations on payments for land use, land leasing, and water surface leasing. The land incentive regulations help implement state policies for those who need preferential treatment, support, and sectors that need encouragement to attract FDI.

Vietnam became a member of the WTO in January 2007, officially joining the global trade system. Since then, Vietnam has undertaken annual tariff reductions in accordance with its commitments to the WTO, ASEAN, and other trade partners, particularly for raw materials and supplies not yet produced domestically. This policy has helped businesses, especially FDI enterprises, reduce production costs, thereby enhancing the competitiveness of domestic products compared to imported ones. To meet new requirements and better support businesses, the Law on Export and Import Taxes has been continuously updated and revised to align with the trends of international economic integration. Additionally, Vietnam has participated in numerous free trade agreements, such as CPTPP, EVFTA, and RCEP, which provide significant tariff preferences for import and export goods. In 2020, the Government issued Decree 57/2020/ND-CP, which added provisions for applying a 0% preferential import tax rate on raw materials, supplies, and components not yet produced domestically. This measure was introduced to support the production and processing of priority-supporting products for the automobile manufacturing and assembly industry during the 2020-2024 period.

2.2. The Situation of Foreign Direct Investment (FDI) Attraction in Vietnam

In the early stages, the amount of FDI attracted to Vietnam was still limited. Chart 01 below provides an overview of the FDI trends in Vietnam from 1988 to 2023, based on the number of projects, total registered capital, and total implemented capital.

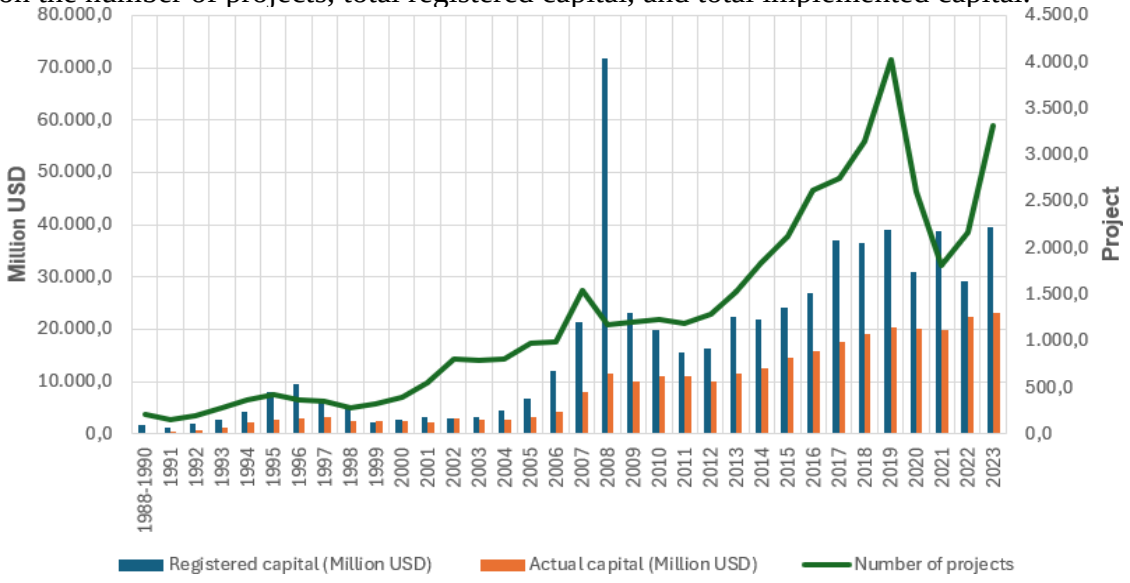

Chart 01. Foreign Direct Investment in Vietnam (Cumulative effective projects as of December 31, 2023)

(Source: General Statistics Office and author's calculation)

In the first three years from 1988 to 1990, Vietnam only attracted 211 projects with a total registered capital of 1.603,5 million USD. In the period from 1991 to 1995, FDI in Vietnam saw a significant increase, with 1.409 projects and a total registered capital of 18.379,1 million USD. This can be considered the beginning of the FDI boom in Vietnam. During this period, the United States lifted the embargo on Vietnam, and the investment environment in Vietnam started to attract investors. However, in the period from 1996 to 2000, FDI declined both in terms of registered capital and the average project size. In 1996, registered FDI capital was 9.635,3 million USD, with an average project size of 25,9 million USD, while by 2000, registered FDI capital had dropped to 2.762,8 million USD, with an average project size of 7,1 million USD. The reason for this was the impact of the 1997 Asian financial crisis. In the period from 2001 to 2005, FDI inflows to Vietnam began to recover, but the pace was slow. During this period, Vietnam attracted 3.935 projects with a total registered capital of 20.806 million USD. From 2006 to 2010, FDI inflows into Vietnam fluctuated. The year 2008 marked an important milestone in Vietnam's FDI attraction process. With a total registered capital of an impressive 71.726,8 million USD, nearly three times that of 2007, Vietnam confirmed its position as an attractive destination for foreign investors. The year 2017 marked the 30th anniversary of FDI in Vietnam. In 2017, Vietnam attracted 2.741 projects with a total registered capital of 37.100,6 million USD. The period from 2020 to 2023 was particularly challenging for the global economy, and Vietnam was no exception, as the COVID-19 pandemic had widespread impacts on FDI attraction. Investors became more cautious and postponed new investment decisions. FDI was directed towards industries with high technological content. In 2023, as the economy stabilized, FDI inflows to Vietnam improved significantly. Total registered capital for new, adjusted, and capital contribution projects from foreign investors exceeded 36,6 billion USD, a 32,1% increase compared to 2022, with 3.188 new projects granted investment registration certificates.

By December 31, 2023, there were 39.151 active projects in Vietnam with a total registered capital of 470.170,32 million USD (Table 01).

Table 01. Foreign Direct Investment (FDI) Licensed by Economic Sector (Cumulative Active Projects as of December 31, 2023)

No.	Economic Sector	Projects		Total Registered Capital	
		Number of Projects	Percentage (%)	Million USD	Percentage (%)
1	Agriculture, Forestry, and Fisheries	534	1,36	3.869,8	0,82
2	Industry and Construction	19.102	48,79	343.288,4	73,01
3	Services	19.515	49,85	123.012,12	26,16
Total		**39.151**	**100**	**470.170,32**	**100**

(Source: General Statistics Office and author's calculation)

The data in the table above provides an overview of the FDI situation in Vietnam as of December 31, 2023, categorized by major economic sectors. This data reveals the distribution of FDI across various sectors of the economy. The industrial and construction sector accounts for the largest proportion in terms of the number of projects (48,79%) and total investment capital (73,01%). This indicates that foreign investors are particularly

interested in the manufacturing and construction sectors in Vietnam, possibly due to the advantages of low labor costs, improving infrastructure, and favorable investment policies. The agriculture, forestry, and fisheries sector accounts for the smallest share in terms of the number of projects (1,36%) and total investment capital (0,82%). This may be due to several factors such as limited technology, small-scale production, and intense competition from imported agricultural products. The services sector also plays a significant role in the development of the economy and society, reflecting the strong growth of service industries such as real estate, finance, and tourism in Vietnam.

As for the active projects to date, Vietnam has FDI partnerships with over 100 countries worldwide. Some countries with many projects and registered capital in Vietnam are shown in Table 02.

Table 02. Foreign Direct Investment (FDI) Licensed by Major Investment Partners (Cumulative Active Projects as of December 31, 2023)

No.	Country	Projects		Total Registered Capital	
		Number of Projects	Percentage (%)	Million USD	Percentage (%)
1	South Korea	9.859	25,18	86.510,53	18,40
2	Singapore	3.498	8,93	74.901,84	15,93
3	Japan	5.263	13,44	73.887,75	15,72
4	Taiwan	3.109	7,94	39.362,33	8,37
5	Hong Kong (China)	2.465	6,30	34.190,2	7,27
6	China	4.249	10,85	27.130,12	5,77
7	British Virgin Islands	914	2,33	22.865,03	4,86
8	Netherlands	432	1,10	14.370,25	3,06
9	Thailand	732	1,87	14.014,89	2,98
10	Malaysia	727	1,86	13.105,66	2,79
11	United States	1.332	3,40	11.828,26	2,52
12	Other Countries	6.571	16,78	58.003,46	12,34
Total		**39.151**	**100**	**470.170,32**	**100**

(Source: General Statistics Office and author's calculation)

Vietnam attracts investment from many countries and territories around the world, reflecting the attractiveness of the Vietnamese market to foreign investors. South Korea, Singapore, and Japan are the top three countries with the largest share of projects and total investment capital, indicating deep and long-term investment cooperation between these countries and Vietnam. South Korea leads in FDI investment into Vietnam with 9.859 projects, accounting for 25,18% of the total number of projects, and 18,4% of the total registered capital, reaching 86.510,53 million USD. In second place is Singapore, with 3.498 projects, although its registered capital accounts for 15,93% of the total FDI in Vietnam. Investors from Asia, particularly traditional investment partners such as Singapore, Japan, Hong Kong, South Korea, China, and Taiwan, still dominate the total FDI capital in Vietnam. Businesses from these countries typically invest in sectors such as manufacturing, assembly, electronics, and automotive. In addition to the inflow of capital from Asia, FDI in Vietnam also comes from investors in countries such as the United States, the Netherlands, Denmark, Switzerland, Italy, and others, contributing significantly to job creation and increasing the income of workers. This investment has

also helped Vietnamese businesses improve their competitiveness in the international market. However, alongside efforts to attract more FDI, it is important to ensure environmental protection, fair competition with domestic enterprises, and the economic autonomy of the country.

In 2023, foreign investors have invested in 56 provinces and cities across the country. Some localities that attracted significant FDI include Ho Chi Minh City, Hai Phong, Quang Ninh, Bac Giang, Thai Binh, and others.

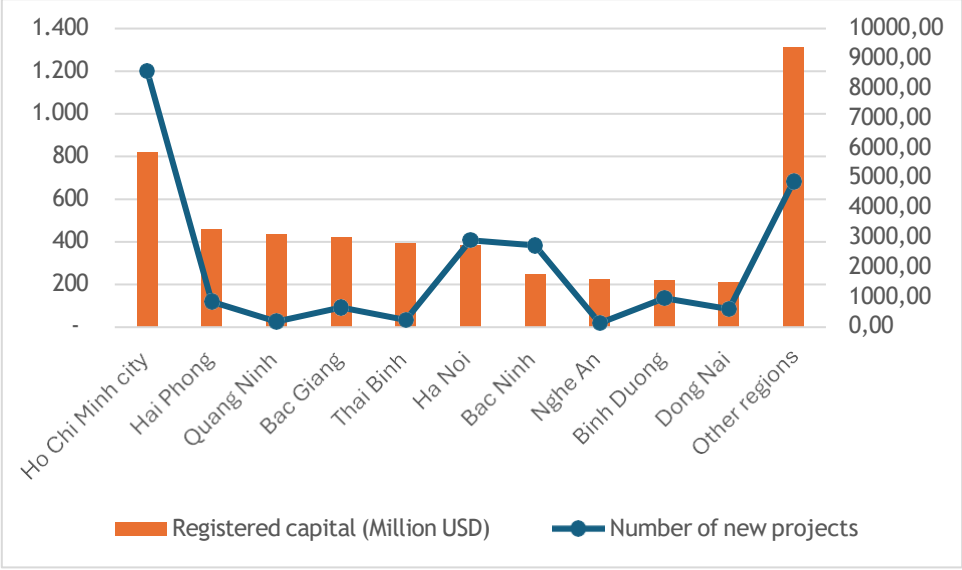

Chart 02. Foreign Direct Investment by Province in 2023

(Source: General Statistics Office and author's calculation)

Ho Chi Minh City leads in attracting investment, with a total registered capital of over 5,85 billion USD, accounting for nearly 16% of the total registered investment, marking a 48,5% increase compared to 2022. Hai Phong ranks second, with a total registered capital of over 3.26 billion USD, accounting for 8,9% of the country's total investment, an increase of 66,2% compared to the previous year. Following them are Quang Ninh with 3.11 billion USD, accounting for 8.5%, and an increase of 31,3%, and Bac Giang with 3.01 billion USD, accounting for 8,2%, marking an impressive growth of 148,3%. These localities have many advantages for attracting investors, such as good infrastructure, a high-quality labor force, and attractive incentive policies. Industrial provinces like Binh Duong, Bac Ninh, and Hai Phong also attract a large amount of investment, mainly focused on manufacturing and assembly industries. However, there is a significant disparity in the scale and growth rate of investment across regions. Provinces like Dien Bien and Lai Chau, for example, only attracted one FDI project each in 2023, with registered capital of 3 million USD and 1,5 million USD, respectively. The reason for this may be limited infrastructure and a labor force that does not yet meet the needs of investors. Despite the focus on key localities, FDI has also spread to many other regions, contributing to the economic and social development of different areas.

2.3. Some issues raised

FDI has significantly contributed to Vietnam's GDP growth. FDI enterprises bring substantial capital to the economy, creating job opportunities, enhancing production capacity, and promoting export activities. In addition, FDI contributes to the construction

and upgrading of infrastructure, including transportation, electricity, and industrial zones. This not only

facilitates business operations but also improves the quality of life for the people. FDI companies often focus on manufacturing and exporting, helping Vietnam increase export turnover, especially in sectors such as electronics, textiles, footwear, and processed foods. Moreover, FDI helps Vietnam connect with international markets, expanding opportunities for cooperation and trade (Long, T. D, 2023).

Along with its contributions to the economic and social development of Vietnam, the FDI sector has also revealed some shortcomings that have yet to ensure the sustainable development of Vietnam.

**** Environmental Issues***

Some FDI projects have not strictly adhered to environmental protection regulations, leading to pollution of water, soil, and air. For example, Vedan Vietnam Co., Ltd. (Taiwan) illegally discharged wastewater into the Thi Vai River (Dong Nai) for a long period, causing 80%-90% pollution of the river. In 2014, Miwon Vietnam Co., Ltd. in Phu Tho was fined 515 million VND for discharging wastewater exceeding technical standards by more than 10 times into the environment. In 2015, severe air pollution caused by the Vinh Tan 2 Thermal Power Plant led to local protests, with residents blocking National Highway 1 in protest. Notably, in early 2016, a marine environmental disaster occurred in four central provinces after the Formosa Ha Tinh Steel Corporation (Taiwan) discharged large amounts of untreated wastewater into the sea during its trial operation.

According to the inspection results of the General Department of Environment in 28 northern provinces from 2017 to 2019, the rate of FDI enterprises violating environmental protection regulations has increased over time. Specifically, in 2017, 44,5% of FDI enterprises violated regulations, in 2018 the rate was 56%, and by 2019, this number had risen to 68%.

*** Technology Transfer Issues**

According to research data on FDI attraction from 1988 to 2023, Vietnam has attracted investment from many countries around the world. However, FDI in Vietnam primarily comes from Asian countries such as South Korea, Japan, Singapore, Taiwan, Hong Kong, and China. Developed countries with advanced science and technology, such as the United States, the United Kingdom, France, Germany, and Russia, have made relatively modest investments in Vietnam. As of December 31, 2023, the cumulative registered capital from the United States accounted for 2,52% of total FDI in Vietnam, from Germany accounted for 0,58%, and from Russia, only slightly over 0,2%. Apart from partners from South Korea, Japan, and Singapore, other investors generally bring average technology levels, with very few high-tech investments. These investments mainly focus on natural resource extraction, with limited access to core technologies. FDI capital is concentrated in the processing, manufacturing, and service sectors, which are labor-intensive and capital-heavy but have low technology transfer. According to World Bank analysis, Vietnam's technology transfer index from FDI enterprises is low, declining from 4,24 in 2015 to 4,13 in 2017 (Malaysia and Thailand have higher indices than Vietnam). In 2018, Vietnam's technology transfer index for FDI ranked 89th, which is low compared to many countries in the region.

According to research by Bang.L. (2020), only 5% of foreign-invested enterprises possess high technology, while 80% have medium-level technology. The remaining enterprises use low-tech processes that consume large amounts of energy and have high emission levels. Some even operate production lines that have been in use since the 1970s and 1980s.

*** Sustainability of Employment in FDI Enterprises**

Employment is a crucial issue, not only for workers but also for the economic and social stability of a country. The operations of FDI enterprises have played and continue to play an important role in creating jobs in Vietnam. The increase in FDI enterprises has created many new job opportunities, contributing to a reduction in unemployment rates. However, FDI also leads to the loss of many traditional jobs. Many FDI enterprises have seasonal or order-based business models, resulting in unstable employment. Additionally, several FDI companies have laid off workers over the age of 35, citing that some industries are not suitable for workers past this age. According to annual data published by the Vietnam General Confederation of Labor, only 21% of FDI enterprises participate in social insurance, health insurance, and union fund contributions for workers, covering 517.000 people. This is a very small percentage compared to the total workforce in the FDI sector in Vietnam today. This situation has caused certain disadvantages for workers, negatively impacting their morale, awareness, and work attitude in the FDI sector (Thang, N.V, 2019). Particularly, the concentration of FDI projects in major urban areas has created income disparities between regions.

3. CONCLUSION

Vietnam has achieved significant accomplishments in attracting Foreign Direct Investment (FDI) in recent years. FDI has significantly contributed to the economic development of Vietnam, creating new job opportunities, enhancing industrial growth, and boosting the country's integration into the global economy. However, FDI also presents challenges, particularly in terms of environmental sustainability, technology transfer, and employment conditions.

Firstly, prioritize attracting high-quality FDI

- Focus on attracting investment projects that use advanced technology, are environmentally friendly, and contribute to minimizing negative impacts on the environment.
- Encourage projects that have the potential to increase added value to products and create sustainable supply chains.
- Focus on key industries with high development potential that align with the country's sustainable development goals.

Secondly, continue improving the investment environment

- Invest in upgrading and completing infrastructure systems such as transportation, energy, and telecommunications to create favorable conditions for investors.
- Complete the legal framework for investment to ensure transparency, stability, and a fair business environment.
- Streamline administrative procedures and reform investment processes to create a more favorable environment for investors.

Thirdly, develop human resources

- Invest in training high-quality human resources to meet the requirements of FDI

projects.

- Organize training programs to enhance workers' skills, helping them adapt to new technologies and labor market demands.

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GREEN INDUSTRIAL PARK MODEL IN VIETNAM: SITUATION AND ISSUES

Dr. Pham Thi Du[1]

Abstract: Vietnam's goal of becoming a developed country by 2045 and achieving net zero emissions by 2050 is both ambitious and challenging for a developing country. Therefore, the development of green industrial parks and closed-loop production chains is considered a solution to help realize this goal. The green industrial park model not only overcomes environmental limitations and shortcomings, reduces waste, reduces resource waste, and minimizes risks, but also promotes sustainable growth. The economic, social, and environmental benefits gained from green industrial parks are significant, and far exceed conventional business benefits. However, there are challenges related to "green" standards and technical regulations, infrastructure, and environmental protection measures. The article focuses on analyzing the current status of green industrial park models in Vietnam, the problems in developing green industrial parks in Vietnam, and proposing some recommendations to promote the green industrial park model in Vietnam.

Keywords: Green industry park, situation, issues

MÔ HÌNH KHU CÔNG NGHIỆP XANH Ở VIỆT NAM: THỰC TRẠNG VÀ NHỮNG VẤN ĐỀ ĐẶT RA

TS. Phạm Thị Dự, ĐH Thương mại

Tóm lược: Việt Nam đặt mục tiêu trở thành nước phát triển vào năm 2045 và đạt phát thải ròng về 0 vào năm 2050 vừa là tham vọng nhưng cũng là một thách thức đối với quốc gia đang phát triển. Do đó, việc phát triển các khu công nghiệp xanh, chuỗi sản xuất tuần hoàn khép kín được coi là giải pháp giúp hiện thực hóa mục tiêu này. Mô hình khu công nghiệp xanh không chỉ khắc phục được những hạn chế, bất cập về vấn đề môi trường, giảm chất thải, giảm lãng phí tài nguyên, giảm thiểu rủi ro, mà còn thúc đẩy tăng trưởng bền vững. Các lợi ích kinh tế, xã hội, môi trường thu được từ khu công nghiệp xanh là đáng kể và vượt xa các lợi ích kinh doanh thông thường. Tuy nhiên, đi kèm với đó là những thách thức liên quan đến hệ thống quy định, tiêu chuẩn, quy chuẩn kỹ thuật "xanh", cơ sở hạ tầng và các biện pháp bảo vệ môi trường. Bài viết tập trung phân tích thực trạng mô hình khu công nghiệp xanh ở Việt Nam, những vấn đề còn bất cập khi phát triển khu công nghiệp xanh ở Việt Nam, và đề xuất một số kiến nghị nhằm thúc đẩy mô hình khu công nghiệp xanh ở Việt Nam.

Từ khóa: Khu công nghiệp xanh, thực trạng, vấn đề đặt ra

Introduction

Vietnam has an orientation to develop a green economy, circular economy, low-carbon economy, digital economy... along with strong impacts from the 4th industrial revolution. The national industrial development goal is to develop green industries, associated with a

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circular economic model, cleaner production, economical and efficient use of resources and energy; develop ecological industrial parks and gradually reduce industrial parks, industrial clusters, and industrial production facilities with high risks of environmental pollution. In the context of the world and the Vietnamese Government setting and pursuing goals of environmental protection, sustainable development, green economy, circular economy, etc., the concept of green industrial parks is gradually becoming popular in articles, research topics, executive documents as well as development ideas in a number of domestic projects. Research on developing green industrial parks is a very necessary task that contributes significantly to achieving national strategic goals as well as Vietnam's commitments to the international community on issues of climate change response, environmental protection, and sustainable development.

1. Literature review, Theoretical framework and Method

1.1. Literature review

Current research primarily focuses on national ecological industrial (eco-industrial) demonstration parks. Based on the theory of industrial agglomeration, Wu and Gao (2022) point out that the construction of national eco-industrial demonstration parks can significantly improve the green innovation capacity of cities and have better policy effects in the eastern region and cities with higher administrative levels. Qian et al. (2022) found that establishing national eco-industrial demonstration parks effectively promotes carbon emission reduction by improving energy utilization efficiency and reducing urban carbon emissions by 3.08%. Hua and Ye (2023) regard the national eco-industrial demonstration parks as a green location-oriented policy, as the pilot parks enhance the intensity of the entire process of environmental regulation and the level of urban green innovation. Zhang and Wei (2023), using the spatial difference-in-difference-in-differences, find that national eco-industrial demonstration parks can significantly and consistently improve urban ecological efficiency.

Brian H Roberts (2004) uses research undertaken to investigate the application of industrial ecology to ensure more sustainable industry development in the State of Queensland, Australia, to develop a set of principles and planning guidelines for use by governments to facilitate the development of eco-industrial parks. Jianxian Wu, Xin Nie, Han Wang, and Weijuan Li (2023) show that the impact of national eco-industrial parks on green technological progress is assessed, with a focus on Chinese cities. Staggered difference-in-differences is used to analyze panel data from 314 prefecture-level cities in China from 2002 to 2017, and the results show that eco-industrial parks significantly increase green technological progress.

Xiang Yu, Wentao Hu, and Mudan Wang (2024) utilize a staggered difference-in-differences model to examine the impact of green industrial park pilot policies. The results demonstrate that green industrial parks have effectively reduced carbon emissions of the studied counties in terms of total and intensity. This study shows that the engine of China's industrial development is industrial parks have confronted an increasingly urgent need for green and low-carbon transformation. In response, the Chinese government has introduced a series of policies aimed at promoting the green and low-carbon development of industrial parks, including establishing the green industrial park, the ecological demonstration park, and the national low-carbon industrial park pilot program.

According to Thu Trang Vu, Thi Song Thuong Phan, and Khanh Duong Phan (2021), the eco-industrial park is the new trend in developing sustainable industrial zones. In Vietnam, the concept of an eco-industrial park has gained popularity in the last decade; yet there remain many obstacles to actualizing this model. One of the main reasons is the lack of a criteria set for building eco-industrial parks that fit the Vietnamese situation. We analyzed the criteria for building eco-industrial parks in other countries to compare them with the current criteria in Vietnam. Suggestions for establishing a criteria set for building eco-industrial parks in Vietnam were discussed. Tran, Phan, and Hoang (2012) proposed a two-step process to evaluate eco-industrial parks in Vietnam, in particular in Ho Chi Minh city. Pre-evaluating criteria were designed to assess all industrial zones. They include 3 categories: (i) willingness to follow the eco-industrial parks model, (ii) compliance with national regulations on environment protection, mostly waste management and pollution regulations, and (iii) public image of the industrial park.

Thus, existing works mainly study ecological industrial parks. Studies on green industrial parks are still limited and according to the approach of some studies, green industrial parks have many similarities with ecological industrial parks.

1.2 Theoretical background

1.2.1. Concept of green industrial park

Eco-industrial parks, a "community of manufacturing and services companies seeking enhanced environmental and economic performance through collaboration in managing environmental and resources issues including energy, water, and materials" (Côté and Cohen-Rosenthal, 1998), have been established around the world to meet the demands of a green economy. Most notably, they have developed in countries like Australia (Giurco et al., 2011), Denmark (Münster et al., 2012), and Europe.

Green industrial park is an industrial park model oriented towards sustainable development, friendly to the environment through greening the industrial park through infrastructure structure and activities such as waste production and recycling; optimizing the use of resources (Xiang Yu, Wentao Hu, and Mudan Wang, 2024). The goals and development orientation of green industrial parks are quite similar to those of eco-industrial parks, both aiming at environmental protection. However, unlike eco-industrial parks, the design and construction process of green industrial parks' infrastructure is given priority from the very beginning, aiming to integrate green space throughout the industrial park.

In Vietnam, there is currently no official regulation for the concept of the green industrial park, but the term commonly used in the legal document system is eco-industrial park (first stipulated in Article 42 of Decree 82/2018/ND-CP). An eco-industrial park is understood as a community of enterprises that produce and provide services together with the goal of both developing and protecting the environment. The standards of an ecological industrial park require large investments to meet the regulations on infrastructure, environmental protection, labor, and basic services. In an ecological industrial park, there is at least one industrial symbiotic link with at least 10% of the total number of participating member enterprises. In addition, an ecological industrial park must have a mechanism to monitor and manage inputs, outputs, and operate efficiently in terms of resources and emissions (Decree 35/2022/ND-CP).

1.2. Characteristics of green industrial park

The green industrial park model is formed and developed including the following characteristics:

(i) Have all basic licenses as prescribed by law: Green industrial parks need to fully meet basic licenses such as land use rights certificates, business registration certificates, etc. Some common standards and certifications certifying green industrial parks:

- LEED (Leadership in Energy and Environmental Design): LEED certification is the world's leading green building standards rating and certification system, developed by the U.S. Green Building Council. LEED is used to evaluate the energy efficiency, resource use, environmental quality and worker health of construction works.

- ISO 14001 Environmental Management System is an international standard for environmental management systems. This standard focuses on developing and maintaining an effective environmental management system within an organization.

- BREEAM (Building Research Establishment Environmental Assessment Method) is a popular green building rating system in Europe. It supports solutions that reduce carbon emissions to zero, improves lifetime performance, manages health and social impacts, promote circularity, resilience, and biodiversity, and facilitate disclosure and reporting.

- Green Globes Certification is a sustainable building and environmental rating system developed by the Green Building Initiative in North America. This system is designed to evaluate and certify buildings based on sustainability criteria such as energy efficiency, interior environmental quality, resource use, and sustainable operations.

- EDGE (Excellence in Design for Greater Efficiencies**)** is a sustainability standard developed by the International Finance Corporation to encourage the construction of energy- and resource-efficient buildings. EDGE focuses on improving energy efficiency, water conservation, and the use of sustainable building materials in construction projects.

- WELL Community Standard focuses on designing and building communities (including green industrial parks) to create a healthy and sustainable living environment for residents.

(ii) Infrastructure structure

- Complete basic infrastructure: Standard technical infrastructure system, developed traffic system, landscape system, and other systems as prescribed by law.

- Designing infrastructure according to green standards: Green industrial parks focus on the first environmental factor in the establishment phase, integrating green spaces, ensuring that at least 25% of the industrial park area is for trees and biodiversity, and planning according to the standards of the Ministry of Construction.

(iii) Optimizing the use of resources and environmental pollution control

- Using resources economically, encouraging renewable energy: Enterprises in green industrial parks innovate thinking to replace traditional energy (fossil) with renewable energy; the closed ecosystem allows for the most optimal use of resources, reusing waste for other activities such as street cleaning, watering plants, etc.

- Environmentally friendly production activities: Developing in a closed-loop direction, the characteristics of production activities in green industrial parks are less expensive, optimizing raw material sources, and recycling waste, contributing to sustainable development in an environmentally friendly direction.

- Ensure green industrial park criteria on environmental protection: Build shared infrastructure, provide housing, social and cultural facilities for workers. Enterprises in green industrial parks need to publish annual environmental reports.

- Industrial symbiosis ecosystem: Enterprises in the green industrial park cooperate to use resources efficiently, cooperate in waste management, circular production, and reduce waste. In addition, symbiosis allows enterprises to share initiatives on converting waste into energy for the common purpose of the industrial park.

- High carbon credit production capacity: Green industrial parks significantly reduce CO_2 emissions into the environment, increasing the ability to produce carbon credits, helping businesses profit from commercial transactions, and moving closer to the goal of sustainable development.

- Environmental pollution control: Through the use of renewable energy, application of modern advanced technology, synchronous management, and automation, green industrial parks are able to overcome and operate in a way that minimizes negative impacts on the environment and natural resources.

1.3. Method

- Document collection method: Collect and review research results of tasks and projects on industrial park environmental management of the Ministry of Natural Resources and Environment, Ministry of Planning and Investment; reports on waste management of the Economic Zone/Industrial Park Management Board; Data on industrial parks in operation with centralized wastewater treatment plants meeting environmental standards from the General Statistics Office.

- The synthesis, analysis and comparison methods: are used to evaluate the results achieved; difficulties and obstacles of industrial parks when converting into green industrial parks. On that basis, some recommendations are proposed to promote the development of green industrial parks.

2. Current status of green industrial parks in Vietnam

2.1. The number of green industrial parks that have basic licenses in Vietnam

Pilot-tested from 2015 to 2019, the green industrial park model established in Vietnam is a foundation for transitioning from a brown to a green industry. To date, industrial parks' awareness and interest in sustainable development and renewable energy have gradually increased, with most parks beginning to adopt rooftop solar power systems to reduce electricity consumption costs. As of the end of 2023, Vietnam has over 620 industrial parks nationwide, with 397 newly established in 2023, reflecting stable growth. However, only seven green industrial parks (approximately 1% of the total) are currently being piloted across the country, including Khanh Phu Industrial Park (Ninh Binh), Hoa Khanh Industrial Park (Da Nang), Tra Noc 1 and Tra Noc 2 Industrial Parks (Can Tho), Hiep Phuoc Industrial Park (Ho Chi Minh City), Amata Industrial Park (Dong Nai), and Dinh Vu Industrial Park (Hai Phong).

Vietnam divides green building standards into 4 main categories, including LEED, LOTUS (focuses on encouraging architectural solutions that "follow" nature or passive design in solving health and comfort goals for users; BCA GREEN MARK (The green building criteria system structure similar to other certifications, according to BCA Green Mark has been adjusted to suit the tropical climate); EDGE. Businesses are increasingly focusing on reducing CO_2 emissions and utilizing renewable energy to achieve green

certifications such as LEED, EDGE, and LOTUS. These certifications help enterprises attract foreign direct investment and streamline the export process for their goods. In the first half of 2020, there were 749,188m^2 of green-certified construction floor area of industrial projects in Vietnam. Of which, the LEED standard construction floor area was the highest at 575,772m^2, accounting for 76.85%. There were 153,222 m^2 of LOTUS standard construction floor area and 20,194 m^2 of EDGE standard construction floor area, no construction floor area met BCA Green Mark standard.

Table 1: Statistics on green-certified construction floor area of different types of buildings by the first half of 2020

	EDGE	LEED	LOTUS	Total
Residental	1,424,809	-	1,012	1,425,821
Office	62,489	188,697	18,370	269,556
Commercial	-	25,034	103,190	128,224
Educational	20,007	6,147	28,904	55,058
Industrial	20,195	575,772	153,222	749,188
Hoppitality	54,391	-	-	54,391

Source: Nguyen. H. M (2024)

2.2. Infrastructure of industrial parks in Vietnam

Infrastructure and utilities in industrial parks in Vietnam are fully available: transportation infrastructure, water infrastructure, electricity infrastructure, and social infrastructure. That facilitates the operation of industrial parks and achieving development goals.

Table 2: Infrastructure and utilities in industrial parks in Vietnam by the first half of 2023

Type of utility infrastructure	Characteristics
Transport infrastructure	4-lane main road, 2-lane secondary road: 70.1%
	2-lane main road, 2-lane secondary road: 10.93%
	Main road 4-6 lanes, secondary road 2 lanes: 6.43%
	6-lane main road, 4-lane secondary road: 6.11%
	6-lane main road, 2-lane secondary road: 4.18%
	8-lane main road, 2-4 lane secondary road: 2.25%
Water infrastructure (water supply)	<5000 m3/day and night: 16%
	5000 - 10000 m3/day and night: 25%
	10000 - 20000 m3/day and night: 32%
	>20000m3/day and night: 27%
Electrical infrastructure	Using the national grid: 95%
	Use national grid + renewable electricity: 5%

Source: Nguyen. H. M (2024)

The social infrastructure in industrial parks is fully equipped with fire prevention and fighting services, hospitals, supermarkets, and customs. These infrastructures are mainly located within the area and a 5km radius.

Table 3: Social infrastructure in industrial parks in Vietnam by the first half of 2023

Unit: %

Infrastructure type	Internal	Under 1 km	1 to 3km	3 to 5km	5 to 15km	Empty
Distance to residential area	72.73	23.38	2.60			1.30
Fire protection services	71.00	8.00	14.00	6.00		1.00
Hospital	11.20	13.66	35.52	22.40	16.94	
Supermarket	14.08	20.42	48.59	16.55		
Customs services	29.57	5.84	28.40	35.41		0.39

Source: Nguyen. H. M (2024)

2.3. Optimizing the use of resources and environmental pollution control in industrial parks in Vietnam

Although the number of industrial parks established is large, the rate of industrial parks in operation is still low. Specifically, in 2023, 297 industrial parks were in operation, accounting for 47.9% of the total number of industrial parks. The percentage of industrial parks in operation with centralized wastewater treatment plants that meet environmental standards has tended to increase in recent times. For the whole country, this rate increased from 89.47% in 2020 to 91.58% in 2023. By region, the Southeast has the highest rate of industrial parks in operation with centralized wastewater treatment plants that meet environmental standards, reaching 100% in 2023, while the Central Highlands has the lowest rate, gaining 71.43% (Table 4).

Table 4: Percentage of industrial parks in operation with centralized wastewater treatment plants meeting environmental standards

	2020			**2022**			**2023**		
	Total number of industrial parks in operation	Number of industrial parks meeting environmental standards	Percentage (%)	Total number of industrial parks in operation	Number of industrial parks meeting environmental standards	Percentage (%)	Total number of industrial parks in operation	Number of industrial parks meeting environmental standards	Percentage (%)
Total	**285**	**255**	**89.47**	**293**	**266**	**90.78**	**297**	**272**	**91.58**
Red River Delta	74	68	91.89	72	68	94.44	74	70	94.59
Northern midlands and mountains	21	18	85.71	22	18	81.82	23	19	82.61
North Central and Central Coast	46	32	69.57	50	37	74.00	51	39	76.47
Mekong Delta	39	35	89.74	42	38	90.48	42	39	92.86

Southeast	99	97	97.98	100	100	100.0	100	100	100.0
Central Highlands	6	5	83.83	7	5	71.43	7	5	71.43

Source: General Statistics Office (2024)

According to the Ministry of Planning and Investment, the results after the pilot phase of the eco-industrial park model are as follows: Over 72 enterprises have implemented 900 energy-saving and cleaner production solutions, achieving economic savings of 76 billion VND per year, attracting 207 billion VND in private investment, and reducing 32 kilotons of CO_2 emissions annually. The green industrial park model has gained significant traction, as businesses and investors increasingly recognize the importance of developing a green industry. This initiative is no longer just state-driven; it now includes private-sector funding. Notable examples include Nam Cau Kien Industrial Park and the VSIP Group.

High-quality foreign investment plays a vital role in greening the country's economy. On the other hand, the consumption trends of developed economies in the world today have changed, they are not only interested in product design and quality but also environmentally friendly products. Therefore, developing green industries has also become an important factor for Vietnam to attract investment competition. Vietnam ranks 2nd among developing economies in attracting FDI in renewable energy (UNTAC 2023) in the period 2015 - 2022, reaching 106.8 billion USD (Figure 1). Many investors are implementing industrial parks by dividing and selling land to maximize land use and attract as many investors as possible. However, reality shows that large FDI investors, especially those aiming for green goals, are placing high demands on environmental criteria, technology, and social infrastructure during the investment process.

Unit: billion USD

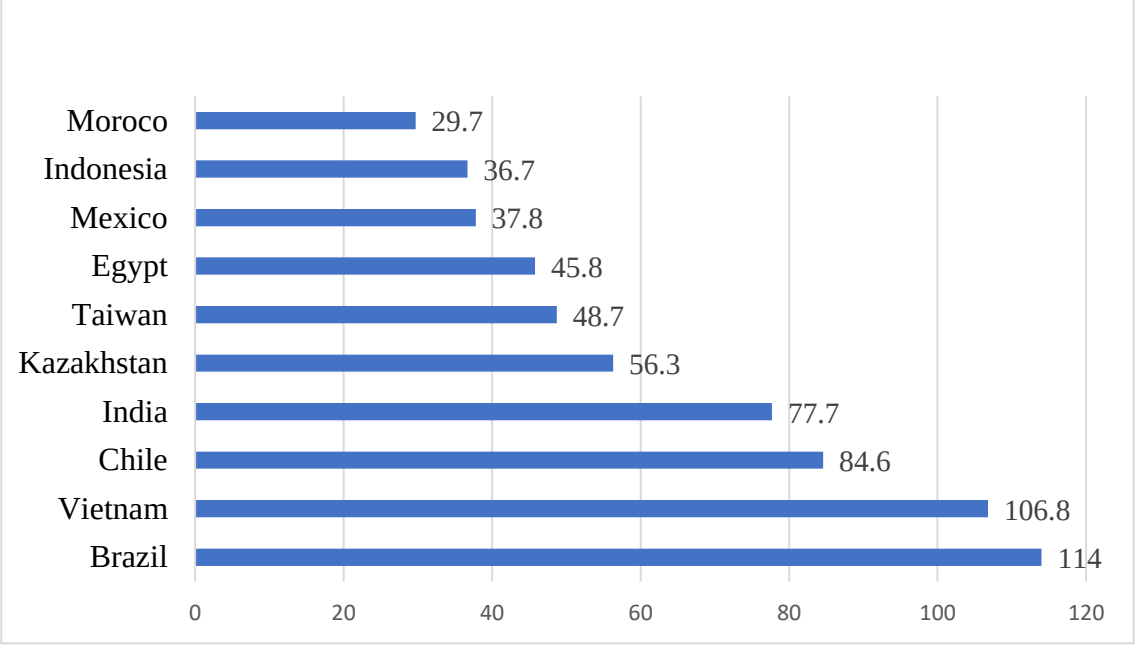

Figure 1: Top 10 developing economies attracting the most FDI into the renewable energy sector (2015 - 2022)

Source: United Nations Conference on Trade and Development, 2023

3. The problems in developing green industrial parks in Vietnam

Developing green industrial parks brings more practical benefits than traditional industrial parks, economically, socially and environmentally. However, developing green industrial parks in Vietnam faces the following problems:

3.1. The regulation on "green" standards and waste recycling remain unclear

The government has implemented several initiatives to promote the green industrial park trend, including transitioning traditional industrial parks into green ones and introducing policies to enhance the investment environment for renewable energy. Notable examples include the Vietnam Renewable Energy Development Strategy to 2030, with a Vision to 2050 (under Resolution No. 55-NQ/TW). Decree 82/2018/ND-CP has also introduced specific incentives for eco-industrial parks, including priority access to loans, facilitation of participation in investment programs, technical support, and market information provision to ensure sustainability.

However, regulations on "green" standards and waste recycling remain unclear, leaving businesses confused about how to comply. The requirements for green industrial parks are scattered in many laws and regulations, so implementation is still complicated and difficult. In particular, the standards and guidelines on waste recycling and reuse are still unclear and inconsistent, or the regulations on digital transformation and application of smart technology in management and production for this field are not yet available, making the current practical application spontaneous and dependent on the capabilities and individual needs of enterprises. The global business environment is shifting towards the development of green industrial parks, but many industrial park development plans in localities still retain the traditional structure that has not been updated, does not keep up with the development trends of the world, and does not integrate new criteria and standards.

Vietnam still does not have specific policies and support to attract investment in green industrial development. Complicated and cumbersome administrative procedures are also a barrier for businesses when converting to a green model. Vietnam has committed to participating in global agreements, programs, and development goals on environmental protection such as Net-zero, resource protection, etc… Still, these goals have not been taken seriously and integrated into current industrial park development plans. Attracting investment and exploiting existing industrial land funds is not effective. Determining land funds for industrial development is still unscientific, and not suitable to the potential, technology development trends, and actual needs of industrial sectors... Many industrial development plans in localities are still calculated subjectively and qualitatively without being based on local economic and industry development goals. Many investors are implementing industrial parks by dividing and selling land to maximize land use and attract as many investors as possible. However, reality shows that large FDI investors, especially those aiming for green goals, are placing high demands on environmental criteria, technology, and social infrastructure during the investment process.

3.2. Infrastructure shortcomings

To help improve production and management efficiency, collecting and establishing a database system on: emissions, environmental pollution, energy consumption, etc. is extremely necessary, but most industrial parks in Vietnam currently do not have a complete data collection, measurement, analysis, and management system. Green industry requires investment in new technologies, infrastructure, and production

processes to reduce emissions, save energy and resources. However, the implementation of new technologies and processes often comes with high initial investment costs. Businesses adopting green industries need to purchase new equipment and technology, build new or upgrade existing infrastructure, train employees, and implement new processes. These costs can put pressure on businesses and governments, especially in developing economies those with limited resources, or SMEs that do not have much capital to invest.

Social infrastructure: accommodation for workers, living facilities for workers... have not been thoroughly resolved, are spontaneous... although they have been strongly mentioned in macro-level policies. Specifically: Housing infrastructure for workers and experts accounts for 8.4%; 91.6% of workers and experts do not have housing (Nguyen. H. M, 2024). Other infrastructure such as hospitals, supermarkets, and customs services within the area is still limited.

The current state of planning and infrastructure development in Vietnam poses significant obstacles to the establishment of green industrial parks. Building green industrial parks based on a closed-loop circular ecosystem requires favorable locations, large land areas, and strong connections with supporting industrial clusters to optimize supply chains and resource utilization. As a result, infrastructure planning and development must be long-term and efficient to benefit an entire industrial region.

3.3. The issue of environmental control

Although Vietnam has achieved a relatively high, continuous and stable growth rate in the Southeast Asian region with an average growth rate of 6.1% in the period 2011 - 2023, however, growth in Vietnam is also the cause of high CO_2 emissions. According to experts' forecasts, Vietnam's CO_2 emissions will reach nearly 471 million tons by 2030, each year, Vietnam generates about 1.83 million tons of plastic waste; each day, the amount of domestic solid waste generated is about 61,000 tons, of which up to 71% of the total waste (equivalent to 43 thousand tons/day) is treated by landfill; many resources are currently seriously depleted. According to World Bank calculations, water pollution could cost Vietnam up to 3.5% of its gross domestic product by 2035. Vietnam is also one of the countries vulnerable to climate change, with losses of up to 11% of GDP by 2030.

Additionally, promoting enterprises to adopt green processes poses a significant challenge. Businesses often face high investment costs for sustainable development processes. Meanwhile, many enterprises continue to prioritize cost optimization over environmental concerns, which creates challenges in managing a cohesive system of green industrial park enterprises to ensure circular development.

4. Recommendations to promote the green industrial park model in Vietnam

4.1. Completing the system of standards and technical regulations related to green industrial parks

Continue to improve the system of standards and technical regulations on classification, reuse and recycling of solid waste. Include environmental standards in the list of essential standards for selecting industries that encourage investment, production technology and products, and planning industrial parks. Study and amend regulations on considering waste as a resource in legal documents through the regulation of terms such as "secondary materials", "used materials"...

Consider and amend regulations allowing the reuse of waste certified to meet the

requirements for reuse and recycling as production materials or meeting standards, technical regulations, and technical instructions used in the production of construction materials and site clearance in industrial parks as internal, reducing administrative procedures, and creating conditions for industrial symbiosis

Encourage enterprises in the industrial park to participate in industrial symbiosis and waste reuse. Issue criteria, roadmaps, and incentive mechanisms to implement circular economy and waste reuse in accordance with Vietnam's conditions, especially mechanisms to support the development of a market for exchanging by-products and discarded products so that waste becomes a secondary resource in the closed loop of the new production cycle. It is possible to create a secondary raw material exchange where stakeholders can exchange raw materials with each other, prioritizing the construction of databases for some industries and fields with potential for development first, such as the plastics industry, the paper industry, etc.

Complete documents and instructions for implementing green industrial parks, it is necessary to specify the criteria for ecological industrial parks with preferential and support policies. Each locality needs to develop an action plan to convert existing industrial parks into green industrial parks, replicate and share successful green industrial park models.

4.2. Completing infrastructure in industrial parks

Increasing green areas; using recycled materials; focusing on using clean, renewable energy (solar, wind, etc.); exploiting natural resources rationally; using new technology to increase the ability to collect and treat waste and wastewater compared to before; reducing emissions to contribute to environmental protection...

Industrial park applies smart lighting system, uses concentrated solar panels, optimizes renewable energy, limits energy use of fossil fuels. For industrial parks that have been invested in and are in operation, investment will be made to convert and upgrade them in parts to achieve the highest level of greening. The infrastructure of industrial parks must meet green and smart criteria demonstrated through the use of advanced technologies such as automation, smart energy management, and high environmental protection standards.

4.3. Strengthen environmental protection measures in industrial parks

Planning green industrial development policies. This is a highly creative and flexible process. There needs to be a close combination between building the pillars of the green economy (industry, agriculture, and services) and removing obstacles and backlogs left by previous polluting industries. When planning green industrial development, it is necessary to take into account factors and agents that cause environmental pollution, degradation, and depletion of natural resources, and at the same time develop solutions to protect environmental resources, in which the treatment of wastewater, exhaust gas, solid waste, and hazardous waste needs to be focused on.

The State shall issue appropriate mechanisms and policies to encourage, promote, and support the development of the environmental industry, such as encouraging enterprises to build and install pollution control systems through preferential measures, tax exemptions, and reductions, depreciation for enterprises...; provide adequate support for research and development activities related to the environmental industry through financial support mechanisms and policies, and organize related fairs, exhibitions, and seminars...

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VIETNAM GREEN GROWTH: MEASUREMENT, ANALYSIS AND POLICIES DISCUSSION

Trần Thị Lan Hương[1], Nguyễn Sơn Tùng[2]

Abstract: The main content of the article is to present the results of assessing Vietnam's green growth, based on the calculation method in Vaghefi et al (2015) research. The results clearly show that economic growth in Vietnam during the period 2001-2021 caused environment degradation. In addition, the article also analyzed the situation of natural resource depletion and pollution, especially CO2 emissions. Based on that, some policy discussions are presented to promote green growth in Vietnam in the future

Key words: *natural resource depletion, green growth, Vietnam*

1. Introduction

GDP has long been considered the standard measure of a nation's wealth and development. However, this indicator only reflects the value of goods and services produced, completely ignoring the negative impacts on the environment and society caused by the production process. The overexploitation of natural resources,T environmental pollution, and social inequality - all are not reflected in GDP. This leads to an incomplete picture of a country's true development and can lead to misguided policies that prioritize short-term economic growth over long-term sustainability

In recent years, international organizations, businesses, and policymakers in many countries have increasingly focused on policies that promote sustainable development, surpassing the traditional economic growth model. The concept of sustainable development has expanded with the emergence of new concepts such as green growth and circular economy.

The concept of Green Gross Domestic Product (Green GDP) was introduced in the early 1990s as a tool to measure economic growth in a way that accounts for environmental costs, addressing the limitations of traditional GDP which often overlooks the economic impacts of natural resource depletion and environmental degradation.

2. Green GDP calculation

Until now, there has been no universally agreed-upon method for calculating Green GDP, primarily due to differing perspectives on how to measure and value various types of environmental costs. Additionally, there are significant data limitations. However, research has identified various approaches that can be applied when calculating Green GDP. According to these approaches, Green GDP calculations can be divided into two main types (Chalandra, 2019). Type 1 calculates Green GDP by subtracting environmental costs and resource depletion costs from traditional GDP, but it often neglects natural ecosystems. This approach, inspired by Herman E. Daly (2005) emphasizes the need to account for the costs of natural resource depletion. However, there is much debate over how to quantify these costs, and data limitations pose a significant challenge. While these costs generally encompass

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environmental and resource depletion costs, information on resource depletion is particularly scarce. Consequently, for many countries, calculations of environmental costs are limited to air and water pollution costs. Based on Herman's approach, Green GDP calculations are typically conducted through a following equation

GGDP = TGDP - NC. . (1)

NC = CE + RD (2)

GGDP is calculated by subtracting environmental damage costs (NC) and resource depletion (RD) from traditional Gross Domestic Product (TGDP). NC refers to the costs associated with environmental damage caused by economic activities, such as air pollution, water pollution, and loss of biodiversity. RD represents the depletion of natural resources like forests, minerals, and water. By deducting these costs, Green GDP provides a more comprehensive measure of economic growth that accounts for environmental impacts.

The neglect of ecosystem services is the reason why researchers have considered and proposed a Type II calculation method. With this approach, the national accounts system would include not only profit and loss statements but also balance sheets for ecosystem services (Heal, 2007). This idea was first proposed by Costanza et al (1997) and later formalized by Heal (2007)

SEP = GDP + ESP (3)

SEP (Subtotal Ecological-Economic Product) is a component used in calculating Green GDP. While Green GDP aims to incorporate the total value of ecosystem services (ESP) into economic calculations, SEP represents a partial calculation of this value. It serves as a building block for constructing a more comprehensive green GDP.

Green GDP = Traditional GDP + Ecological GDP. (4)

With Ecological GDP= The value of ecosystem services - Costs for ecosystem. (5)

However, the choice of what ecosystem depends on the view of researches, and mainly assessed based on these criterias: climate regulation, air clean, soil conservation, fecundation value, pets control, biodiversify and cultural recreation.

3. Research methodology and green GDP calculation for Vietnam

This research utilized secondary data collected from the World Bank and Global Forest Watch, and subsequently calculated indicators related to natural resource depletion and pollution damage which are the two main componenets for green GDP calculation from traditional GDP. Data and all computation results are described and then analyzed to perform the status for Vietnam green GDP growth.

Vietnam's green GDP index is computed from 2001 to 2021. The analysis is limited to 2021 due to data constraints, primarily from the World Bank. While Global Forest Watch data is more recent, the World Bank's environmental data only extends to 2021. The calculation follows the methodology of Vaghefi et al. (2015). The green GDP index, as calculated by this method, is as follows

Green GDP= GDP - Natural resources depletion- Pollution damage (5)

Natural resources depletion, it is the sum of net forest depletion, energy depletion, and mineral depletion. The energy depletion is calculated as the ratio of the value of energy resources stock to the remaining reserve life time. It includes coal, crude oil, and natural gas. Mineral depletion is also estimated as the ratio of the value of the mineral resources stock to the remaining reserve life time. The mineral depletion covers tin, gold,

zinc, lead, copper, nickel, iron, silver, bauxite, and phosphate. Data for energy depletion và mineral depletion are directly collected from WB. Meanwhile, the net forest depletion is estimated as the unit resource rents multiplied by the excess or round wood harvest over natural growth, and be computed from the following equation

Net forest depletion= Forest rent (% of GDP) * GDP *(Net forest loss/Total forest area)

The reason for using this formula is based on the interconnectedness between economic factors and the environment, which is a component of the Natural Capital Accounting approach. This approach is used to measure the depletion of natural resources within the context of economic development. Furthermore, incorporating this formula with GDP helps to quantify the value of forest depletion within a national economic context, demonstrating that forest loss is not only an environmental issue but also an economic cost. Additionally, using the ratio of forest loss to total forest area helps to refine the valuation of forest depletion by reflecting the actual scale of forest loss, as it directly relates to the total value of forest rent

Forest rent, calculated as a percentage of GDP, reflects the economic contribution of forests to a nation's economy. In developing countries, where forests often serve as a vital livelihood source, the forest rent is generally higher compared to developed nations. This highlights the significant role of forests in these economies and underscores their vulnerability to environmental issues related to forest exploitation

Net forest loss refers solely to the change in forest area after accounting for both deforestation and reforestation activities. This data is primarily sourced from the Global Forest Watch (GFW) system for monitoring global forest loss. Meanwhile, total forest area data is sourced from the World Bank's database.

In addition to calculating green GDP using equation (1), pollution damage can also be calculated. There are many options for choosing an indicator for this calculation. However, in this study, CO2 emissions are chosen as the main indicator for pollution damage. There are two main reasons for this choice: (1) CO2 is a major greenhouse gas, and its emissions are closely linked to climate change. Climate change causes widespread "pollution-like" damages such as rising sea levels, extreme weather, and disruptions to ecosystems and agriculture, which are forms of environmental damage. (2) CO2 emissions are often correlated with other pollutants (e.g., SO2, NOx, PM2.5) because they share common sources, such as fossil fuel combustion in power plants, transportation, and industrial processes. Reducing CO2 emissions typically involves cleaner energy and technologies, which also reduce other types of pollution. In Vietnam, major CO2 emitters include various sectors: energy (from fossil fuels, emissions during extraction, transportation of fuels), industry (cement, steel, lime, ammonia), agriculture (rice cultivation, land use), and other activities from different sources. Furthermore, processes such as deforestation, waste treatment and wastewater, and daily household activities also contribute to CO2 emissions. Economic activities such as industrial production, consumption, and waste disposal all contribute a portion of CO2 emissions. To estimate pollution damage, we use data on CO2 damage (expressed as a percentage of GNI) and Vietnam's GNI.

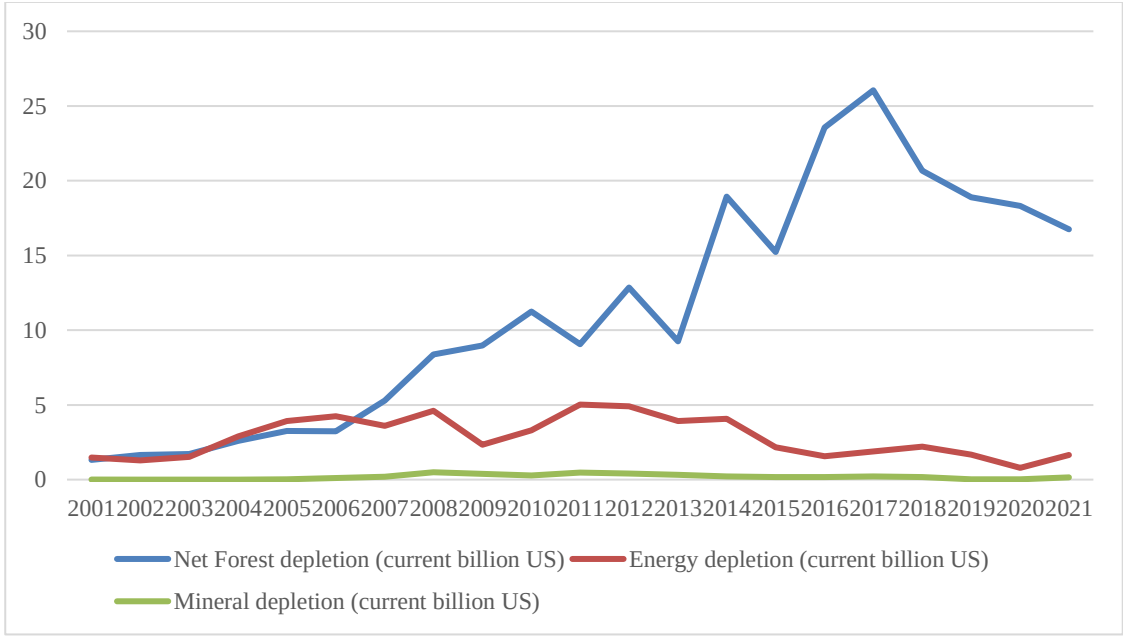
After collecting and processing the data, green GDP is calculated using equation (5). In this equation, all indicators related to GDP, green GDP, the value of natural resource depletion, and environmental damage are measured using the international US dollar PPP

measurement unit.

Figure 1 shows a clear trend of decreasing forest area, energy, and mineral resources in Vietnam from 2001 to 2021. Notably, the decline in mineral resources appears to be relatively stable when compared to the significant decreases in forest and energy resources. For instance, the mineral resources decreased by approximately 0.18 billion USD in the period from 2001 to 2021. A distinctive feature of the country's mineral resources is that reserves are generally limited and non-renewable. This characteristic may explain the relatively stable decline in mineral resources compared to other resources.

Despite the potential benefits of mineral resources, their exploitation often faces numerous challenges, especially in industries that extract minerals for construction materials. Vietnam's primary mineral resources include coal, which is also the main mineral used in construction, accounting for approximately 60% of the total mineral extraction. Natural resources such as energy are crucial for various activities and for environmental protection and economic development. Vietnam possesses a diverse range of energy resources including natural gas, coal, hydropower, and renewable energy. However, the overexploitation of traditional energy sources like coal has led to severe environmental consequences. The transition to renewable energy sources still faces many challenges, particularly in terms of investment and technology.

Vietnam is facing a rapidly increasing demand for energy, especially electricity, driven by economic growth. Despite this, the value of energy resources has declined by an average of 2.89 billion USD annually. Simultaneously, the country is experiencing significant forest loss due to human activities such as land conversion for agriculture or industrial development. This deforestation has resulted in an average annual economic loss of 11.3 billion USD

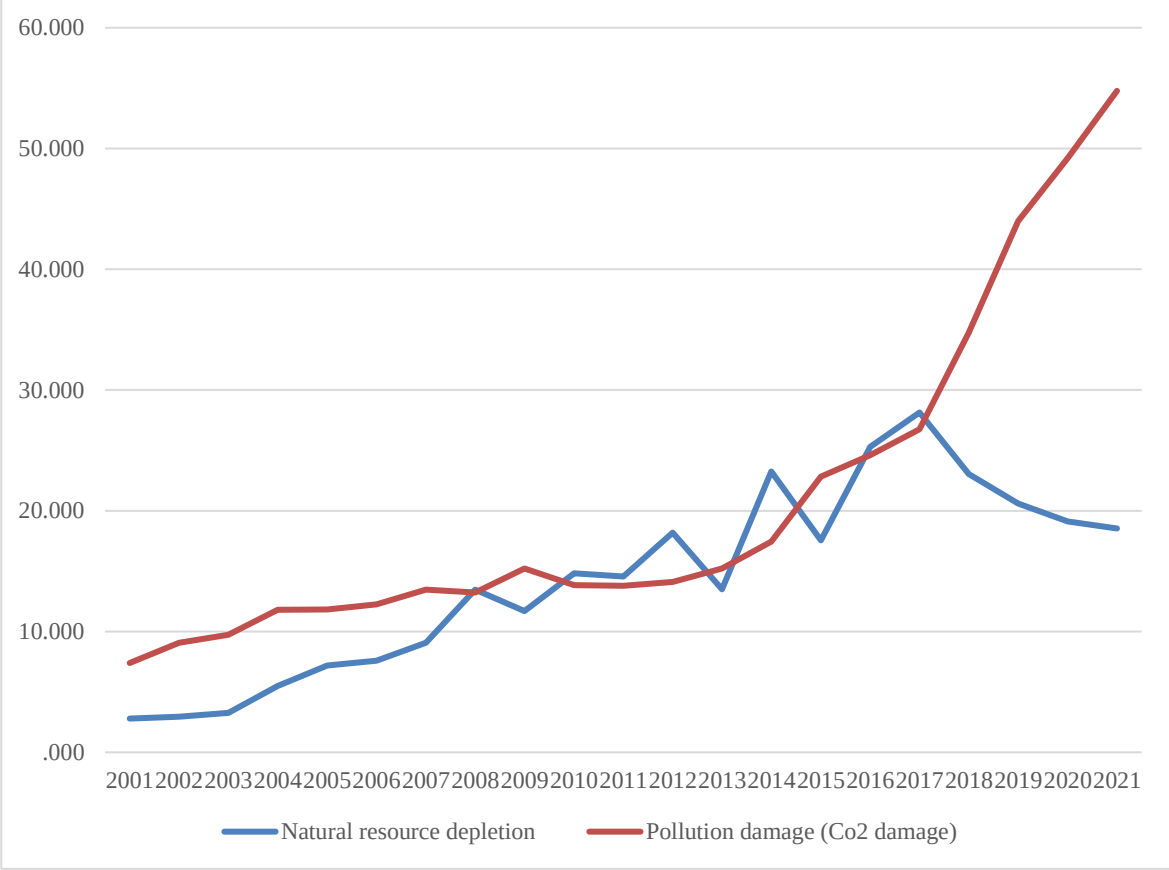


Measurement unit: billion US

Figure 1: Net forest, energy and mineral depletion for Vietnam in the period 2001- 2021

Sources: World Bank, and author's calculation based on data from Global Forest Watch

While Vietnam is experiencing a surge in pollution, as evidenced by rising CO2 levels, there is a positive trend of slowing down natural resource depletion. This trend is particularly evident from 2017 to 2021. The shift towards cleaner energy sources may have contributed to this improvement. Figure 1 supports this claim, showing a lower average rate of energy depletion during this period

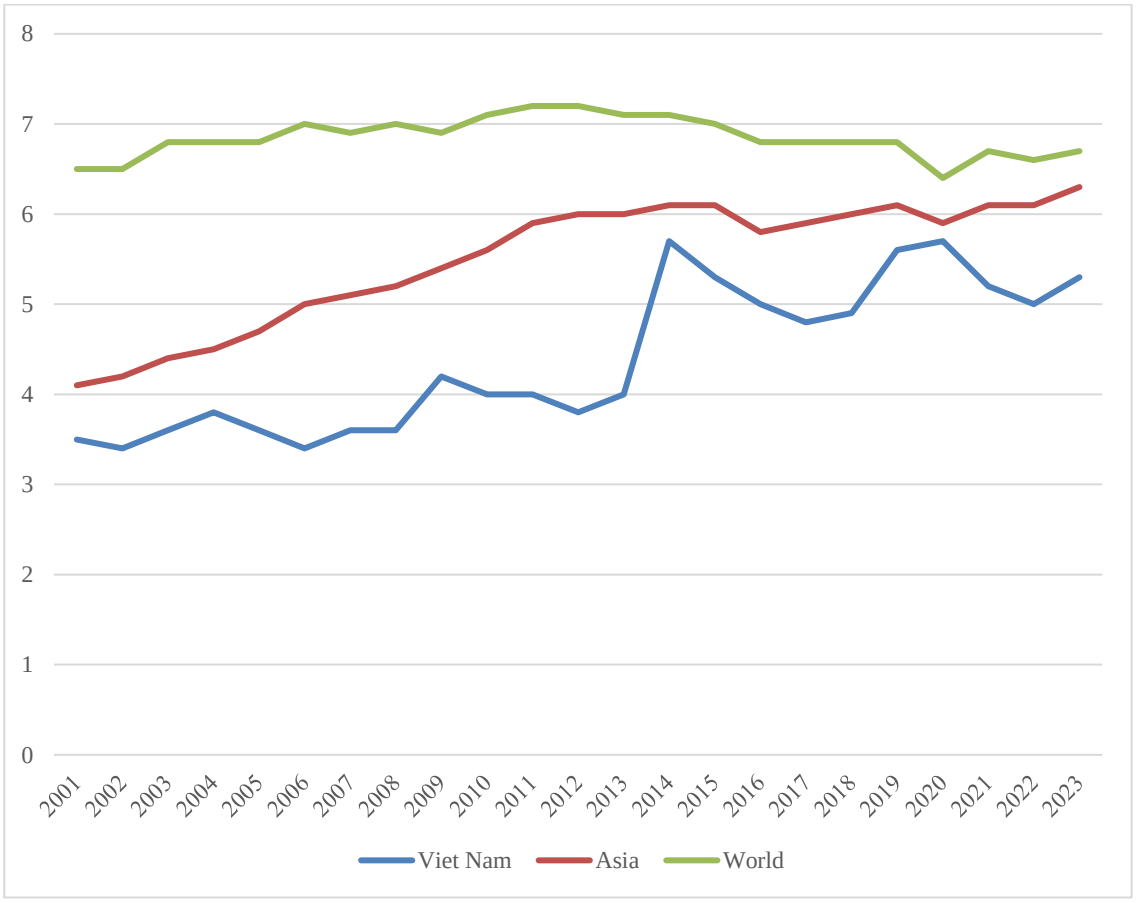


Measurement unit: billion US

Figure 2: Natural resource depletion and pollution damage (proxied by Co2)

Sources: World Bank, and author's calculation based on data from Global Forest Watch

Figure 3 reveals that the per capita greenhouse gas emissions of Vietnamese people are linked to land use. This implies that we should not only focus on direct activities such as production, consumption, and transportation, but also consider indirect activities like land use changes. For instance, changes in land use, such as deforestation or converting forests to farmland, significantly contribute to greenhouse gas emissions. This is a crucial piece of information for assessing the impact of human activities on climate change. Moreover, the figure shows that the average Vietnamese emits less greenhouse gas compared to individuals in **other** regions, especially in developed countries



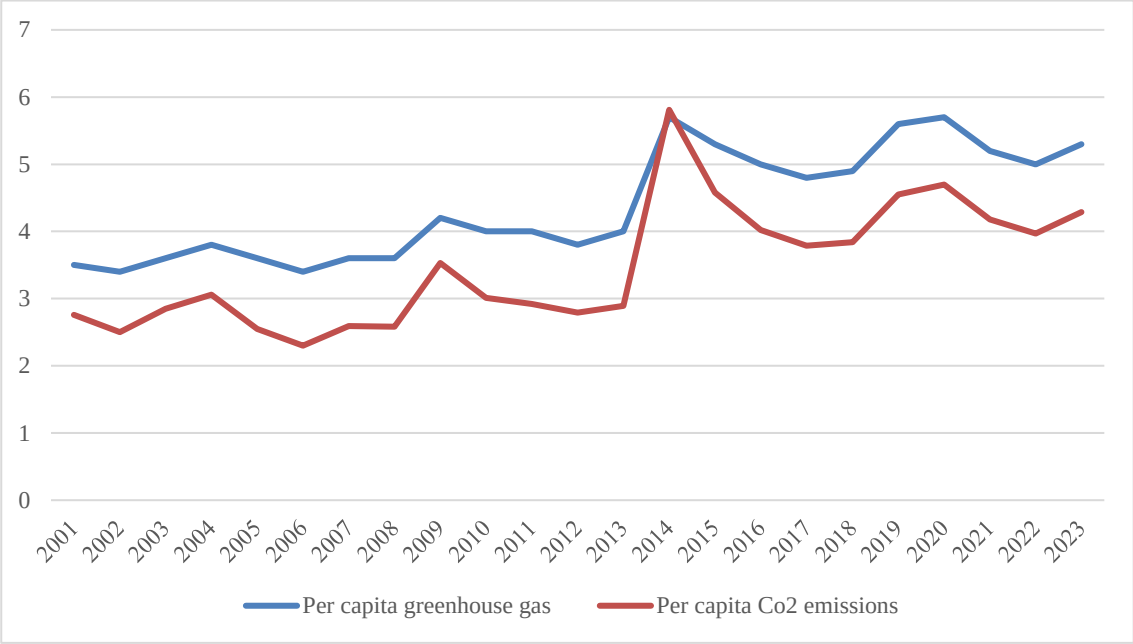
Measurement unit: tonnes of carbon-dioxide equivalents

Figure 3: Per capita greenhouse gas emissions including land use

Sources: Jones et al (2024); Population based on various sources (2024)

Greenhouse gases are substances that can absorb infrared radiation from the sun, trapping heat in the atmosphere and causing the greenhouse effect. This is a natural process necessary to maintain Earth's temperature suitable for life. However, excessive emissions of greenhouse gases have led to climate change. Among greenhouse gases, carbon dioxide (CO2) is the most abundant and contributes significantly to global warming. Figures 3 and 4 present data on greenhouse gas emissions, which include carbon dioxide, methane, and nitrous oxide from all sources, including land use. To facilitate comparison, all greenhouse gases except CO2 are converted to carbon dioxide equivalents based on their global warming potential. In Vietnam, the primary source of CO2 emissions is the combustion of fossil fuels for energy and industrial processes.

Figure 4 shows the levels of greenhouse gas emissions (including land use) and per capita CO2 emissions in Vietnam from 2001 to 2023. The figure clearly shows that CO2 emissions are the main driver of overall greenhouse gas emissions, with both indicators following the same trend. In almost all years, CO2 emissions accounted for about 80% of total per capita greenhouse gas emissions in Vietnam.



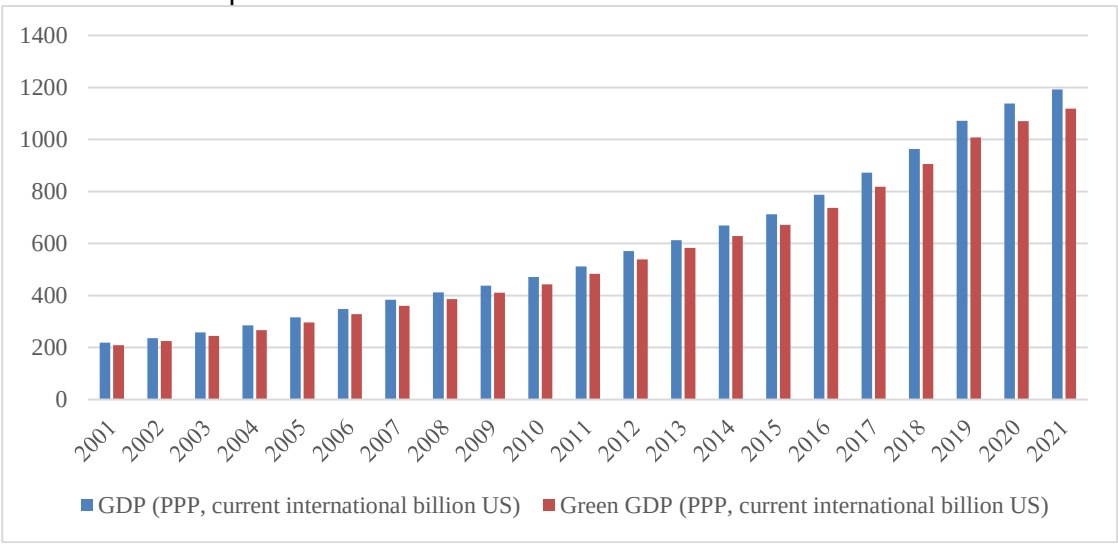
Measurement unit: tonnes of carbon-dioxide

Figure 4: Per capita greenhouse gas and Co2 emissions

Sources: Jones et al (2024); Population based on various sources (2024)

4. Results for Vietnam green GDP

Throughout the study period, a notable fact is that Vietnam's green GDP is consistently lower than its nominal GDP (both of which are measured in current US dollars) (Figure 5). This indicates that Vietnam's economic growth has come at the expense of the environment, leading to environmental degradation and hindering sustainable development.

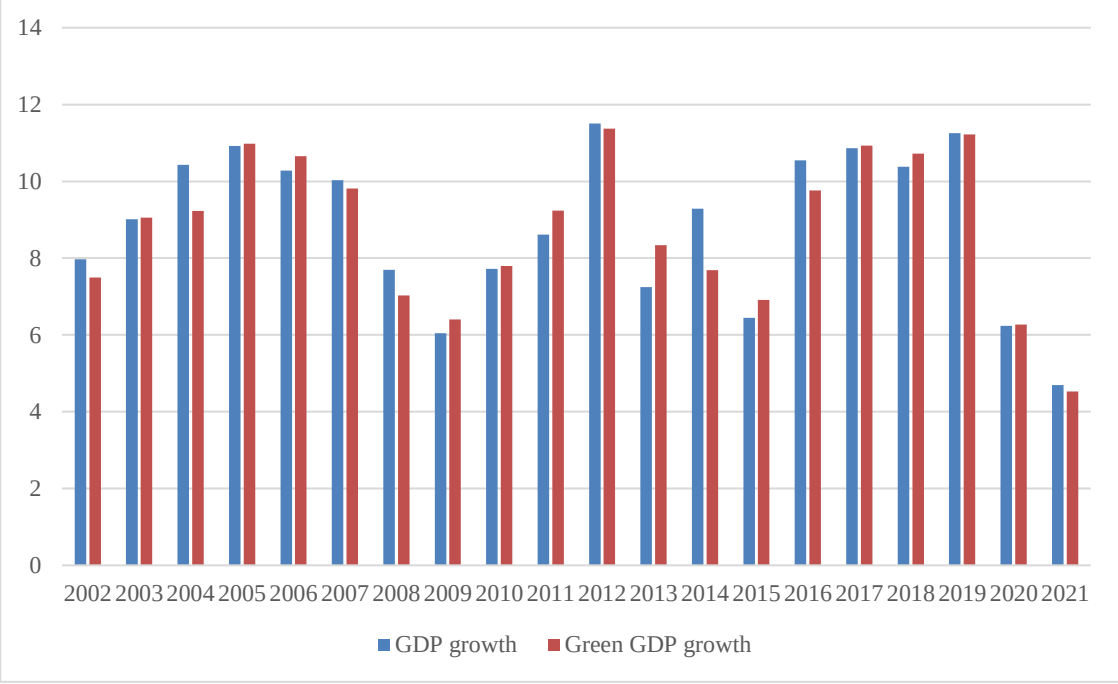


Measurement unit: billion US

Figure 5: GDP and green GDP for Vietnam for the period 2001-2021 (PPP current international US)

Sources: World Bank, and author's calculation based on data from Global Forest Watch

Figure 6 illustrates the growth rates of both GDP and green GDP in Vietnam from 2002 to 2021. While both indicators generally showed an upward trend, their growth rates varied significantly, especially in the short term. Notably, in 2014, the gap between the growth rates of GDP and green GDP was the widest among all years, indicating that economic growth in that year was largely driven by unsustainable activities.



Measurement unit: %

Figure 6: GDP and green GDP growth rate for Vietnam in the period 2001-2021

Source: Author's calculation

5. Policies discussions for Vietnam green growth

In general, the global trend towards green growth often focuses on issues such as: renewable energy expansion, circular economy initiatives, green finance and investments, technological innovations, policy integration and international cooperation. Policies for green growth for Vietnam should seek to mitigate pollution, greenhouse gas emissions, and enhance environmental quality. Policy recommendation for Vietnam may include:

Energy Efficiency and Renewable Energy: A core objective is to decouple economic growth from energy consumption by reducing energy intensity (energy consumption relative to GDP) by 1-1.5% annually from 2021 to 2050. Simultaneously, Vietnam aims to significantly increase the share of renewable energy in its total primary energy supply, targeting 15-20% by 2030 and 25-30% by 2050. This transition involves promoting investments in solar, wind, and other renewable energy technologies [8]

Sustainable Land Use and Water Management: Maintaining forest cover at 42% is a critical component, recognizing the vital role of forests in carbon sequestration and biodiversity conservation. Alongside this, the strategy emphasizes efficient water resource management by promoting advanced water-saving techniques in agriculture, aiming for implementation on 30% of irrigated land by 2030 and 60% by 2050 [16]

Green Technology and Circular Economy: Vietnam aims to increase the contribution of green technology to its GDP to 42-45%, fostering innovation and adoption of environmentally friendly technologies across various sectors. The promotion of a circular economy model, focusing on resource efficiency, waste reduction, and reuse, is also a key aspect [9] [14]

Urban Sustainability and Infrastructure: Developing sustainable urban infrastructure is prioritized, including the construction of wastewater treatment systems in 60% of cities with populations over 150,000. This addresses urban pollution and promotes environmental sanitation [4] [15]

Sustainable Agriculture: The strategy targets reducing greenhouse gas emissions from agriculture by promoting research and adoption of efficient production processes that optimize the use of seedlings, feed, agricultural inputs, soil, and water. Furthermore, it encourages the treatment and reuse of agricultural waste to produce valuable by-products like animal feed, mushrooms, industrial materials, biogas, and organic fertilizer, contributing to a circular agricultural system [7] [13]

These policies are underpinned by the National Green Growth Strategy for the period 2021-2030, with a vision towards 2050, which aims to restructure the economy towards a green, low-carbon, and climate-resilient pathway. The strategy recognizes that green growth is not merely an environmental concern but an integral part of achieving long-term economic prosperity and social equity.

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ASSESSING THE CONTRIBUTION OF TOTAL FACTOR PRODUCTIVITY (TFP) TO THE ECONOMIC GROWTH OF HA TINH PROVINCE

Tran Manh Hung[1], Nguyen Thanh Dong[2]

For every country, capital and labor resources are finite. However, total factor productivity (TFP) is considered an unlimited factor in promoting economic growth.

Ha Tinh Province boasts numerous favorable characteristics for socio-economic development, such as substantial mineral reserves with diverse types and high mineral content, land conducive to various industrial crops, and a diverse terrain and culture that attract eco-tourism and cultural tourism. Some districts also possess high, flat terrain, ideal for industrial park development. However, the Province also faces several challenges, including uneven geographical distribution, numerous high hills and mountains that hinder overall and harmonious development, limited intellectual levels in many regions that complicate the implementation of socio-economic development policies, and constrained development resources that make it difficult to implement large-scale investment projects and create breakthrough incentives for development. Given these conditions, evaluating the contribution of TFP and researching and implementing solutions to enhance TFP's contribution to the Province's economic growth is both necessary and important.

Key words: Total factor productivity (TFP), the contribution of total factor productivity (tfp) to the economic growth, Gross Regional Domestic Product (GRDP)

1. Theoretical issues on TFP and methods for evaluating TFP's contribution to economic growth

Total factor productivity (TFP) is an indicator reflecting the production results brought about by improving the efficiency of capital and labor use through technological innovation, production rationalization, management improvement, and labor skill enhancement. Accordingly, the growth rate of production results can be divided into three parts: *(i)* the increase due to increased capital; *(ii)* the increase due to increased labor; and *(iii)* the increase due to improved total factor productivity. Thus, it is possible to achieve greater production/output results through optimizing labor and capital resources, improving technological processes, and enhancing management processes, without necessarily increasing labor or capital. Therefore, the TFP indicator reflects the quality of growth and the sustainable development of the economy and serves as a basis for analyzing macroeconomic efficiency and evaluating scientific and technological progress in each industry, locality, and country. TFP can be understood as the productivity or efficiency of production factors other than capital and labor in creating economic output. These factors include technological progress, management levels, human capital, institutions, the quality of the economic environment, and other random factors.

TFP growth is often considered the real driver of an economy's growth. Studies have shown that while labor and investment growth are important contributors, TFP growth

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can account for more than 60% of growth in economies. Thus, with the same quantity of input factors, the increase in GDP due to TFP increase is crucial for the overall growth rate of an economy. TFP increase signifies the quality and depth of economic growth and is assessed based on two main indicators: the TFP growth rate and the contribution ratio of TFP increase to economic growth.

Regarding the method of calculating and evaluating the contribution of TFP to economic growth, the research team used the General Statistics Office's method - the Solow residual method. This method calculates TFP using statistical data from the General Statistics Office, such as GRDP, capital (K), and labor (L). TFP is calculated using the Solow residual: $A = \frac{Y}{K^{\alpha}L^{1-\alpha}}$. This method is widely used by many provinces and is likely to be applied to all 63 provinces and cities to ensure consistency in methodology, reliability of results, and the ability to compare TFP contributions across provinces and cities.

2. Evaluation of TFP contribution to economic growth of Ha Tinh Province

According to research results, Ha Tinh is actively working on improving the efficiency of production factors through technological and managerial advancements. During the period from 2011 to 2015, the contribution of capital to Gross Regional Domestic Product (GRDP) was 56.43%, labor accounted for 13.89%, and Total Factor Productivity (TFP) made up 29.67%. However, in the periods from 2016 to 2020 and 2021 to 2023, the contribution of TFP to the Province's GRDP growth increased significantly, reaching 32.19% and 33.04% respectively. This indicates a positive improvement in the efficiency of using production factors and highlights the increasingly important role of technology and effective management in driving Ha Tinh's economic growth (see Figure 1).

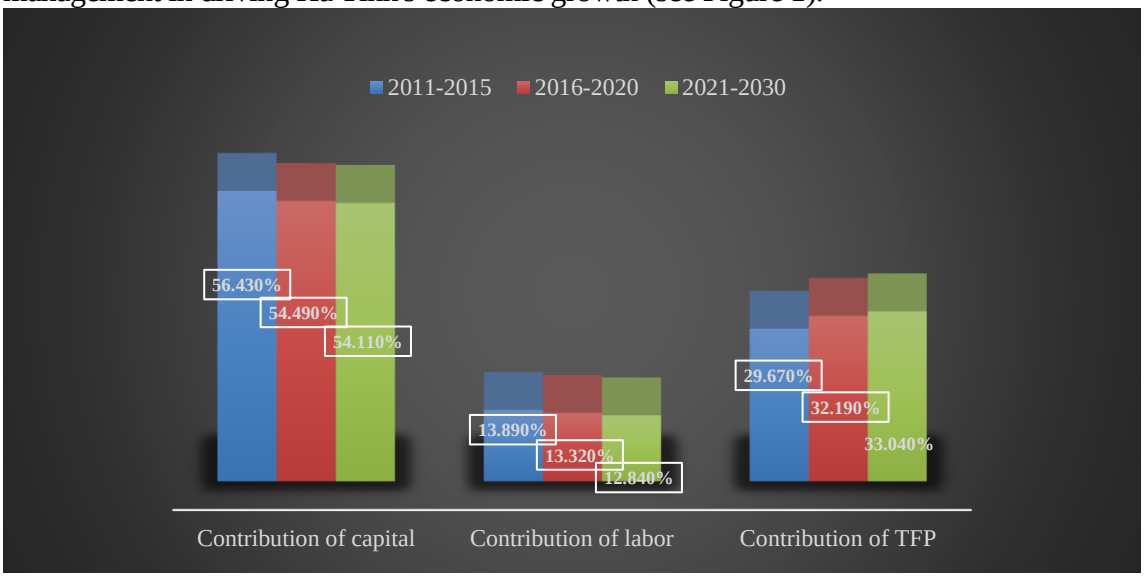

Figure 1. Contribution of factors and TFP to Ha Tinh's GRDP

Source: Authors' calculations in 2024

From 2016 to 2023, the contribution of labor and capital to Ha Tinh's GRDP showed a decreasing trend, whereas the contribution of TFP to the Province's GRDP showed an increasing trend. However, the rates of decrease in capital and labor contributions, as well as the rate of increase in TFP's contribution to GRDP, were not clearly defined. The growth of the Province's GRDP still heavily relies on capital investment, particularly in

the Foreign Direct Investment (FDI) sector. Large investment projects, especially in industrial and infrastructure sectors, have played a significant role in enhancing the Province's production capacity (see Figure 2).

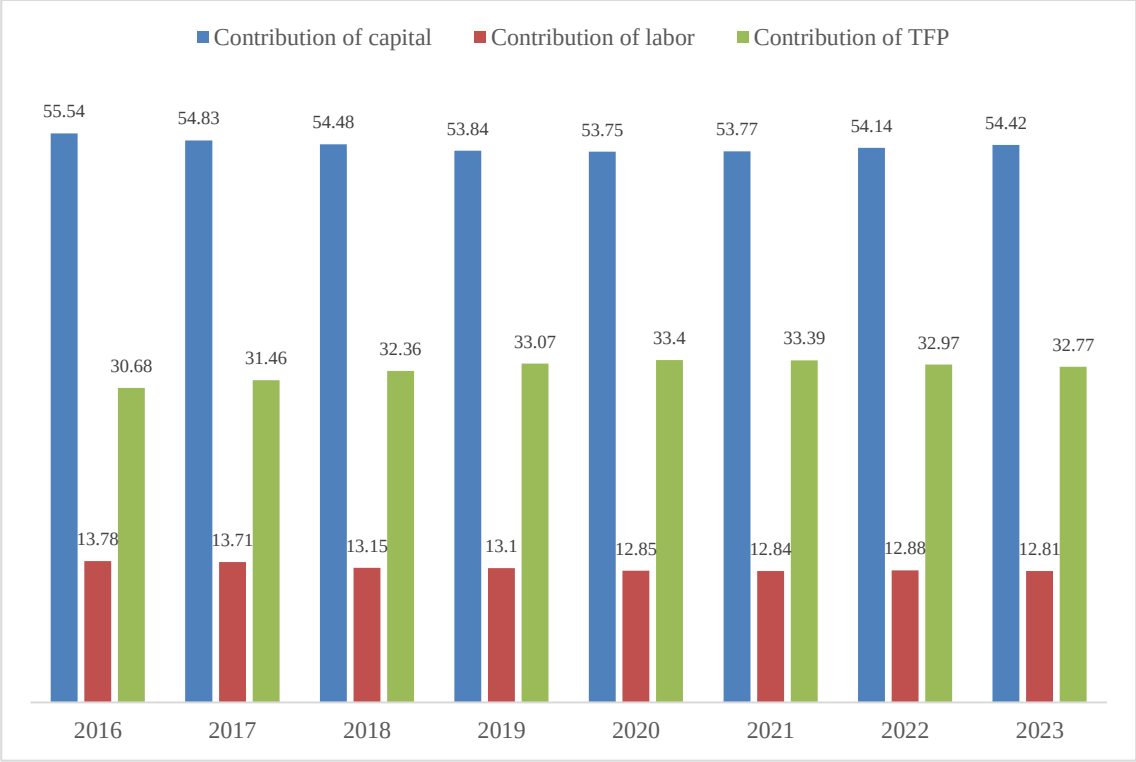

Figure 2. Contribution of capital, labor and TFP to Ha Tinh's annual GRDP over the period 2016 - 2023 (%)

Source: Authors' calculations in 2024

However, compared to the national average, the contribution of TFP to Ha Tinh's GRDP growth remains significantly lower. On average, during the period 2016-2022, TFP's contribution to Ha Tinh's GRDP was 32.47%, which is below the national average of 41.96%.

Table 1. Comparison of TFP contribution to economic growth of Ha Tinh Province and the whole country

Year	Nationwide		Ha Tinh Province	
	GDP growth rate	***TFP's contribution to GDP***	***GRDP growth rate***	***TFP's contribution to GRDP***
2011-2015	5.91	33.6	16.85	32.19
2016-2020	6.01	43.32	5.81	33.04
2021-2022	6.54	44.61	3.33	33.18
2016	6.81	46.09	-16.99	30.68
2017	7.08	44.76	13.09	31.46
2018	7.02	47.72	20.85	32.36
2019	2.91	33.42	9.27	33.07
2020	2.56	36.03	2.85	33.40

2021	8.02	43.35	4.16	33.39
2022	5.05	42.37	2.49	32.97

Source: Authors' calculations in 2024

The contribution of TFP factors to the Value Added (VA) of enterprises in Ha Tinh Province during the period 2011-2023 is shown in the following table.

Table 2. Contribution of TFP factors to VA of enterprises in Ha Tinh Province over the period 2011-2023 *(%)*

	TFP	***Scale Efficiency***	***Technological Advancement***	***Technical Efficiency***
2011	*30.29*	*1.10*	*24.88*	*4.30*
2012	*29.17*	*0.85*	*23.22*	*5.10*
2013	*29.81*	*0.35*	*23.60*	*5.86*
2014	*29.39*	*0.66*	*22.20*	*6.52*
2015	*29.70*	*0.77*	*21.29*	*7.65*
2016	*30.68*	*0.33*	*21.65*	*8.69*
2017	*31.46*	*2.77*	*18.67*	*10.02*
2018	*32.36*	*1.32*	*18.18*	*12.86*
2019	*33.07*	*3.05*	*15.20*	*14.82*
2020	*33.40*	*2.93*	*16.55*	*13.92*
2021	*33.39*	*2.32*	*16.60*	*14.47*
2022	*32.97*	*2.19*	*15.59*	*15.20*
2023	*32.77*	*1.92*	*14.89*	*15.96*
Average 2011-2015	*29.67*	*0.75*	*23.04*	*5.89*
Average 2016-2020	*32.19*	*2.08*	*18.05*	*12.06*
Average 2021-2023	*33.04*	*2.14*	*15.69*	*15.21*

*Note: *VA stands for Value Added*

Source: Calculation by the research team from data of the General Statistics Office

(1) Contribution of Scale Efficiency to VA: Scale efficiency has shown considerable fluctuations over the years. In 2011, the value was 1.10% and decreased to 0.35% in 2013. The period 2014-2015 saw a slight increase but remained low, with values of 0.66% and 0.77% respectively. The average scale efficiency contribution to VA during 2011-2015 was 0.75%, indicating a low level of scale efficiency. From 2016 onwards, the scale efficiency contribution to VA tended to increase, especially in 2017 (2.77%) and 2019 (3.05%).

The calculation results show improvement during 2016-2020 with an average of 2.08%, and further improvement during 2021-2023 with an average of 2.14%. This reflects a more stable scale efficiency and highlights that enterprises in Ha Tinh Province are becoming increasingly efficient in production scaling. The early years of 2011-2015 might have been a challenging period for expanding production scale. The gradual improvement in subsequent periods suggests that enterprises have found ways to optimize production scale, or there have been government support policies to enhance production scale.

(2) Contribution of Technological Advancement Efficiency to VA: The efficiency of technological advancements has tended to decrease over the years. In 2011, the value of technological efficiency in TFP contributing to VA was 24.88%, but this gradually decreased over the years, with a sharp decline starting from 2018, reaching only 14.89%

in 2023. The average efficiency of technological advancements during 2011-2015 was 23.04%, indicating a high efficiency level of technological advancements. However, the period 2016-2020 witnessed a decline, with the average falling to 18.05%. The period 2021-2023 showed the lowest efficiency with an average of only 15.69%. The high efficiency of technological advancements during 2011-2015 may reflect strong investment in new technologies and production improvements. The subsequent decline could be due to various factors such as technological saturation, financial or policy difficulties in technology investment, and shortages of human resources or skills needed to adopt and exploit new technologies.

The period 2021-2023, in particular, shows very low levels of technological advancement efficiency, possibly due to the impact of the Covid-19 pandemic, which disrupted the supply chain, reduced technology investment, and diverted resources to maintaining production and business activities. This highlights the need for local authorities and businesses to carefully consider the influencing factors to develop appropriate strategies to improve production efficiency, invest in new technologies, and stabilize production scale to achieve optimal productivity.

(3) Contribution of Technical Efficiency to VA: The contribution of technical efficiency to VA has tended to increase over the years. In 2011, this value was 4.30% and it increased over the years, reaching a peak of 15.96% in 2023. The average contribution of technical efficiency to VA during 2011-2015 was 5.89%, and this increased to 13.26% during 2016-2020, reflecting a clear improvement. In the period 2021-2023, the average contribution was 15.21%. This result shows that businesses have focused on improving labor skills, production processes, and applying more effective management measures.

Overall, the contribution of TFP factors to the added value (VA) of enterprises in Ha Tinh Province has shown a basic increasing trend, except for the efficiency of technological change.

3. Conclusion and policy recommendations

3.1. Conclusion

Several conclusions regarding the contribution of TFP to Ha Tinh's GRDP are as follows:

- The role of TFP in GRDP growth is becoming increasingly significant. Analysis of the contribution rates of factors to the GRDP of Ha Tinh Province indicates that TFP has shown a gradual increase over the periods, from 29.67% (2011-2015) to 32.19% (2016-2020) and 33.04% (2021-2023). This highlights improvements in the efficiency of using production factors and underscores the growing importance of technology and effective management in driving the Province's economic growth.

- The contribution of science, technology, and innovation to the Province's TFP and GRDP is on a downward trend. This decline may be attributed to various factors such as technological saturation and the impact of the COVID-19 pandemic.

- The role of TFP in the VA of enterprises is increasingly evident and significantly contributes to the increase in VA. This demonstrates that enterprises have made improvements such as optimizing production processes, reducing waste, and enhancing work efficiency.

3.2. Policy recommendations

Firstly, continue to improve the investment and business environment in the

Province to capitalize on the trend of foreign capital inflow, thereby increasing the ability to attract FDI. This will facilitate the transfer of advanced management methods and modern science and technology to Ha Tinh Province. Additionally, explore solutions to encourage local enterprises to actively participate in the supporting industry segment *(prioritize support for fields with advantages in the Province)*, integrate deeply into the value chain of FDI enterprises, strengthen large-scale linkages, form independent industrial production and supply chains, and develop feasible plans to establish and grow large domestic private enterprises in terms of scale and efficiency.

Secondly, within the Province's functions and tasks, focus on reforming administrative procedures related to civil transactions, land regulations, taxes, fees, social insurance, fire prevention, household registration, and immigration to improve the business environment, facilitate project implementation, and reduce costs for enterprises.

Thirdly, proactively review and recommend the implementation of infrastructure projects, with priority given to electricity, transportation, and industrial park infrastructure to enhance the ability to attract FDI to Ha Tinh Province, particularly in the fields of processing, manufacturing, and high technology.

Fourthly, develop science and technology towards comprehensive and sustainable modern industry. Ha Tinh Province aims to become an industrial development center in the region, focusing on the steel industry, supporting industry, post-steel manufacturing, and electricity production. Maintain a high growth rate, and continue to be a key driver of economic growth. More specifically,

(1) Improve steelmaking technology. Invest in R&D of new technology in the steelmaking process to enhance product quality, increase productivity, and reduce emissions. Promote the application of modern technologies such as automation and artificial intelligence to optimize the production process;

(2) Develop supporting industries. Facilitate enterprises in producing supporting components and materials for the steel industry, such as metals, alloys, and necessary equipment. Encourage cooperation and investment in high-tech companies to produce high-quality supporting products and services;

(3) Encourage post-steel manufacturing. Increase investment in R&D technology to produce post-steel processing products like steel pipes, cables, and metal components. Promote cooperation between enterprises in the supply chain to create higher added value.

(4) Invest in efficient power generation technology: Strengthen the development of renewable energy sources such as wind power, solar power, and hydropower to produce clean and efficient electricity. Promote the application of energy storage technology and smart grids to optimize electricity use and reduce energy loss.

(5) Enhancing training and human resource development are crucial factors for ensuring the success of the aforementioned solutions. It is essential to train skilled workers and highly specialized engineers to meet the demands of modern industries. Cooperation with training and research institutions is necessary to improve the quality of vocational education and training, ensuring that the workforce possesses the necessary skills and knowledge. Promoting international cooperation is a vital strategy for accessing advanced technology, management experience, and investment capital. Expanding collaboration with international partners and participating in international programs and projects will enhance the competitiveness of Ha Tinh's industry in the global market, while facilitating the transfer of

technology and knowledge. Building modern infrastructure is fundamental for industrial development. Investments in developing transport infrastructure, logistics, and modern industrial parks are necessary to support industrial growth. Ensuring the supply of electricity, water, and other basic services will create a favorable environment for production and business activities, helping businesses develop sustainably.

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RESEARCH ON FACTORS AFFECTING THE ADOPTION OF CORPORATE SOCIAL RESPONSIBILITY OF SMALL AND MEDIUM ENTERPRISES IN THANH HOA PROVINCE

Dao Thu Tra[1]

Abstract: This study aims to analyze the factors that promote the implementation of social responsibility of small and medium enterprises in Thanh Hoa. Data were collected from 168 small and medium enterprises in Thanh Hoa province through a pre-designed questionnaire. In this study, the research methods include descriptive statistics, frequencies, Cronbach's Alpha coefficient, KMO and Bartlett test, and exploratory factor analysis (EFA). The research results show that the factors that promote the implementation of social responsibility of small and medium enterprises include "economic benefits", "external pressure", and "moral responsibility". Among them, "moral responsibility" is considered the most important factor promoting the implementation of social responsibility of small and medium enterprises in Thanh Hoa province.

Keywords: Social responsibility, SMEs, Thanh Hoa

1. Introduction

In recent times, issues related to business ethics and corporate social responsibility have increasingly attracted strong public attention. Cases such as melamine-contaminated milk in China or the discharge of untreated waste into Thi Vai River by Vedan Company in Vietnam have left serious consequences for the environment, society and human health. These incidents clearly show that the lack of awareness of social responsibility from businesses not only affects consumer confidence but also causes great harm to the sustainable development of society.

For small and medium enterprises (SMEs), the implementation of Corporate Social Responsibility (CSR) faces many barriers such as limited awareness, lack of financial and technical resources, as well as inconsistency between legal regulations and codes of conduct. However, in the context of global integration, CSR is not only a challenge but also an indispensable factor to help businesses strengthen their competitive position and develop sustainably.

Studies show that although SMEs have different characteristics in terms of size, sector and industry, most of them cannot ignore the important role of CSR. In Vietnam, small and medium enterprises are considered the backbone of the economy, especially since the reform period. In particular, SMEs in Thanh Hoa have also contributed significantly to creating job opportunities, increasing income for the community, and promoting socio-economic development. However, along with this development, cases of businesses lacking social responsibility have also increased, making the issue of CSR even more urgent.

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In today's market, CSR is considered an important part of the sustainable business strategy of enterprises. Consumers are increasingly concerned about transparency and ethics in business activities, which directly affects their purchasing behavior. This emphasizes that CSR is not only a responsibility but also an opportunity for businesses to build trust and enhance brand value.

For the above reasons, research on the factors that motivate SMEs to implement CSR in Thanh Hoa is very necessary. This research not only helps to better understand the motivations and challenges for CSR but also provides practical solutions to encourage and support businesses to implement social responsibility, contributing to sustainable socio-economic development.

2. Literature review and hypothesis development

2.1 Corporate Social Responsibility and SMEs

Corporate social responsibility (CSR), introduced by E. Merrick Dodd in 1932, refers to the fact that businesses not only make profits but also act as good corporate citizens, contributing positively to the community and performing social functions (Kercher, 2006). CSR is rooted in ethical standards and brings many benefits such as managing corporate image, improving organizational efficiency and increasing competitiveness, especially for small and medium-sized enterprises.

CSR is not only a charitable activity but also an essential strategy for businesses to develop sustainably, promote customer satisfaction, enhance brand reputation, and improve economic results (Wierzbicka, 2008). CSR implementation helps businesses increase productivity, save costs through recycling, resource management and efficient supply chains. At the same time, CSR also improves access to capital through transparency and sustainable management (Tolhurst, 2007; Ali et al., 2010). Studies also show that strong CSR reputation helps reduce brand damage during crises, increase trust and understanding from customers (Vanhamme & Grobben, 2004).

In short, CSR brings many benefits such as enhancing reputation, improving employee loyalty, increasing innovation, reducing operating costs and building strong community relationships. It is an important tool for businesses to achieve sustainable success in business and society.

2.2 Hypothesis development

The Relationship Between Economic Benefits and Social Responsibility of SMEs

The economic responsibility of a business, as a prerequisite, requires maximizing profits, ensuring efficiency, competitiveness and growth, since businesses are founded on the motive of seeking profits (Branco & Rodrigues, 2007). This is the foundation for implementing other responsibilities, including CSR, which helps businesses maintain financial performance and build beneficial relationships with stakeholders (Maimunah, 2009).

CSR, whether charitable or humanitarian, should still be linked to the goal of generating sustainable profits. Nielsen and Thomsen (2009) emphasize that business owners are concerned with balancing profits and costs for CSR. Furthermore, CSR implementation not only improves reputation but also helps businesses effectively deal with negative publicity, reduce risks and maintain profit maximization (Vanhamme & Grobben, 2009). The classical view also holds that CSR is meaningful only when it

increases the value of profits for the company, while ensuring efficient resource allocation (Sweeney, 2007).

According to research, profit and ethics in CSR have a reciprocal relationship. Businesses implementing ethical actions often come from strong financial capacity, ensuring social benefits and long-term sustainability (Maimunah, 2009). In particular, SME managers view CSR as an extension of growth-oriented business activities, combining profit motives and a sense of social responsibility (Mankelow & Quazi, 2006).

In summary, the relationship between profit and CSR not only motivates SME managers to implement CSR but also brings about a balance between economic and social goals. Proposed hypothesis:

H1: There is a significant relationship between economic benefits and SME motivation towards CSR.

The Relationship Between External Pressures and Corporate Social Responsibility in SMEs

Corporate social responsibility is the commitment of a business to pursue its economic objectives within the framework of the law, ensuring fairness and meeting social standards. Economic and legal responsibilities are two fundamental pillars of CSR, supported by the important role of the government in creating an enabling environment through policies and regulations to minimize negative impacts and promote lawful business behavior (Fox et al., 2002).

Small and medium-sized enterprises (SMEs) are affected by the business environment, and their survival depends on their ability to meet the demands of stakeholders, who play a vital role in the sustainable development of the company. Stakeholders, including customers, suppliers, business partners, governments, and non-governmental organizations, are the main pressures that motivate SMEs to engage in CSR to maintain positive relationships and increase competitiveness (Medhurst, 2010).

In addition, CSR is considered a way for SMEs to meet the increasingly high expectations from outsiders regarding social responsibility, contributing to increasing competitiveness and building a better reputation (Porter & Kramer, 2002).

Hypothesis H2: There is a significant relationship between external pressures and SMEs' motivation towards CSR.

The Relationship Between Ethical Responsibility and Social Responsibility of SMEs

Ethical responsibility is a set of accepted but not codified social norms and values that require businesses to voluntarily go beyond the minimum standards set by law to fulfill extra-legal commitments. This is the heart of social responsibility, expressed through issues such as working conditions, community relations, or reputation with partners. SMEs often voluntarily participate in social, ethical and environmental activities, not only to meet social expectations but also to connect and strengthen their position in the community (Worthington et al., 2006). These actions not only contribute to building social capital but also reflect the ethical ideals and values of entrepreneurs, becoming the main driving force behind CSR. According to Longo, Mura and Bonoli (2005), companies that carry out ethical responsibilities often go beyond economic considerations, while Jenkins (2004) emphasizes that ethical reasons play an important role in businesses acting for the "right thing". Promoting CSR based on these ethical

orientations and social values helps SMEs gain intrinsic reputation rather than superficial business advantage.

Hypothesis H3: There is a significant relationship between ethical responsibility and SME motivation for CSR.

Based on a thorough review of relevant previous studies, this study proposes the following conceptual framework for the study.

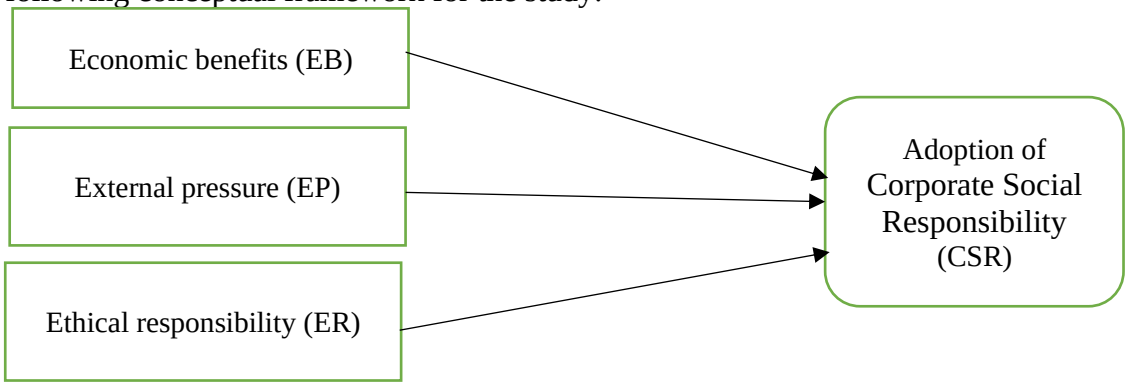

Figure 1: Research conceptual framework

3. Research method

3.1. Measure

The proposed research model (Figure 1) with scales formed on the basis of inheriting previous studies such as Chau Thi Le Duyen and Nguyen Minh Canh (2012). The Economic Benefits scale has 4 observed variables, External Pressure has 5 observed variables, Ethical Responsibility has 4 observed variables and Social Activities Implementation has 4 observed variables, with a 5-point Likert scale: (1) is completely disagree and (5) is completely agree.

3.2. Sampling method and sample size

The study used the convenience sampling method and conducted a survey using a pre-designed questionnaire. According to Hair et al. (2009), for exploratory factor analysis (EFA), the minimum sample size is $N \geq 5*x$ (x: total number of observed variables). As for Tabachnick et al. (2007), to conduct regression analysis in the best way, the minimum sample size must be calculated according to the formula $N \geq 8k + 50$ (where N is the sample size, k is the total number of independent variables of the model). Thus, in this study, the scale consists of 17 observed variables with 03 independent factors and 01 dependent factor, so the data collected must ensure that both conditions are satisfied according to the recommendations of the EFA factor analysis method and the multiple regression method. $N \geq$ max with the sample size required by EFA, so the minimum sample size is 17*5=85; the minimum sample size required by multiple regression is 8*4+50=82. The number of questionnaires administered is 168.

3.3. Data analysis method

The study uses SPSS 20.0 software to support data analysis and solve research objectives. The scales in the research model are built by testing Cronbach's Alpha coefficient and EFA method to test the convergent validity and discriminant validity of the scales. After performing EFA analysis, the hypotheses proposed in the research model will be tested by multivariate regression analysis to measure factors affecting the implementation of social activities of small and medium enterprises in Thanh Hoa province.

4. Research's result

4.1. Survey sample statistics

The results of the statistical data distribution on the proportion of the research sample with the number of respondents are shown in Table 1.

Table 1: Research sample statistics

Criteria	Contents	Frequency	Percentage
Business type	Limited liability company	65	38,69
	Joint stock company	58	34,52
	Private company	40	23,81
	Partnership	5	2,98
Business sector	Trade and service	95	56,55
	Industry and construction	47	27,98
	Agriculture, forestry and fishery	24	14,29
	Others	2	1,19
Duration of operation	Fewer than 5 years	48	28,57
	From 5 to 10 years	97	56,74
	Over 10 years	23	13,69

(Kết quả xử lý số liệu phỏng vấn)

Of the 168 surveyed enterprises, 65 are Limited liability company (38.69%), followed by joint stock companies (34.52%), private enterprises (23.81%) and finally partnerships (2.98%). In terms of business fields, 95 enterprises (56.55%) are operating in the trade and service sector, 47 enterprises (27.98%) are operating in the industry and construction sector, 24 enterprises (14.29%) are operating in the agriculture, forestry and fishery sector. In terms of operating time, 48 enterprises (28.57%) have been operating for less than 5 years, 97 enterprises (56.74%) have been operating for 5 to 10 years, and 23 enterprises (13.69%) have been operating for over 10 years.

4.2.1. Reliability testing by Cronbach's alpha coefficient for the scales

Through Cronbach's Alpha analysis, the observed variables in the 3 factors have a total correlation coefficient greater than 0.30 and the Cronbach's Alpha coefficient of the 3 factors is greater than 0.70. The results of all observed variables above are retained for further analysis.

Table 2. Results of Cronbach's Alpha coefficient test

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Cronbach's Alpha				**0,791**
EB1	11,26	3,754	0,636	0,721
EB2	11,41	3,899	0,618	0,731
EB3	11,35	3,932	0,575	0,752
EB4	11,23	3,865	0,571	0,754
Cronbach's Alpha				**0,852**
EP1	11,29	3,879	0,578	0,833
EP2	11,22	3,913	0,588	0,849
EP3	11,19	3,152	0,807	0,754

EP4	11,27	3,408	0,794	0,763
EP5	11,34	3,478	0,673	0,745
Cronbach's Alpha				**0,843**
ER1	11,02	3,574	0,651	0,813
ER2	10,96	3,471	0,598	0,841
ER3	10,89	3,446	0,749	0,771
ER4	10,94	3,579	0,735	0,780
Cronbach's Alpha				**0,816**
CRS1	7,54	2,030	0,700	0,705
CRS2	7,68	1,899	0,708	0,729
CRS3	7,63	2,297	0,567	0,804
CRS4	7,48	1,373	0,645	0,768

(Source: SPSS data processing results)

4.2.2. Exploratory factor analysis EFA

The results of the rotation matrix of the CRS scale show that 13 observed variables are reduced to 3 factor groups, all observed variables have Factor Loading coefficients greater than 0.3, with the KMO coefficient having a value of 0.826 (0.50 <= KMO = 0.826< 1.00), factor analysis is accepted with the research data set, and the Eigenvalues = 1.048 > 1.00 shows the convergence of the factors. The total variance extracted is 71.043 > 50.00%, showing that the EFA model is suitable. Thus, it is shown that these 3 factors explain 71.043% of the variation in the data.

Table 3: Results of factor analysis of independent variables

Variables	**Factors**					
	1	2	3	4	5	6
EB1	,884					
EB2	,864					
EB3	,684					
EB4	,566					
EP1		,872				
EP2		,850				
EP3		,716				
EP4		,532				
EP5		,538				
ER1			,921			
ER2			,662			
ER3			,694			
ER4			,843			
Eigenvalues	7,590	1,902	1,760	1,591	1,426	1,048
Variance (%)	36,714	8,627	7,903	7,100	6,784	4,901
Total Variance (%)						71,043
KMO						0,826
Sig.						0,000

(Source: SPSS data processing results)

The results of the rotated matrix of Adopted Social corresponding to the customer show that the 4 observed variables are reduced to 1 factor, all observed variables have Factor Loading coefficients greater than 0.30, with the KMO coefficient having a value of 0.784 (0.50 <= KMO = 0.784 < 1.00), factor analysis is accepted with the research data set, and the Eigenvalues = 2.169 > 1.00 shows the convergence of the factor. The total variance extracted is 72.315 > 50.00%, showing that the EFA model is appropriate.

Table 4: Results of factor analysis of dependent variable

Variable	Factors
	1
CRS1	0,883
CRS2	0,877
SRS3	0,787
CRS4	0,853
Eigenvalues	2,169
Variance (%)	72,315
KMO	0,784
Sig.	0,000

(Source: SPSS data processing results)

6. Regression analysis

Regression coefficient test In the table below, the Sig. values of the independent variables EB, EP and ER have Sig. values < 0.05, so these independent variables are all meaningful in explaining the dependent variable, and no variable is eliminated.

Table 5: Results of the regression model

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-,453	,202		-3,237	,001		
	EB	,165	,054	,235	4,755	,000	,539	1,854
	EP	,251	,052	,224	4,791	,000	,599	1,669
	ER	,287	,052	,143	3,105	,002	,620	1,613
a. Dependent Variable: CRS								

(Source: SPSS data processing results)

- Model fit test

+ Model explanatory power (adjusted R2)

Tbale 6: Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.758[a]	.575	.567	.29989	.575	73.160	6	161	.000	1.990

a. Predictors: (Constant), EB, EP, ER

b. Dependent Variable: CRS

(Source: SPSS data processing results)

The adjusted R2 value is 0.575, so the four independent variables included affect 57.5% of the change in the dependent variable.

The ANOVA test gives a Sig. value = 0.000 < 0.01, it can be concluded that the proposed model fits the data set. In other words, the independent variables are linearly correlated with the dependent variable at a confidence level of 99%.

- Multicollinearity test The table above shows that the VIF variance magnification value = 1.000 < 2. Conclusion: There is no multicollinearity in the model.

- Autocorrelation test of residuals The Durbin-Watson coefficient is used to test autocorrelation between residuals in the model, here the Durbin-Watson coefficient is 1.990, ranging from 1.0 to 3.0, so there is no autocorrelation between residuals in the model.

5. Discussion

The results of the hypothesis testing determined that all three motivational factors were significantly associated with SMEs' orientation towards corporate social responsibility (CSR). Jenkins (2009) emphasized that most SMEs engage in CSR for ethical and moral reasons, rather than external pressures, with the main motivation coming from the intrinsic values of the owner-manager. Similarly, Jenkins (2009) pointed out that many SMEs are aware of their social and environmental responsibilities but based on personal moral beliefs rather than business reasons. External pressures were the second highest motivators for SMEs towards CSR, including demands from customers, supply chains and communities. SMEs perceive that CSR improves their image, reputation and customer loyalty, but also face negative pressures such as cost cutting demands from supply chain parties, which reduce social responsibility (Jenkins, 2009). Cochius (2006) argue that SMEs only act when pressured by laws, unfavorable publicity, or requests from large companies to engage in CSR activities.

Economic benefits are the third most important motivation, with a p-value of 0.000 < 0.05 significance level, indicating a positive relationship between profit maximization and CSR motivation of SMEs. According to Carroll (1979), economic responsibility is the foundation of CSR, in which companies meet profit goals while contributing to the community, such as providing goods and services at reasonable prices, paying employees fairly and increasing shareholder value. Friedman (1970) also emphasized CSR as a tool to create profits, through strategies to maximize shareholder value and achieve competitive advantage. In general, SMEs implement CSR not only for profit goals but also to meet social and economic responsibilities, demonstrating a positive role towards the community and stakeholders.

7. Conclusion

In the past, corporate social responsibility (CSR) activities were mainly recognized by large companies in developing countries due to their resource advantages. However, recent trends show that small and medium-sized enterprises (SMEs) are increasingly participating in the CSR agenda (Nejati and Amran, 2009). In Vietnam, this participation is increasing as SMEs are aware of their role in promoting economic growth and implementing CSR activities in various forms for sustainable development. Despite contributing nearly 20% of the economic market share and being mainly motivated by personal responsibility, SMEs face difficulties in implementing CSR due to lack of expertise and financial resources. Implementing ISO 26000 can raise awareness, clearly

define social responsibility and provide professional support, helping SMEs face short-term challenges. At the same time, credit support and advice are also needed for SMEs to make the most of their business context.

In the academic context, SMEs contribute more to CSR in the community than large companies. They improve customer loyalty and build relationships with the community by providing quality goods and services, meeting community needs and practicing honest and non-fraudulent business practices. This not only improves the corporate image but also helps build positive relationships with public authorities. Environmentally, SMEs achieve energy efficiency, reduce pollution and costs, thereby increasing competitiveness.

Currently, the trend of focusing on CSR and environmentally friendly activities is increasingly evident. A positive environmental profile is bringing competitive advantage, customer satisfaction and marketing opportunities. Many SMEs see this as a business strategy to strengthen their market position. CSR not only provides competitive advantage but also helps organizations move towards a knowledge economy, using knowledge to strengthen growth and create value. The study found that factors such as economic benefits, ethical responsibilities, and external pressures all influence CSR. Of these, ethical responsibilities play the largest role, while economic benefits are less motivating. These findings provide practical insights for SME leaders in Vietnam, especially in Thanh Hoa, helping them better understand the factors that influence CSR and adjust their strategies accordingly.

Based on the research results, the author has some recommendations as follows:

First, enterprises should voluntarily consider ethical issues in all aspects such as working environment, working conditions, and behavior with stakeholders to take appropriate actions, not only within the legal framework but also in accordance with Vietnamese ethics.

Second, external pressure greatly affects the adoption of Corporate Social Responsibility, so SMEs should pay attention to the views of stakeholders such as customers, suppliers, authorities, etc. to take appropriate actions.

Third, enterprises should consider economic benefits (in the long term, not in the short term) to have the most appropriate Corporate Social Responsibility strategies.

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INFLUENCING FACTORS OF THE INTERNATIONAL PAYMENT SERVICE QUALITY AT AN BINH JOINT STOCK BANK

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Abstract: International payment is an essential part of the economy, which is beneficial to both commercial banks and trading enterprises. Moreover, service quality, which has been a key point of discussion for decades, relates to customer satisfaction. This study aims to investigate the factors influencing international payment service quality at the An Binh Joint Stock Bank (ABBank). This research deploys quantitative methods to discuss the effects of these components. Statistical data was examined through different tests, including reliability analysis, correlation, and regression analysis by SPSS 20.0. The authors obtain and analyze 120 valid responses from customer surveys, then by applying an integration SERVPERF and PSQM model, identify five main components: Reliability, Tangibles, Assurance, Convenience, and Responsiveness, which explain how the customer perceives the service quality of international payment activities at ABBank. The results show that these five factors have a positive relationship with service quality, in which, Convenience has the most significant impacts on service quality level. Besides, the findings not only contribute to the literature but also give some practical implications for An Binh Joint Stock Bank to improve its international payment service quality and help them to obtain customer satisfaction in the fast-changing environment.

Keywords*: Service Quality, International Payment,* An Binh Joint Stock Bank (ABBank)*, SERVPERF, PSQM*

1. Introduction

After becoming an official member of the WTO - World Trade Organization in 2007, Vietnam's economy has progressively integrated into the world economy. The opening economy leads to a higher demand for trading transactions related to the international payment field. Moreover, there are more private joint-stock banks, foreign banks, and financial companies providing international payment services, in order to foster the rapid growth of both domestic and international trades. Customers are seen as banks' survival and growth. Therefore, the provision of high-quality services increases the rate of customer retention, attracts new customers through word-of-mouth communication, increases productivity, expands the market share, reduces staff turnover and operating costs, and improves employee morale, financial performance, and profitability (Hinson et al., 2006). Based on these facts, it is essential to find out the main factors that impact on the quality of international payment activities, for further development and enhancement. This research investigates international payment service quality at ABBANK, An Binh Commercial Joint Stock Bank (ABBank) was established under License No. 535/GP-UB issued by the People's Committee of Ho Chi Minh City dated 13th of May 1993. The headquarter is currently located at 1st, 2nd, 3rd Floor, Geleximco Building, No. 36 Hoang Cau Street, O Cho Dua

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Ward, Dong Da District, Hanoi. (ABBank, 2023). The study employs a qualitative method to analyze the secondary data and quantitative methods to examine primary data from the survey (online & offline). The survey was conducted through mail and at the counters in some big cities of Vietnam. Data collected from the survey was analyzed by SPSS 20.0 to determine the factors affecting the quality of international payment at ABBANK. This paper contains seven main parts. Along with the introduction, a literature review is presented in Section 2. Section 3 provides the research methodology applied. Section 4 shows the data analysis and the findings from the results. From that, the recommendations to improve ABBANK international payment service quality are given in Section 5. The last two parts will present limitations and suggestions for further research as well as the conclusion of the research.

2. Literature review

2.1 General Theories of documentary credit payment method

Documentary Credit (Letter of Credit) is the method in which A bank, at the buyer's request, guarantees payment to the seller upon presentation of compliant documents (Dinh Xuan Trinh, 2006). The L/C ensures security for both parties and requires specific documents like transportation and insurance papers to fulfill terms. These methods highlight the balance between security and flexibility in international transactions.

2.2. Service Quality

Services are essential to the economy, often being intangible and immediately consumed upon provision, as noted by Kotler et al. (2018). The American Society for Quality describes quality as the collective characteristics and features of products or services that enable them to fulfill implied or stated needs (Jay & Barry, 2003; Le, 2020; Lee, 2017). According to ISO 8002, service quality is defined by an object's attributes that allow it to meet specified or potential requirements. Consequently, the authors define the quality of international payment activities in commercial banks as the array of attributes related to these activities, which enable banks to meet customer demands effectively.

Over the past few decades, service quality has caught significant attention from practitioners, managers, and researchers due to its profound impact on business performance, cost reduction, customer satisfaction, customer loyalty, and profitability (Cronin and Taylor, 1992). Ongoing research into the various aspects of service quality—such as its definition, modeling, measurement, data collection methods, and data analysis—has laid a robust foundation for further study in this field.

2.3. Conceptual Framework

Evaluating quality in the service sector poses greater challenges compared to the manufacturing sector, as it involves both the service outcome and the delivery process. Various models have been developed to address these complexities.

Gronroos Model (1984) Gronroos pioneered a service quality evaluation model based on the comparison between customers' pre-use expectations and their actual experiences. The model identifies three components: Technical Quality: The actual outcome received by customers, significantly influencing their perception of quality. Functional Quality: How the service outcome is delivered. Corporate Image: Shaped by both technical and functional quality, alongside marketing activities and external factors like word-of-mouth, which is particularly influential. While insightful, this model lacks guidance on measuring technical and functional quality.

SERVQUAL Model (Parasuraman et al., 1985) This model assesses service quality

by examining the gap between customer expectations and perceived performance across five dimensions: Tangibles: Physical elements visible to customers. Responsiveness: Employee willingness to assist. Reliability: Consistency in fulfilling service promises. Assurance: Employee expertise and politeness that build trust. Empathy: Personalized care and attention provided to customers.

SERVPERF Model (Cronin & Taylor, 1992) SERVPERF simplifies service quality assessment by focusing solely on performance. Derived from SERVQUAL, it retains the same five dimensions but measures only performance, not the expectation-performance gap. Benefits of SERVPERF include: Accuracy: More precise in measuring service quality (Brown et al., 1993; Jain & Gupta, 2004). Efficiency: A shorter questionnaire with 22 items compared to SERVQUAL's 44 items, making it more time-efficient and user-friendly (Hartline & Ferrell, 1996; Babakus & Boller, 1992). Effectiveness in Context: Particularly suitable for sectors like banking in developing countries (Adil & Ansari, 2012; Mohd Adil, 2012, 2013).

These models provide valuable frameworks for evaluating service quality, highlighting its multifaceted nature and the need for tailored approaches based on context and objectives.

2.4. Research Model and Hypothesis

In this research, the integrated SERVPERF and PSQM models are used to assess the quality of international payment activities at ABBANK. The four factors selected from the SERVPERF model are Tangibles, Responsiveness, Reliability, and Assurance, while Convenience is chosen based on the functional aspect of the PSQM model.

Tangibles are the physical facilities and equipment available at the bank's transaction centers, as well as the appearance of the bank employees.

Responsiveness refers to the eagerness and readiness of the bank staff to offer services and assist customers.

Reliability is the bank's capability to deliver services accurately and punctually, getting it right the first time.

Assurance is the trust and confidence in the bank's services, the specialized skills of the employees, and their service-oriented attitude.

Convenience involves how conveniently the services are presented and provided, including the extensive correspondent network, the locations of the bank's transaction centers, and the procedures for transactions.

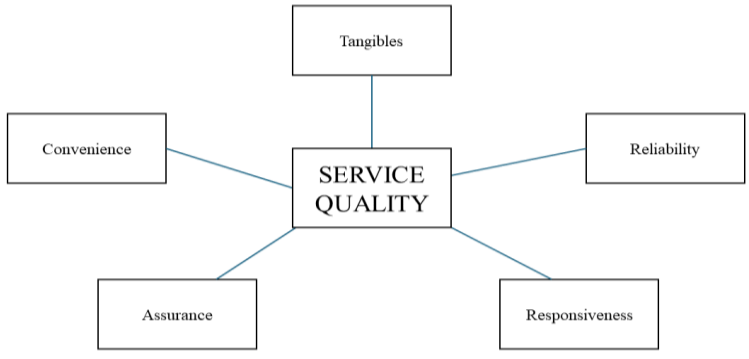

Figure 1. Proposed research model

Source: Synthesized by the author, 2024

Consequently, five hypotheses are proposed as follows:

H1: Tangible components have a positive relationship with the service quality. That means, the higher/lower the tangible factor; the higher/lower the service quality.

H2: Reliability components have a positive relationship with the service quality. That means, the higher/lower the reliability factor; the higher/lower the service quality.

H3: Responsiveness components have a positive relationship with the service quality. That means, the higher/lower the responsiveness factor; the higher/lower the service quality.

H4: Assurance components have a positive relationship with the service quality. That means, the higher/lower the assurance factor; the higher/lower the service quality.

H5: Convenient components have a positive relationship with the service quality. That means, the higher/lower the convenient factor; the higher/lower the service quality.

The measurement scale for each factor is detailed in this table below.

Table 1. Measurement scale

Tangible						
TA1	The bank's facilities are adequate and visually appealing	1	2	3	4	5
TA2	The bank's equipment is modern.	1	2	3	4	5
TA3	Staff are professionally dressed	1	2	3	4	5
TA4	The bank's supporting utilities are diverse and suitable for the service industry (brochures, website interface, etc.).	1	2	3	4	5
Reliability						
RE1	The bank provides services as promised and advertised.	1	2	3	4	5
RE2	The bank carries out transactions accurately without any unusual errors.	1	2	3	4	5
RE3	Customer and transaction information is completely confidential.	1	2	3	4	5
RE4	Special and complex transactions receive thorough attention and enthusiastic support.	1	2	3	4	5
Responsiveness						
RS1	The bank provides a variety of products and services to meet customers' needs.	1	2	3	4	5
RS2	The bank offers reasonable, flexible, and competitive service fees.	1	2	3	4	5
RS3	The bank's document verification process is quick.	1	2	3	4	5
RS4	The bank handles customer feedback and complaints effectively.	1	2	3	4	5
Assurance						
AS1	The bank's staff have high expertise in procedures, regulations, and international practices, and can provide information to customers.	1	2	3	4	5
AS2	Staff enthusiastically advise customers to ensure	1	2	3	4	5

	appropriate document preparation.					
AS3	The bank has a high reputation for document verification, payments, discounting, and financing.	1	2	3	4	5
Convenience						
CO1	The bank has a wide network of correspondent banks.	1	2	3	4	5
CO2	The bank has many branches and transaction offices that are convenient for customers.	1	2	3	4	5
CO3	Transaction procedures are easy, simple, and comply with regulations.	1	2	3	4	5
Service quality						
SER1	Overall, the quality of international payment services via letters of credit at ABBank meets my company's needs.	1	2	3	4	5
SER2	I am satisfied with the international payment services via letters of credit at ABBank.	1	2	3	4	5
SER3	I will recommend ABBank's international payment services via letters of credit to others.	1	2	3	4	5

Souce: Synthesized by the author, 2024

1. Methodology

3.1. Designing Questionnaire

In the scope of this research, the questionnaire was conducted in Vietnamese, and is divided into three main parts.

Part I includes questions relating to important demographic information of the respondents, such as gender, educational level, etc. Part II contains questions about the company and its history of using international payment services at financial institutions. Part III are questions requiring respondent to assess the perceived services (international payment services by documentary credit method) at ABBank, based on five independent factors and one dependent factor of the research model.

In this questionnaire, corresponding to the measurement scale, part III has 21 variables. The measurement scale employed a Likert scale, with answers ranging from 1 to 5 that represents respondents' perspective about a certain statement. More specifically, "1" denotes "Totally disagree" and "5" denotes "Totally agree". The full questionnaire is included in the Appendix 1.

3.2. Sampling and Collecting Data

This study incorporates 21 variables. As suggested by Hair et al. (2010), the sample size should consist of at least five responses per observed variable. Therefore, to meet this requirement, the study needed a minimum of 105 responses. To achieve this sample size, 150 questionnaires were distributed to customers.

Data for the study were collected utilizing mail surveys and direct surveys. For mail survey, export-import enterprises' information was collected through ABBank's database. And for the direct surveys, questionnaires were given out to customers at counters when they were having some free time.

The survey process took place in November of 2024.

3.3. Descriptive Analysis

Descriptive analysis involves examining collected data by assessing valid and non-valid responses using measures such as mean, percentage, mode, and variance of variables. Once these data are analyzed, the results can be utilized to describe the gathered information.

3.4. Reliability Analysis

Tavakol and Dennick (2011) describe Cronbach's alpha as a widely used measure of a scale's internal consistency, indicating how well all items in a test measure the same concept or construct, thus reflecting the interrelatedness of the test items.

The alpha value (α) ranges from negative infinity to 1, but only positive values are meaningful. Typically, the alpha coefficient falls between 0 and 1, with higher values indicating stronger correlations between items. In this study, scales with an alpha coefficient of 0.6 or higher are considered acceptable.

In addition to assessing scale reliability, Cronbach's alpha analysis helps identify items that are inconsistent with the rest of the scale through item-total correlations. Variables with item-total correlations greater than 0.3 are retained, while those with correlations less than 0.3 are excluded from the analysis data.

3.5. Exploratory Factor Analysis

Descriptive factor analysis is a valuable technique for reducing and summarizing data. The Kaiser-Meyer-Olkin (KMO) measure assesses the sampling adequacy for each variable in the model. If the KMO value ranges from 0.5 to 1.0 and the significance (Sig.) level is below 0.5, it suggests that factor analysis is appropriate. Conversely, if the KMO value is less than 0.5 or the Sig. level is above 0.5, it indicates that factor analysis is not suitable.

3.6. Correlation Analysis

The Pearson correlation coefficient (r), which ranges from +1 to -1, quantifies the correlation strength between two variables. If r is less than 0, it signifies a negative correlation between the variables. An r value of 0 indicates no correlation. If r is greater than 0, it shows a positive correlation between the two variables.

3.7. Regression Analysis

Regression analysis is utilized to examine the relationship between the dependent variable (service quality) and independent variables (tangibles, responsiveness, reliability, assurance, and convenience). This technique measures the impact of each independent variable on the dependent variable and predicts how changes in the independent variables may affect the dependent variable.

4. Research Analysis and Results

4.1 Respondent Profile

There are total 120 respondents (executives, managers and owners of firms) to the survey with 35.8% are male and 64.2% are female. Regarding the educational level, the majority of respondents have a Bachelor’s Degree or above (81.7%). Regarding their position in the company, more than three fourths of surveyors are specialists; the rest are managers of different levels (16.3%) and only 3.3% of respondents are founders or CEO of the company.

In addition, the characteristics of enterprises sample adopted in the research (the company profile) is illustrated in Appendix 2. More specifically, 41 respondents are joint

stock company, 4 companies are partnership, 20 companies are multi-member limited liability company, 20 are single-member limited liability company and 35 enterprises are private-owned enterprises (account for 34.2%, 3.3%, 16.7%, 16.7% and 29.2% respectively). Regarding size of the company, 24.2% are large enterprises and 75.8% are small-to-medium enterprises. Almost half of the surveyed companies have used international payment services of 2-3 banks (42.5%), while 38.4% have used only 1 bank for international payment. The rest (19.2%) have used more than 3 banks for this service. Regarding international payment services by documentary credit method at ABBank, the majority of respondents have been a customer for under 1 year (59.2%), while 37.5% of companies have been a customer from 1 to 5 year. Only 4 companies (5.5%) are 5-year customer. Regarding frequency of service usage, most companies use international payment service by documentary credit method at ABBank once a month (54.2%). Only 19.2% of companies use the service twice a month; the rest use the service for more than three times a month (26.7%). Regarding the purpose of using documentary credit payment method at ABBank, most companies use documentary credit to serve both import and export activities (47.5%). 34.2% and 18.3% of companies use documentary credit to serve import and export activities respectively.

4.2. Reliability Analysis

Table 2 illustrates that all the six scales in the model are reliable, six scales are reliable, each having a Cronbach's Alpha value over 0.6. Moreover, all 21 observed variables have a corrected item-total correlation above 0.3, which means they are accepted for further analysis.

Table 0. Reliability Analysis Result

Factors	Measures	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
TANGIBLES scale: Cronbach's Alpha =.893			
TA1	Adequate and visually appealing physical facilities	.770	.860
TA2	Up-to-date equipment	.721	.877
TA3	Well-dressed and professional employees	.785	.853
TA4	Diverse and suitable supporting facilities (leaflets, website interface, etc.)	.777	.857
RELIABILITIES scale: Cronbach's Alpha =.864			
RE1	Providing services as their commitment and advertisement	.777	.799
RE2	Handling transaction accurately, without unexpected errors	.684	.839
RE3	Secure information of customers and their transactions	.668	.845
RE4	Supporting special and complex transactions	.727	.822
RESPONSIVENESS scale: Cronbach's Alpha =.865			

RS1	Providing various types of products and services, meeting customers' demand	.651	.853
RS2	Givng reasonable, flexible and competitive service fees	.727	.822
RS3	Quick document checking time	.730	.820
RS4	Well-handling customers' feedbacks and complaints	.760	.813
ASSURANCE scale: Cronbach's Alpha =.778			
AS1	Bank's staff are highly knowledgable in international procedures, regulations and practices, and are able to provide information to customers.	.626	.688
AS2	Enthusiastically advising businesses to have the appropriate set of documents.	.579	.743
AS3	Bank's high reputation in document examination, payment, discounting and financing.	.642	.671
CONVENIENCE scale: Cronbach's Alpha =.831			
CO1	Having wide network of correspondent banks	.694	.763
CO2	Having many transaction locations which is convenient for customers	.663	.794
CO3	Easy, simple and proper transaction procedures	.717	.743
SERVICE QUALITY scale: Cronbach's Alpha =.785			
SER1	Generally meeting customers' need	.628	.705
SER2	Being satisfied with this service quality at the bank	.617	.717
SER3	Being willing to introduce this service at the bank to others	.628	.705

Source: Synthesized by the author, 2024

4.3. Exploratory Factor Analysis

a. Exploratory factor analysis for factors affecting service quality

The exploratory factor analysis for the independent variables is appropriate, showing a KMO value of 0.629, which exceeds 0.5, and a Sig. Value of.000, which is below 0.05. The factors' cumulative percentage of variance explained is 73.817%, which is higher than 50%, indicating the model's suitability for research. The five components account

for 73.817% of the variance in service quality. Therefore, all variables will be included in the next analysis stage of the research model.

Table 3. Results of Exploratory Factors Analysis for Independent Factors

	Component				
	1	**2**	**3**	**4**	**5**
TA4	.870				
TA1	.863				
TA3	.850				
TA2	.846				
RE1		.900			
RE4		.827			
RE3		.808			
RE2		.789			
RS4			.884		
RS3			.861		
RS2			.845		
RS1			.775		
CO3				.878	
CO1				.864	
CO2				.849	
AS2					.839
AS3					.812
AS1					.774
KMO	.629				
Sig.	.000				
Initial Eigenvalues	3.743	3.163	2.635	2.247	1.489
Cumulative Variance	20.792	38.367	53.006	65.546	73.817

Source: Synthesized by the author, 2024

b. Exploratory factor analysis for factors affecting service quality

Table 4. Results of Exploratory Factors Analysis for Dependent Factors

	Component
	1
SER3	.839
SER1	.839
SER2	.832
KMO	.706
Sig.	.000
Initial Eigenvalues	2.100
Cumulative %	69.984

Source: Synthesized by the author, 2024

The analysis shows a KMO value of 0.706, which is above 0.5, and a Sig. Value less

than 0.05, indicating the data is adequate. It identifies one component with eigenvalues of 2.100, exceeding 1. This component is defined by all three service quality items, each with factor loadings over 0.5. The cumulative variance is 69.984%, meaning this component accounts for 69.984% of the variance in service quality. To summarize, the service quality scale consists of three observed variables, all extracted into one component known as SERV.

4.4. Regression Analysis

The relationship between service quality and five factors—Tangibles, Convenience, Assurance, Responsiveness, and Reliability—is shown by positive Pearson correlation values. Tangibles (TA) have the strongest correlation with Service quality (SERV) with a correlation of r = 0.504, while Assurance (AS) has the weakest relationship with r = 0.340. Pearson correlation values among the factors are relatively high (over 0.3), suggesting possible multicollinearity. However, according to table 2.4 the VIF values of these factors are low (under two), indicating that multicollinearity is not an issue, and the regression model is valid.

Table 5. Correlation Matrix

Pearson Correlation	**TA**	**RE**	**RS**	**AS**	**CO**	**SER**
TA	1	.180	.131	.241	-.006	.504
RE	.180	1	.044	-.223	.038	.368
RS	.131	.044	1	.115	-.034	.378
AS	.241	-.223	.115	1	.012	.340
CO	-.006	.038	-.034	.012	1	.408
SER	.504	.368	.378	.340	.408	1

Source: Synthesized by the author, 2024

5. Findings and Discussions

5.1. Discussions

Empirical findings deploying regression data analysis techniques have revealed that the five factor Tangibles, Responsiveness, Reliability, Assurance and Convenience have a relatively equal impact level. However, the Convenience factor is the factor that has the most influence, followed by Reliability, Tangibles, Responsiveness and Assurance.

The result in which Convenience has the most influence is absolutely consistent with the reality of international payment services by documentary credit method at ABBank. The fact that the documentary credit method is complex by its nature while international trade activities expand rapidly requires the bank to own the ability to strengthen relationships with different correspondent banks in the world, as well as expanding a network of branches and transaction offices nationwide to provide the most convenience to customers.

In addition, the Reliability factor shows that customers highly regard accuracy and safety in international payment services. In fact, ABBank received the award “Best Retail Bank in Vietnam” from Global Banking and Finance Trading Review for three years in a row since 2016. (ABBank, 2023). Furthermore, ABBank has also been honored with additional awards from renowned global organizations like Moody's. These achievements have solidified ABBank's reputation and status as one of Vietnam's foremost prestigious commercial banks, consistently delivering high-quality trade finance products and

services to its customers.

The next factor affecting in this case is Tangibles. This indicates that the modernity of the banks' facilities, programs, and applications plays a crucial role in enabling customers to efficiently manage their transactions with the bank. This aspect has gained increasing importance in international payment services, particularly in the era of the 4th industrial revolution, with significant advancements in technology today.

Furthermore, the Responsiveness factor indicates that customers involved in international payment transactions value the bank's efficiency in processing times, as well as its ability to offer a diverse and flexible range of products to meet their various needs.

Last but not least, the factor of Assurance plays a significant role. It pertains to the ability of bank employees to deliver services to customers. To effectively support and provide advice on transactions, particularly complex ones, bank staff must continually enhance their professional knowledge not only in banking but also in related areas such as insurance, customs, and international transportation.

5.2. Recommendations

a. Tangibles factor

To enhance the "Tangibles" aspect and improve the quality of documentary credit payment services, ABBank should prioritize modernizing its physical infrastructure and ensuring an aesthetically pleasing and professional environment. Upgrading bank facilities with high-quality and visually appealing designs will create a positive impression on customers. Additionally, investing in state-of-the-art equipment, such as advanced transaction systems and user-friendly interfaces, can improve service efficiency and customer satisfaction. The bank should also ensure its staff maintains a professional appearance by adhering to formal dress codes, fostering trust and confidence in the bank's services. Furthermore, ABBank could expand and diversify its support tools, including providing comprehensive brochures, user-friendly website interfaces, and digital platforms tailored to the unique needs of international payment customers. These improvements will together enhance the customer experience, strengthen ABBank’s image, and drive satisfaction in its international payment services.

b. Reliability factor

ABBank should prioritize delivering consistent and high-quality service that meets or exceeds customer expectations. The bank must ensure that all services are aligned with what is promised in advertisements and commitments. This requires not only clear communication with customers about what they can expect but also internal checks to ensure that these promises are upheld at every stage of the payment process. Precision in transaction execution is crucial; ABBank should implement advanced automated systems to minimize errors, ensure transaction accuracy, and reduce processing time. A robust error-detection mechanism can further enhance reliability, allowing the bank to identify and rectify discrepancies swiftly before they impact customers.

Strengthening the bank’s data security measures is another vital step. ABBank should continually invest in cybersecurity infrastructure, such as encryption and multi-factor authentication, to protect customer information and transaction details from breaches or unauthorized access. Regular audits and compliance with international security standards will help instill confidence in customers that their sensitive data is being safeguarded.

Moreover, ABBank should place greater emphasis on handling complex or high-value transactions with care and expertise. Specialized training for staff in managing such transactions, paired with dedicated sales officer, would ensure these processes are executed smoothly and tailored to customer needs.

c. Responsiveness factor

ABBank should focus on offering more diverse and tailored product and service options to meet the varied needs of its customers. Customization is key, as businesses engaging in international trade often require specific solutions. By understanding customer requirements and offering specialized packages, ABBank can ensure its services are aligned with client expectations, enhancing their overall satisfaction.

The bank should also adopt a more competitive and transparent fee structure. Providing flexible and reasonable service fees, along with clearly communicating these charges, would demonstrate ABBank's commitment to customer-centric operations. This approach not only attracts new customers but also retains existing ones who value fairness and flexibility in pricing.

Another crucial area for improvement is the speed and efficiency of document processing. ABBank must streamline its internal workflows to reduce the time required for document verification and processing. Investing in advanced technology, such as automation and machine learning, could significantly accelerate these processes, minimizing delays and errors. This would make ABBank's services more appealing to clients operating in fast-paced international trade environments.

Lastly, ABBank should enhance its feedback and complaint resolution mechanisms. Efficiently addressing customer inquiries and resolving issues demonstrates a high level of responsiveness and care. Feedbacks should be delivered to the Center of International Payment promptly and the center should ensure that clients are informed throughout the resolution process. Proactively reaching out to gather feedback on service quality would also allow ABBank to identify potential areas for improvement, fostering a stronger relationship with its customers.

d. Assurance factor

ABBANK should focus on improving the professional expertise of its banking staff on international trade regulations, procedures, and standards. Regular workshops, certifications, and professional development programs can ensure that the staff possesses the necessary skills to provide accurate and reliable information to clients. By fostering a workforce knowledgeable in international banking practices, ABBANK can deliver superior service quality, which directly enhances customer trust and satisfaction.

ABBANK should also emphasize the importance of personalized consultation. Staff members must demonstrate a high level of dedication and attentiveness when assisting customers, particularly in guiding them to prepare accurate and complete documentation. To achieve this, ABBANK could establish a consultation team specifically trained to support businesses in understanding complex documentation requirements. By doing so, the bank ensures that its clients feel supported and confident, ultimately reducing errors and delays in processing transactions.

The research results also highlight the need for ABBANK to reinforce its reputation for reliability in document checking, payment processing, discounting, and financing. The bank should adopt advanced technological solutions, such as automated systems for

document verification, to minimize manual errors and speed up processing times. Additionally, ABBANK should implement stringent quality control measures to maintain its credibility in handling sensitive international transactions. Consistent performance in these areas will solidify ABBANK's standing as a trusted financial partner in the global trade market.

e. Convenience factor

Convenience is proven to have the most influence over documentary credit service quality at ABBank. ABBANK should focus on expanding its agent network to ensure broader accessibility for clients. Establishing partnerships with international correspondent banks in key trade regions would allow ABBANK to facilitate smoother cross-border transactions. Additionally, within Vietnam, ABBANK should ensure its domestic branches are equipped to handle international payment services, enabling clients to access these services from multiple locations. A more comprehensive network would minimize logistical challenges and improve customer satisfaction.

ABBANK should consider increasing the number of transaction points and optimizing their locations to better serve clients. The bank could analyze trade activity data to identify areas with high demand for international payment services and strategically place branches or representative offices in those locations. Furthermore, creating dedicated service counters for documentary credit transactions at key branches would enhance customer experience by reducing waiting times and streamlining service delivery.

Simplifying transaction procedures is critical to improving convenience. ABBANK should implement user-friendly digital solutions, such as an online platform for documentary credit applications and document submission. This would allow clients to initiate transactions remotely, reducing the need for physical visits to the bank. Additionally, ABBANK should ensure that its procedures are clearly outlined, easily understood, and compliant with international regulations. Providing step-by-step guides and personalized support would further simplify the process for clients.

5.3. Limitations

Despite providing valuable findings and implications from both theoretical and practical perspective, the current research also encounters limitations. Firstly, some questionaire survey was conducted in several selected transaction offices of ABBank. The answers from the survey, sometimes, may be conducted by the employee. It may relect the personal views of such employees only, not evidence of the official opinion from such enterprises. Therefore, some analysis and conclusions in this study are subjective and can be improved.

Secondly, information about the quality dimensions stated in the research is not complete. Since international payment by documentary credit is very complex by its nature, the measurement for each scale might not be complete and require further research.

Thirdly, the results identified might be influenced by some control variables. However, due to limited time and resources, the author has not analyzed the role of control variables in this model.

5.4 Direction for further research

To address the limitations identified in the current research, several directions for

further research are proposed. Firstly, future studies should expand the scope of the questionnaire survey to include a larger and more diverse sample size across multiple ABBANK branches and transaction offices. By collecting responses from a broader range of enterprises and external stakeholders, researchers can minimize subjectivity and ensure that the findings reflect a more comprehensive view of customer perspectives.

Secondly, further research should focus on developing more detailed and robust measurements for the quality dimensions of international payment services by the documentary credit method. This could involve identifying additional criteria or factors that capture the complexity of these transactions more effectively. Collaborating with industry experts and incorporating international best practices could lead to the refinement of the measurement scales, providing more accurate and actionable insights.

Thirdly, future studies should explore the role of control variables, such as firm size, industry type, and frequency of international transactions, in influencing the quality of documentary credit payment services. By incorporating these variables into the analysis, researchers can gain a deeper understanding of how different factors impact customer perceptions and satisfaction levels. This would allow for more tailored and strategic recommendations to enhance service quality.

Lastly, longitudinal studies could be conducted to track changes in customer satisfaction and service quality over time. Such research would help evaluate the effectiveness of any improvements implemented by ABBANK and provide insights into evolving customer needs and expectations in the international payment sector. These directions will build upon the current research and contribute to a more comprehensive understanding of the quality of documentary credit payment services.

6. Conclusion

This research explores ABBank's international payment activities via the documentary credit method, aiming to analyze service quality components and suggest improvements. The theoretical framework employs the SERVPERF and PSQM models, incorporating 18 observed items into five service quality components (replacing "Empathy" with "Convenience"). Data from 120 valid responses were used for reliability analysis, exploratory factor analysis, and regression analysis as detailed in Chapter 2. The regression analysis reveals a positive correlation between service quality and independent variables, driven by Tangibles, Reliability, Responsiveness, Assurance, and Convenience. These findings highlight the significance of these five aspects in improving service quality. Consequently, ABBank managers can consider these factors to develop appropriate policies and allocate resources effectively. The study also proposes several solutions to enhance the quality of international payments by documentary credit, ultimately benefiting enterprises engaged in international trade.

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CIRCULAR TOURISM: THEORETICAL FOUNDATIONS, PRACTICAL INSIGHTS, AND SOLUTIONS FOR VIETNAM

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Abstract: The rapid development of the tourism industry has posed numerous challenges to the sustainability of destinations. Circular economy emerges as an effective solution to maintain sustainability. Although some studies have analyzed the application of the circular economy concept in the service sector, this concept remains relatively unclear within the tourism industry, especially in the context of Vietnam. Therefore, through a literature review, this study aims to address issues related to the concept of Circular tourism. Additionally, by assessing the current situation, the author proposes several solutions to successfully implement circular tourism in Vietnam.

Keywords: Circular tourism, sustainable tourism, Vietnam

1. Introduction

Tourism is one of the fastest-growing industries in recent decades (Gazta, 2018), generating substantial foreign exchange revenue for developing countries. In Vietnam, tourism revenue significantly contributed to economic growth in the first half of 2024 (Michael Kokalari, 2024). Moreover, the industry creates over 40,000 job opportunities annually (Vietnam National Administration of Tourism, 2020). However, this growth presents a double-edged sword. While it contributes to economic development, it also exacerbates challenges such as climate change, resource depletion, and environmental pollution (Gazta, 2018). According to ITDR data, Vietnam's tourism sector alone discharged over 300,000 tons of unrecycled plastic waste into the ocean in 2023. These environmental challenges necessitate more sustainable and environmentally friendly approaches in the tourism and service sectors. The circular economy (CE) emerges as an effective solution to address these environmental challenges. CE focuses on minimizing waste, emphasizing recycling, and efficient waste management. Its principles have been effectively applied in sectors such as manufacturing and agriculture (Bjørnbet, Skaar, Fet, & Schulte, 2021; Velasco-Muñoz, Aznar-Sánchez, López-Felices, & Román-Sánchez, 2022). However, its application in services, particularly tourism, remains limited (Arzoumanidis, Mancini, Walker, Petti, & Raggi, 2020). Recent studies have begun exploring CE's potential in tourism, introducing the term "circular tourism" to describe the application of CE principles to tourism activities (Arzoumanidis et al., 2020; Ma, Li, Ai, & Chen, 2016). Yet, this term lacks consistent usage and a clear definition. Furthermore, the relationship between circular tourism and sustainable development has not been thoroughly or specifically researched (Vargas-Sánchez, 2021). The absence of a solid theoretical foundation acts as a barrier, making the adoption of circular tourism slow

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and challenging. For Vietnam, tourism plays a critical role in economic development. The country possesses abundant natural resources for tourism, including numerous sites recognized by prestigious international organizations. Consequently, fostering a sustainable tourism sector is essential. Research indicates that Vietnam has substantial potential to integrate CE into tourism. However, implementation faces significant obstacles due to limited awareness, institutional, and policy challenges. Encouragingly, recent developments, such as directives from the 13th National Congress of the Communist Party, have prioritized creating a robust legal framework to attract investment in sustainable sectors. Based on these considerations, the authors recognize Vietnam's significant potential to implement circular tourism but also note the lack of a fundamental theoretical framework. Therefore, through a literature review, this study aims to provide a comprehensive understanding of "circular tourism." Additionally, it evaluates the opportunities and challenges of implementing circular tourism in Vietnam and offers actionable recommendations.

2. Literature review

2.1. Definition of circular tourism

Through a literature review conducted using Google Scholar with keywords such as "circular economy in tourism" and "circular tourism," the author identified eight relevant scientific articles. These studies are relatively recent, published between 2017 and the present. However, the concept of "circular tourism" remains sparsely defined in the literature.

According to Girard & Nocca (2017), circular tourism involves transitioning from linear processes to circular ones, thereby minimizing negative environmental impacts. Circular tourism aims to regulate and manage resources effectively. Some studies suggest that the concept of circular tourism originates from terms like green tourism or eco-tourism, given their shared characteristics (Pan et al., 2018). However, circular tourism and green tourism are distinct concepts (Bosone & Nocca, 2022). While green tourism focuses on conservation, preservation, and restoration of natural features, circular tourism emphasizes the lifecycle of products and services. This approach ensures that these products and services are designed for extended lifespans and can serve as inputs for subsequent processes when necessary. Additionally, Patti (2017) describes circular tourism as a way to minimize carbon emissions in tourism activities. In contrast, Naydenov (2018) defines circular tourism as ultimately aimed at efficient resource management and reducing environmental impacts on tourism ecosystems. The study by Arzoumanidis et al (2020) highlights inconsistencies in how the term "circular tourism" is used across recent research. Various terms, such as "tourism circularity," "circular models in tourism," and "circular tourism activities," are used interchangeably, sometimes within the same study. This inconsistency indicates a lack of uniformity in defining the concept.

Synthesizing these perspectives, the authors conclude that circular tourism applies the fundamental principles of the circular economy, shifting from the "take-make-dispose" model to the "take-make-use-remake" paradigm. The ultimate goal is to sustain a tourism industry with minimal impact on the natural environment.

2.2. Opportunities for circular tourism in Vietnam

From the process of reviewing literature and analyzing the current state through

domestic articles and studies, the research team identifies several challenges and advantages in developing circular tourism in Vietnam as follows:

Post-COVID-19 Recovery: Following the COVID-19 pandemic, Vietnam's tourism industry has experienced a resurgence, offering significant opportunities for growth. This upward trajectory is expected to continue as the pandemic has been brought under control, and the global economic downturn has gradually been alleviated. Notably, the U.S. Federal Reserve's announcement to lower interest rates in 2024 is expected to boost economic recovery. Between 2021 and 2024, Vietnam's tourism industry witnessed rapid growth. According to the Vietnam National Administration of Tourism (VNAT), international arrivals reached 12.6 million in 2023, 3.4 times higher than in 2022 and substantially higher than in 2021. Early 2024 figures also forecast continued growth, with international arrivals totaling 1.5 million, a 73.6% increase compared to the same period in 2023 (Vietnam National Administration of Tourism, 2024).

The Vietnamese government has demonstrated strong commitment to promoting the circular economy (CE), progressively incorporating CE principles into legislative frameworks. Specific measures include tax incentives and streamlined administrative procedures for newly established or transitioning sustainable businesses. In recent years, Vietnam has also actively participated in international agreements and partnerships to develop green, digital, and circular economies. A notable example is the Swiss Minister of Economy's pledge at the World Economic Forum's Annual Meeting in Davos on January 16, 2024, to support Vietnam in implementing a green economy and achieving net-zero emissions by 2050 (Phương, 2024).

Rapid technological advancements, particularly in artificial intelligence (AI), offer significant opportunities for Vietnam to adopt CE principles. AI applications in CE can streamline production processes, enhance decision-making through data-driven insights, and improve productivity and product quality. With Vietnam's proactive policies embracing "future-ready" technologies, AI is positioned to become a crucial enabler of circular economy adoption.

Vietnam boasts a wealth of tourism resources, including diverse geography, climate, and ecosystems, as well as rich cultural and historical heritage. The country is home to several UNESCO-recognized sites, such as Ha Long Bay and the Imperial Citadel of Hue, alongside intangible cultural heritage, including Hue's royal court music, Ca Tru singing, and Quan Ho Bac Ninh,…(UNESCO, 2023). Such diversity enhances Vietnam's potential for circular tourism, further amplifying the advantages of CE implementation.

The perception of circular tourism among Vietnamese citizens and businesses has gradually evolved. Both groups increasingly recognize the economic and environmental benefits of CE models. Public environmental awareness has grown markedly, evidenced by reduced littering at tourist sites and a preference for eco-friendly products and services that are durable, reusable, or recyclable. Generation Z travelers, in particular, favor destinations with clean air and natural surroundings, often seeking immersive experiences such as participating in local environmental conservation activities. In response, businesses are gradually transitioning to sustainable models, meeting customer demands while contributing to environmental protection.

2.3. Challenges for circular tourism in Vietnam

Despite these opportunities, the adoption of CE principles in Vietnam's tourism

sector faces several challenges:

Policy and Institutional Barriers: As discussed in previous sections, policies and regulatory frameworks for CE development in Vietnam remain unclear and fragmented. This lack of cohesion complicates the adoption of CE in general and in tourism specifically. Businesses pursuing sustainability often face difficulties due to limited access to long-term, targeted funding. Transitioning to or investing in CE requires significant initial capital and coordinated efforts across the production-to-consumption value chain.

Legal Ambiguity: Although many CE-related projects in tourism have received investments, the lack of clear legal guidelines hinders their implementation. Consequently, projects often face delays or incur substantial cost overruns. Recent years have witnessed numerous investments in waste treatment, water recycling, and other sustainable practices, yet progress has been slow.

Ineffective Environmental Management: Environmental management agencies in Vietnam often lack efficiency and accountability. Bureaucratic inertia and weak enforcement of environmental regulations fail to deter polluting activities at tourist sites. This undermines the quality of destinations and damages Vietnam's reputation among tourists.

Insufficient Awareness and Action: Although awareness of CE principles has improved, practical application remains limited. Businesses and citizens often fail to take full responsibility for protecting ecological environments. Pollution and littering persist in tourist areas, with waste from tourism services frequently discharged untreated into the environment. Many products still fail to meet environmental standards, and after-sales services remain underdeveloped, leading to excessive waste generation.

Public Attitudes: Many citizens lack environmental consciousness in public and tourist spaces. Tourists often prefer inexpensive, disposable products for convenience, neglecting environmental considerations. This mindset reflects a general tendency to prioritize comfort during travel over sustainability.

Funding Constraints: A significant barrier to CE adoption is the availability of capital. Transitioning to CE requires substantial investment, often long-term and strategically focused. However, inefficiencies in capital management and inadequate fundraising efforts exacerbate difficulties for businesses seeking financing to shift production models.

Infrastructure Deficiencies: Environmental management infrastructure and technological equipment remain limited, falling short of requirements. Furthermore, Vietnam's readiness for Industry 4.0 technologies is low compared to regional peers, hindering the integration of information technology into environmental management.

These challenges underscore the need for concerted efforts from the government, businesses, and society to overcome barriers and capitalize on the opportunities presented by circular tourism.

2.4. Evaluation

According to the authors, public financial, legal, and institutional policies in Vietnam primarily encourage businesses but lack the scale or effectiveness necessary to establish a comprehensive circular economy (CE) model. Investments in CE are treated similarly to environmental protection initiatives, with incentives such as tax exemptions and

reductions, particularly for environmentally friendly products. However, these incentives mainly target industrial production and fail to adequately address the service or tourism sectors. While tax incentives may encourage businesses to transition to CE, they are insufficient in the short term to offset the costs of transitioning to sustainable production or services. This poses significant challenges for tourism enterprises, particularly small and medium-sized businesses, which require not only policy encouragement and tax incentives but also substantial initial investment.

In practice, CE concepts and methods in Vietnam's tourism sector remain nascent and underdeveloped. At the "Circular Economy in Tourism" seminar held at the University of Social Sciences and Humanities, Vietnam National University, Ho Chi Minh City, Miquel, Head of Human Resources and Quality at the Vietnam National Tourism Advisory Board, stated that "Circular economy in tourism is a familiar concept in Western countries, but it is relatively new in Vietnam and requires broader dissemination." In recent years, CE concepts and development roadmaps have been incorporated into legal documents. For example, Article 142, Clause 1 of the Environmental Protection Law 2020 defines CE and encourages local governments, businesses, and organizations to implement CE in production. Additionally, the 13th Party Congress Document includes provisions promoting CE models in production, initiating roadmaps, mechanisms, policies, and laws to establish, operate, and manage CE models. While these developments highlight governmental interest in CE, the effective implementation of these policies across industries, particularly tourism, will require considerable time.

Not waiting for governmental policies to be fully realized, some businesses have partnered with specialized agencies and local authorities to proactively realign their business models towards CE. A notable example is the Novaworld Ho Tram project by Novaland Group, in collaboration with the Institute of Circular Economy Development (ICED), which researched and proposed sustainable resource utilization models for the Ho Tram area. Unlike conventional tourism, this destination integrates CE principles across residential areas, tourism zones, and production facilities. Organic waste is repurposed into fertilizers and biochar, biogas is used for electricity and cooking, rainwater is harvested, wastewater is treated for irrigation, and clean energy sources such as solar power are utilized. However, on a broader scale, most Vietnamese businesses prioritize sales and profitability, often neglecting environmental considerations. Environmental criteria are secondary, if not entirely disregarded.

In summary, while adopting CE in Vietnam's tourism sector faces numerous challenges, there remain significant opportunities and untapped potential for growth. Stronger government intervention in policies, institutions, and especially funding is essential to support businesses transitioning from linear to circular tourism models. Alongside governmental efforts, businesses must proactively shift their operations and develop a clear understanding of the benefits of sustainable practices. Only then can CE models be successfully implemented in Vietnam's tourism industry.

3. Conclusion and implication

3.1. Conclusion

Tourism is a rapidly growing industry accompanied by sustainability challenges. This paper highlights that the concept of circular tourism remains underexplored in

previous research. By synthesizing existing studies, the authors propose a comprehensive understanding of this term. The findings enhance awareness and offer a new development pathway for achieving sustainability in tourism. Additionally, the authors identify several advantages and obstacles to applying CE in Vietnam's tourism sector, providing a general evaluation of the current situation. Finally, the study presents solutions to serve as a foundation for implementing circular tourism in the future.

3.2. Implication

To promote the development of circular tourism in Vietnam, the research team proposes the following recommendations:

Promoting CE in tourism must begin at the macro level, with the government acting as a driving force, facilitator, and regulatory framework for development. The government should quickly refine institutional and policy frameworks to create a foundation for CE investments and development.

Beyond policies, investment funding for CE projects is crucial. The government, banks, or investment funds should expand policies to facilitate access to capital for sustainable businesses. Dedicated funds exclusively for CE development should be established.

A model circular tourism destination should be developed. Tourism is a complex industry involving multiple stakeholders. Instead of transitioning the entire tourism sector simultaneously, a prototype circular tourism destination can be created where all stakeholders—from production to service providers—participate in the CE cycle. This model would also serve as a "laboratory" for deeper insights into CE.

Investment in digital transformation and AI technology is essential. Digital transformation enables resource management and allocation, while AI supports decision-making processes, such as evaluating product life cycles and activities like refurbishment and recycling. AI can also aid in reducing waste generated by tourists and service providers.

Enhanced communication and education campaigns are needed to raise societal awareness about pollution, climate change, and the benefits of adopting CE.

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APPLICATION OF GREEN ACCOUNTING IN VIETNAM'S SUSTAINABLE DEVELOPMENT TREND

MA. Truong Thi Hoai[1]

Summary: In recent years, with efforts to reform the economic model towards rapid and sustainable growth, harmonizing economic, environmental, and social issues while ensuring strong environmental protection, the Party and the State have embraced the strategy of "greening" the economy. The government has implemented numerous policies to limit the exploitation of natural resources for socio-economic development and to mitigate environmental violations and pollution.

Green accounting is regarded as a critical tool that incorporates environmental factors into economic decisions, facilitating the transformation toward sustainable development and a green economy. This accounting approach enhances the transparency, accuracy, and accountability of information, improving an enterprise's image in the eyes of regulators, shareholders, investors, and competitors. However, the implementation of green accounting in Vietnam faces significant challenges.

This article analyzes the factors and barriers hindering the adoption of green accounting and proposes solutions to promote its application in Vietnam within the current context of sustainable development trends.

Keywords: *Green accounting, environmental accounting, sustainable development.*

1. Introduction

The issue of social responsibility, particularly environmental protection, is increasingly prioritized. This has led to the emergence of new accounting disciplines such as Environmental Accounting and Social Accounting. These fields expand the scope of traditional accounting to include environmental and social dimensions, forming the foundation of Green Accounting.

In Vietnam, environmental and social issues have been a concern of the State, reflected in legal frameworks that address the environmental impact of economic activities. Despite its advantages over traditional accounting, green accounting remains underutilized by businesses in Vietnam.

Globally, sustainable development has become a prevailing trend, marked by initiatives like green growth, green bonds, and green accounting. Studies confirm that green accounting serves as a vital tool for integrating environmental concerns into economic decision-making, fostering sustainable development. Environmental accounting, a key aspect of green accounting, provides essential environmental information alongside traditional financial data, helping enterprises meet environmental obligations, reduce risks, and improve management efficiency.

The United Nations initiated the "System of Environmental-Economic Accounting" program in 2014, encouraging nations and organizations to implement green accounting. For Vietnam, the development and application of green accounting is both a necessity

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and a challenge. While businesses are required to comply with environmental regulations, few have integrated accounting into their sustainable development strategies. This study examines the difficulties Vietnamese businesses face in adopting green accounting and offers recommendations to enhance its implementation.

2. Theoretical Basis and Research Methods

2.1. Theoretical Basis

a) Concepts of Green Accounting

According to Wikipedia, green accounting incorporates environmental costs into financial reporting, enabling businesses to balance economic and environmental goals for sustainable development. It records, summarizes, and reports on the economic and environmental impacts of an organization's activities.

Sudhamathi and Kaliyamoorthy (2014) identify three main objectives of green accounting:

1. Identifying, collecting, and analyzing materials and energy-related information.
2. Reporting and utilizing environmental cost data internally.
3. Supporting effective decision-making to achieve environmental and economic goals.

Lako (2018) describes green accounting as a process of recording, measuring, synthesizing, reporting, and publishing information on the social, environmental, and economic impacts of business activities. Unlike traditional accounting, green accounting integrates economic, environmental, and social dimensions into decision-making processes, benefiting both businesses and the community.

While definitions of green accounting vary, its core purpose is to provide comprehensive and reliable information that reflects environmental and social impacts alongside financial data. Unlike traditional accounting, which focuses solely on economic information, green accounting highlights costs and benefits related to environmental and social factors.

b) Benefits of Green Accounting for Businesses

Green accounting offers several advantages for enterprises, including:

• Providing environmental cost data for informed decision-making, reducing resource use, and increasing competitive advantages by lowering production costs.

• Anticipating and managing environmental risks, thereby improving environmental and financial management.

• Addressing limitations of traditional accounting, which lacks mechanisms to track environmental costs accurately.

• Enhancing transparency and accountability, thereby improving the enterprise's reputation with regulators, investors, and other stakeholders.

2.2. Research Method

This study uses qualitative research methods, including data analysis in three steps:

1. Describing research content.
2. Classifying research content.
3. Connecting research findings.

3. Results and Evaluation

3.1. Research Results

The implementation of green accounting in Vietnam faces several challenges:

a) Legal Framework

While Vietnam has laws regulating environmental protection, such as the Environmental Protection Law (1993, revised in 2005) and related decrees, there is no established accounting regime specifically guiding green accounting. Current accounting systems lack provisions to track and report environmental costs effectively, leading to difficulties in decision-making and financial reporting.

b) Accounting Systems and Tools

Vietnam's accounting standards do not include separate accounts for environmental costs such as environmental repair, cleanup, or compensation expenses. Environmental expenditures are often aggregated under general management costs, obscuring their scale and nature.

c) Accounting Human Resources

Vietnamese enterprises lack trained personnel to implement green accounting. Most accounting departments focus on financial accounting, and businesses are hesitant to invest in specialized environmental accounting staff.

d) Business Awareness and Attitudes

Many businesses prioritize short-term profits over environmental considerations, avoiding the additional costs associated with green accounting. Limited awareness and understanding further hinder its adoption.

e) Technical and Technological Challenges

The absence of modern accounting tools and systems aligned with green accounting requirements poses additional barriers.

3.2. Solutions for Promoting Green Accounting

To address these challenges and enhance the adoption of green accounting, the following solutions are proposed:

- Policy Development: The government should issue guidelines and policies to encourage the adoption of green accounting. The Ministry of Natural Resources and Environment should emphasize green accounting as a tool for managing environmental activities.
- Performance Indicators: Develop a system of environmental performance indicators to support analysis and reporting of environmental costs.
- Raising Awareness: Businesses should recognize the importance of green accounting and integrate it into their accounting systems.
- Leveraging Technology: Utilize advanced technologies from the Fourth Industrial Revolution to streamline green accounting processes.
- Learning from International Practices: Vietnam should study green accounting models in developed countries to identify best practices for implementation.

4. **Conclusion**

Although green accounting is widely adopted in developed countries, it remains a new concept for Vietnamese businesses. By addressing existing challenges and implementing the proposed solutions, Vietnam can promote green accounting as an essential tool for achieving sustainable economic development.

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BARRIERS FOR GREEN TRANSFORMATION ADOPTION: A STUDY OF SMALL AND MEDIUM SIZED ENTERPRISES IN THANH HOA PROVINCE

Dr. Do Thi Man[1]

Abstract: In the context of a world facing serious challenges from climate change, resource depletion, and the rise of the digital revolution, green transformation has become an inevitable trend. Businesses, especially small and medium enterprises (SMEs), are at the heart of digital transformation and green transformation because they represent the majority in most economies and are also the main actors impacting the environment. This research focuses on studying the barriers faced by SMEs in Thanh Hoa province in the process of applying green transformation through a survey of 500 businesses in various industries. The research results show that among the surveyed enterprises, only 34.02% have applied and are ready for green transformation. However, both businesses that are ready and not ready for green transformation agree that the main barriers to their application of green transformation include: (1) Cost barriers; (2) Lack of government support; (3) Barriers in accessing information; (4) Lack of linkage and support from stakeholders; (5) Barriers to the absorption capacity of enterprises; (6) Barriers from customers and the market; and (7) Barriers to corporate culture**.** Based on the research results, the author proposes some recommendations for businesses and authorities at all levels to promote green transformation, towards sustainable development for SMEs in Thanh Hoa province in the coming time.

Keywords: *Barriers; Green transformation, SMEs, Thanh Hoa*

1. INTRODUCTION

Continuous economic growth and expansion globally have led to concerns about the depletion of natural resources, air pollution, and broader climate change challenges (Rao & Yan, 2020; Zhu et al., 2019). Longstanding public concern about the sustainability of economic development, along with a growing awareness of environmental issues, has driven the emergence and development of green transformation (Bergquist, 2017). In Vietnam, green transformation efforts not only bring environmental and social benefits but also help businesses enhance their competitiveness and achieve sustainable development in the new era. Green transformation offers opportunities for long-term growth for businesses, linked to sustainable benefits for the community in terms of culture, society, and the environment.

In Vietnam, as in other countries around the world, small and medium-sized enterprises (SMEs) play a particularly important role in promoting socio-economic development. Along with contributing a large volume of goods to society and creating many jobs for workers, SMEs also generate a stable income for a part of the population, exploiting local resources and potential. On the other hand, SMEs play a supporting role, complementing large enterprises to form a link to cooperate, compete, and develop

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together. The biggest and most important contribution of SMEs is to create jobs and contribute to the transformation of the social labor structure (Decree 80/2021/ND-CP).

Thanh Hoa is a province with the number of enterprises, especially SMEs, ranked in the top 10 provinces in the country (Department of Planning and Investment of Thanh Hoa, 2024). According to the report of the Department of Planning and Investment of Thanh Hoa, as of June 30, 2024, Thanh Hoa province has about 36,000 registered enterprises. Of which, more than 20,000 enterprises are operating and generating revenue, with SMEs accounting for about 97.4%. Therefore, this is the main force dominating the province's economy and is also the subject that has a great impact on the environment. Therefore, reducing the negative impact on the environment of SMEs is an inevitable path to greening the economy.

In recent years, the Vietnamese Government and the Ministry of Natural Resources & Environment have implemented a number of solutions to support businesses, especially SMEs, in the process of green transformation such as: Decree No. 08/2022/ND-CP detailing a number of articles of the Law on Environmental Protection, Decree No. 45/2022/ND-CP regulating administrative sanctions in the field of environmental protection; The Ministry of Natural Resources and Environment has issued Circular No. 02/2022/TT-BTNMT detailing the implementation of a number of articles of the Law on Environmental Protection. [1] The above documents aim to create a legal framework for the implementation of environmental protection measures and sustainable development in production and business. In addition, policies on green credit, tax incentives, and environmental fee reductions have also been considered and implemented to encourage businesses to participate in the green transition process. However, SMEs in general and SMEs in Thanh Hoa province in particular are currently facing many difficulties in implementing green growth and sustainable development goals. This article will focus on studying the barriers faced by SMEs in Thanh Hoa province in the process of applying green transformation through a survey of 500 businesses in various industries. From there, the author proposes some recommendations for businesses and authorities at all levels to promote green transformation, towards sustainable development for SMEs in Thanh Hoa province in the coming time.

2. LITERATURE REVIEW

2.1. The Concept of Green Transformation

Green Transformation is a term that refers to efforts aimed at achieving a sustainable and environmentally friendly future. This concept encompasses a set of policies, strategies, and practices with the goal of ensuring economic, social, and environmental sustainability. The main objectives of green transformation include increasing energy efficiency, reducing carbon emissions, promoting sustainable use of natural resources, minimizing environmental pollution, and enhancing social participation. Green transformation aims for social equity, fairness, and balance between ecological, economic, and social aspects (Tu & Hai, 2024).

Green transformation emphasizes the shift from an extensive development method (with high input, high consumption, and high pollution) to an intensive development method with low input, low consumption, and no pollution (Zhai & An, 2021). According to the United Nations Environment Programme (UNEP), green transformation is about creating improvements in human well-being and social equity, while significantly

reducing environmental risks and ecological scarcities. It involves addressing activities and consumption patterns that cause significant environmental impacts and endanger human lives.

Green transformation can be defined as a transition with the following characteristics: low carbon emission rates and rational use of natural resources. Environmental protection and natural resource management (water resources, renewable energy control) are the main activities of green transformation. In green transformation, revenue growth and job creation are driven by public and private investments characterized by better resource use, combating climate change, reducing carbon emissions, waste and pollution, and preventing biodiversity loss and ecosystem degradation (Jun et al., 2019). Green technology and industries are the driving forces behind national economic growth in terms of green transformation (Abdullah et al., 2016).

2.2. Studies on Barriers for Green Transformation Adoption in SMEs

According to Rao et al. (2009), SMEs often express their intention to opt for voluntary environmental initiatives, as long as the process is not too costly and not too difficult. However, SMEs are often unaware that there are many attractive opportunities for environmental improvement, such as tax breaks and subsidies from government organizations (OECD, 2023). Typically, these SMEs are busy increasing productivity and focusing primarily on their product outcomes; the lack of necessary skills and expertise also often prevents them from seizing new opportunities, even when they are aware of the opportunity to improve competitiveness (OECD, 2023).

Gupta and Barua (2018) discussed overcoming barriers to green innovation and categorized the obstacles into seven groups: (1) organizational or managerial, (2) technological, (3) financial and economic, (4) external partnerships and stakeholder engagement, (5) government support, (6) market and customer, and (7) knowledge and information-related barriers. They argue that organizational or managerial barriers often stem from a lack of management commitment to green activities because they prefer to run a business in the usual way and they try to avoid unexpected risks from innovation. Furthermore, they point out that technological, as well as knowledge and information-related barriers, are mainly present due to resource constraints commonly found in SMEs. Unlike multinational enterprises that can support technological advancement through their research and development activities, SMEs often rely on commercially available technology (Chang and Slaubaugh, 2017).

Financial and economic issues can also act as both drivers and barriers to the adoption of green transformation in SMEs (Kumar et al., 2019). Gupta and Barua (2018) explain that, while incentives by way of cost reduction can motivate businesses to adopt green transformation, the high investment cost in green transformation often hinders SMEs from making such changes. This major challenge in implementing green transformation is understandable, due to the uncertainty of payback periods (Ormazabal et al., 2018). Gupta and Barua (2018) also argue that the lack of support from external stakeholders such as government, business partners throughout the supply chain, and customers is a deterrent to SMEs continuing to pursue green transformation. Their research results have suggested policies and frameworks for governments and policymakers, such as environmental tax benefits and low-interest loans.

The study by Purwandani and Michaud (2021) on the drivers and barriers to the

adoption of green business practices for small and medium-sized enterprises in Ohio (USA) also indicated that lack of capital is a central barrier to the adoption of green practices, in addition to other barriers such as lack of information, reduced profits, the burden of increased work, and not seeing immediate benefits. Another study by Ashton et al. (2017) also showed that the implementation of green transformation by businesses still faces some major barriers such as high investment costs, market and customer barriers.

3. RESEARCH METHODOLOGY

In this study, the author uses primary data collected through a survey method, sent directly or via email to leaders of SMEs in Thanh Hoa province. The questionnaire was constructed based on a literature review and consultation from leaders in SMEs, including the following sections:

General information: Business sector, years of operation, type of business.

The level of readiness of businesses in green transformation: This section assesses the willingness and preparedness of SMEs to adopt green practices.

Barriers to applying green transformation: This section explores various barriers, including: Cost barriers **(**Financial constraints related to green investments), Barriers in accessing information **(**Difficulty in obtaining information about green technologies and practices), Barriers from the absorption capacity of the enterprise **(**Lack of technological capabilities and skilled employees), Barriers to corporate culture (Resistance to change and lack of environmental awareness), Lack of linkage and support from stakeholders **(**Limited collaboration and support from external partners), Lack of government support **(**Insufficient policy incentives and assistance from the government), Barriers from customers and the market (Limited market demand and customer awareness of green products/services).

The desire of businesses to implement green transformation: This section examines the aspirations and motivations of SMEs for pursuing green transformation.

To minimize potential bias caused by differing interpretations of green transformation, the author provided a definition of green transformation used for this study within the questionnaire itself. The research sample was selected according to Slovin's formula (1960),

$$\mathrm{n} = \frac{N}{1+N*e^2}.$$

Where:

- **n:** is the sample size to be surveyed
- **N:** is the total population
- **e:** is the margin of error (the author chose 0.05)

At the time of the survey (from March to June 2024), the number of SMEs operating in Thanh Hoa province was 16,508 enterprises, so the minimum sample size required was 391 enterprises. To ensure objectivity and reliability, in this study, the author selected a research sample of 500. The cluster random sampling method (according to 14 main business industries) was applied, resulting in 488 valid samples for analysis. From the collected data, the author uses descriptive statistical analysis methods through frequency indicators and charts to see the assessment of SMEs on difficulties and barriers to businesses in green transformation.

4. RESULTS AND DISCUSSION

4.1. General Information of the Research Sample

Out of 500 questionnaires distributed, the author collected 492 responses, of which 488 were valid and used for analysis. The descriptive statistics of the research sample according to general information are summarized in Table 1.

Table 1. General Information of the Research Sample

Criterion	Number	%	Criterion	Number	%
Duration of Business Operation	**488**	**100**	***Business Sector***	**488**	**100**
Under 3 years	61	12.5	Agriculture, Forestry and Fishery	18	100
From 3 to under 5 years	107	21.9	Manufacturing and Processing	37	3.7
From 5 to under 10 years	115	23.6	Trade	133	7.6
10 years or more	205	42.0	Construction	97	27.3
Type of Business Operation	**488**	**100**	Accommodation, Food and Beverage Services	30	19.9
Private Enterprise	98	20.1	Education and Training	13	6.1
Joint Stock Company	168	34.4	Transportation and Warehousing	21	2.7
			Electricity, Water, and Environmental Services	14	4.3
Household Business	83	17.0	Information, Communication and Advertising	18	2.9
			Finance and Banking	23	3.7
Limited Liability Company	123	25.2	Real Estate	24	4.7
			Pharmaceuticals	14	4.9
Partnership Company	16	3.3	Garment	16	2.9
			Mining	30	3.3

Source: Compiled and calculated by the author

The survey results show that 42% of businesses have been operating for over 10 years, 23.6% of businesses have been operating for 5 to 10 years, 21.9% of businesses have been operating for 3 to 5 years and only 12.5% of businesses have been operating for less than 3 years. Regarding the type of business activity, the surveyed enterprises are mainly joint stock companies (accounting for 34.4%), limited liability companies accounting for 25.2%, private enterprises accounting for 20.1% and only 17% are household businesses. In this survey sample, the author selected a sample divided into 14 main business industries in Thanh Hoa province, in which the number of commercial enterprises accounted for the highest proportion (27.3%), this is also the business sector accounting for the highest proportion in the province, followed by businesses in the construction sector (19.9%) and the least are businesses in the education and training, electricity, water and environment sectors, and businesses in the field of pharmaceuticals.

4.2. The Readiness of Businesses in Adopting Green Transformation

Among the surveyed enterprises, 65.98% of businesses responded that they were not ready for green transformation and only 34.2% of the remaining businesses were ready. This group of agreeing businesses mainly focuses on businesses in agriculture, forestry and fishery; manufacturing and processing industries; garment; mining. Businesses in the group that are not ready for green transformation responded that they are also interested in green transformation, but currently only consider it a trend that many people talk about but do not see as mandatory. Some businesses said that the green transformation is not really necessary, especially businesses in the construction, service, commerce, and real estate industries.

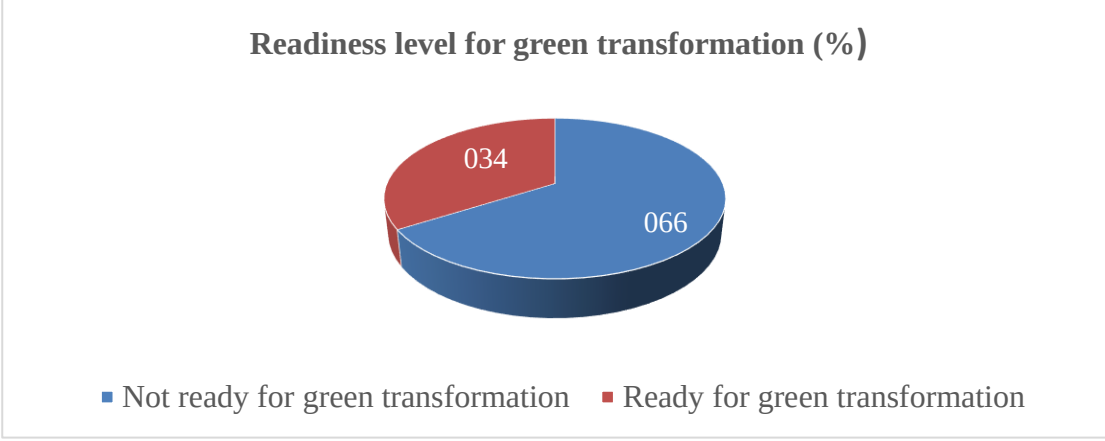

Figure 1. Readiness level for green transformation of SMEs in Thanh Hoa

Source: Compiled by the author

In addition, businesses that are not ready to transition say that it is too difficult to transition to green, businesses do not know where to start, what to do first. Besides, meeting green criteria for businesses also faces many difficulties such as businesses having to spend a lot of capital, then changes in technology, processes, etc.

For SMEs in Thanh Hoa who responded that they were ready for green transformation, the author used green transformation criteria, including criteria on: complying with environmental protection principles, building an environmental management system, using input materials that are green products, using energy resources efficiently and minimizing or reusing and recycling waste (Purwandani & Michaud, 2021) to survey the level of application of enterprises.

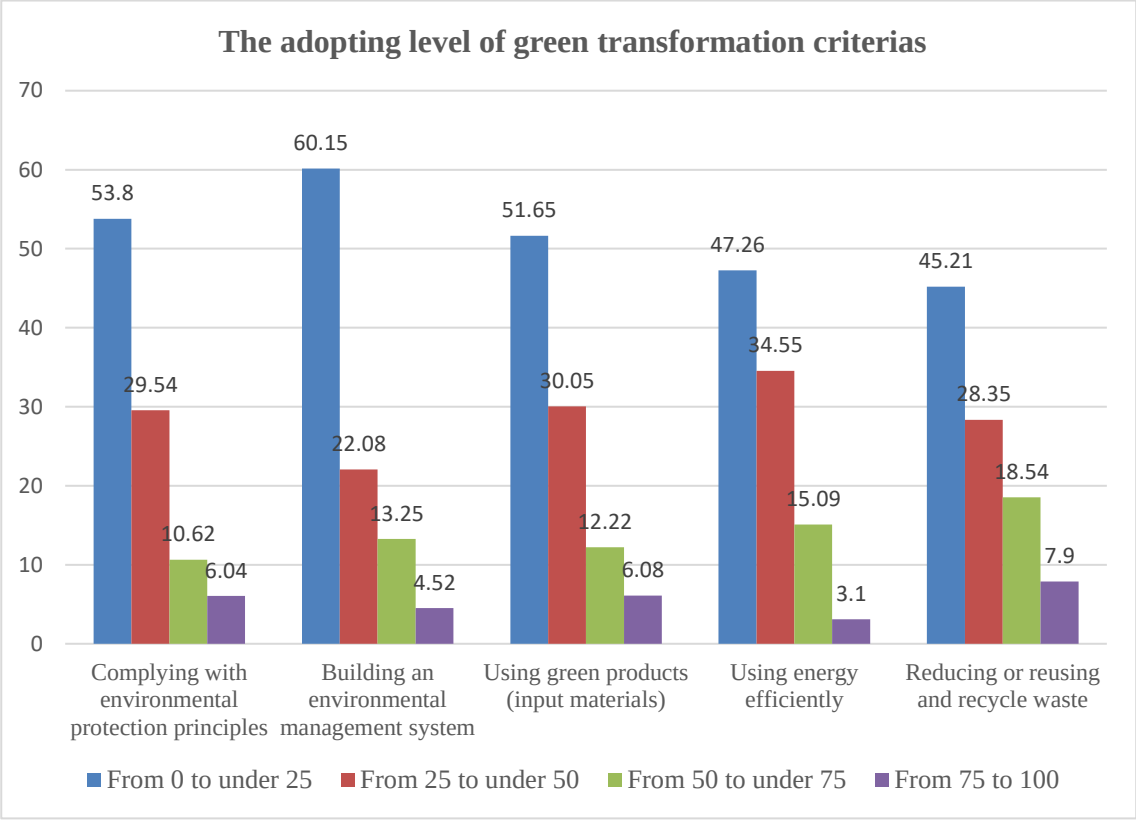

Figure 2. The adopting level of green transformation criterias of SMEs in Thanh Hoa

Source: Compiled by the author

The survey results show that for all criteria, the majority of businesses are applying at a level below 25%. For the criterion of complying with environmental protection principles, up to 53.8% of businesses are applying at a level below 25%; 29.54% of businesses are applying at a level from 25 to 50% and only 6.04% of businesses are applying at a level from 75 to 100%. Similar to the criterion that businesses build an environmental management system, over 60% of businesses that are ready for green transformation apply at the lowest level of less than 25% and only 4.52% of businesses have applied over 75% for this criterion. For the criterion that businesses use green products, the number of businesses that have applied 25% or more accounts for nearly half. Regarding the criterion of efficient use of energy sources, over 50% of businesses confidently answered that they have applied it at a level of over 25%. Finally, regarding the criterion that businesses have minimized or reused and recycled waste, 28.35% of businesses have applied at the level of 25-50%, 15.9% of businesses have applied at the level of 50-75% and 3.1% of businesses have applied at the level above 75%.

As can be seen, for SMEs in Thanh Hoa province, the percentage of businesses ready for green transformation is still very low. However, for businesses that are ready for green transformation, the level of application of green transformation criteria is still low (mainly below 25%). Therefore, the author conducted a business survey to identify barriers to applying green transformation, thereby proposing recommendations to help businesses accelerate the green transformation process more quickly and efficiently.

4.3. Barriers for green transformation adoption of SMEs in Thanh Hoa province

Based on the literature review, the author developed a survey questionnaire for SMEs in Thanh Hoa province with the main barriers including cost barriers, barriers in accessing information, barriers to the absorption capacity of the enterprise, barriers to corporate culture, lack of linkage and support from stakeholders, lack of government support, barriers from business leaders and barriers from customers and the market. In addition, the author also added an open question about other barriers for businesses to propose and choose. The results compiled from 488 valid survey questionnaires collected on the barriers to applying green transformation by SMEs in Thanh Hoa province are shown in Figure 3.

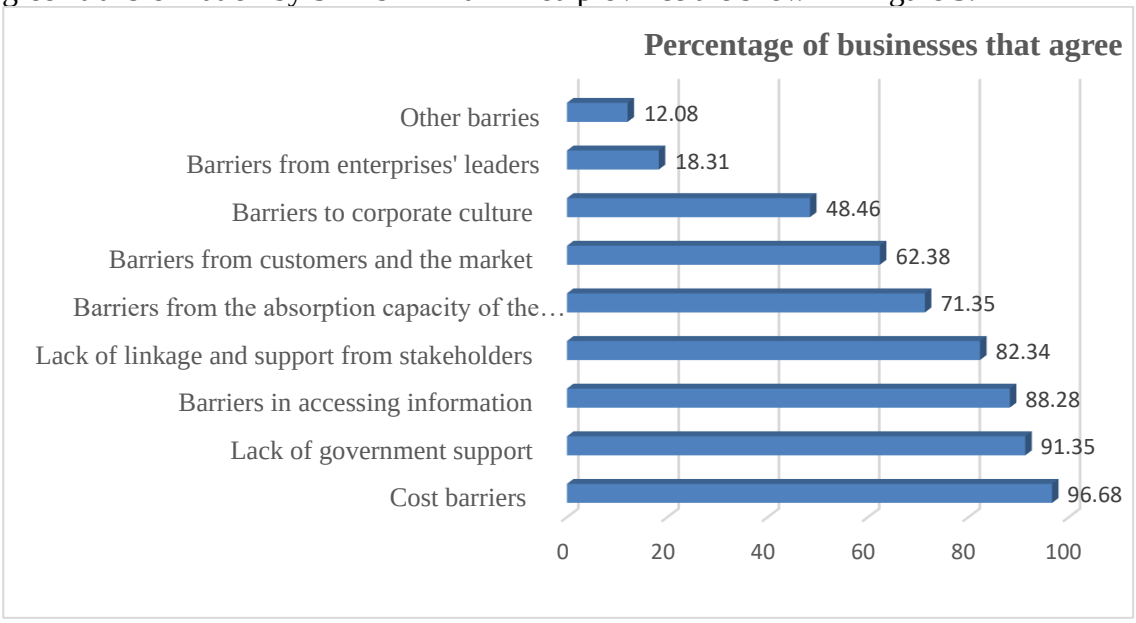

Figure 3. Barriers forGreen Transformation Adoption of SMEs in Thanh Hoa

Source: Compiled by the author

The results from Figure 3 show that most businesses agree that the cost barrier is the biggest barrier for businesses, with 96.68% of surveyed businesses agreeing with this. Businesses all said that the cost of applying green transformation is very high because replacing all old machinery and processes with new "green" technologies and methods is not a simple process and requires a lot of investment. This also becomes the biggest barrier to the green transformation revolution in businesses, especially SMEs, when spending a large amount of money on new technology without seeing immediate benefits is a big risk. Meanwhile, SMEs often face difficulties in accessing capital to invest in green technologies and processes. Financial support policies from the Government or financial institutions are still not strong enough to promote green transformation.

The second biggest barrier in the process of applying green transformation identified by businesses is the lack of support from the Government. The process of applying green transformation is a long process and requires a lot of investment in capital, technology, people, processes, and linkages between stakeholders. Therefore, businesses, especially SMEs, need support from the Government, ministries, branches, localities, and the social community. In recent years, many policies to support SMEs have been issued; in which, financial and non-financial policies are of interest to many businesses; but access to this

resource is still difficult; many businesses express their hesitation when having to rely on support resources. Most businesses also said that their internal resources are still very limited, thereby hindering them from accessing support resources from the Government. While in reality, support resources are still very limited, and administrative procedures are not friendly. There are also many other opinions that some policies only focus on supporting training programs, while businesses have a great need for technical support, technology, finance, supply chain connection, promoting green consumption, etc. Meanwhile, green credit at credit institutions is not popular, and the number of businesses accessing green credit is not much.

The next barrier to applying green transformation for SMEs in Thanh Hoa province is the limitation in accessing information. The survey results show that up to 88.28% of the surveyed businesses confirm that the barrier in accessing information makes them unaware, not excited, or not knowing how to make a green transition or are ready for the green transition. However, the application process still feels vague and worrisome. For businesses that acknowledge the information barrier to applying green transformation, some businesses say that they do not know much about the requirements for green transformation, and some businesses confirm that there are no specific instructions on implementing green transformation for each stage and each criterion. Most businesses say they lack information about forms of support; especially with support programs using the state budget and there are still many "hesitations" about the conditions related to payment procedures, meeting the requirements of regulatory agencies is still very cumbersome and complicated.

The research results also confirmed that the lack of linkage and support from stakeholders is the next barrier for SMEs in Thanh Hoa province in applying green transformation (with 82.34% of surveyed businesses confirming this). According to the businesses surveyed, green transformation needs to be carried out for businesses as a system, whereby in the business ecosystem including suppliers, customers, government, businesses, investors must all be aware of the requirements of green transformation and must act together. In addition, businesses operating in the same field also need to have links and consensus to support each other in the green transformation journey. This is a very challenging issue for businesses themselves as well as for the entire business ecosystem.

The next barrier identified by SMEs in Thanh Hoa province is the absorption capacity of enterprises, including technological absorption capacity and employee transformation capacity. According to the businesses surveyed, investing in green technology and infrastructure often requires a large resource of technological capacity for infrastructure and the absorption capacity of employees, while the current technological level of many businesses is still available. Backward, the workforce still lacks many necessary skills, besides, the awareness of technological innovation is still limited, some businesses have not seen the long-term benefits of technological innovation, in addition, the cost of investing in innovation is high. New technology is large, so most businesses save costs by only partially improving technological equipment. Accepting/absorbing a change is a challenge for most businesses, not only because of the high cost but also because the existing capacity of the business has not been able to receive it in time.

Another barrier identified by the surveyed businesses is the barrier from customers and the market. In many places, customers are still not fully aware of the benefits of using green products, both in terms of personal (health, long-term cost savings) and social

aspects (environmental protection, emission reduction). This makes them prioritize price over "green" factors when choosing products. Meanwhile, the price of green products is high due to higher production costs, including environmentally friendly raw material costs, advanced production technology, and stricter quality inspection processes. The consumer market has also not created enough momentum when consumers do not really prioritize green products. Therefore, businesses that have applied green innovation, but if customers and the market do not accept it, businesses will face great difficulties. Therefore, applying green transformation requires synchronous implementation, in terms of awareness and action from all stakeholders, including customers and the market.

Corporate culture is also a challenge for SMEs when applying green transformation. According to the assessment of the surveyed businesses (48.46% of businesses confirmed), the issue of corporate culture is also a barrier because changing the corporate culture towards green transformation requires everything from within. business to the reception of stakeholders, including beliefs, behaviors, attitudes, norms and general behaviors of all members of the enterprise. Corporate culture must stem from the organization's goals, strategies, structure, and approach to employees, customers, partners, and the community. Therefore, to apply green transformation, it also takes a long process for the corporate culture to change in a green direction. In addition, the survey results also show that 18.31% of the opinions said that business leaders themselves are also afraid of applying green transformation, and 12.8% of businesses proposed a number of other barriers in applying green transformation. for SMEs in Thanh Hoa province such as barriers in awareness and understanding. For many businesses, green transformation and digital transformation are still new concepts and there is not enough information to understand clearly, barriers to accessing government support policies.

4. CONCLUSIONS AND RECOMMENDATIONS

This study has shown that, for SMEs in Thanh Hoa province, with a sample survey of 500 enterprises, the research results show that only 34.02% of enterprises have been and are ready to apply green transformation. However, both businesses that are ready and not ready for green transformation agree that the main barriers to their application of green transformation include: cost barriers; Lack of government support; Barriers in accessing information; Lack of linkage and support from stakeholders; Barriers to the absorption capacity of the enterprise; Barriers from customers and the market; Barriers to corporate culture; Barriers from business leaders and some other barriers such as barriers in awareness and understanding, barriers in accessing policies.

From the research results, the author proposes some recommendations for businesses and authorities at all levels to promote green transformation, towards sustainable development for SMEs in Thanh Hoa province in the coming time as follows:

For businesses

First of all, businesses need to identify green transformation as an inevitable step that businesses must prepare for, just like the process of building a business plan. Next, businesses need to conduct a comprehensive assessment of the current production and business situation, identify areas where green transformation can be implemented and potential risks. Based on the assessment, businesses need to develop a detailed roadmap with short-term and long-term goals, along with a specific action plan to achieve those goals. Business leaders need to come up with clear strategies and convey the importance

of green transformation to all employees. Management also needs to ensure adequate financial, technical and human resources for the transformation process, while creating favorable conditions for the implementation of green initiatives.

Businesses should choose advanced green production technologies, save energy and resources, and minimize waste and greenhouse gas emissions; Applying sustainable management and production processes such as cleaner production, circular economy and total quality management. Businesses regularly organize training programs for employees on knowledge and skills related to green production, energy management, and environmental protection; Creating conditions for employees to clearly understand the importance of green transformation, as well as the benefits it brings to businesses and the community. Businesses also need to strictly manage costs during the transition process, ensure investment in green solutions that bring long-term value, and optimize resources to avoid waste.

In addition, businesses should build cooperative relationships with the Government, non-governmental organizations, suppliers and customers to receive support, share knowledge and experience as well as participate in green business alliances to learn, share experiences and promote joint initiatives on sustainable development; Finally, businesses need to regularly communicate internally about achievements and progress in the green transformation process to encourage employee morale and participation.

For authorities

The government needs to have a consistent policy framework, clearly and transparently build policies and tools to create a business investment environment towards green and sustainable development; Developing mechanisms and policies to mobilize domestic and international financial resources, improve access to green finance for businesses; Supporting state-owned enterprises and large enterprises to become financial institutions leading the green production and consumption market in the economy, as well as support SMEs. Government policies focus on tax incentives and green credit to reduce costs and overcome capital difficulties during the transition as well as supporting businesses with knowledge on how to establish strategies and build a roadmap for green and sustainable transformation.

In addition, the government needs to develop a roadmap for the use of clean technology, green technology, and environmentally friendly technology. The government also needs to form support packages, invest, and innovate technology, clean and environmentally friendly products as well as develop a reasonable and scientific consumption policy. It is necessary to consider consumer guidance as a part of community lifestyle education to achieve sustainable development. a reasonable and accepted consumption policy will contribute to the scientific use of natural resources. Finally, the government should raise awareness of consumer rights and responsibilities for all goods circulating in the market to create pressure to force manufacturers to comply with quality standards for their products.

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FACTORS INFLUENCING CAREER ORIENTATION OF ECONOMICS STUDENTS IN NGHE AN PROVINCE

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Abstract: The article analyzes factors influencing the career orientation of economics students in Nghe An Province, aiming to develop high-quality human resources and contribute to the sustainable economic development of the region. Research data was collected from 540 survey responses via Google Forms, targeting economics students at Vinh University and Nghe An University of Economics. The study results indicate that four factors—Students Themselves, Family, Society, and Economy—positively influence students' career orientation. Among these, the "Students Themselves" factor has the strongest impact, with an influence coefficient of 0.469, highlighting the critical role of self-awareness and personal competencies in career orientation. Economic and Family factors rank second and third, respectively, while the Social factor has the lowest impact, with an influence coefficient of 0.102. The research emphasizes the importance of integrating these factors to support students in building suitable career paths, thereby contributing to the sustainable economic development of the region.

Keywords: *Career orientation, Economics, Nghe An, Students*

1. Introduction

The career orientation of students is not only a critical factor in shaping their individual career paths but also significantly impacts sustainable economic development. Properly aligning students' chosen careers with their abilities and societal demands contributes to enhancing the quality of the labor force, improving work efficiency, and reducing unemployment. In the context of international integration and digital transformation, researching the influence of students' career orientation on sustainable economic development has become an urgent issue. This research aims to propose appropriate solutions to optimize the potential of the younger generation and meet the development needs of the economy.

In Nghe An Province, with two primary educational institutions, Vinh University and Nghe An University of Economics, the number of economics students is steadily increasing. However, career orientation for students still faces significant limitations, failing to meet the practical demands of the labor market in the context of global integration and digital transformation. Many students struggle to identify suitable career paths, leading to unemployment or working in unrelated fields after graduation. Researching the factors influencing the career orientation of economics students in Nghe An is a pressing issue. Understanding these factors will enable universities, management agencies, and businesses to implement effective solutions to assist students in making informed career decisions.

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Furthermore, this research will contribute to improving educational quality, strengthening the connection between universities and the labor market, and promoting the sustainable development of human resources in the economic sector within the province.

Based on this, the article focuses on analyzing the factors affecting the career orientation of economics students at Vinh University and Nghe An University of Economics. Through this research, the authors aim to provide comprehensive insights, contributing to enhancing educational quality and the effectiveness of career orientation efforts in the future.

2. Overview and Research Methodology

2.1 Research Overview

Career orientation encompasses the tendencies and behaviors of individuals in pursuing or applying themselves to specific professions, influencing their decision-making process regarding future career choices.

Students Themselves: Research shows that individual factors play a crucial role in students' career orientation. Tran Thi Phung Ha (2014), through a survey of Can Tho University students, revealed that most students develop their own strategies to improve skills and attitudes to prepare for the future. Similarly, Le Thi Thu Tra (2016) highlighted that the process of self-discovery and identifying strengths and weaknesses helps students find suitable careers, bringing satisfaction and sustainable development. Mai Thi Bich Phuong (2018) found that over 70% of students actively seek information about their intended careers, demonstrating proactive preparation for their future work. The "Students Themselves" factor, including self-awareness of abilities, interests, and personal values, serves as the foundation for effective career orientation, ensuring long-term development and success.

H1: *Students themselves positively influence the career orientation of economics students in the future.*

- **Family:** Parents, with their experience and knowledge, often provide crucial advice and suggestions in career selection. Levon T. Esters and Blannie E. Bowen (2005), along with Tran Thi Phung Ha (2014), indicated that many students choose careers based on their parents' preferences or family traditions, as it may facilitate job opportunities. Tran Thi Ngoc Duyen and Cao Hao Thi (2009) found that students with parents working in government agencies often tend to seek employment in similar organizations. Mai Thi Bich Phuong (2018) reported that 68.8% of students consult their parents when selecting a career, with parents typically prioritizing stable jobs and high income for their children. However, this perspective is gradually shifting as society increasingly demands professional competence, flexibility, and adaptability.

H2: *Family positively influences the career orientation of economics students in the future.*

- **Society:** Social factors, including friends, teachers, colleagues, and the community, significantly influence an individual's career orientation. Hodkinson and Sparkes (1997) emphasized that the "social context" within educational and community environments plays a crucial guiding role. Additionally, Salleh (2010) highlighted the importance of social activities, which help individuals expand their networks, develop soft skills, and adapt to the labor market. According to Nguyen Thi Bich Thuy (2015), teachers, who provide information and encourage students to explore their personal

abilities, are regarded by many students as a reliable source of guidance. Mai Thi Bich Phuong (2018) pointed out that schools not only deliver knowledge but also connect students with employers, contributing to clear career orientation.

H3: *Society positively influences the career orientation of economics students in the future.*

- **Economy:** Economic factors play a crucial role in career orientation, influencing individuals' perceptions and career decisions. Levon T. Esters and Blannie E. Bowen (2005) highlighted that socioeconomic conditions affect access to career guidance information and services. Tran Thi Ngoc Duyen and Cao Hao Thi (2009) affirmed that regional economic disparities lead to differing career trends, with developed areas prioritizing technology, finance, or business management sectors. According to Tran Thi Phung Ha (2014), family income levels are closely related to career choices, as students often consider fields that align with their financial situation. Mai Thi Bich Phuong (2018) observed that students from affluent families tend to choose high-cost fields such as medicine, engineering, or studying abroad, while those from lower-income families often opt for careers that offer easier job opportunities to support their families. In summary, family economic conditions, income levels, and labor market development strongly influence career orientation, making it an essential factor in studying students' career choices.

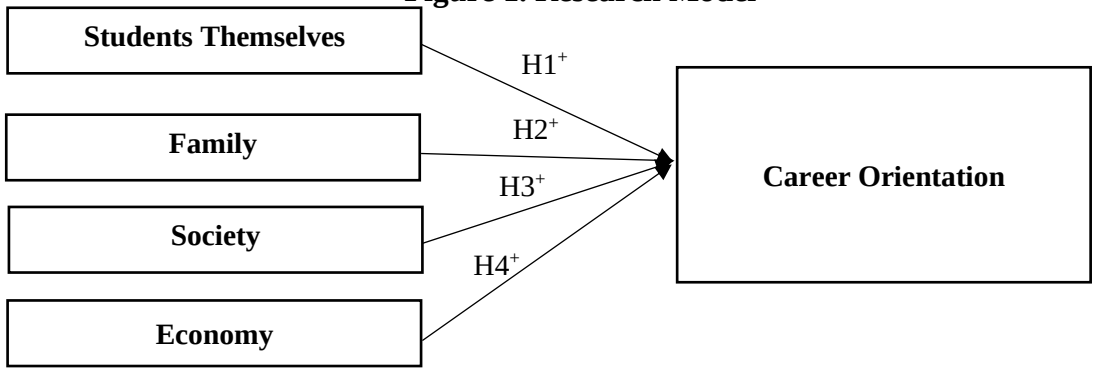
H4: *Economic factors positively influence the career orientation of economics students in the future.*

2.2 Research Methodology

2.2.1. Research Model

Based on the research objectives and a review of previous studies, the authors propose four factors that may influence the career orientation of economics students.

Figure 1. Research Model



(Source: Results from the authors' research)

Table 1. Measurement Scales of Observed Variables in the Model

STT	Factor	Notation	Observed Variables
1	Students Themselves	BTSV1	Personal Interests
		BTSV2	Personal Traits
		BTSV3	Personal Competence
		BTSV4	Personal Aspirations
		BTSV5	Personal Health
2	Family	GĐ1	Guidance and Expectations from Family
		GĐ2	Family Traditions

		GĐ3	Family Economic Conditions
3	**Society**	XH1	Friends, Seniors, and Juniors
		XH2	Lecturers
		XH3	Social Stereotypes about Careers
		XH4	Social Media and Communication
		XH5	Career Orientation Activities
		XH6	Training Programs
		XH7	Social Status of Careers
4	**Economy**	KT1	Labor Market Demand
		KT2	Expected Income
		KT3	Opportunities for Personal Development (Skills, Mindset, etc.)
		KT4	Education Costs
		KT5	Promotion Opportunities
5	**Career Orientation**	DH1	Plan for Postgraduate Studies or Additional Certifications
		DH2	Clarity in Career Choices Based on Personal Competence
		DH3	Awareness of Career Options (e.g., Accounting, Business Management, Investment, Bidding, etc.)
		DH4	Clarity in Career Choices after Graduation

(Source: Results from the authors' research)

2.2.2. Data Collection Method

Sampling Method:

In this study, the authors applied exploratory factor analysis (EFA) and regression analysis. According to Hair et al. (1998), the minimum sample size for factor analysis should be at least five times the total number of observed variables. With 24 observed variables in this study, the minimum sample size required is 5 * 24 = 110 respondents.

Additionally, based on Tabachnick and Fidell (2007), the minimum sample size for regression analysis should be eight times the number of independent variables plus 50. Using this formula, the study requires at least 50 + 8 * 4 = 82 survey participants.

Data Collection and Processing Method:

The authors conducted a survey using online questionnaires via Google Forms, distributing them to economics students at Vinh University and Nghe An University of Economics. A total of 540 valid responses were collected. The data was then aggregated, entered, and processed using SPSS 22 software.

Exploratory Factor Analysis (EFA) was performed to eliminate unsuitable observed variables and to examine the convergence and discrimination of research variable groups. Regression analysis was used to investigate the linear relationships between the variables within the research model.

3. Results and Discussion

3.1 Descriptive Statistics

Table 2. Descriptive Statistics

	Number (People)	Percentage(%)

1.	**Gender**	
Male	117	21.7
Female	423	78.3
2.	**Academic Year**	
First Year	283	52.4
Second Year	139	25.7
Third Year	101	18.7
Fourth Year	17	3.2

(Source: Results from the authors' research)

According to the descriptive statistics from Table 2, a total of 540 students participated in the survey, with female students outnumbering males at 78.3% and 21.7%, respectively. The majority of respondents were first-year and second-year students. Additionally, the survey on career orientation among economics students showed an increasing trend in the proportion of students with career orientation as they progressed through their academic years. Specifically, 60.78% of first-year students had a clear career orientation, increasing to 67.33% in the third year and 70.59% in the fourth year. This indicates that university education has, to some extent, helped students gain a clearer understanding of their future careers.

3.2 Exploratory Factor Analysis (EFA)

Table 3. Exploratory Factor Analysis (EFA)

	Component			
	KT	**XH**	**BTSV**	**GD**
KT3	0.791			
KT2	0.781			
KT5	0.761			
KT1	0.723			
KT4	0.620			
XH5		0.775		
XH2		0.766		
XH4		0.751		
XH3		0.715		
XH6		0.667		
XH1		0.656		
XH7		0.591		
BTSV1			0.776	
BTSV2			0.748	
BTSV4			0.735	
BTSV3			0.701	
BTSV5			0.677	
GD2				0.772
GD3	0.520			0.585
GD1				0.582
Cronbach's Alpha	0.925	0.918	0.900	0.780
Eigenvalues	1.021	1.057	11.065	1.554

% of Variance	4.606	5.285	55.327	7.771
Cumulative %	72.989	68.383	55.327	63.098

(Source: SPSS 22 Software)

Based on the Exploratory Factor Analysis (EFA) results (Table 3), the measurement scales for the factors "Students Themselves" (BTSV), "Family" (GD), "Society" (XH), and "Economy" (KT) all have Cronbach's Alpha coefficients exceeding 0.5, indicating reliability and suitability for EFA analysis.

Table 4. KMO Coefficient and Bartlett's Test Results

Kaiser- Meyer- Olkin (KMO) measure of sampling adequacy		0.956
Bartlett's Test of Sphericity	Approx Chi - Square	8374.399
	df	190
	Sig.	0.000

(Source: SPSS 22 Software)

The EFA results show:

- The KMO coefficient is 0.956, indicating that the data is suitable for EFA. Bartlett's test results with Sig. < 0.05 reject the null hypothesis (the correlation matrix is an identity matrix), meaning the variables are interrelated. Thus, the EFA method is appropriate for the data.
- Combined with the analysis results in Table 3, the Eigenvalues are all greater than 1, meeting the analysis condition (>1).
- The total variance explained is 83.74%, exceeding the 50% threshold, which is considered satisfactory.

These results confirm that the model is appropriate.

3.3 Correlation Coefficients Between Variables in the Model

Table 5: Correlation Coefficients Between Variables in the Model

		DH	**BTSV**	**GD**	**XH**	**KT**
DH	**Pearson Correlation**	1.000	0.802	0.675	0.672	0.751
	Sig.		0.000	0.000	0.000	0.000
BTSV	**Pearson Correlation**	0.802	1.000	0.660	0.657	0.739
	Sig.	0.000		0.000	0.000	0.000
GD	**Pearson Correlation**	0.675	0.660	1.000	0.659	0.683
	Sig.	0.000	0.000		0.000	0.000
XH	**Pearson Correlation**	0.672	0.657	0.659	1.000	0.726
	Sig.	0.000	0.000	0.000		0.000
KT	**Pearson Correlation**	0.751	0.739	0.683	0.726	1.000
	Sig.	0.000	0.000	0.000	0.000	

(Source: SPSS 22 Software)

Table 5 shows that the Pearson correlation coefficients are all within the range of [-1; 1] and are statistically significant, with a significance level (Sig) < 0.05.

3.4. Linear Regression Results

Table 6: Linear Regression Results

Model	Unstandardized Coefficient		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	0.420	0.091		4.623	0.000
BTSV	0.446	0.035	0.469	12.787	0.000
GD	0.127	0.032	0.136	3.936	0.000
XH	0.102	0.036	0.102	2.826	0.005
KT	0.229	0.039	0.238	5.924	0.000

(Source: SPSS 22 Software)

Based on the results in Table 6, the Sig. values for all variables are less than 0.05, indicating that the regression coefficients are statistically significant at the 5% level. The standardized regression coefficients (Beta) determine the influence of the independent variables on the dependent variable.

- The most influential factor is BTSV (Students Themselves), with a Beta coefficient of 0.469, showing a positive relationship with DH (Career Orientation) under the condition that other factors remain constant.
- The second most significant factor is KT (Economy), with a Beta coefficient of 0.238, also positively correlated with DH.
- The third factor is GD (Family), with a Beta coefficient of 0.136, positively affecting DH.
- The least influential factor in the model is XH (Society), with a Beta coefficient of 0.102, showing a weaker positive relationship with DH compared to the other factors.

4. Conclusion and Recommendations

The research findings indicate that over 60% of economics students in Nghe An Province have clear career orientations upon graduation. All factors included in the research model positively influence the career orientation of economics students. The order of influence is as follows: students themselves have the greatest impact, followed by economic factors, family, and society. Based on these results, the authors propose the following solutions to enhance career orientation:

Universities play a crucial role in guiding students' career orientation. They should enhance diverse communication efforts about career orientation and organize specialized workshops and in-depth counseling sessions starting from the first year to help students plan their studies and careers early.

Specialized courses should incorporate expert talks to provide students with a clearer understanding of their fields of study and career prospects. Career orientation activities tailored to specific majors should be organized to equip students with detailed knowledge and practical skills.

Moreover, teaching methods should be improved, training programs should be updated, and international collaborations should be fostered to enhance the quality of education. The education process must also focus on developing ethics, character, and labor skills to ensure that students become professional, creative, and innovative human resources, meeting the demands of sustainable socio-economic development.

Students must take initiative and make efforts to achieve their career goals. They

should self-assess their abilities, interests, and personal values to identify suitable career paths. Actively seeking labor market information, understanding skill requirements, and exploring career opportunities through channels such as workshops, career counseling, or online platforms is essential.

Participating in extracurricular activities, subject-specific clubs, and internships at companies can help students improve their soft skills and gain practical experience. Additionally, students need to develop clear study plans and prioritize enhancing their professional skills, foreign language proficiency, and IT capabilities to increase their competitiveness in the job market.

Students should also take full advantage of support from universities, teachers, and family for specific advice and career guidance, ensuring they stay on track to achieve their professional aspirations.

Recommendations:

For universities: Enhance career guidance activities, integrate expert talks into specialized courses, and promote career-focused workshops and training.

For students: Actively assess personal strengths, explore labor market trends, and participate in extracurricular and internship programs to gain practical experience.

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THE ROLE OF MARKET COMPETITION AND MACROECONOMICS IN SHAPING FINANCIAL STABILITY OF COMMERCIAL BANKS IN ASIA

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Abstract: The study examines the impact of market competition and macroeconomic factors on the stability of the commercial banking system, utilizing data collected from 1,093 banks across Asian countries during the period from Q1 2008 to Q1 2024 through the application of the Two-Stage Least Squares (2SLS) estimation method. The findings underscore the heightened "vulnerability" of banks operating in highly competitive environments, where the pressures to attract and retain customers often result in reduced interest rates and engagement in unsustainable competitive practices. Particularly within volatile market conditions, the trade-off between short-term profitability and market share expansion may exacerbate financial imbalances, thereby increasing the likelihood of institutional instability. Furthermore, the analysis identifies macroeconomic factors, such as elevated inflation and excessive economic growth, as primary drivers of heightened credit risk and rising non-performing loan ratios. These factors collectively undermine financial stability and impose significant adverse effects on the overall resilience and health of the banking system.

Keywords: *Asian banking sector, commercial banks, financial stability, macroeconomics, market competition.*

1. Introduction

Commercial banks are among the most significant financial intermediaries within an economy. Banks implement economic policies, particularly monetary policies, and thus serve as key instruments in the Government's economic policy to maintain economic stability (Phan, 2023). Well-functioning commercial banks foster a nation's economic growth, whereas poor performance of these banks increases the likelihood of failure, ultimately leading to financial crises (Siddique et al., 2020). Following the global financial crisis that began in late 2007, a major debate among financial analysts questioned the financial stability of all corporations, including commercial banks. Banks must meet rigorous reliability standards, particularly regarding financial stability, to fulfill their role as financial intermediaries and regulate money circulation effectively (Khanh, 2022).

Several studies have examined the factors influencing the stability of commercial banks. Positive factors include the equity-to-total assets ratio (Linh, 2023), bank size and loan-to-deposit ratio (Quoc, 2020), capital adequacy ratio, cost-to-income ratio, and liquidity ratio (Tien and Duc, 2023); and competitive capability (Tu and Oanh, 2021). On

[1,2,3,4,5,6] National Economics University

the other hand, the net interest margin (Quoc, 2020) was found to be a negative factor. Factors strongly correlated with the Z-score include GDP, the Lerner index, net interest margin, and cost-to-income ratio, while weakly correlated factors include the ratio of non-interest income to total income and the ratio of foreign capital to total assets (Alihodzic et al., 2020).

Through the synthesis and analysis of related studies worldwide, the authors have drawn the following conclusion: previous studies have not extensively addressed the issue of endogeneity in their models, even though its impact could bias estimates, reduce model efficiency, and lead to unreliable results. After identifying the gaps in the published studies, the research team conducted the study "The role of Market Competition and Macroeconomics in shaping Financial Stability of Commercial Banks in Asia." This research aims to address the question: What is the impact of market competition and macroeconomics on the financial stability of commercial banks? Furthermore, 2008 marked the onset of the global financial crisis, while the Asia region, home to a large number of commercial banks, was significantly affected. In recent years, the Asia region, particularly the Middle East, has also experienced frequent geopolitical instability and armed conflicts. Therefore, the authors used a research sample of commercial banks in the Asia region from Q1/2008 to Q1/2024. To address the endogeneity issue regarding the first-order lag variable of bank stability in the model, the research team also applied the two-stage least squares (2SLS) regression method, with the instrument variable being the second-order lag of bank stability.

2. Literature review and hypothesis development

2.1. Stability of Commercial Banks

Bank stability refers to the institution's capacity to sustain a robust financial position and maintain operational efficiency even amidst periods of economic turbulence or instability (Diaconu and Oanea, 2014). The financial health or stability of commercial banks consistently remains a critical focal point within the broader economic landscape. Among the various measures of financial stability, the Z-score has emerged as a widely recognized indicator, encapsulating the overall risk profile and resilience of banks. Initially introduced by Altman (1968) and subsequently refined by Boyd et al. (1993), the Z-score has become an essential metric for assessing the financial soundness of banking institutions. The stability of a bank is measured as follows:

$$\text{Z-score}_{i,t} = \frac{ROA_{i,t} + \frac{Equity_{i,t}}{Total\ Assets_{i,t}}}{\sigma ROA_{i,t}}$$

Wỉth:

- ROA is the after-tax profit on total assets
- $\frac{Equity}{Total\ Assets}$ is the ratio of equity to total asset
- σROA is the standard deviation of ROA, indicating income volatility and the risk-taking strategies of banks.
- i, t respectively represent bank i at time t.

2.2. Impact of Market Competition on the Stability of Commercial Banks

Ozili (2018) highlighted the need to consider the degree of competition within the banking sector. The Lerner index is widely used in recent banking studies and is the only measure of market power applied at the bank level (Berger et al., 2017). Many current

studies have simplified the Lerner index by measuring the ratio of profit to revenue of the bank (Gounder and Sharma, 2012), where a higher value indicates greater individual bank power and a less competitive market. There are two opposing views regarding the relationship between market competition and bank stability:

On one hand, the competition-fragility nexus theory posits that heightened competition within the banking sector adversely affects financial stability (Berger et al., 2009; Tongurai and Vithessonthi, 2020). In highly competitive environments, banks may engage in practices such as lowering service fees and reducing interest rates to attract customers and expand market share. While these strategies aim to enhance competitive positioning, they often lead to diminished profitability. Furthermore, banks may channel resources into specific sectors or market segments in pursuit of higher returns, thereby increasing concentration risk and rendering themselves more susceptible to financial shocks. Based on these arguments, the authors propose the following research hypothesis:

H1a: Market competition reduces bank stability.

On the other hand, the competition-stability nexus theory supports the view that higher competition in the banking system increases bank stability (Nicoló et al., 2004; Uhde and Heimeshoff, 2009; Fiordelisi and Mare, 2014; Li, 2019; Soedarmono et al., 2011; Ovi et al., 2014). When many banks compete, they enhance operational efficiency by increasing transparency, innovation, and product improvements to meet customer needs, which strengthens the financial stability of the banks. Based on these arguments, the authors propose the following research hypothesis:

H1b: Market competition increases bank stability.

2.3. Impact of Macroeconomics on the Stability of Commercial Banks

Analyzing macroeconomic indicators can assist bank regulators in assessing the financial health of banks and detecting early signs of instability (Quagliariello, 2008). The authors use two macroeconomic indicators—inflation and economic growth rate—because these are the fundamental indicators that reflect fluctuations as well as adjustments in economic policies that indirectly affect other factors in the banking sector, such as interest rates, credit scale,.., thereby allowing an assessment of bank stability.

Hoggarth et al. (2001) argued that high and unexpected inflation can create challenges for banks in planning lending activities and negotiations. Rising prices and borrower incomes may not keep pace, leading to reduced repayment ability and increased bad debt risk and credit losses for banks (Fazio et al., 2015). Meanwhile, Ali and Puah (2018) indicated that excessive, uncontrolled economic growth can expose banks to credit risk from bad debts. This sudden growth can also lead to demand-pull inflation, increasing prices, prompting people to spend more, save less, and reduce bank deposits. Based on these arguments, the authors propose the following research hypothesis:

H3a: Macroeconomics reduces bank stability.

However, Perry (1992) suggested that when high inflation is anticipated and banks take protective measures, such as investing in real-value assets and raising interest rates, this indirectly creates significant income from loan interest, supporting business stability. Moreover, strong economic growth indicates a nation's development and serves as a positive foundation for a stable financial system, whereas bank failures are a result of economic downturns (Levine et al., 2000). Based on these arguments, the authors propose the following research hypothesis:

H3b: Macroeconomics increases bank stability.

2.4. Control Variables

The research employs a set of control variables focusing on internal bank-specific factors, including credit risk, liquidity, profitability, net interest margin, and governance. These factors are essential in assessing risks, overall profitability, credit activities, and management costs, all of which directly influence the stability of banks and the relationships under examination.

Kumai and Hussaini (2015) believe that the most commonly used indicator reflecting bank size and financial capacity is total assets. Management theory suggests that an increase in size signals favorable structural conditions and enhances stability (Adusei, 2015). Economies of scale explain that large banks have sufficient resources to increase profits and spread risk (Gwachha, 2023). Therefore, size has a positive effect on bank stability.

The non-performing loan (NPL) ratio, a measure of credit risk, is calculated as the proportion of total non-performing loans to total outstanding loans (Phan, 2013). An elevated NPL ratio results in capital erosion, thereby undermining bank stability (Setiawan and Widiastuti, 2019). To offset these losses, banks often increase lending rates, which reduces loan demand and adversely affects revenue and profitability (Amara and Mabrouki, 2019). Hence, the NPL ratio negatively impacts bank stability.

Ayinuola and Gumel (2023) show that liquidity measures the amount of cash and cash-equivalents available to a bank for meeting financial obligations as they mature without significant loss. High liquidity can help banks protect against unexpected difficulties and ensure their stability (Bermpei et al., 2018). Therefore, liquidity has a positive effect on bank stability.

Return on assets (ROA), calculated as the ratio of after-tax profits to total assets, serves as an indicator of operational profitability and financial stability. A higher ROA reflects effective operations and sound financial health (Prawira and Wiryono, 2020), whereas a lower ROA restricts income flows, compelling banks to hold excess cash reserves and weakening their financial position (Hughes et al., 1996). Thus, ROA positively influences bank stability.

Net interest margin (NIM) measures a bank's efficiency in managing loans and meeting customer withdrawal demands. It is derived by dividing the difference between interest income and interest expenses by total earning assets. An increase in NIM suggests improved operational efficiency and the availability of financial buffers to absorb unexpected losses (Ozili, 2018). Therefore, NIM contributes positively to bank stability.

2.5. Research data

The study analyzes data from 1,093 banks across 44 countries in Asia during the period from Q1/2008 to Q1/2024 to examine the impact of market competition and macroeconomic factors on the stability of commercial banks. The research sample focuses exclusively on the Asian region and includes only commercial banks to ensure uniformity, as the primary business of commercial banks is lending (Bermpei et al., 2018). Control variable data, market competition levels, and macroeconomic indicators are sourced from the S&P Capital IQ database.

2.6. Research Model

The research team employs an Econometric Model to evaluate the impact of market

competition and macroeconomics on the stability of Asian commercial banks. The model, first introduced by Frisch (1933), has been widely used by various authors to study the effects of these factors on the stability of commercial banks (Kiemo et al., 2019). The research team proposes the following model:

$Z\_score_{i,j,t} = \beta_0 + \beta_1.Lener_{j,t} + \beta_2.Macro\_Eco_{j,t} + \beta_3.Control_{i,j,t} + u_{i,j,t}$

Where:

- *i, j, t*: Represent bank *i* in country *j* at time *t* (measured in quarters).
- *Z_score*: The financial stability level of the bank.
- $\beta_{i,j,t}$: Coefficient of the independent variable in the model.
- *Lener*: Variable representing the level of market competition in the banking industry.
- *Macro_Eco*: A vector comprising variables related to macroeconomic factors.
- *Control*: A vector of control variables.

Table 2: Data Collection Sources and Variable Calculation

Variable Name	Symbol	Calculation	Expected Sign
Dependent Variable			
Bank Stability Level	$Z\_score_{i,j,t}$	$Z\text{-}score_{i,j,t} = \frac{ROA_{i,j,t} + \frac{Equity_{i,j,t}}{Total\ Assets_{i,j,t}}}{\sigma ROA_{i,j,t}}$	
Independent Variable			
Banking Industry Market Competition Variable			
Market Competition	$Lerner_{i,j,t}$	$Lerner_{i,j,t} = \frac{Profit_{i,j,t}}{Total\ Revenue_{i,j,t}}$	+/-
Macroeconomic Factors			
Economic Growth Rate	$GDP\_gr_{j,t}$	$GDP\_gr_{j,t} = \frac{GDP\_gr_{j,t} - GDP\_gr_{j,t-1}}{GDP\_gr_{j,t-1}} * 100\%$	+/-
Inflation Rate	$Inf_{j,t-1}$	$Inf_{j,t-1} = \frac{Consumer\ Price\ Index_{j,t-1} - Consume}{Consumer\ Price\ Index_{j,t}} * 100\%$	+/-
Control Variable			
Bank Size	$Size_{i,j,t}$	$Size_{i,j,t} = ln(Total\ Assets_{i,j,t})$	+/-
Non-Performing Loan Ratio	$NPL_{i,j,t}$	$NPL_{i,j,t} = \frac{Total\ non-performing\ loans_{i,j,t}}{Total\ loan\ portfolio_{i,j,t}} * 100$	-
Liquidity	$Liquidity_{i,j,t}$	$Liquidity_{i,j,t} = ln(Cash\ and\ cash\ Equivalents)_{i,j,t}$	+

Return on Assets	$ROA_{i,j,t}$	$ROA_{i,j,t} = \frac{Post - tax\ profit_{i,j,t}}{Total\ assets_{i,j,t}} * 100\%$	+
Net Interest Margin	$NIM_{i,j,t}$	$NIM_{i,j,t} = \frac{Net\ interest\ income_{i,j,t}}{Total\ earning\ assets_{i,j,t}}$	+
Bank Stability in the Previous Period	$Z\_score_{i,j,t-1}$	$Z\text{-}score_{i,j,t-1} = \frac{ROA_{i,j,t-1} + \frac{Equity_{i,j,t-1}}{Total\ Assets_{i,j,t-1}}}{\sigma ROA_{i,j,t-1}}$	+

Source: Authors' Calculations

2.7. Research Methodology

The research team examines this relationship using regression analysis; however, the model encounters an endogeneity issue with the lagged variable Z_score_1 due to its correlation with the residuals (Larcker and Rusticus, 2010). This correlation leads to estimation bias, making the regression results unreliable (Bascle, 2008). To address this model deficiency, the team employs the Two-Stage Least Squares (2SLS) method along with instrumental variables. Semadeni et al. (2013) show that the 2SLS method resolves endogeneity issues, thereby providing more accurate parameter estimates, especially in complex econometric models where variables may interact with each other and with the residuals. The research team chooses STATA 17 as the analytical tool and uses the lagged variable Z_score_2 as the instrumental variable, as it exhibits autoregressive properties over time. This approach helps mitigate endogeneity issues and leads to more reliable results.

3. Results and Discussion

Table 3: Correlation Matrix

Variable	Z_score	Lerner	Inf	GDP_gr	Size	NPL	Liquidity	ROA	NIM	Z_score_1
Z_score	1.00									
Lerner	0.01	1.00								
Inf	-0.04	-0.08	1.00							
GDP_gr	-0.01	-0.03	-0.02	1.00						
Size	0.07	-0.48	0.16	0.07	1.00					
NPL	-0.01	-0.06	0.16	-0.03	0.15	1.00				
Liquidity	0.01	0.06	-0.05	0.06	-0.14	-0.18	1.00			
ROA	0.03	-0.01	0.00	0.00	-0.04	0.00	0.00	1.00		
NIM	0.06	0.01	0.01	0.01	0.05	0.00	-0.01	-0.79	1.00	
Z_score_1	0.55	0.00	0.05	0.04	0.08	-0.01	-0.01	-0.07	0.08	1.00

Source: Calculated from Stata

Table 3 shows the relationship between the independent variables in the model and bank stability. The variables Liquidity, Size, ROA, and NIM have a positive correlation with the Z_score variable, whereas the variables Lerner, Inf, GDP_gr and NPL have a negative correlation. The Z_score_1 variable also has a relatively close relationship with Z_score, indicating the lagged effect on bank stability. The multicollinearity test results indicate that all variable pairs exhibit correlation coefficients below 0.8. This finding allows the research team to incorporate these variables into the regression model to analyze the impact of financial and governance factors on the financial stability of banks.

Table 4: Regression Model Estimation Results

Instrumental variables 2SLS regression				Number of obs = 35,736 Wald chi2(16) = 806.75 Prob > chi2 = 0.0000 R-squared = 0.6865 Root MSE = 3899.8		
Z_score	**Coeffient**	**Std. err.**	**z**	**P>|z|**	**[95% conf.interval]**	
Lerner	-1.02	1.75	-5.85	0.000	-1.36	-6.78
Inf	1.14	2.32	4.90	0.000	6.82	1.59
GDP_gr	1.02	4.89	2.08	0.038	5.73	1.97
Size	6.98	5.96	11.71	0.000	5.81	8.15
NPL	-1.78	3.95	-4.52	0.000	-2.56	-1.01
Liquidity	9.54	4.97	19.21	0.000	1.05	8.56
ROA	5.16	7.52	6.85	0.000	3.68	6.63
NIM	4.57	3.81	12.01	0.000	3.83	5.32
Z_score_1	-3.01	9.60	-3.14	0.002	-4.89	-1.13
_cons	5.95	2.55	23.32	0.000	5.45	6.45

Source: Calculated from Stata 17

The market power of individual banks (Lerner) has a positive effect on the stability of commercial banks, meaning that when market competition increases, it negatively impacts bank stability. In a highly competitive environment, the pressure to maintain and increase market share may lead banks to reduce service fees and interest rates to attract customers. At the same time, banks may be willing to accept higher-risk loans and expand credit without strictly controlling asset quality. With the entry of foreign financial institutions into the domestic market, the level of competition among banks increases, resulting in interest rate races and a surge in customer withdrawals, which negatively affects the stability of banks. On the part of the banks, when a bank holds less power and must survive in a highly competitive environment, it may lower investment standards because they have little to lose. This increases the potential risks, particularly investment and loan portfolio risks. However, this can lead to a decrease in profitability and an increase in the risks faced by the bank. Additionally, to maintain their position and increase competitiveness, banks focus on specific markets to achieve higher profits, which may lead to concentration risks, making the bank more vulnerable to economic shocks or fluctuations in the financial system. The results are consistent with the studies of Berger et al. (2009) and Tongurai and Vithessonthi (2020).

Macroeconomic factors (Macro_Eco) all have an inverse effect on the stability of commercial banks. If economic growth becomes too hot and out of control, banks will face

credit risk from non-performing loans. It can also cause demand-pull inflation, leading to an increase in prices, which causes people to spend more, save less, and reduce deposits at banks. This creates difficulties for banks in raising capital and meeting their financial obligations. Additionally, this sudden growth improves the business environment and lowers market entry barriers for new banks, creating competition and reducing bank profits. Furthermore, banks may compete to increase market share by offering credit with relaxed conditions and little oversight, increasing the bank's risk and reducing stability. Additionally, when inflation increases unexpectedly, banks may fail to adjust interest rates accordingly, causing difficulties in managing cash flows for borrowers. Rising prices and borrowers' income may not keep up, reducing their ability to repay loans, which increases the risk of non-performing loans and credit losses for banks. High and sudden inflation can create difficulties for banks in loan planning and negotiations. Moreover, the devaluation of the local currency affects exchange rates in the market, leading banks to raise interest rates to prevent capital flows from moving to other investment channels such as foreign currencies, stocks, gold, … However, this indirectly increases credit risk and liquidity risk from loans. Furthermore, inflation can erode asset values and worsen the bank's balance sheet position while potentially reversing essential capital flows needed for economic development (Sanya and Wolfe, 2011). The results are consistent with the studies of Ali and Puah (2018) and Adusei (2015).

In addition, other factors are impacted differently in relation to commercial banks. Specifically, total liquid assets, profitability ratio, and net interest margin are positively affected in terms of their relationship with the stability of commercial banks. On the other hand, the non-performing loan ratio and management expenses are negatively impacted concerning the stability of commercial banks.

The financial stability of the previous period has a positive impact on the current financial stability of commercial banks. When a bank has exhibited a high level of stability in the past, it often reflects effective risk management policies, a safe asset portfolio, and a sound financial structure, which helps the bank maintain or improve stability in the subsequent period. The study addressed the endogeneity related to Z_score_1 using the 2SLS method with a second-lagged instrumental variable Z_score_2, ensuring that the research results are not biased due to endogeneity issues. This allows for accurate conclusions regarding the relationship between bank stability and factors such as market competition and macroeconomic conditions.

4. Conclusions and Policy Implications

4.1. Conclusions

This study was conducted to analyze the impact of market competition macroeconomics on the financial stability of commercial banks in Asia. The research team used a panel dataset comprising 43,232 observations from 1,093 commercial banks in Asian countries during the period from Q1/2008 to Q1/2024. By applying 2SLS regression approach, the study addressed the endogeneity issue in the model and provided robust estimation results. The research findings indicate a positive relationship between the Lerner index and Z-score. In other words, market competition has a negative impact on bank stability, and this finding supports the competition-fragility view, suggesting that this theory can be applied to the banking market in the Asian region. The study also concludes that macroeconomic factors, including overheating economic growth and inflation, negatively affect bank stability. Additionally, the research results also reveal

the role of control variables in explaining the variation in the Z-score.

4.2. Policy Implications

First, the Government needs to implement risk management regulations that align with international standards: the Expected Credit Loss (ECL) model under IFRS 9 and Basel III to help businesses control non-performing loan ratios and manage risks more effectively. The government should issue a policy framework to guide the implementation of these standards, while also enhancing the quality of data from the National Credit Information Center (CIC) and regional areas. Additionally, the Government should improve the credit rating methodology, enhance the effectiveness of the internal audit system, strengthen monitoring capabilities, and improve human resources in the risk management system of commercial banks.

Second, maintaining liquidity reserves in line with Basel standards and the regulations of the State Bank is an essential requirement in the trend of deeper integration into the global economy. To implement Basel II, the State Bank has provided a roadmap for commercial banks. Accordingly, commercial banks need to continuously update and adapt to the roadmap set by the State Bank.

Third, banks need to tighten their credit granting processes to ensure the quality of loans and implement policies for managing non-performing loans. To ensure financial stability, banks should have a process in place for reviewing high-value loan applications, prioritizing those with loan insurance. In countries with Asset Management Companies (AMCs), also known as "bad banks," commercial banks can transfer their non-performing loan portfolios to them. Banks can also use Credit Default Swaps (CDS) as a tool to hedge against credit default risks, mitigate concentrated credit risk, diversify their loan portfolios, and actively manage their lending portfolios.

4.3. Limitations

However, this study has some limitations:

First, the study has not yet considered financial stability from the perspective of government institutions. Therefore, future research could explore the overall impact of institutional factors, market competition, and macroeconomic variables on bank stability.

Second, future studies could focus on different national contexts and explore the impact of global instability events and geopolitical risks on bank stability. Additionally, the importance of banking regulations and supervision during times of policy instability is also a potential research direction. Furthermore, supplementary studies could examine the role of leadership regulation and governance rules and strategies in relation to bank stability.

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RESEARCH ON FACTORS AFFECTING START-UP ACTIVITIES OF UNIVERSITY STUDENTS IN HANOI CITY

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Abstract: The research aimed to identify factors affecting the start-up activities of students at universities in Hanoi City, and to propose recommendations to enhance the success rate of student start-ups. Data was collected from 311 students from various universities in Hanoi. Using SPSS software for data analysis, the study identified seven factors influencing student start-ups: Time, Finance, Knowledge and Skills, Support, Attitudes and Business Ideas, Networks, and Competitive Market. The factor "Knowledge and Skills" had the greatest impact. These findings provide a basis for recommendations to improve the entrepreneurial activities of Vietnamese students.

Keywords: Hanoi, start-up activities, influencing factors, students

1. Introduction

Forming a new business is a long and challenging journey. The first step is initiating start-up activities. Currently, student start-ups are very active, though the failure rate is also significant. Therefore, understanding and evaluating the factors affecting start-up activities is crucial. Previous studies have mostly focused on factors influencing students' intentions to start businesses, with few examining the factors affecting actual start-up activities. This research aims to fill this gap by evaluating the factors influencing university students' start-up activities in Hanoi City. The results will provide a comprehensive understanding of the factors truly affecting student start-ups.

Apart from the abstract, introduction, and references, the paper is structured into the following main sections: theoretical framework and influencing factors, research methodology and model, research results, and finally, conclusions and recommendations.

2. Theoretical Framework and Influencing Factors

2.1. Theoretical Framework

The concept of entrepreneurship has evolved over time. Globally, the term has long existed with the French word “entrepreneur.” In the late 17th century, economist Richard Cantillon defined an entrepreneur as one who makes decisions about acquiring and using resources while taking on risks. Stevenson [1] further clarified entrepreneurship as the process of self-employment, where individuals identify and pursue opportunities in the economy.

Entrepreneurial activities are the events, behaviors, and achievements of individuals leading to the creation of new businesses as defined by Audretsch [2]. The U.S. uses a new index to measure entrepreneurial activity, integrating timely, high-quality business information into a composite index. This index captures business activity across all sectors and is based on a nationally representative sample and all employer businesses in the U.S. E.J. Reedy [3].

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The Contingency Theory emphasizes the role and influence of situational factors on business activities Lawrence [4]. This theory suggests that entrepreneurial activities are organized depending on the nature of the business education environment and the attitudes of individuals involved. Many researchers have used this theory to examine the factors affecting entrepreneurial activities.

The Resource Dependence Theory focuses on the role of resources in creating competitive advantages and success for organizations, including start-ups. Successful entrepreneurial activities depend on various factors such as capital, knowledge, manpower, and brand (Resource Dependence Theory).

2.2. Influencing Factors

2.2.1. Time

Time management is crucial for university students. Claessens [5], highlighted that individual time management affects academic outcomes. Tesser [6] noted that students' academic results are influenced by their time management skills. Zarbakhsh [7], found a positive relationship between time management and business activities. Effective time management is essential for balancing studies and entrepreneurial activities Nigussie [8].

Hypothesis H1: Time positively affects student start-up activities.

2.2.2. Finance

Financial resources play a vital role in boosting entrepreneurial effectiveness Trinh [9]. Shaw [10] divided financial resources into internal and external sources, emphasizing the necessity of external funding for start-ups. Ronald [11], indicated that the availability of financial resources influences innovation, as access to capital enables entrepreneurs to develop products before selling them.

Hypothesis H2: Finance positively affects student start-up activities.

2.2.3. Knowledge and Skills

Entrepreneurial knowledge encompasses concepts, skills, and mindsets required by business owners Anderson [12]. Chen [13] defined business skills as activities or know-how to establish and operate a successful business. Entrepreneurs need various skills to develop specific competencies for business management Phelan [14].

Hypothesis H3: Knowledge and skills positively affect student start-up activities.

2.2.4. Support

Support from family provides significant advantages for young entrepreneurs (Linda F.Edelman [15] and Oyekan [16]). University support also critically impacts student start-up activities Lee [17]. Additionally, government policies positively affect student start-ups, though current policies lack specific support for start-up businesses Nga [18].

Hypothesis H4: Support positively affects student start-up activities.

2.2.5. Attitudes and Business Ideas

Attitudes are positive or negative evaluations of a planned behavior Ajzen [19]. This factor positively affects student start-ups Bui Nhat Vuong [20]. Entrepreneurial activities are driven by clear business ideas and enthusiasm towards starting a business, as well as relevant experience Lee [17].

Hypothesis H5: Attitudes and business ideas positively affect student start-up activities.

2.2.6. Networks

Networks involve knowing the "right people" and creating connections to achieve personal and organizational goals Powell [21]. Networks are dynamic structures of social relationships that provide access to resources such as capital, information, advice, moral

support, and endorsements Coleman [22]. Entrepreneurs should leverage their networks to access resources, and building relationships is crucial to mitigate the high failure risk of start-ups Zhang [23].

Hypothesis H6: Networks positively affect student start-up activities.

2.2.7. Competitive Market

A competitive market is a structure where no single consumer or producer can influence the market. The level of market competition determines the likelihood of cooperation between new market entrants and established companies Markovich [24]. Increased competition may lead to job losses and exacerbate economic recessions Maggi [25].

Hypothesis H7: Competitive market positively affects student start-up activities.

3. Research Methodology and Model

The research employed both qualitative and quantitative methods. Qualitative research involved collecting relevant domestic and international documents from the Internet and the press regarding factors affecting student start-up activities. Quantitative research surveyed students from Hanoi universities, using both random and non-random sampling to ensure valid responses.

The sample size was determined using Hair et al.'s (2006) formula, requiring a minimum of five times the number of variables in factor analysis: N=5*m. With 39 observed variables, the minimum sample size was 195. To increase reliability and account for invalid data, the survey collected 350 responses, of which 311 were valid. The data were analyzed using SPSS software, including Cronbach's Alpha reliability tests, Exploratory Factor Analysis (EFA), Pearson correlation analysis and regression analysis.

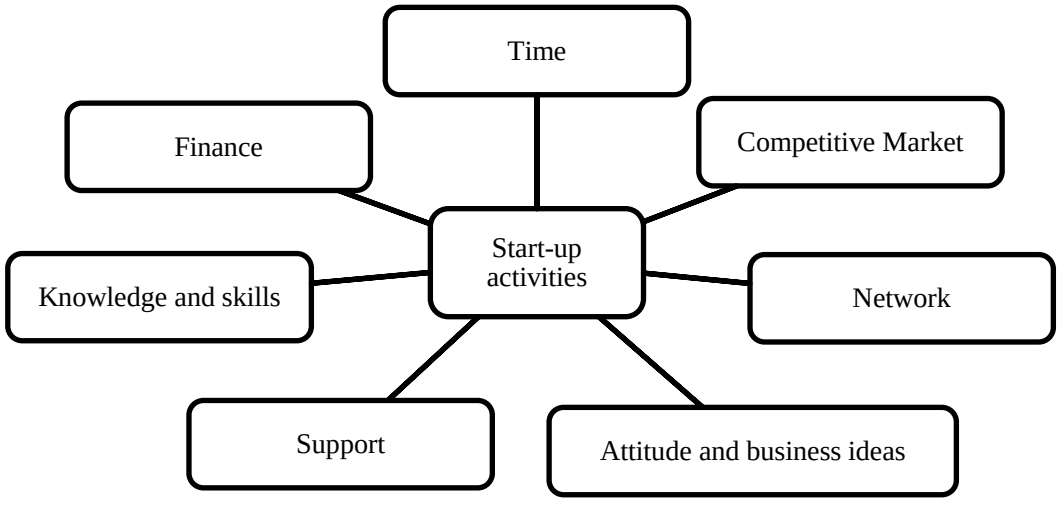

Image 1. Model of Study

4. Research Results

4.1. Reliability Testing

The scales were preliminarily screened using Cronbach's Alpha reliability testing. The results showed that all scales had Cronbach's Alpha coefficients greater than 0.6, and all items had total variable correlations greater than 0.3, except for items TG1, KTKN2, HT5, and TVY5.

Table 1. Cronbach's Alpha of variables in the scale measuring students' entrepreneurial activities

Observed variable	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
"Time" variable: Cronbach's Alpha =.871				
TG2	10.79	7.581	.721	.837
TG3	10.53	7.418	.756	.822
TG4	10.79	8.013	.711	.841
TG5	10.59	7.642	.712	.840
"Finance" variable: Cronbach's Alpha =.868				
TC1	14.37	12.318	.704	.837
TC2	14.10	12.142	.744	.827
TC3	14.34	12.915	.669	.846
TC4	14.14	12.027	.741	.828
TC5	14.17	13.008	.603	.862
"Knowledge and skills" variable: Cronbach's Alpha =.858				
KTKN1	12.41	5.366	.680	.828
KTKN3	12.42	5.380	.719	.813
KTKN4	12.45	5.093	.745	.801
KTKN5	12.54	5.385	.666	.834
"Support" variable: Cronbach's Alpha =.860				
HT1	10.80	7.461	.693	.827
HT2	10.75	7.343	.749	.804
HT3	10.93	7.288	.754	.802
HT4	11.05	7.411	.636	.853
"Attitude and business ideas" variable: Cronbach's Alpha =.825				
TVY1	10.66	7.123	.699	.757
TVY2	10.86	7.571	.648	.781
TVY3	10.68	7.206	.679	.766
TVY4	10.70	7.726	.576	.813
"Network" variable: Cronbach's Alpha =.804				
ML1	16.06	7.254	.564	.774
ML2	16.04	7.211	.596	.763
ML3	16.08	7.420	.595	.764
ML4	16.10	7.558	.584	.767
ML5	16,05	7.430	.602	.762
"Competitive market" variable: Cronbach's Alpha =.854				
TTCT1	14.62	13.223	.669	.824
TTCT2	14.30	13.346	.707	.814
TTCT3	14.49	13.889	.692	.819
TTCT4	14.36	13.490	.688	.819
TTCT5	14.41	14.152	.587	.845
"Start-up activities" variable: Cronbach's Alpha =.675				
HĐKN1	10.93	5.040	.421	.631
HĐKN2	10.80	4.289	.598	.509

HĐKN3	10.84	4.800	.460	.606
HĐKN4	10.87	5.160	.357	.672
HĐKN5	10.93	5.040	.421	.631

(Source: Processed results of SPSS 22.0)

4.2. Exploratory Factor Analysis (EFA)

Table 2. The results of the KMO and Bartlett's test for the independent variables.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**.805**
Barlett's Test of Sphericity	Approx. Chi - Square	4320.900
	Df	465
	Sig.	.000

(Source: Processed results of SPSS 22.0)

After removing unsuitable variables, the scales with reliable Cronbach's Alpha coefficients were used in EFA with the "Principal Component" extraction method and Varimax rotation. The KMO coefficient was 0.805 (> 0.5), and Bartlett's test was statistically significant, indicating that the data were suitable for factor analysis. The total variance explained was 66.735% (>50%).

4.3. Regression Analysis

To identify an appropriate regression model for the study, the authors sequentially tested the linear relationships between the dependent variable HĐKN and 7 independent variables.

Table 3 shows that an adjusted R-squared of 0.692 means that 69.2% of the variation in HĐKN is explained by the variation in the 7 independent variables: TG, TC, KTKN, HT, TVY, ML, TTCT.

Table 3. Analysis of regression coefficients

Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Durbin-Waston**
1	.835[a]	.697	.692	.25402	1.266
a. Predictors: (Constant), TTCT, KTKN, TVY, TC, HT, TG, ML					
b. Dependtent Variable: HĐKN					
F = 133.593 Sig. =.000					

(Source: Processed results of SPSS 22.0)

The unstandardized regression equation is:

HĐKN = 2,477 + 0,202*TG + 0,150*TC + 0,480*KTKN + 0,091*HT + 0,224*TVY + 0,207*ML + 0,104*TTCT + ε

The standardized regression equation is:

HĐKN = 0,222*TG + 0,170*TC + 0,560*KTKN + 0,115*HT + 0,274*TVY + 0,194*ML + 0,095*TTCT + ε

According to the results from Table 4, all independent variables in the model have t-test Sig values less than 0.05. Therefore, these variables are statistically significant and affect the dependent variable HĐKN. As a result, hypotheses H1, H2, H3, H4, H5, H6, and H7 are accepted.

Bảng 4. Coefficients Table

Model	**Unstandardized**	**Standardized**	**t**	**Sig.**	**Collinearity**

		Coefficients		Coefficients			Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.477	.431		5.745	.000		
	TG	.202	.054	.222	3.152	.000	.961	1.040
	TC	.150	.049	.170	1.863	.003	.959	1.043
	KTKN	.480	.050	.560	9.550	.000	.797	1.255
	HT	.091	.045	.115	2.021	.044	.980	1.021
	TVY	.224	.047	.274	7.404	.000	.985	1.015
	ML	.207	.062	.194	3.541	.001	.785	1.275
	TTCT	.104	.034	.095	3.077	.000	.984	1.016

a. Depentdent Variable: HĐKN

(Source: Processed results of SPSS 22.0)

5. Conclusion and Management Implications

Based on the theoretical overview, a research model was developed for this study. This model was tested with a sample of 311 students from universities in Hanoi. With the obtained results, this study has practical contributions as follows:

Regarding the scales used, the results show that all the scales used in the research are reliable (Cronbach's Alpha > 0.6) and can be used for other studies.

Regarding the factors affecting the entrepreneurial activities of university students in Hanoi, the study identified seven factors that impact entrepreneurial activities, arranged in increasing order of influence: TTCT (β = 0.095) < HT (β = 0.115) < TC (β = 0.170) < ML (β = 0.194) < TG (β = 0.222) < TVY (β = 0.274) < KTKN (β = 0.560). Among these, the factor "Equipping knowledge and skills" (KTKN) has the strongest impact on students' entrepreneurial activities.

To increase the entrepreneurial activities of university students in Hanoi, the authors proposed several managerial implications as follows:

The research results show that "Equipping knowledge and skills" is the most influential factor in entrepreneurial activities among the seven factors studied. To enhance the entrepreneurial activities of university students in Hanoi, through the factor "Equipping knowledge and skills," the authors propose several managerial implications: Universities should integrate entrepreneurial knowledge into the main curriculum so that students can get closer to entrepreneurial activities or organize courses aimed at soft skills to promote creativity, readiness to face challenges, time management skills, negotiation, presentation, and problem-solving skills for students. Students themselves should proactively study and equip themselves with knowledge and skills related to entrepreneurial activities.

The research results show that "Attitude and business ideas" is the second most influential factor in entrepreneurial activities among the seven factors studied. To increase the entrepreneurial activities of university students in Hanoi, through the factor "Attitude and business ideas," the authors propose several managerial implications: To become entrepreneurs, students must have qualities suitable for challenging business environments, such as being sharp and adventurous. Those with a persistent attitude, liking creativity, and breakthrough ideas can easily adapt to the business environment and are more inclined to start a business. Therefore, each student needs to have a serious, persistent attitude and be proactive in learning to develop business ideas.

The research results show that "Time" is the third most influential factor in entrepreneurial activities among the seven factors studied. To increase the entrepreneurial activities of university students in Hanoi, through the factor "Time," the authors propose several managerial implications: Students should know how to use online platforms to manage their time more effectively, create specific schedules for each implementation step, and reasonably balance the time between studying and entrepreneurial activities to ensure both are highly effective.

The research results show that "Network" is the fourth most influential factor in entrepreneurial activities among the seven factors studied. To increase the entrepreneurial activities of university students in Hanoi, through the factor "Network," the authors propose several managerial implications: Universities should support partner networks to facilitate students' entrepreneurial activities or establish startup clubs to connect students interested in entrepreneurship. Students themselves need to regularly participate in seminars and extracurricular events connecting the entrepreneurial community to develop networking opportunities.

The research results show that "Finance" is the fifth most influential factor in entrepreneurial activities among the seven factors studied. To increase the entrepreneurial activities of university students in Hanoi, through the factor "Finance," the authors propose several managerial implications: The government should improve the legal environment, such as facilitating administrative procedures for student startups or having preferential policies such as corporate income tax exemption or reduction in the first 3-5 years of startup. Additionally, financial institutions should pay more attention to new projects and actively support the feasible entrepreneurial activities of students.

The research results show that "Support" is the sixth most influential factor in entrepreneurial activities among the seven factors studied. To increase the entrepreneurial activities of university students in Hanoi, through the factor "Support," the authors propose several managerial implications: Family and friends need to help, support, and encourage students because they influence the psychology and behavior of individuals in deciding whether to start a business. Besides, universities should organize meetings with entrepreneurs who have risen from startups to create opportunities for students to meet, talk, and learn from experiences. This can promote students' understanding of entrepreneurs, increasing their aspirations to become entrepreneurs.

The research results show that "Competitive market" is the least influential factor in entrepreneurial activities among the seven factors studied. To increase the entrepreneurial activities of university students in Hanoi, through the factor "Competitive market," the authors propose several managerial implications: Students themselves need to regularly study the market to understand customer needs, competitors, and development opportunities. The government should also provide financial resources, material support, and consulting assistance for students engaged in business activities, helping them to develop their entrepreneurial activities in the market safely and effectively.

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CORPORATE GOVERNANCE'S ROLE IN COMBATING EARNINGS MANIPULATION: LEVERAGING CYBER LAWS, FORENSIC ACCOUNTING, AND EMERGING TECHNOLOGIES FOR PREVENTION AND EARLY DETECTION

Nguyễn Hữu Trinh[1]

Abstract: This paper aims to examine the impact of Corporate Governance on Earnings Manipulation, with Cyber Laws, Forensic Accounting Practices, and Emerging Technologies serving as moderating factors. This study, utilizing data from 400 high-tech industry professionals in China, validates the overall research hypothesis through PLS-SEM, demonstrating that strict governance procedures effectively mitigate earnings manipulation. Cyber laws and emerging technologies enhance financial regulation by augmenting oversight and reducing the potential for manipulation, while forensic accounting provides supplementary techniques for fraud detection and compliance. The study advocates for the integration of regulatory and compliance mechanisms, technology, and forensic processes into organizational compliance systems to improve accountability and transparency in financial reporting. Thus, the policy options may include strengthening cybersecurity regulations, advancing technological capabilities, and incorporating forensic accounting into the organizational management framework.

Keywords: *Corporate governance, Earning manipulation, Cyber laws, Forensic accounting, Emerging technologies*

1. Introduction

The current global developments in the corporate world have taken a new dimension with the technological revolution, globalization, and new institutional changes towards corporate governance and financial reporting (Claessens & Yurtoglu, 2013). Earnings manipulation defined as the action of falsifying the reports on an organization's earnings in a bid to mislead stakeholders has become rampant. It is considered one of the main vices that affect sound financial systems and lead to a downfall of the reputation of the organizations (Dechow et al., 2010). They also erode the true picture of organizations and consequently affect the stability of investors, negatively affecting the overall efficiency of the markets and the broader economy (Healy & Wahlen, 1999). Accordingly, sound corporate governance structures are gradually being regarded as vital controls against fraud and exercises in promoting transparency, accountability, and integrity in preparing and presenting corporal financial statements (Agrawal & Chadha, 2005).

Corporate governance, described as the mechanisms that control and monitor a business entity's management and support executive operations, significantly addresses the issue of financial malpractice (OECD, 2015). Governance means that ethical standards, accountability, and compliance are improved in organizations, which are key to the efficient running of the organizations. Thus, amid the global focus on governance reforms, more or less frequent examples of earnings manipulations are detected, indicating deficiencies in the existing systems and generating important questions about

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the efficiency of the corporate governance frameworks. The high prevalence of fraud in the context of recurring financial scandals has raised the stakes for better means of identifying, preventing, and responding to earnings management, particularly in the burgeoning technology and innovation-driven sectors (Kusnadi, 2011).

High-technology industries are some of the most vulnerable, with increased risks of earnings manipulation because of factors such as legends of technological modernization, high valuations anticipated, and intricate operations. This sector has been under pressure to deliver strong financial results to the market from investors who are vulnerable and can inflate their earnings to retain stock price and investor confidence (Lev, 2003). Therefore, the high-tech industry that plays an important role in economic development and modernization needs strong methods of governance and practical tools to minimize these risks.

Despite all the efforts to implement corporate governance mechanisms, earnings manipulation remains a problem, especially in high-tech industries. As stated before, corporate governance seeks to prevent the occurrences of ethical misconduct and financial fraud, but its measures are hampered by factors such as weak regulatory compliance, poor technology adoption, and weak forensic accounting (Braun & Mueller, 2024; Efunniyi et al., 2024). However, these changes are insufficient in that they not only expand opportunities for manipulation due to the fast development of technology and plethora of new IT platforms but also make the effort to regulate these industries even more challenging.

According to the research problem, this study's goal is to examine how corporate governance influences earnings management to understand how financial statements are affected. Second, it investigates how cyber laws can improve company governance by preventing earning manipulations. Thirdly, this study analyzes the use of forensic accounting and other emerging technologies as moderating factors to assess the governance structures' ability to address financial malpractice and improve detection and prevention. The study hypothesizes that corporate governance and earnings manipulation are inversely related, but cyber laws, forensic accounting, and developing technology may influence this association.

This research aims to fill these gaps and improve governance systems. Although prior works (Abbas & Abbas, 2021; Banerjee et al., 2024; Biswas et al., 2022; Han & Wu, 2023; Thoppan et al., 2021; Velte, 2023) review the relationship between CG and FR, moderating variables, especially in high-tech industries, are neglected. Since this study addressed cyber legislation, forensic accounting, and technologies, its findings provide a holistic view of governance efficacy. This research also suggests ways for politicians, regulators, and industry practitioners to improve corporate governance and financial systems (Brown et al., 2011).

This study focuses on Chinese high-tech industries only since China is a global leader in technology and digitalization. China's corporate governance and earning manipulation are relevant since its economy is continually changing and becoming more difficult and turbulent (Wang et al., 2023). The report combines poll data from 400 subject matter experts to assess governance structures and offer improvements. This context-specific approach makes the conclusions more applicable to the investigated countries and gives other countries and sectors with similar difficulties experience.

Cyber rules implemented as a moderating factor show how enforcement laws are adapting to new-age interactions. Cyber laws regulate and safeguard cyber security, and data protection is crucial to detecting and reporting financial fraud (Brenner, 2012). Laws

prohibit or control digital transactions, privacy, and information exchange, giving corporate governance frameworks. This research tries to determine how effective cyber laws increase the negative link between corporate governance and earning manipulation to help evaluate regulatory measures to combat financial crime.

The forensic accounting, which detects, investigates, and prevents fraud. Forensic accounting helps to evaluate and avoid financial reporting system fraud and procedure misuse (Bhasin, 2013). Therefore, forensic accountants may actively identify manipulations and preserve ethical standards using their accounting and detective skills. This article addresses this gap by investigating how forensic accounting methods mediate the relationship between corporate governance and earning manipulation to establish effective governance solutions.

Artificial intelligence, blockchain, and data analytics can address earnings distortions. These technologies provide real-time tracking, analysis, and identification of fraud, boosting the organization's credibility to detect and prevent manipulation (Radziwill, 2018). This paper's analysis of new technologies' moderating influence shows that they improve governance frameworks and transparency. The findings urge enterprises to use innovation to improve financial integrity.

Thus, this research seeks to uncover a key issue in corporate governance and financial reporting and elements that significantly impact governance in high-tech firms. This study uses moderating roles of cyber laws, forensic accounting, and emerging technologies to combat earnings manipulation and improve financial systems. Policymakers, regulators, and industry practitioners may improve governance processes and promote openness and accountability with the paper's recommendations. This research only examined high-tech sectors in China to address the global dilemma, but it has important implications for other regions and industries to improve digital governance models.

2. Literature Review

This study focuses on the correlation between corporate governance and earnings manipulation, which has received much attention in financial and managerial studies. Therefore, synthesizing existing literature, this review focuses on corporate governance, earnings manipulation, the moderating effects of cyber laws, forensic accounting, and emerging technologies. Thus, it supports the study's hypotheses and objectives and offers a strong theoretical framework for the case analysis.

2.1 Corporate Governance and Earnings Manipulation

Corporate governance is an important mechanism that provides structure in organizations and prevents organizations from engaging in unethical behaviors like earnings manipulation. Sehrawat et al. (2019) have established a negative correlation between the level of corporate governance and the probability of earnings manipulation. For instance, Salehi et al. (2023) pointed out that higher levels of governance, board, and internal control mechanisms decrease the likelihood of managerial self-serving behavior and create an environment in which manipulation of financial statements is less likely to occur. Similarly, Elmashtawy et al. (2024) expounded on the contribution of audit committees in improving the quality of financial reports to eliminate manipulation risks.

Corporate governance as a solution to agency costs reduces conflicts between managers and shareholders by ensuring that executives and shareholders have the same objectives (Meckling & Jensen, 1976). Nonetheless, Unsurprisingly, governance

structures are not equally efficient in all industries or countries. García-Sánchez et al. (2020) stated that contextual factors like regulation and culture may affect governance efficiency. Moreover, (Wahid, 2019) also focused on the role of Gender diversity and board expertise in enhancing oversight and restraining the process of earnings manipulation.

However, these results show that continued financial scandals imply that current governance models are only partially effective. As elucidated by Salehi et al. (2023), Busirin et al. (2015), Herawaty and Solihah (2019), and Almasarwah et al. (2024) on the need to reinforce the reforms, great strides towards enhancing and implementing regulatory enforcement and the use of new and better tools to tackle emerging techniques of fraud in financial crimes have been made. These perspectives serve as a positive starting point in providing a negative hypothesized relationship between corporate governance and earning manipulation, as explained in H1.

2.2 The Moderating Role of Cyber Laws

Cyber laws refer to regulations and policies that govern cyberspace and, more specifically, how corporations minimize risks relating to cyber threats and mishaps. These laws provide legal regulations for the exchange and conduct of digital business, data protection, and fraud prevention, thus reducing the chances of earnings manipulation. According to Hayes (2020), sound cyber laws greatly enhance governance measures, especially in organizations dependent on online systems.

The threats in the virtual world are evolving, so the legislation must be the same. In their work Cortez and Dekker (2022) explain that inadequate or non-existent or weak cyber laws are ineffective in preventing manipulation strategies, suggesting that the problem's resolution requires constant legislation improvements. Moreover, Dashkevich et al. (2024) provided evidence that the laws relating to innovative financial reporting increase corporate disclosure and accountability, thus diminishing manipulation risks.

According to the research conducted by Shalhoub and Al Qasimi (2010) as well as Wang et al. (2023), the problems of implementing virtual legislation in emerging economies are manifold - from a lack of funds to insufficient regulation. Adopting technology-enabled compliance instruments like blockchain-based systems has revealed the potential to meet these hurdles (Zhang & Guan, 2023).

These findings support the development of the hypothesis that strong cyber laws strengthen the negative relationship between corporate governance and earnings manipulation (H2).

2.3 The Moderating Role of Forensic Accounting

Forensic accounting is one of the most popular and important fields integrating accounting and investigative knowledge to fight financial fraud. Its incorporation into corporate governance systems improves firms' performance in detecting and countering issues with financial reporting. Bhasin (2013) observed that forensic accountants are instrumental in exposing earnings manipulation in dynamic financial structures.

Several pieces of literature have also established a positive relationship between using forensic accounting practices and preventing financial fraud. For instance, Salih et al. (2022) observed that companies that hired forensic accountants in their organizations recorded low fraud cases. Similarly, Njanike et al. (2009)) and Nandini and Ajay (2021) highlighted the value of forensic audit training and applications in enhancing fraud-fighting instruments. Its integration into corporate governance frameworks enhances the

ability of organizations to identify and address irregularities in financial reporting. Bhasin (2013) forensic accountants play a crucial role in uncovering earnings manipulation, particularly in complex financial environments.

Several studies have highlighted the efficacy of forensic accounting practices in mitigating financial misconduct. For example, Salih et al. (2022) found that organizations employing forensic accounting teams experienced a significant reduction in financial irregularities. Similarly, studies by Njanike et al. (2009) and Nandini and Ajay (2021) emphasized the importance of forensic audit training and tools in strengthening fraud detection capabilities.

However, forensic accounting is not well implemented across organizations. Umara et al., 2016 also stated that they face many challenges due to resource constraints due to the unavailability of a specialized workforce. Furthermore, a recent study by Burnett et al. (2024) underlined the necessity of improved interaction between forensic accountants and corresponding bodies. These insights provide evidence for the proposed hypothesis that forensic accountancy as a moderator, enhance the efficiency of governance which reduce the earning manipulation (H3).

2.4 The Moderating Role of Emerging Technologies

Technological advancement has changed corporate governance and financial reporting regimes, including artificial intelligence (AI), blockchain, and data analytics. These technologies provide new monitoring approaches for identifying and avoiding earnings manipulation. For example, Daraojimba et al. (2023) demonstrated that the proposed AI methods improve the accuracy of detecting anomalous patterns in financial data and minimize the risks of their manipulation.

Various researchers have focused on blockchain regulatory technology to enhance governance structures. Dashkevich et al. (2024) proved that controlling mechanisms in the context of blockchain systems extended the quality of audit trails and accountability to reduce incidents of economic fraud. Further, studying the work of Wang et al. (2023) revealed that smart contracts can integrate with compliance and monitoring by automating them.

Data analytics as a part of governance practices has also been reported to have been a potential area. Moreover, Hashimzade et al. (2016) and Dbouk and Zaarour (2017) highlighted predictive analytics' work to detect some manipulation patterns and prevention. However, the use of these technologies is not without challenges. Wu (2024) states that high implementation costs and organizational resistance remain major reasons governing frameworks integrate advanced technologies.

Innovation is especially valuable in technology-intensive sectors where conventional corporate management styles are inadequate. Ayu Paramitha and Fadjarenie (2023)) and Kipilimba (2024) call for a technology approach to financial reporting challenges in these industries. These results have implications for H4 that suggest that emerging technologies enhance corporate governance which may reduce earnings manipulation motives.

3. Data and Methodology

This article attempts to connect corporate governance, profit manipulation, and moderating factors such as cyberlaw, forensic accounting, and emerging technologies. A standardized questionnaire was adopted from the existing literature to gather quantitative data from 400 high-tech industrial experts in China. The methodological framework's selection enables rigorous investigation of posited relationships via Partial Least Squares

Structural Equation Modeling (PLS-SEM), which is appropriate for the models' complexity and sample size.

3.1 Data Collection

This study used a comprehensive questionnaire with five sections such as earnings manipulation, cyber legislation, forensic accounting methods, technology, organizational culture, and corporate governance. Constructs are adopted from reputable sources including Dechow et al. (2010), (Pandey et al., 2020), and Singleton and Singleton (2010). After completing the questionnaires, participants were asked to rate their agreement with each item on a Likert Scale ranging from Strongly Disagree=1 to Strongly Agree=5. This method collected accurate views based on participants' predicted experiences.

High-tech workers including forensic accountants, compliance officers, auditors, and IT specialists were targeted. Purposive sampling selected applicants with considerable corporate governance and financial reporting experience. According to Hair Jr et al. (2021), 400 respondents were enough for the final PLS-SEM study.

3.2 Instrument and Analytical Approach

The questionnaire was constructed using constructs available in the literature (Dechow et al., 2010; Pandey et al., 2020; Singleton & Singleton, 2010), and its reliability and validity were tested. Cronbach's alpha coefficients were used to assess the internal consistency of the four measures, which all above 0.7. Convergent and discriminant validity were also examined using the AVE and Fornell-Larcker criteria. The questionnaire captured key dimensions of the variables such as regulations and mechanisms that can mitigate earnings management, the relative efficiency of cyber laws in protecting firms' financial information, methods of detecting fraud with the help of forensic tools, trends in the application of innovative technologies such as blockchain and AI, and practical aspects of ethical and transparent corporate governance.

PLS-SEM was chosen as the major analytic tool because to its suitability for dealing with models with multiple-formatted constructs and moderation effects. Using SmartPLS, the measurement model was further tested for internal consistency, reliability, and construct validity, with factorial loadings greater than 0. 7. Path coefficients, t-values, and p-values were employed in this structural model testing, along with hypothesized moderations applied to interaction terms, R-squared, and effect size.

3.4 Ethical Considerations

This study observed high ethical considerations during data collection to prevent the researcher from recognizing the participants. Respondents in the study were first asked for their consent after being informed of the purpose of the study and that responses would be used solely for research purposes.

4. Results and Discussion

This section is elucidative of the analysis of the results from the measurement model and its implications in line with earlier literature. The findings confirm the internal consistency and concurrent validity of the constructs; namely, Corporate Governance, Earnings Manipulation, Cyber Laws, Techniques of Forensic Accounting, and Emerging Technologies. The study gives backing to the hypothesized relationships while emphasizing the importance of cyber laws, forensic accounting as well as emergent technologies to strengthen governance frameworks to curb the vice of earnings manipulation.

Table 1: Convergent validity

Constructs	items	Loading	Alpha	CR	AVE
Corporate Governance (CG)	CG1	0.847	0.916	0.937	0.749
	CG2	0.857			
	CG3	0.859			
	CG4	0.886			
	CG5	0.878			
	CL1	0.932			
Cyber Laws (CL)	CL2	0.929	0.961	0.97	0.865
	CL3	0.933			
	CL4	0.94			
	CL5	0.915			
	PEM1	0.849			
Earning Manipulation	PEM2	0.81	0.908	0.932	0.732
	PEM3	0.842			
	PEM4	0.886			
	PEM5	0.888			
	TA1	0.865			
Emerging Technology	TA2	0.833	0.884	0.915	0.684
	TA3	0.805			
	TA4	0.777			
	TA5	0.852			
Forensic Accounting Practices	FAP1	0.815	0.879	0.911	0.673
	FAP2	0.772			
	FAP3	0.788			
	FAP4	0.924			
	FAP5	0.793			

Table 1 confirms the measurement model and shows that all constructs have very high levels of convergent validity. The high values of loading obtained for all the constructs imply Composite Reliability (CR) and Average Variance Extracted (AVE) revealing that the current research model is both reliable and valid. These formed a solid empirical ground for examining the connections between corporate governance, earnings manipulation, and the mediating roles of cyber laws, forensic accountancy, and technologies.

The reliability and validity of the Corporate Governance questionnaire are quite robust with Cronbec's alpha (0.916) and AVE (0.749) above the acceptable levels. These findings are consistent with prior work, for instance, Velte (2023) stresses the significance of aspects such as board independence and transparency to curtail earnings management. The high loading values emerging from all the items offer substantive evidence that the proposed construct accurately captures all the important aspects of corporate governance, which in turn supports the negative association between earnings manipulation.

Likewise, high reliability is obtained for the Cyber Laws which measure has further confirmed the construct reliability, with Cronbach's Alpha with (0.961) and AVE with (0.865). Such findings support this study because other studies like Brenner (2012) and Hayes (2020) agree that regulatory measures play a crucial role in avoiding such fraud. The high factor loadings of indicators show the mediating role of cyber laws in the impact

of the level of governance on earnings manipulation. This goes to support the notion of regulation and more so compliance since some business disciplines heavily rely on the digital arena.

The construct for Earnings Manipulation has a reliability of 0.876 and Fornell's estimates of AVE (0.732) indicate that the items are valid since they reflect the various perspectives of earnings misreporting. These findings are in support of the work of Dechow et al. (2010). The results also support the hypothesis that there is an inverse relationship between earnings manipulation and sound governance structures.

Though the average variance extracted value of Emerging Technologies is slightly lower than that of Information Technology, the reliability of the scale is very satisfactory (Cronbach's Alpha = 0.884) and the convergent validity also proves worthy (AVE = 0.684). These findings are consistent with existing literature, including (Wu, 2024), which shows that, while relatively new technologies like blockchain or artificial intelligence may harbor significant improvement and innovative benefits, they may also pose issues, for instance, high implementation costs and organization opposition to their integration into governance architectures. Nevertheless, the study provides evidence that the application of emergent technologies is useful in moderating the transparency of financial reports.

The current study reveals high reliability and convergent validity of Forensic Accounting Practices with total variance extracted (AVE= 0.673) confirming the adequacy of the construct to capture the dimensions under study. This supports the work of Bhasin (2013) and Njanike et al. (2009) who pointed out that forensic accounting is useful in cases of fraud. The high loadings for items like the use of forensic tools, and the presence of the forensic accounting team provide a solid backing to the proposed construct of moderating the effect of governance on earnings manipulation.

Consequently, it can be stated that all the hypothesized relationships are supported to a great extent, and all of the measured constructs for their reliability and validity are highly appreciable. The result supports and extends previous research, which shows that corporate governance hurts earnings manipulation, and this relationship is conditioned by cyber laws, forensic accounting, and emergent technologies. In support of the theoretical framework set out above, the findings of the study underscore the importance of multi-faceted initiatives to improve corporate governance by appealing to both legal and technological angles. This paper presents a holistic framework that adds to the current literature and practices for enhancing financial reporting credibility, particularly in technologies-inclined organizations where conventional corporate governance control may not suffice.

Table 2: Fornell Larcker

	CG	CL	EM	ET	FA
Corporate Governance	0.865				
Cyber Laws	0.424	0.93			
Earning Manipulation (PEM)	0.399	0.396	0.855		
Emerging Technology (ET)	0.436	0.481	0.485	0.827	
Forensic Accounting (FAP)	-0.109	-0.14	-0.155	-0.062	0.82

The tests of discriminant validity in Table 2 also reveal necessary and sufficient conditions for discriminant validity based on Fornell and Larcker (1981) criterion which supports that all constructs are methodologically different from each other. The values along the diagonal in the table, being the AVE estimates of the individual constructs, are higher than the values in the columns and rows which signify the inter-construct

correlations; hence, the Fornell-Larcker condition for discriminant validity is achieved. The results presented here address the one-dimensionality of each construct and ensure the reliability of the measurement model, as well as strengthening the hypothesized relationships in this study.

Corporate governance reveals a discriminant validity, or in other words, confirms that the percentage of AVE (0.865) is higher than the intersection of the construct with the other ones. The relationship with Earnings Manipulation is moderately negative (Pearson's r = - 0.399) which supports Hypothesis H1 that sound governance structures protect against earnings manipulation. These results support the literature, based on studies like Velte (2023) that stress the use of governance structures that enhance the transparency and ethical tone regarding reporting of entity finances.

Cyber Laws show a very good level of discriminant validity where the square root of AVE (0.93) is higher than all the construct correlations. This moderate correlation with Corporate Governance is found to be 0.424, which shows how important the regulations in ensuring governance effectiveness. When Cyber Laws are strong the correlation between Cyber Laws and Earnings Manipulation (-0.396) is more conducive to rejecting Hypothesis H1 Thus, providing support for Hypothesis H2. Such findings are supported by Brenner (2012) and Hayes (2020) who argue that legal factors affect the reduction of fraud in digital financial systems.

The AVE of the Earn Manipulation is 0.855 which is larger than all other figures and proves that Earning Manipulation is a distinct construct. The moderate positive correlations with Corporate Governance being 0.399 and Cyber Laws being 0.396 hence support the impression that both Governance mechanisms and Regulatory frameworks have vital roles to play in minimizing the levels of financial mal- reporting. These findings support the presence of the literature, including that of Dechow et al. (2010) to advance the understanding of the relationship between earnings quality as well as reporting credibility.

Convergent validity of Emerging Technology is also established because the value of the square root of AVE (0.827) is higher than the values of the cross-loadings of the construct. Consistent with H4, the positive significant link between Corporate Governance (0.436) and Earnings Manipulation (0.485) sustains its position as a moderating variable. These findings corroborate Wu (2024) and Tapscott and Tapscott (2016) who stress the opportunities for using AI, blockchain, and data analytics to improve the work of governance models and eliminate the possibility of manipulation.

As it concerns distinctiveness, the estimate of the square root of AVE (0.82) is greater than the correlations with other constructs in the context of Forensic Accounting Practices. We also found that Corporate Governance experienced a negative correlation in forensic accounting (-0.109), while Earnings Manipulation had an even stronger negative correlation (-0.155), thus supporting H3. These findings support the arguments of Bhasin (2013) and Njanike et al. (2009) on the importance of forensic auditing, concerning identification and prevention of fraud.

Altogether, the Fornell-Larcker Criterion analysis indicates the discriminant validity of the constructs and gives empirical evidence of the hypothesized links. The study establishes crucial insights into the prospects of governance, regulatory structures, forensic accounting, and computing technology in curbing earnings manipulation consistent with theoretical propositions in the literature. These findings further support

the need for a multi-pronged approach by governments to ensure that corporate governance compliance is enforced rigorously - via regulation and legislation and implemented technologically and via specialized forensic financial reporting.

Table 3: Cross-loadings

	CG	CL	EM	ET	FA
CG1	0.847	0.351	0.326	0.32	-0.094
CG2	0.857	0.358	0.317	0.385	-0.092
CG3	0.859	0.349	0.306	0.359	-0.099
CG4	0.886	0.377	0.358	0.407	-0.097
CG5	0.878	0.394	0.402	0.406	-0.091
CL1	0.387	0.932	0.359	0.45	-0.148
CL2	0.392	0.929	0.36	0.447	-0.151
CL3	0.421	0.933	0.352	0.452	-0.13
CL4	0.41	0.94	0.374	0.446	-0.123
CL5	0.366	0.915	0.394	0.442	-0.101
FAP1	-0.133	-0.16	-0.132	-0.061	0.815
FAP2	-0.053	-0.051	-0.094	-0.009	0.772
FAP3	-0.044	-0.123	-0.124	-0.074	0.788
FAP4	-0.076	-0.109	-0.111	-0.038	0.924
FAP5	-0.119	-0.111	-0.155	-0.058	0.793
PEM1	0.372	0.342	0.849	0.441	-0.124
PEM2	0.339	0.401	0.81	0.446	-0.152
PEM3	0.346	0.33	0.842	0.407	-0.144
PEM4	0.323	0.305	0.886	0.376	-0.126
PEM5	0.315	0.299	0.888	0.39	-0.113
ET1	0.37	0.404	0.45	0.865	-0.101
ET2	0.363	0.449	0.424	0.833	-0.004
ET3	0.35	0.399	0.375	0.805	-0.016
ET4	0.341	0.381	0.375	0.777	-0.105
ET5	0.378	0.35	0.371	0.852	-0.028

Table 3 presents cross-loadings to support the hypothesized relationship stated among the constructs. They include Hypothesis H1 which states that Corporate Governance has a negative relationship with Earnings Manipulation; the high loadings of the governance items (CG1 to CG5) on their construct and the relatively low loadings on Earnings Manipulation confirm this hypothesis. This shows the operationalization of the Corporate Governance construct and in the process establishes its effectiveness in reducing financial misreporting. These results are also similar to Velte (2023) who wrote that strong governance mechanisms are critical while advocating for higher levels of financial transparency and less corruption. Also, the moderate correlations obtained between Corporate Governance and Emerging Technologies imply that while the companies employ better governance practices, the technologies complement their process of enhancement.

As indicated earlier, Hypothesis H2 posits that Cyber Laws mediate the linkage between Corporate Governance and Earnings Manipulation. The results demonstrate that Cyber Laws items (CL1 to CL5) have high factor loading on the construct identified, thus

supporting this hypothesis. The moderate cross-loadings with Corporate Governance and Earnings Manipulation are suggestive of the important role of the legal and regulatory systems in increasing the potency of corporate governance mechanisms. As found by Brenner (2012) and Hayes (2020), well-implemented cyber laws have a deterrent influence on financial misconduct. Also, the data support Cyber Laws as moderating the effect of negative governance-earnings manipulation relationships in digitally oriented industries.

In this study, research hypothesis H3 states that the practices of forensic accounting have high discriminant validity, and the results obtained assigned them high loadings on their construct (FAP1 to FAP5) but low loadings with the other variables in the model. The results presented here show how forensic accounting can act as a moderator to enhance the anti-earnings manipulation effects that can improve governance structures. The negativity of Corporate Governance and Earnings Manipulation helps in hypothesizing that forensic accounting places a measure of responsibility and official supervision on the financial reporting practice. These findings support the studies of Bhasin (2013) and Njanike et al. (2009) who noted that forensic auditing should be used to implement solutions to financial irregularities.

Endorsing Hypothesis H4 regarding a bi-variate positive significant relationship between Corporate Governance and Earnings Manipulation, high values of loadings of Emerging Technologies items (ET1 to ET5) favoring the concept support the hypothesis. This relatively higher, but moderate cross-loadings with Corporate Governance and Earnings Manipulation underscore the relevance of technological advances such as AI, blockchain, and data analytics in the corporate world in the fight against manipulation. These findings support Wu (2024) and Tapscott and Tapscott (2016) in their view that technological advancements would bring positive changes in governance measures and increase the reliability of ACC's financial report.

Therefore, the oblique cross-loadings support the construct distinctiveness evidencing superior confirmation of all four hypotheses. Using research questions, the findings also confirm that while CG is a very vital factor that can significantly reduce EM, its efficiency is highly dependent on CL, FAP, and ETs. To the best of the authors' knowledge, these findings provide some novel insights into the relationship and interaction between governance, regulation, and technology and their positive impacts on the decrease of financial misconduct and increase of transparency in innovative companies.

Table 4: Heterotrait Monotrait ratio

	CG	CL	EM	ET	FAP
CG					
CL	0.451				
EM	0.43	0.419			
ET	0.482	0.521	0.535		
FAP	0.116	0.148	0.167	0.078	
ET x CG	0.265	0.071	0.072	0.375	0.061
FAP x CG	0.029	0.1	0.1	0.061	0.079
CL x CG	0.253	0.245	0.057	0.09	0.107

The discriminant validity of the measures, which assesses whether constructs share enough discriminability, can be found in Table 4 in the form of the Heterotrait-Monotrait

(HTMT) ratio. As a rule, an HTMT ratio should not exceed 0.85. The discriminant validity of all the constructs is confirmed, supporting the conceptual soundness of the measurement model as well as the theorized links.

The HTMT values between Corporate Governance (CG) and other constructs are still below the threshold limit of 0.85, and the highest value is 0.482 with Emerging Technologies. This confirm that Corporate Governance is empirically different from the moderating variables/Cyber Laws, Forensic Accounting, and Emerging Technologies) and the dependent Variable/Earnings Manipulation. Thus, the moderate HTMT ratio between CG and Emerging Technologies supports H4 that the advancement of technologies considerably strengthens the governance structures. These findings support Wu (2024) and Tapscott and Tapscott (2016) and their complementary role in enhancing the efficacy of governance.

The HTMT values for Cyber Laws (CL) and other constructs are also below the threshold and the highest value is 0.521 with the construct of Emerging Technologies. This means that Cyber Laws are different but moderately related to technological innovations in support of H2. The HTMT value of 0.419 proved that Cyber Laws indeed moderates between Cyber Laws and Earnings Manipulation in reducing financial misconduct as supported by Brenner (2012) and Hayes (2020).

In the case of Earnings Manipulation (EM), the correlations between HTMT ratios and other constructs are also less than an acceptable threshold. The highest value of 0.535 that has been obtained by Emerging Technologies states moderate correlation, where the important role of technology in identifying manipulation is evident. This supports H4, stressing on the promise of AI, blockchain, and data analytics in enhancing the quality of financial reports.

Low HTMT ratios are observed in FAP with a maximum of 0.167 with Earnings Manipulation. To support these findings, H3 which posited a moderating role for forensic accounting is supported by these results as forensic accounting is empirically different from other related constructs. The comparatively low HTMT ratios are therefore considered to indicate the distinctive contribution of forensic practices in improving governance, as suggested by Bhasin (2013) and Njanike et al. (2009).

These interaction terms (ET x CG, FAP x CG, CL x CG) show a lower HTMT ratio with all constructs meaning that these are unique moderators. With an HTMT value of 0.375 between ET x CG and Emerging Technologies, these interaction effects are highly distinct from their constituent constructs. These enhancements increase the negative relationship between Corporate Governance and Earnings Manipulation, due to the moderating roles of Emerging Technologies, Forensic Accounting, and Cyber Laws.

The HTMT analysis offers strong empirical support to the hypothesized associations and confirms the discriminant validity of all the constructs under consideration. That the HTMT ratios between Corporate Governance and the moderators (Cyber Laws, Forensic Accounting, Emerging Technologies) are moderate shows that all the variables analyzed support each other in improving governance effectiveness. These results provide empirical support to H1 that strong governance structures have a negative relationship with earnings manipulation, which supports H2 cyber laws, H3 forensic accounting, and H4 emerging technologies.

The implications show that; governance mechanisms and external moderators play a complementary role in reducing financial misconduct, consistent with previous studies,

and expand on the corridors' applicability to high-tech industries. The discriminant validity of the measures reported in this research comprehensively supports the conceptual model that has guided this study, as well as provides the approach for the subsequent analysis.

Figure 1: Measurement assessment model

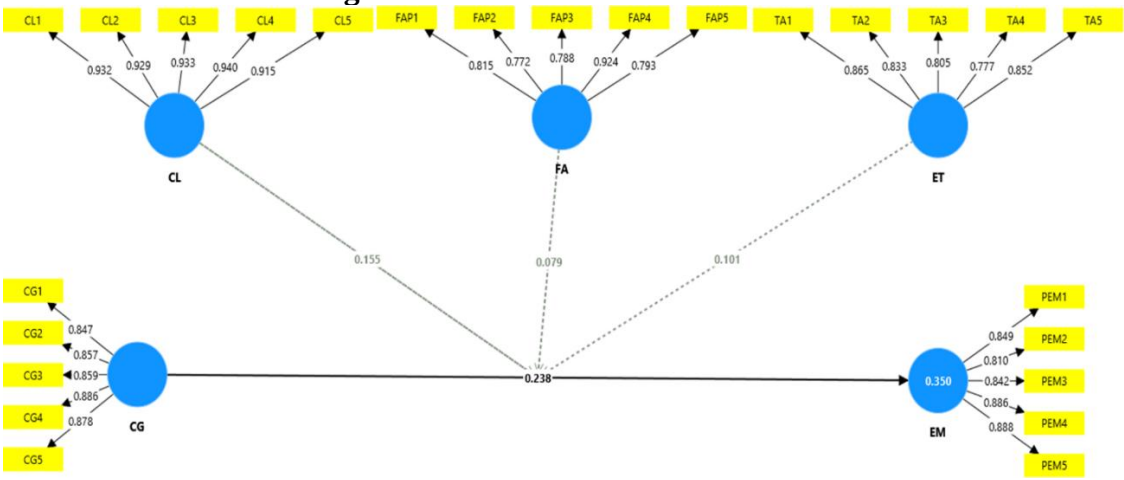


Figure 1 depicts the measurement model showing the association between the constructs and the indicators and confirms the validity and reliability of the model. Substantially all the loadings for the indicators are higher than 0.7, thereby affirming that the observed variables adequately reflect the latent variables proposed in the theoretical model. For example, in the loadings with regards to Corporate Governance indicators the values obtained range from 0.847 to 0.886 while for values obtained for Cyber Laws, the values range from 0.915 to 0.940. These higher loadings confirm the constructs and affirm the convergent construct validity thus ascertaining the indicators an optimal representation of the dimensions of the related construct.

The standardized coefficients that are presented as path coefficients highlight the degree of the connection between the constructs. The direct path estimates between CG on the one hand and EM, on the other hand, is 0.350 for a moderate negative association. This provides support for H1 suggesting that strong corporate governance mechanisms significantly limit earnings management. This result supports Velte (2023), as well as prior studies by Dechow et al. (2010) that revealed that robust corporate governance structures such as an independent board and transparency make financial reports more accurate and discourage fraud.

Indeed, the path coefficient from Cyber Laws (CL) to Earnings Manipulation (EM) is estimated to be 0.155 indicating a moderate effect. Supporting Hypothesis H2, the results demonstrate that regulatory frameworks make the negative correlation between Corporate Governance and Earnings Manipulation stronger. Cyber laws play an influential role in insulating a financial ecosystem against cyber risk and preventing fraud, while Brenner (2012) and Hayes (2020) imply this notion. This paper reveals that Cyber Laws and Corporate Governance are mutually supportive in their quest to increase transparency and curb cases of financial fraud.

Earnings Manipulation (EM) shows only a low but significant positive relationship with Emerging Technologies (ET), where the path coefficient is equal to 0.101. This provides support for H4 and suggests that AI, blockchain, and data analytics increase the

ability of governance structures to supervise and recognize earnings manipulation. These findings are in line with Wu (2024) and Tapscott and Tapscott (2016) advocating for the use of new technologies to enhance the effectiveness of governance and the accuracy of financial reports.

FA indicates a relatively small path coefficient of 0.079 for Earnings Manipulation (EM) hence supporting the investigations in their supplementary roles to curtailing financial misreporting. Direct, it does not make a significant contribution; however, it forms a part of the overall improvement of governance structures by increasing the ability to detect fraud and facilitate audits. This confirms Hypothesis H3 and complements Bhasin (2013), who insisted on the role of forensics in the identification of deviations and adherence to rules for handling financial statements.

On the whole, the analysis of the measurement model reaffirms the postulated links and reveals Batess out of the total end of every construct in reducing earnings manipulation. Cyber Laws, Emerging Technologies, and Forensic Accounting Practices are identified to perform an enabling role that amplifies the influence of Corporate Governance. The implications of the findings stress the necessity of a multi-pronged approach that brings together the mechanism of Corporate Governance, Regulation, and Technology to contain the difficult problems of earnings manipulation, especially in high-tech industries. From these results, it can be seen that the theoretical framework is largely supported by empirical data and the findings could be useful to both theoretical and practical research.

Table 5: Path analysis

	Original sample	Sample mean	Standard deviation	T statistics	P values
CG -> PEM	0.238	0.240	0.056	4.224	0.000
CL -> PEM	0.150	0.135	0.065	2.302	0.023
ET -> PEM	0.348	0.362	0.065	5.392	0.000
FAP -> PEM	-0.101	-0.112	0.046	2.180	0.032
ET x CG -> EM	0.101	0.098	0.054	1.859	0.066
FAP x CG -> EM	0.079	0.081	0.044	1.798	0.075
CL x CG -> EM	0.155	0.156	0.059	2.630	0.010

The results of the path analysis are shown in Table 5, which displays the estimates of the paths between constructs, and the hypothesis tests of between hypothesized paths. By looking at the path coefficients, T-statistics, and p-values, this study confirms the hypotheses made and provides critical insights into the strength and directionality of the relationships toward understanding and business implications.

The straight line from CG to PEM yields a coefficient of 0.238, $t = 6.807$ ($p < 0.001$) suggesting that corporate governance indeed depresses earnings manipulation. This result provides support for H1, the proposition that strong governance structures reduce earnings manipulation. The higher value of T-statistic (4.224) further ensures the magnificence of this relation. This is consistent with findings from Velte (2023) and Dechow et al. (2010) in pointing out that efficient governance systems like board oversight and transparency eliminate the chances of financial wrong reporting. To sum up, the outcomes reveal that governance may be viewed as the major lever for creating financial integrity.

Another pathway worth looking at is CL>PEM which is equal to 0.150 of significance level 0.023. The result provides evidence for Hypothesis H2 suggesting that regulatory frameworks play a part in minimizing financial misconduct. The T-statistic (2.302) makes it possible to assert the stability of this connection. Cyber laws improve the effectiveness of governance by reducing risks in online financial transactions; this supports findings by Brenner (2012) and Hayes (2020). The relevance of this path indicates the necessity to look for the incorporation of regulatory measures in the systems of corporate governance, especially in the spheres, where the successful work of the enterprises is strictly dependent on the use of online platforms.

The direct path from the ET construct to Earnings Manipulation (PEM) was the strongest with a path coefficient of 0.348, $t = 9.577$, $p < 0.001$. This result provides empirical support for the final research hypothesis proposed in this paper, namely H4 that the use of technologies such as AI and blockchain improves governance and decreases earnings manipulation. A high value of T-statistic (5.392) established this study's hypothesis that technology plays a vital role in reducing manipulation as supported by other researchers such as Tapscott and Tapscott (2016) and Wu (2024). This result shows that emergent technologies, if properly adopted, can bring about a positive change in transparency, automation of fraud checks, and general governance frameworks.

Similarly, the path coefficient of -0.101 ($p = 0.032$) for Forensic Accounting Practices (FAP) also supports Hypothesis H3. The coefficient is negative and it shows that forensic accounting enhances the negative correlation between governance and earnings manipulation. The t-statistic of 2.180 supports this effect. This assertion agrees with Bhasin (2013) and Njanike et al. (2009) who pointed out the importance of forensic auditing in matters relating to detection of fraud and prevention. Although the effect is small compared to other variables, it confirms the fact that forensic accounting has a complementary role in limiting earnings manipulation.

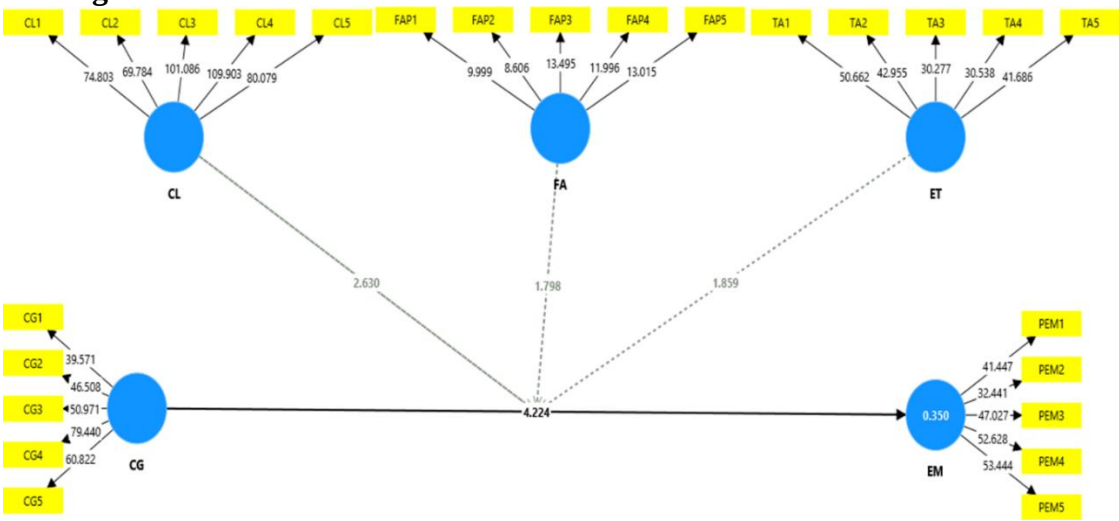
The remaining variables serve as the control variables for the moderating effects revealed by the interaction terms. The analysis of the Moderation Regression with the variables Emerging Technologies (ET) and Corporate Governance (CG), concerning the independent variable Earnings Manipulation, shows a coefficient of 0.101 (Sig 0.066). However, the correlation is positive and although the coefficient is significant at the 1 percent level, it is not statistically significant at the conventional level of 5 percent ($p < 0.05$). This implies that the role of technology in moderating the relationship between key variables could depend on the interaction level of technology. Likewise, when the FAP and CG were entered into the analysis in the equation FAP x CG, significance was also not observed with a coefficient of 0.079 ($p = 0.075$). Such results imply that, although these variables can influence the decrease of manipulation, their moderating relationship with the governance factor may need elaborate examination or a broader population tested.

Last, there is a positive and significant correlation with a coefficient of 0.155 at $p = 0.010$ for Hypothesis H2 between Cyber Laws and Corporate Governance (CL x CG). The T-statistic (2.630) shows the significance of this Moderating effect. This result provides credence to the idea that Hayes (2020) posited that cyber laws and governance are symbiotic in preventing financial misconduct. Still, it tends to focus on the role of regulation and its application in linking with governance to improve financial credibility.

The analysis of the path model yields moderate support for the proposed hypotheses.

They include Corporate Governance mechanisms, Cyber Laws and Emerging Technologies, and Forensic Accounting Practices that in one way mitigate earnings manipulation. The findings support the theoretical framework, providing a detailed discussion of the connection between the four components: governance, technology, regulation, and transparency. That is, while some of the interaction effects were not significant, the findings generally support the necessity of a multi-faced solution-based approach in combating earnings manipulation, especially in the field of high-tech companies. Doing so, these findings advance the existing body of knowledge on financial reporting integrity and provide valuable recommendations to policymakers, regulators, and practitioners to address this wrongdoing.

Figure 2: Structural assessment model



The structural assessment model in Figure 2 shows the nature of the relationship between the constructs using strength, significance, and commonality. As shown in the above research results, the path coefficient from Corporate Governance (CG) to Earnings Manipulation (EM) is 0.350 with a corresponding t-statistic of 4.224, expressively indicating that there is a significant and negative influence. This goes a long way to support Hypothesis H1 which tallies with the previous research works of Velte (2023) and Dechow et al. (2010) that posited that the strength of accounting governance minimizes earnings management through transparency and accountability. Equally, the results of Cyber Laws (CL) have a positive path with Earnings Manipulation, with a coefficient of 0.155 and t-statistic 2.630 for Hypothesis H2. This supports the argument that setting up regulation will help to improve governance and also reduce the cases of financial misconduct in the country as suggested by Brenner (2012) and Hayes (2020).

We find the strongest/proxy relationship, Hypothesis H4: Emerging Technologies (ET) also have the highest path coefficient of 0.348 (t = 5.392) for Earnings Manipulation. As such, it brings significance to AI, Blockchain, and Data analytical in enhancing the overall financial reporting and Governance systems (Tapscott & Tapscott, 2016; Wu, 2024). The macro variable Forensic Accounting Practices (FAP) is also negatively and significantly associated with Earnings Manipulation with a regression coefficient of -0.101 and t-statistic of 2.180 for ‘H3’. These research works are in harmony with Bhasin (2013) by underlining the central function of venture accounting in the identification and prevention of fraud.

The findings of the interaction terms are therefore as follows: The results show that the CL x CG moderation is valid as the current study as it shows a coefficient of 0.155 and a t-statistic of 2.630 Furthermore, contrary to the previous research, the current paper finds that the moderator role of ET x CG and FAP x CG relationships are not statistically different. Taken altogether, these studies propose that these moderators while improving the effectiveness of governance also appear to have a moderating effect on the total interaction, subject to implementation level and other contexts such as the industrial segment.

On balance, the model supports the postulated relationships and affirms that Corporate Governance in consonance with Cyber Laws, Emerging Technologies, and Forensic Accounting Practices serves the purpose of deterring earnings manipulation. The research comes with a reminder of the need to ensure that efforts are made under governing, regulatory, and technological innovation in combating financial misconduct especially in highly technology-oriented companies. These results support the proposed theoretical framework and offer practical implications for enhancing the financial reporting/company's integrity.

5. Conclusion, Policy Implications, and Future Research Directions

The link between CG and EM is of interest in this research, together with the mediating functions of CL, FAP, and ET. Altogether these results endorse that good governance decreases earnings manipulation and Cyber Laws & Emerging Technologies bring additional strength to the effective good governance system. As expected, the value of Forensic Accounting Practices also increases, but this is less than the impact of the interaction between these practices with the governance frameworks, which emphasizes their supporting role. These findings support the prior research's proposed theoretical approach framework by proving its applicability to curtail fraud in high-technology organizations.

The results have the following implications for policymaking. It is therefore important for policymakers to apply efforts in improving the regulations regarding Cyber Laws to help eliminate the loopholes within digital financial systems. Governments and organizations should also begin developing newer technologies such as AI and blockchain to improve these measures of financial monitoring and fraud prevention. Furthermore, it is especially important to incorporate forensic accounting practices into the frameworks of governance in a bid to enhance the features of financial reporting as well as compliance. All these measures can collectively improve corporate transparency, portray investor confidence, and discourage the systematic risks of earnings manipulations.

Subsequent research could follow up on this research by extending the list of moderators that may impact the governance-earnings manipulation nexus, including cultural and organizational factors. Probably, highly detailed longitudinal research can offer a better view of how governance structures change over time due to technological and/or regulatory changes. Further, extending this research to other industries or regions would offer the empirical verification of these results. Last, qualitative methods can supplement this quantitative work to provide rich descriptions of perceptions of governance practices and their practical difficulties.

Therefore, this research caters to the need to combine the governance, regulatory, and technological factors to prevent earnings manipulation. These results offer a strong

impetus for further theorization research and real-world application and continued growth of global industries' financial credibility.

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FEATURES OF CHINESE DIGITAL ECONOMY AND POLICY IMPLICATIONS FOR VIETNAM

Dr. Tran Thi Lan Phuong[1]

Abtract: This article analyzes the key features of the "exponential growth" of China's digital economy, including: (i) robust digital infrastructure development, the emergence of innovative digital finance, the rapid growth of the Central Bank Digital Currency (CBDC); (2) the Digital Yuan and (3) the digital that is the critical role of the government in promoting and regulating the digital economy. Drawing from these prominent features of China's digital economy, the article outlines several policy implications to foster digital economy development in Vietnam, aiming to achieve the digital economy goals set out in the 13th Party Congress Resolution and the Digital Economy and Digital Society Development Strategy under Decision No. 411 by the Government.

Introduction

For many years, China's digital economy has maintained its position as the second largest globally and has been a fundamental driver of the country's economic development. As illustrated in Figure 1**,** the China Academy of Information and Communications Technology (CAICT) reported that the added value of China's digital economy in 2022 reached 50.2 trillion RMB (approximately USD 7.15 trillion), accounting for 41.5% of GDP. In 2023, China's digital economy grew to approximately 55% of GDP, equivalent to over USD 9 trillion. This success can be attributed to significant investments in digital infrastructure and technology, with direct spending on ICT from 2022 to 2026 expected to exceed USD 2.4 trillion.

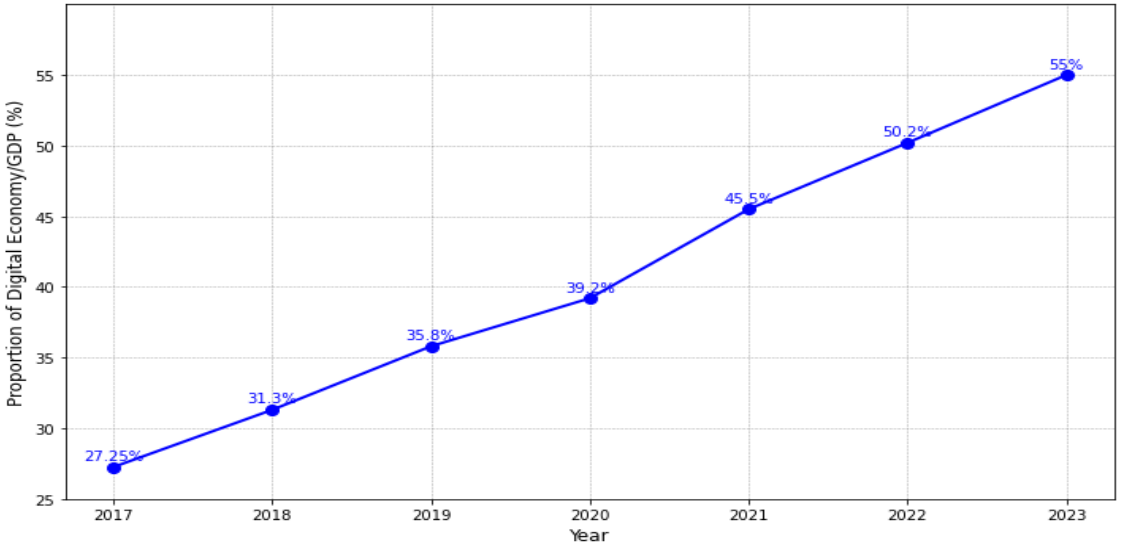

Figure 1. Added Value of China's Digital Economy (Trillion RMB) [4], [7]

China's impressive strides in the digital economy have permeated every aspect of industrial production and daily life, creating a distinct economic development model

[1] National Economics University

compared to the United States. Unlike the U.S., China's digital economy has been predominantly driven by market demand and innovative business models rather than technological breakthroughs. Moreover, the development of China's digital economy is closely linked to the widespread adoption and enhancement of the country's information infrastructure, which covers both urban and rural areas. Additionally, the government has played a crucial role in fostering the advancement of the digital economy. As a result, with digital transformation occurring across various sectors, an increasing number of enterprises, organizations, and individuals are actively participating in the digital economy.

1. Features of China's Digital Economy

This section summarizes the key features of the development of China's digital economy from the perspectives of the digital industry, digital infrastructure, digital finance, the Digital RMB, and digital regulation.

Digital Industry

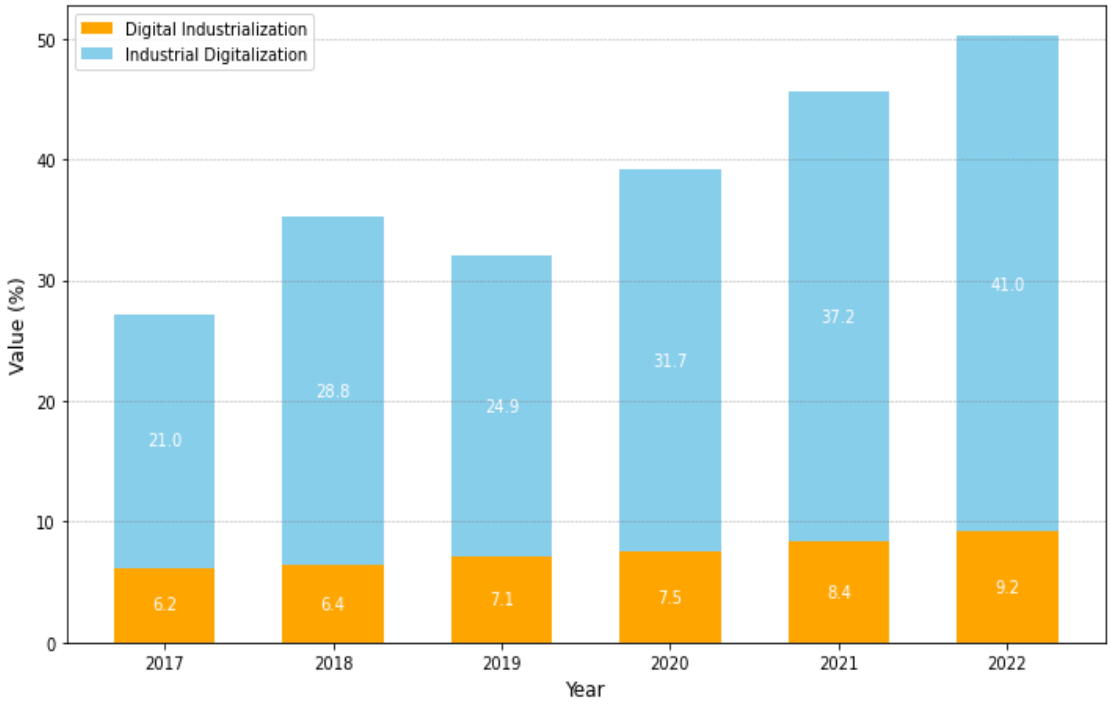

Figure 2. Added Value of Digital Industrialization and Industrial Digitalization in China (Trillion RMB) [7]

In China's perspective, the digital economy consists of two main components: industrial digitalization and digital industrialization. This means that China not only emphasizes digital technologies and the information and communication technology (ICT) industries but also strives to leverage digital technologies to transform and upgrade traditional industries. At the 2016 G20 Summit in Hangzhou, a broader definition of the digital economy was informally adopted, which includes "the use of digitized information and knowledge as key factors of production, modern information networks as important operational spaces, and the effective use of information and communication technology (ICT) as a key driver of productivity growth and economic structural optimization." Industrial digitalization, which involves using digital technologies to upgrade traditional industries—such as integrating automation and

artificial intelligence technologies into traditional manufacturing—is a major driver behind China's digital economy. As shown in Figure 2, in 2022, industrial digitalization in China contributed significantly to the economy, with an added value of 41 trillion RMB, achieving a nominal growth rate of 10.3%. This accounted for 81.7% of the total value of the digital economy and 33.9% of the country's GDP.

The development of the digital economy in China has received significant support from the government. According to the "China Digital Economy Development Report" published by CAICT, by the end of March 2022, more than 200 technology parks had been designated as "digital economy parks," emphasizing the efforts of local governments to leverage favorable conditions to accelerate digital sector growth. However, China still faces technological gaps, particularly in advanced digital technologies, compared to developed nations like the United States. In recent years, China has encountered challenges due to sanctions and export restrictions imposed by Western countries, leading to slower digital economy growth. In 2019, ICT-related patents from China—including high-speed networks, mobile communications, big data analytics, imaging, and audio technologies, as well as information transmission equipment—accounted for 53.1% of IP5 patent families. However, most foundational technologies still rely on foreign sources.

Digital Infrastructure

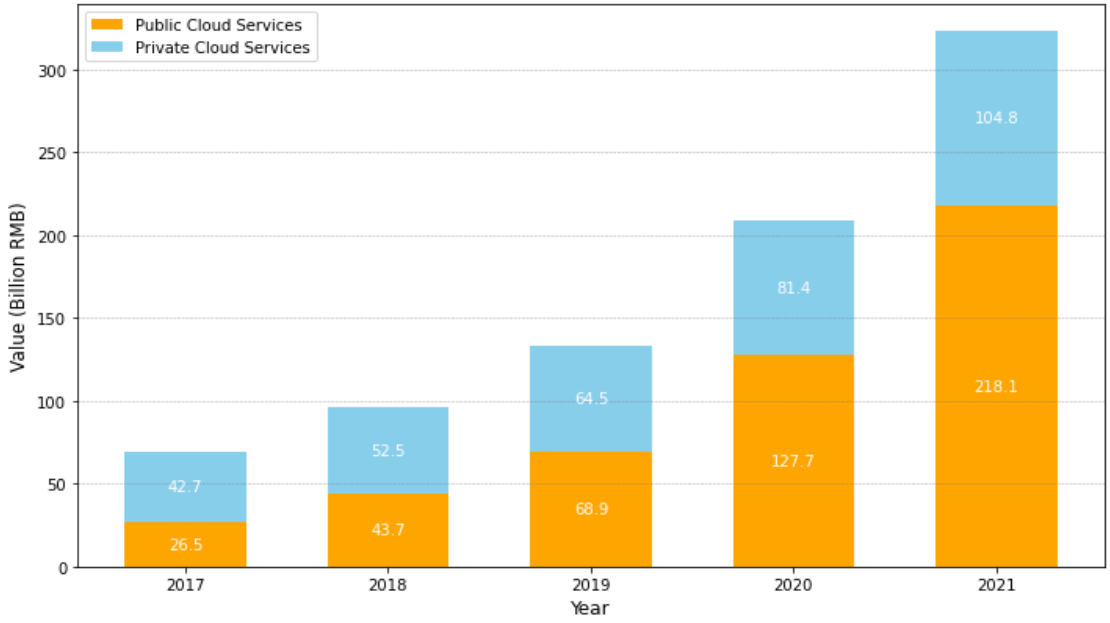

Figure 3. Market Volume of Cloud Services in China (Billion RMB) [7]

The rapid growth of China's digital economy is rooted in a robust digital infrastructure. As a global leader in infrastructure development, China has achieved remarkable success in building digital infrastructure. The value of China's cloud service market reached 322.9 billion RMB in 2021, with the public cloud service market valued at 218.1 billion RMB and the private cloud market at 104.8 billion RMB, as shown in Figure 3. As of the end of September 2022, China had established the world's largest optical fiber network, with over one billion optical fiber ports and 550 million fiber optic users.

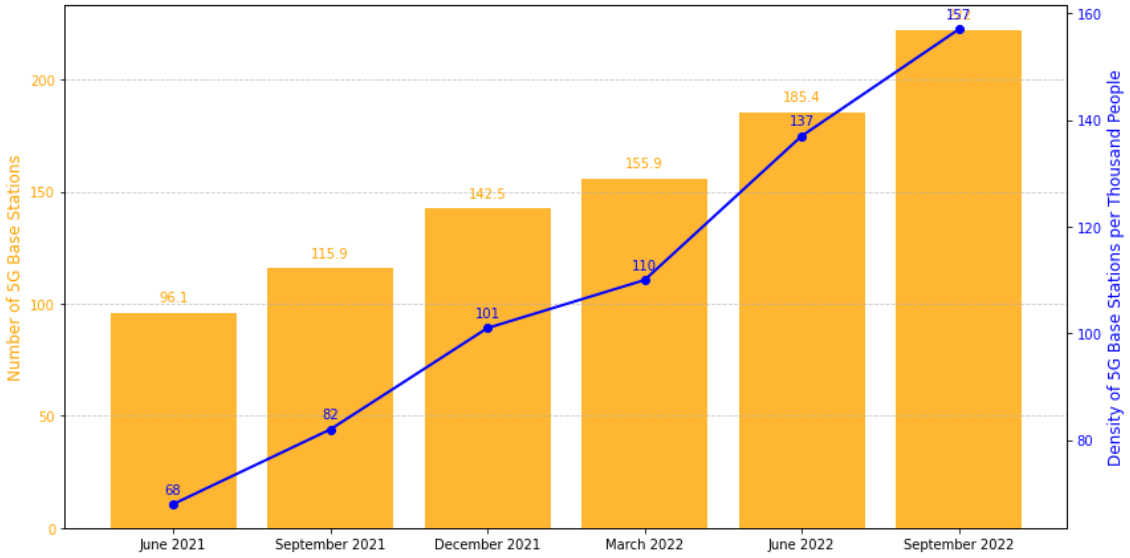

Figure 4. Number and Density of 5G Base Stations in China [7]

5G technology, as a key component of the next generation of information technology and new digital infrastructure, is also a major driver behind the digital transformation and upgrading of the real economy. China currently boasts the largest standalone 5G network in the world. As of the end of November 2022, China had deployed over 2.28 million 5G base stations, accounting for more than 60% of the global total (see Figure 4).

Data has emerged as a new factor of production in the digital economy era, serving as the foundation for the development of computational power. The increasing volume of data, coupled with growing demands for data processing and the free flow of data resources, acts as a catalyst for computational power expansion.

Digital Finance

China is currently a global leader in digital financial services. The rapid expansion of digital finance in China stems from the insufficient provision of traditional financial services and a relatively favorable regulatory environment. Despite the country's market-oriented transformation in recent years, state-owned banks have continued to prioritize state-owned enterprises and large corporations with substantial collateral, leaving many small and medium enterprises (SMEs) and households without adequate credit access from traditional financial institutions. By leveraging big data and artificial intelligence technologies, digital finance addresses this gap by offering non-collateral loans to SMEs and households with reliable credit histories. It meets the needs of the majority who are excluded from traditional financial services. Consequently, digital finance has quickly gained traction in China's credit market. However, the emergence of digital finance has presented challenges for regulators. In its early years, the industry experienced relatively loose oversight, which encouraged fintech companies to innovate financial products. This led to the development of various business models, such as crowdfunding, peer-to-peer (P2P) lending, and online insurance. These models expanded the scope and depth of financial services while reducing costs for individuals in underdeveloped and remote areas. Nevertheless, it is important to note that financial innovation inevitably introduces risks. In particular, issues related to arbitrage, defaults, and capital raising, exacerbated by regulatory delays, could pose systemic financial risks.

Digital Yuan

Central Bank Digital Currency (CBDC) refers to a form of digital currency issued or backed by the credit of a monetary authority or government. A survey conducted by the Bank for International Settlements highlighted key drivers for issuing CBDCs, including financial stability, monetary policy enforcement, financial inclusion, domestic and cross-border payment efficiency, and payment security. In China, a vast and rapidly developing country, the central bank has been motivated by goals of payment efficiency, financial stability, and financial inclusion, leading to efforts to develop the Digital Yuan. In 2021, the People's Bank of China (PBOC) released a white paper titled "Progress of Research & Development of E-CNY in China", outlining three primary objectives for developing the Digital Yuan. These objectives include diversifying forms of cash provided by the central bank to the public, promoting fair competition, efficiency, and security in retail payment services, and improving cross-border payments. The widespread adoption of the Digital Yuan could also provide the government with insights into domestic capital flows and allocation. The Chinese government's expectations for the Digital Yuan are also reflected in its goals related to cross-border payments and the internationalization of the Renminbi. Currently, the design and purpose of the CBDC are primarily focused on meeting domestic retail payment needs. However, cross-border and international use involves legal issues such as anti-money laundering and customer due diligence, which still require in-depth consideration.

Digital Regulation

Since the 18th National Congress of the Chinese Communist Party, the Chinese government has emphasized the necessity of accelerating e-governance and building integrated online service platforms that encompass all processes. Subsequently, the Chinese government strengthened the "Internet Plus Government Services" initiative, allowing government services to be accessed via a "single network, single portal, and one-time access." This means that government services can operate "entirely online," and for businesses and the public, they only need to "enter one portal" and "access at most once." While the government provides data, it must also address concerns regarding data protection and privacy. In developing laws, regulations, and governance tools, the government must carefully consider how to balance individual privacy with the convenience of data exploitation and usage. Challenges related to data privacy in the digital economy fundamentally stem from insufficient awareness and understanding by both regulators and the public regarding the underlying technologies and business models. With the deployment of governance technologies, regulations will encompass various data usage processes, including collection, analysis, sharing, reporting, and processing, aiming to facilitate efficient data usage while ensuring data privacy protection.

2. Key Features of Vietnam's Digital Economy

Resolution No. 52-NQ/TW dated September 27, 2019, by the Politburo on "Several Guidelines and Policies to Proactively Participate in the Fourth Industrial Revolution," the 13th National Congress Resolution of the Party, the "National Digital Transformation Program" under Decision No. 749/QD-TTg dated June 3, 2020, and Decision No. 411/QD-TTg dated March 31, 2022, by the Prime Minister approving the "National Strategy for Digital Economy and Digital Society Development until 2025, with Orientation toward 2030," have outlined the strategic priorities for Vietnam's digital transformation and digital economy development in the coming period. The National Strategy for Digital Economy and Digital Society Development until 2025, with Orientation toward 2030, emphasizes the current context as an opportunity that Vietnam must seize and act decisively upon to develop

its digital economy. The task of digital economy development is placed as a high priority in the national development strategies. The overarching goal for digital economy development is for it to account for 20% of GDP by 2025 and 30% by 2030. These are challenging targets, as current estimates suggest the digital economy only contributes around 13% of GDP, and this proportion has remained stagnant over the past three years (according to data from the General Statistics Office), indicating that the growth rate of the digital economy has not "broken through" compared to GDP growth. To achieve the targets set by the 13th National Congress, Vietnam needs to maintain an average annual digital economy growth rate of approximately 20%, three times that of GDP growth. Currently, the structure of the digital economy relies heavily on the core digital economy (accounting for nearly 70% of the total digital economy value), which is significantly dependent on foreign direct investment (FDI). Economists have calculated achievable digital economy targets under various scenarios: normal, fast, and breakthrough. If digital transformation and the application of the digital economy proceed at the same pace as in recent years—at a growth rate below 20%—it will be difficult to meet the set targets. However, under fast or breakthrough scenarios with an overall digital economy growth rate exceeding 20%, the goals are entirely achievable.

According to the General Statistics Office (2023), the share of added value from the digital economy in GDP from 2020 to 2023 was 12.66%, 12.88%, 12.63%, and 12.33%, respectively. The average share of added value from the digital economy in GDP during this period was approximately 12.62%, with the 2023 figure at 12.33%. Of this, the core digital economy contributed 7.42% (accounting for 60.19%), while the digitalization of other sectors contributed 4.91% (accounting for 39.81%). In contrast to the "exponential growth" of China's digital economy, the share of added value from the digital economy in Vietnam's GDP has been decreasing due to the contraction of the electronic products, computers, and optical products manufacturing sector, which accounts for over 30% of the total added value of digital economic activities, amid declining global demand. Meanwhile, the added value generated by services using information technology in production and management has shown a slight increase—from 6.53% in 2020 to 6.65% in 2023—but remains modest.

Table 1: Revenue contribution of travel service industry of Added Value from the Digital Economy to GDP (2020-2023)

Unit: %

	2020	2021	2022	2023
Total	**12,66**	**12,87**	**12,63**	**12,33**
1. Agriculture, Forestry, and Fisheries	0,05	0,05	0,05	0,05
2. Industry and Construction	6,08	6,22	5,97	5,63
3. Services	6,53	6,60	6,61	6,65

Source: General Statistics Office [8]

Similar to the development structure of China’s digital economy, the core digital economy sector has made significant contributions to the growth of both Vietnam’s digital economy and its overall economy. Several provinces and cities with well-developed core digital economic activities, such as Hai Phong City, Bac Ninh, Bac Giang, Thai Nguyen, and Vinh Phuc, have shown notable progress. However, due to the unique economic characteristics of each locality, the proportion of added value from the digital economy in GRDP varies across provinces and cities. In 2023, among the 63 provinces and centrally governed cities, five provinces and cities had a proportion exceeding 20%,

eight had a proportion between 10-20%, 48 had a proportion between 5-10%, and only two had a proportion below 5%.

In recent years, Vietnam's economy has been rapidly transforming through the adoption of new digital technologies, showcasing the vast potential of the digital economy in the years to come. Several industries in Vietnam are digitizing at a remarkable pace, including e-commerce, tourism, digital content, fintech, e-government, and the digital society, all of which have achieved significant advancements. Regarding the structure of the digital economy, the e-commerce sector has demonstrated impressive growth. Vietnam's e-commerce market has been growing steadily, with an average annual growth rate of 16-30% over the past four years, outpacing conventional e-commerce by 2.3 times during 2022-2025, ranking among the highest globally. Over the past five years, Vietnamese businesses have significantly expanded their international reach, with many small and medium enterprises (SMEs) generating annual revenues of over USD 1 million, and the volume of products exported via international e-commerce platforms has increased by 300%. The startup ecosystem has been thriving, particularly in the technology sector, with the number of tech startups rapidly increasing, especially in major cities like Hanoi and Ho Chi Minh City. However, case studies in the agriculture and manufacturing sectors reveal a low level of readiness for digital transformation, and the "core" digital economy of information and communication technology (ICT), which accounts for nearly 70% of the total digital economy value, remains heavily reliant on FDI and global demand. This indicates that while Vietnam's digital economy has made remarkable progress in recent years, significant challenges still need to be addressed.

Regarding ICT infrastructure, while 4G networks have been widely deployed and 5G networks are being introduced in major cities, there are still “coverage gaps” in rural, remote, and mountainous areas. Internet penetration in Vietnam is relatively high, with over 70% of the population having access, but the speed and quality of connectivity need improvement to meet growing demand. Vietnam also faces a shortage of high-quality human resources in ICT and the digital economy. Educational and training programs related to ICT need substantial improvement to meet the labor market’s requirements.

3. Key Policy Implications for Digital Economy Development in Vietnam

The above features show that Vietnam's digital economy is developing comprehensively and robustly, although it has not yet met the targets set forth in the Party's Resolutions. The relatively rapid growth of some segments of Vietnam's digital economy in recent years reflects the efforts and determination of the government, authorities, sectors, localities, the business community, and citizens in strongly applying information technology in business production and management, significantly contributing to national digital transformation, and the development of a digital economy and digital society in Vietnam. To further develop the digital economy in Vietnam, lessons from China's experiences offer the following recommendations:

- **Management Perspectives on the Digital Economy**: The Chinese government initially managed the digital economy with a "relatively relaxed" approach, offering supportive policies to create a superior and pioneering institutional framework. However, as public concerns over data privacy and conflicts between digital platforms and customers increased, the Chinese government began to address potential risk governance issues on large digital platforms. Accordingly, Vietnam can consider a more "open" market approach to balance the relationship between the market and the state, aiming to find equilibrium between the need to "drive innovation in developing and applying the digital economy" and the need to "ensure market order."

- **Investment in Digital Infrastructure**: As a global leader in infrastructure development, China has achieved remarkable success in building digital infrastructure. Although the core digital economy in Vietnam now accounts for nearly 60% of the digital economy's scale, compared to just 20% in China, Vietnam still needs to further develop its digital infrastructure, expand and upgrade 5G networks to support digital services and applications, and lay the groundwork for advanced technologies like IoT and AI. The early impressive advancements of China's digital economy highlight the critical role of digital technology. Vietnam should prioritize supporting core digital economy businesses, digital transformation, and fostering ICT-focused economic development with a strong emphasis on "Make in Vietnam" digital products and businesses.
- **Establishing Regional Data Centers and Cloud Computing Systems**: In realizing the value of data, fostering the data market, and enabling the circulation, exchange, development, and use of data, China implemented the "Eastern Data and Western Computing" project. Developing large regional data centers and cloud computing systems in key economic zones will help process and store vast amounts of data, supporting businesses and the government in digital transformation. For Vietnam, developing national, unified, and shared digital platforms in each sector should be a major driver for advancing the digital economy in various fields.
- **Development of Fintech and Digital Payments**: China is a global leader in digital financial services, particularly in digital payments. Drawing on China's experience in fostering fintech, Vietnam can support companies providing digital financial services, such as e-wallets and digital banks, and explore the development of a national digital currency to enhance electronic payments and strengthen the financial system. However, the rise of digital finance also presents challenges for regulators, as these models expand the scope and depth of financial services, particularly in reducing costs for underserved and remote areas, while potentially introducing significant risks.
- **Promoting E-commerce and Cross-border E-commerce**: Online shopping is a hallmark of China's digital lifestyle, and the country has expanded cross-border e-commerce pilot zones. Consumers are transitioning from emotional to rational shopping, and sellers are focusing on stable profitability rather than just sales volume. This shift fosters sustainability, aligning with the convenience of the digital lifestyle. Vietnam can learn by facilitating businesses' participation in e-commerce platforms sustainably and penetrating international markets through cross-border e-commerce with policies supporting digital exports.
- **Digital Transformation in Public Administration**: Since the 18th National Congress of the Chinese Communist Party, the Chinese government has emphasized the need to accelerate e-governance and build integrated online service platforms covering all processes. The government has enhanced the "Internet Plus" initiative with government services, making these services accessible via "one network, one door, and one-time access." This means that government services can be operated "entirely online," and for businesses and the public, they need to access "only one portal" and "visit at most once." Vietnam can draw from these experiences in developing a digital government and society, leveraging digital technologies to improve efficiency and transparency in public administration, from data collection and analysis to delivering online public services.

Conclusion

From China's experiences, Vietnam can consider implementing policies to seize opportunities brought about by digital technology, including: (i) Increasing investment in R&D to foster innovation in key technological fields such as 5G, artificial intelligence,

blockchain, cloud computing, and the semiconductor industry, which have spillover effects and play an increasingly important role in driving efficiency, productivity growth, and the creation of new business models, (ii) Integrating traditional industries with digital infrastructure and platforms will be a key driver of the digital economy's future development. Industries such as digital finance, e-commerce, mobile payments, and digital entertainment will continue to expand rapidly, fueled by changing consumer preferences and the growing adoption of digital services, (iii) Supporting startups and innovation by facilitating technological startups through financial aid programs, tax incentives, and international collaboration opportunities. These measures will help Vietnam develop its digital economy sustainably and expand its global presence.

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FACTORS INFLUENCING THE E-COMMERCE ADOPTION DECISION OF OCOP ENTITIES IN THANH HÓA

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Abstract: This article aims to provide an overview of studies related to e-commerce adoption decisions, and based on this, build and test a model for evaluating the factors influencing the e-commerce adoption decisions of OCOP entities in Thanh Hóa. The model is based on regression analysis using survey data from 189 entities. The results show that among the factors included in the model, Perceived Benefits and Social Environment have the strongest and most positive impact on e-commerce adoption decisions, followed by Perceived Costs and Perceived Risks, which both have a negative effect. Finally, Innovation Capability also has a positive impact on this decision. Based on the findings, the authors propose several recommendations to promote e-commerce adoption, including raising awareness about benefits, minimizing risks, organizing training support programs, and encouraging innovation in business.

Keywords: *E-commerce adoption, OCOP entities, Innovation Capability.*

1. Introduction

The One Commune, One Product (OCOP) program was initiated in Oita Prefecture, Japan, in 1979, with the goal of enhancing the value of local products by developing internal resources and increasing the value of local specialties. This program has been implemented in many countries around the world, including Vietnam, where OCOP was first introduced in 2017 in Quảng Ninh Province. By now, OCOP has been implemented nationwide, with thousands of products rated from 3 to 5 stars, representing agricultural and non-agricultural products and services that highlight the advantages of each locality.

In Thanh Hóa, a province rich in natural resources with a long agricultural tradition, the OCOP program has achieved significant success. By the end of 2023, Thanh Hóa had 464 OCOP-certified products, including 407 products rated 3 stars, 56 rated 4 stars, and 1 rated 5 stars. Although OCOP products in the province have great potential, most are still distributed through traditional channels and primarily serve the domestic market. The lack of modern sales channels, especially e-commerce, has limited the ability to expand market reach, enhance brand value, and strengthen the competitiveness of OCOP products. In the context of the rapid development of e-commerce in Vietnam, applying e-commerce to distribute and promote OCOP products is considered an effective solution to overcome these current limitations. E-commerce not only facilitates access to a wider market but also helps reduce distribution costs, expand business scale, and enhance the brand image of OCOP products. While e-commerce presents many opportunities, OCOP entities in Thanh Hóa still face challenges such as limitations in technical infrastructure, investment capital, management knowledge, and awareness of the benefits of e-commerce.

Currently, many studies have been conducted to analyze e-commerce usage behavior

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in business, primarily focusing on enterprises or individuals. However, research on e-commerce adoption by OCOP entities is still quite limited, particularly in Thanh Hóa, a locality with great potential for OCOP product development. Therefore, studying the factors influencing the e-commerce adoption decisions of OCOP entities in Thanh Hóa is essential, both to contribute to the theoretical framework and to clarify practical aspects in the current context of digital transformation.

This paper constructs a research model and identifies the factors impacting the e-commerce adoption decisions of OCOP entities in Thanh Hóa. Based on the analysis results, the paper proposes specific solutions to enhance the effectiveness of e-commerce adoption in the OCOP product value chain, contributing to sustainable rural economic development and strengthening the position of OCOP products in both domestic and international markets.

2. Theoretical Background and Literature Review

2.1 Theoretical Background

2.1.1 TOE Theoretical Framework

The TOE framework was developed by Tornatzky, Fleischer, and Chakrabarti (1990). TOE is one of the most popular research frameworks for analyzing the adoption of new technologies by businesses. The Technology, Organization, and Environment (TOE) framework, developed by Tornatzky and colleagues, is widely used to analyze technology adoption. The core idea of this model is that a business's adoption of a new technology is influenced by three main groups of factors: first, the technology factors such as the availability of the technology and its characteristics; second, the organizational factors such as the organization's structure, size, characteristics, and internal communication processes; and finally, the environmental factors such as industry characteristics, the level of competition in the industry, government support, and government regulations.

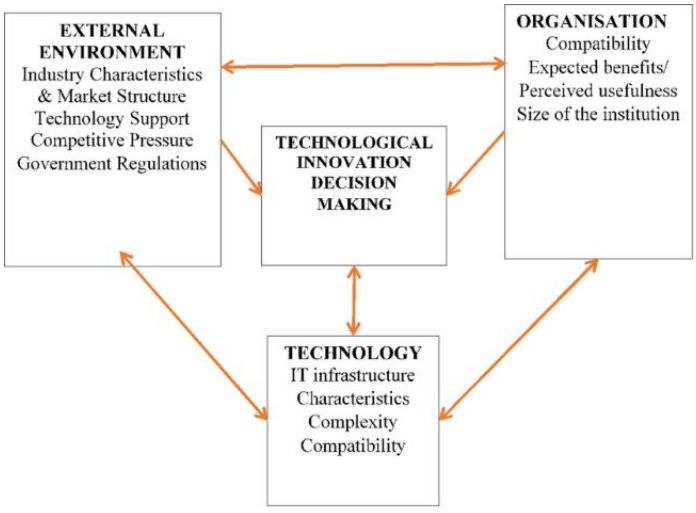

Figure 1: TOE Framework

The TOE model provides a comprehensive view of technology implementation within an organization, while also offering a framework for detailed analysis of each factor and how they interact. This helps researchers, managers, and businesses better understand how technology deployment can influence an organization's success or failure. TOE has been widely recognized by researchers as a well-established framework

for analyzing e-commerce adoption (Rahayu and Day, 2015; Triyogo Priambodo et al., 2021).

2.1.2 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) was developed by Davis in 1989. According to this model, an individual's or organization's decision to adopt a technology depends on their perceptions of its usefulness and ease of use (Davis, 1989; Venkatesh et al., 2003).

According to Davis, there are two key factors that determine whether an organization will accept or reject a technology: the ability of the technology to make work more efficient. These two factors are referred to as perceived usefulness and perceived ease of use (Davis, 1989; Venkatesh et al., 2003).

The TAM model has demonstrated its flexibility by being applied in various fields, including healthcare, banking, and both personal and organizational decisions (Mortensson & Vidgen, 2016). TAM is one of the most influential and widely used models in the study of technology acceptance and adoption by individuals and organizations (Kim, 2006). With its simple structure and ease of application in various research contexts, TAM provides a quick and effective tool for gathering information about users' perceptions (Weerasinghe & Hindagolla, 2017).

2.2 Literature Review

The application of e-commerce in business activities has become an inevitable trend for enterprises in the current digital transformation context. Previous studies have identified various factors influencing the decision to adopt e-commerce, particularly among small and medium-sized enterprises (SMEs). Rahayu (2015), in a study conducted in Indonesia, identified factors such as organizational support, perceived benefits, technology readiness, the innovation capability of business owners, and experience in information technology (IT) as playing critical roles in the decision to adopt e-commerce.

Similarly, a study by Govinnage and Sachitra (2019) in Sri Lanka highlighted factors such as perceived benefits, technological skills, government support, and technological infrastructure. These factors not only determine readiness to adopt e-commerce but also drive business efficiency. Meanwhile, Khattak (2022) emphasized that innovation within businesses fosters an environment conducive to creativity and technology adoption, enabling companies to maximize the potential of e-commerce.

On the other hand, significant barriers have also been identified. Chawla and Kumar (2021) pointed out that businesses' trust in the security and safety of e-commerce is a decisive factor in their adoption behavior. Their study indicated that warranty services, user interface design, and customer experience play crucial roles in building trust among businesses and consumers. Similarly, a study by Lê Văn Thiệp (2016) in Vietnam highlighted concerns about transaction security and information confidentiality as key obstacles to the development of e-commerce. The study also suggested using tools such as digital signatures and risk insurance mechanisms to address these issues.

Furthermore, the study by Nguyễn Thị Mai et al. (2023) clarified the current situation of OCOP entities in Thanh Hóa, highlighting that they often lack technical knowledge about e-commerce and face challenges in managing online supply chains. Constraints in capital and managerial capacity are significant obstacles that reduce efficiency when implementing modern sales channels.

Mansor (2010) also noted that small business organizations face difficulties in

accessing financial resources and information. The costs associated with establishing and operating e-commerce, including hardware, software, telecommunications, and training, sometimes exceed the financial capacity of businesses. A lack of government support and poor infrastructure further exacerbate barriers to e-commerce adoption. According to Van Dung Ha (2020), financial readiness, infrastructure, and awareness of e-commerce benefits are key factors driving its adoption among small and micro-sized enterprises.

Although numerous studies have focused on factors influencing e-commerce adoption, research has yet to delve deeply into OCOP entities—a distinct group characterized by small-scale operations, diverse business activities, and typically limited resources. Thanh Hóa Province, which has seen robust development in OCOP products, still lacks systematic and comprehensive studies analyzing the factors influencing e-commerce adoption decisions for these entities. Moreover, most current research emphasizes factors like perceived benefits, technological readiness, or government support, without thoroughly analyzing the roles of innovation capacity and access to information—factors that may significantly impact OCOP entities when adopting e-commerce.

3. Research Model and Research Methodology

3.1 Research Model"

The proposed research model is based on a combination of the TOE framework, TAM, and a review of previous studies.

First, from the TOE framework, the technology factor is represented by " awareness of e-commerce" and "information accessibility." These two factors reflect the level of technological readiness and the vision of the entities in using e-commerce to optimize business operations. According to Rahayu (2015) and Govinnage & Sachitra (2019), perceived benefits and technological readiness are foundational factors driving the decision to adopt e-commerce.

Second, the organizational factor in TOE is represented by "innovation capability" and "Cost perception." The research by Khattak (2022) and Mansor (2010) emphasizes that innovation is key to helping small businesses overcome resource limitations and leverage technology. At the same time, perceived costs reflect the financial capacity and investment considerations of OCOP entities, which is particularly important as small businesses often face challenges in resource management.

Third, the social environment factor highlights the role of pressures from customers, competitors, and support from policies, aligning with Govinnage & Sachitra (2019) who stated that the external environment significantly influences the willingness to adopt technology.

Fourth, the TAM model is supplemented by the factor of " risk perception," which is an important barrier highlighted by Chawla & Kumar (2021) and Lê Văn Thiệp (2016). Concerns about security and transaction safety are reasons many OCOP entities hesitate to adopt e-commerce, especially given their lack of experience with technology and risk management.

Finally, the literature review reveals a gap in the in-depth analysis of the factors affecting the decision to adopt e-commerce by OCOP entities— a specific group with small scale and limited resources. In particular, factors such as "information accessibility" and "innovation capability"—which have not been fully studied—are expected to contribute new insights to both theory and practice.

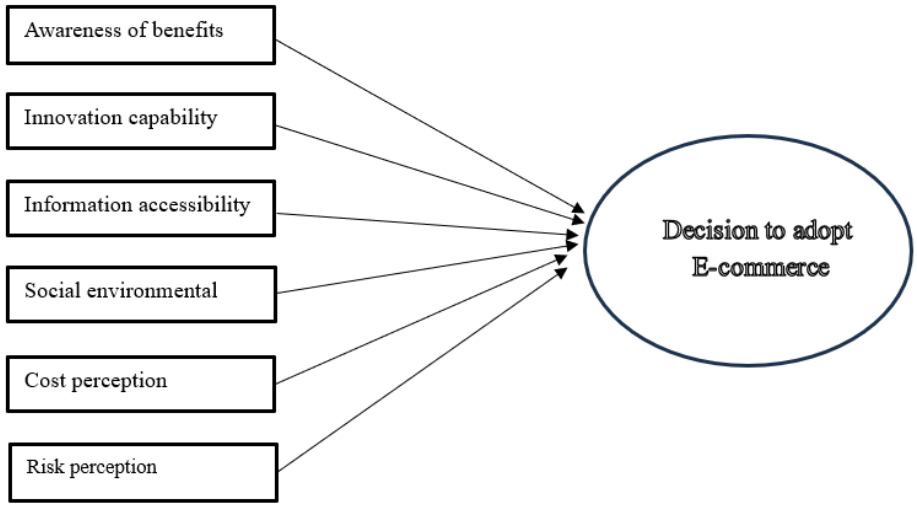

Figure 2: Proposed Research Model

3.2 Research Methodology

Investigation Methods, Sampling, and Processing: The formal research was conducted using a quantitative approach, combining direct survey distribution with online surveys. To reach OCOP entities and gather information for the study, the convenience sampling method was applied. Surveys were distributed directly in localities or online via shared survey links through email, social media groups, and channels involving friends and partners. Additionally, the research received support from specialized agencies that advise and promote OCOP product development locally, aiding in expanding the sample size. The survey distribution period spanned from February 2024 to June 2024, yielding a total of 205 responses through both methods. After excluding invalid responses, only those that met the required standards were compiled, coded, and entered into SPSS software for processing. The final results recorded 189 valid surveys, meeting the criteria for inclusion in the official analysis.

Data Analysis Methods

After identifying the factors influencing the application of e-commerce by OCOP entities, the analysis process is carried out in the following steps: (1) Reliability testing of the measurement scale: The Cronbach's Alpha coefficient is used to test reliability, eliminating observation variables that do not meet the requirements for total correlation. (2) Exploratory Factor Analysis (EFA): Observed variables are reduced into more meaningful factor groups, laying the foundation for regression analysis. (3) Multivariate Regression Analysis: Regression is performed to determine the impact level and order of influence of independent factors on the dependent variable."of e-commerce by OCOP entities, the analysis process is carried out in the following steps: (1) Reliability testing of the measurement scale: The Cronbach's Alpha coefficient is used to test reliability, eliminating observation variables that do not meet the requirements for total correlation. (2) Exploratory Factor Analysis (EFA): Observed variables are reduced into more meaningful factor groups, laying the foundation for regression analysis. (3) Multivariate Regression Analysis: Regression is performed to determine the impact level and order of influence of independent factors on the dependent variable.

3. Research Results

3.1 Development and Application of E-Commerce in OCOP Products in Thanh Hoa

Classified by business type, we have the following results:

Table 1. OCOP Products in Thanh Hóa Province Categorized by Entity and Rating

Content	2021	2022	2022/2021	2023	2023/2022
OCOP Products by Entity	**203**	**236**	**16.26**	**464**	**96.61**
Households	54	69	27.78	172	149.28
Cooperatives	7	8	14.29	10	25.00
Enterprises	64	75	17.19	135	80.00
OCOP Products by Rating	78	84	7.69	147	75.00
5 Stars	1	1	0.00	1	0.00
4 Stars	41	57	39.02	65	14.04
3 Stars	161	178	10.56	398	123.60

Source: Compiled by the author from the Decisions on the Evaluation and Rating Results of OCOP Products in Thanh Hóa Province for 2021-2023

The number of OCOP products and participants in the program has grown significantly over the years, especially from 2022 to 2023 with an increase of 96.61%. Household businesses recorded an outstanding increase of 149.28%, indicating active participation from individuals and small households. Meanwhile, cooperatives and enterprises continue to grow steadily, playing a crucial role in the OCOP ecosystem. In terms of quality, the number of 4-star products has slightly increased, but the number of 5-star products has remained unchanged over the years, highlighting the need for quality improvement to meet higher standards. Notably, the number of 3-star products surged in 2023 with a 123.60% increase, reflecting a trend of scaling up rather than focusing on quality enhancement. Overall, the OCOP program is developing positively, but there is a need to balance growth in quantity with improvement in product quality

Table 2. Growth of OCOP Products on E-Commerce Platforms by Industry and Platform 2021-2023

Content	2021	2022	2022/2021	2023	2023/2022
OCOP Products Using E-Commerce by Industry	**150**	**161**	**7.33**	**187**	**16.15**
Handicrafts	10	15	50.00	22	46.67
Medicinal Plants and Products	2	3	50.00	9	200.00
Beverages	5	5	0.00	11	120.00
Food Products	133	142	6.77	145	2.11
Products by E-Commerce Platform	**150**	**161**	**7.33**	**187**	**16.15**
Voso.vn Platform	46	50	8.70	66	32.00
Posmart.vn	31	27	-12.90	33	22.22
Other E-Commerce Platforms	73	84	15.07	88	4.76

Source: Author's compilation from the E-commerce Report of the Department of Industry and Trade of Thanh Hóa for the period 2021-2023.

OCOP products applying e-commerce have experienced steady growth over the years, with an increase of 7.33% from 2021 to 2022 and 16.15% from 2022 to 2023. Handicrafts,

medicinal herbs, and beverages all showed impressive growth, especially medicinal herbs with a 200% increase from 2022 to 2023, indicating strong potential for development in this sector. Food products also recorded moderate but stable growth, with a 6.77% increase from 2021 to 2022 and only a 2.11% increase in 2023. Regarding distribution through e-commerce platforms, products on Voso.vn saw a strong increase of 32% from 2022 to 2023, while Posmart.vn experienced a decline in 2022 but rebounded with a growth rate of 22.22% in 2023. Overall, the market for OCOP products on e-commerce platforms shows positive development, despite some fluctuations on certain platforms.

3.2 Results of the analysis of factors affecting the decision to adopt e-commerce by stakeholders

3.2.1 Research sample

The survey sample includes 189 OCOP entities, classified by entity type, product category, and business sector. In terms of entity type, household businesses account for the highest proportion with 65 entities, or 34.4%. This is followed by enterprises with 60 entities (31.7%), cooperatives with 57 entities (30.2%), and cooperative groups with 7 entities (3.7%).

Regarding the business sectors of the OCOP entities, the processed food group represents the largest share with 85 entities, or 45%. This is followed by handicrafts with 35 entities (18.5%), beverage businesses with 15 entities (7.9%), medicinal herbs and health care products with 15 entities (7.9%), and community tourism services with 7 entities (3.7%). These figures reflect the diversity in the business sectors of OCOP entities, while also highlighting the disparity in scale and development levels among the different industry groups

3.2.2 Evaluation of the reliability of the scale and exploratory factor analysis testing

Table 3: Correlation Coefficients and Variable Analysis

Group of Factors	Code	Variable Name and Scale (Adjusted)	Total Variable Correlation Coefficient	CA if Excluded	Excluded Variables
Perceived Benefits of E-commerce	LI1	E-commerce optimizes time in management and sales	0.532	0.800	LI5 - Significant reduction in cash transactions
	LI2	E-commerce helps save costs on business infrastructure and human resources	0.826	0.710	
	LI3	E-commerce creates opportunities to expand the market, especially to out-of-province customers	0.629	0.776	
	LI4	E-commerce enhances sales capability and increases OCOP brand value	0.755	0.725	

Innovation Ability	ST2	Ability to apply new technology in production and management	0.516	0.435	ST1 - Creativity in marketing and product promotion
	ST3	Ability to adapt and respond flexibly to the e-commerce environment	0.577	0.351	
Information Accessibility	TT1	Ease of access to information about e-commerce platforms (websites, apps)	0.416	0.642	
	TT2	Ability to access e-commerce training programs and seminars	0.465	0.586	
	TT3	Support level from e-commerce service providers (technical support, consulting)	0.562	0.441	
Social Environmental Factors	XH1	Government and local government support programs for e-commerce development for OCOP entities	0.746	0.731	
	XH2	Online shopping trends and social digital transformation influence the decision to adopt e-commerce	0.497	0.828	
	XH3	The growing development of technology and internet infrastructure facilitates easier participation in e-commerce for OCOP entities	0.742	0.694	
	XH4	The development of cashless payment systems facilitates e-commerce transactions	0.596	0.770	
Perceived Risks	RR1	Concerns about financial security risks in e-commerce platform transactions	0.519	0.515	
	RR2	Potential issues with product delivery, especially with perishable OCOP products	0.745	0.394	
	RR3	Risk of personal information and business data being exploited or not well-secured	0.716	0.340	

Perceived Costs	CP1	Transaction fees and commissions on e-commerce platforms significantly affect OCOP entity profits	0.647	0.683	CP2 - Penalty fees impact seller revenue
	CP3	High costs of online advertising and digital marketing tools for OCOP business budgets	0.732	0.583	

The author continues to perform Exploratory Factor Analysis (EFA) with the 6 measurement scales mentioned above. According to Hair et al. (2014), the conditions for conducting factor analysis are: (1) The Kaiser-Meyer-Olkin (KMO) coefficient should range from 0.5 to 1; (2) The Bartlett's Test of Sphericity should be statistically significant (Sig. < 0.05); (3) The total variance explained should be greater than 50%, and the Eigenvalue (representing the variance explained by each factor) should be greater than 1; (4) The factor loading coefficient should be greater than 0.5 (for sample sizes of 120 or more).

The results from the first test are as follows:

Table 4. KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,519
Bartlett's Test of Sphericity	Approx, Chi-Square	3195,617
	Df	153
	Sig,	0,000

Source: Data Analysis from SPSS Survey, 2024

The factor analysis results show that the KMO index is 0.519, which is greater than 0.5, indicating that the data used for factor analysis is entirely suitable.

The Bartlett's Test of Sphericity yielded a significance level of Sig. = 0.000, which is less than 0.05. This indicates that the variables are correlated with each other and meet the conditions for factor analysis."

Table 5. Rotated Factor Matrix

Variable	Factor				
	1	2	3	4	5
LI2	0,962				
XH1	0,910				
XH3	0,867				
LI4	0,840				
LI3	0,746				
XH4	0,737				
XH2	0,651				
LI1	0,532				
RR2		0,921			
RR3		0,871			
RR1		0,848			
CP1			0,875		
CP3			0,866		
TT3				0,783	

TT1				0,764	
TT2				0,682	
ST3					0,880
ST2					0,841

Source: Data Analysis from SPSS Survey, 2024

With the factor matrix using the Varimax rotation method, the factor loadings of all factors are greater than 0.5. The EFA test has reorganized the 18 observed variables from the 6 original scales into 5 scales, with some variables being reassigned to the appropriate scales.

Table 6: Adjusted model after Cronbach's Alpha and EFA testing

No.	Factor	Scale	Variable Names
1	Perception of benefits and social environment	LIXH	LI1, LI2, LI3, LI4, XH1, XH2, XH3, XH4
2	Risk perception	RR	RR1, RR2, RR3
3	Cost perception	CP	CP1, CP3
4	Information accessibility	TT	TT1, TT2, TT3
5	Innovation capability	ST	ST2, ST3

The research model uses regression analysis to assess the impact of factors including: LIXH (Perception of benefits and social environment), RR (Risk perception), CP (Cost perception), TT (Information accessibility), and ST (Innovation capability), on the dependent variable Q (Business decision to adopt e-commerce for business households). The regression model is expressed as:

$Q = \beta0 + \beta1\ LIXH + \beta2\ RR + \beta3\ CP + \beta4\ TT + \beta5\ ST + \varepsilon$

The results of the regression analysis are shown in the following table:

Table 7: Results of Regression Analysis

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0,893[a]	0,798	0,793	0,44341	2,250
a. Predictors: (Constant), CP, ST, RR, TT, LIXH					
b. Dependent Variable: Q					

Table 8. ANOVA

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	142,288	5	28,458	144,743	0,000[b]
	Residual	35,979	183	0,197		
	Total	178,268	188			
a. Dependent Variable: Q						
b. Predictors: (Constant), CP, ST, RR, TT, LIXH						

According to the test results, the adjusted R-squared coefficient is 0.793, indicating that this linear regression model explains 79.3% of the variance in the sample data, which is greater than 50%. This result is considered good.

Table 9. Coefficients

Coefficients[a]					
	Unstandardized Coefficients	Standardized Coefficients			Collinearity Statistics

Model		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	-1,276	0,297		-4,297	0,000		
	ST	0,086	0,037	0,078	2,338	0,020	0,989	1,011
	TT	-0,009	0,048	-0,006	-0,179	0,859	0,926	1,080
	LIXH	0,824	0,041	0,730	20,020	0,000	0,829	1,206
	RR	-0,087	0,039	-0,077	-2,242	0,026	0,943	1,061
	CP	-0,306	0,039	-0,285	-7,822	0,000	0,829	1,206
a. Dependent Variable: Q								

Source: Data Analysis from SPSS Survey, 2024

The hypothesis test for the model's overall fit, with an F-test result of Sig. = 0.000 < 0.05, indicates that the constructed linear regression model is appropriate for the overall data. The independent variables LIXH, RR, CP, and ST have regression coefficients with Sig. values less than 0.05, indicating that these variables statistically significantly affect the dependent variable. On the other hand, the variable TT has a Sig. value of 0.859 > 0.05, suggesting that this independent variable does not have a statistically significant impact on the dependent variable. This means that the TT variable is excluded, and the remaining variables are accepted. Furthermore, all four independent variables above have Beta values greater than 0, indicating that these variables are positively correlated with business decisions on e-commerce platforms. The test results also show that multicollinearity does not occur because the VIF values are all less than 2. The obtained regression model is:

Q = -1,276 + 0,824 LIXH - 0,306 CP - 0,087 **RR** + 0,086 **ST** + ε

The results from the regression model show the factors influencing the decision to participate in e-commerce by OCOP entities in Thanh Hóa. Specifically, the perception of benefits and social influence (LIXH) has the strongest impact, with a regression coefficient of 0.824, indicating that as the perception of benefits and social influence increases, the likelihood of participating in e-commerce also increases. Next, the perception of costs (CP) and the perception of risks (RR) both have negative impacts, with regression coefficients of -0.306 and -0.087, respectively, suggesting that when entities perceive the costs and risks associated with e-commerce participation as high, they are less likely to decide to participate. Finally, the ability to innovate (ST) has a positive but weaker effect compared to the other factors, with a regression coefficient of 0.086, indicating that innovation can encourage e-commerce participation, especially in product and business process improvements, although the effect is not strong. Overall, factors such as the perception of benefits and social influence play the most significant role in the decision to engage in e-commerce, while the perception of costs and risks hinder this decision.

4. Conclusion and Recommendations

The study has clarified the factors influencing the decision to apply e-commerce by OCOP entities in Thanh Hóa. Among the factors included in the model, the perception of benefits and the social environment have the strongest impact, followed by the perception of costs and risks, both of which have negative effects, while the ability to innovate has a positive effect. Based on the research findings, the author proposes several recommendations to promote the adoption of e-commerce, including:

Enhancing awareness of the benefits of e-commerce

To help OCOP entities better understand the benefits of e-commerce, it is necessary to strengthen communication programs with rich and practical content, focusing on

benefits such as cost savings, optimized management, and market expansion. Additionally, organizing workshops, forums, and practical training courses is essential to provide entities with specific knowledge and skills for applying e-commerce in their business. These programs should incorporate exemplary success stories to motivate and encourage entities to participate more actively.

Minimizing Costs and Risks

Costs and risks remain significant barriers to the adoption of e-commerce, so specific support policies are needed, such as transaction fee exemptions or subsidies for OCOP businesses during the initial phase of implementation on e-commerce platforms. Furthermore, investing in information and transaction security systems is essential to enhance the trust of OCOP entities. Mechanisms to ensure rights and provide support in case of issues, such as transaction insurance or digital security tools, should also be developed to minimize risks.

Supporting innovation capability

Innovation capability plays a crucial role in enhancing the effectiveness of e-commerce adoption. Innovation support programs should focus on product development, packaging design, improving marketing methods, and supply chain management. Additionally, local authorities can encourage collaboration between OCOP entities and technology companies to leverage the power of digital platforms. This not only helps entities enhance their capabilities but also contributes to promoting sustainable innovation in business.

Developing infrastructure and the social environment

To facilitate the participation of OCOP entities in e-commerce, it is important to focus on upgrading telecommunications infrastructure and the Internet network in rural areas, where there are still many limitations. Additionally, building specialized e-commerce platforms for OCOP products could create opportunities for direct connections between sellers and buyers, helping to expand the market. Local authorities should also promote community support programs, creating a favorable social environment that encourages OCOP entities to innovate and adopt e-commerce.

Training human resources and enhancing management capacity

Training and workforce development are key factors for OCOP entities to fully leverage the benefits of e-commerce. Training courses on management skills, business operations on digital platforms, and the use of online marketing tools should be organized. At the same time, entities need support in accessing modern technologies such as business management software or market analysis tools to optimize operations. Enhancing management capacity not only helps improve business efficiency but also increases the competitiveness of OCOP products in both domestic and international markets.

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ECONOMIC GROWTH IN SOUTHEAST ASIA: THE ROLE OF ICT INFRASTRUCTURE AND FINANCIAL DEVELOPMENT

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Abstract: The objective of this paper is to assess the impact of information and communication technology (ICT) infrastructure and financial development on economic growth measured as per capita income across 11 Southeast Asian countries during the period from 1990 to 2023. Using Fixed Effects Model and Generalized Least Squares estimation methods to analyze the research models, the findings indicate that ICT infrastructure including fixed telephone subscriptions, fixed broadband subscriptions, secure Internet servers, and individual Internet users positively affects economic growth and enhances per capita income. Furthermore, financial development plays a critical role in driving economic growth. Our study provides valuable insights for policymakers to better acknowledge the importance of ICT in promoting economic growth.

Keywords: *economic growth, financial development, ICT infrastructure, Southeast Asian.*

1. Introduction

The classical economic theory, when discussing production resources, often refers to three key factors in the labor, capital, and technology model (Cobb & Douglas, 1928), with changes in these factors influencing economic growth (Verma et al., 2023). However, most previous studies have primarily focused on the main drivers of economic growth, such as foreign direct investment (FDI), trade openness, financial development, and labor (Kumari & Singh, 2024). The role of technology has gained significant attention in recent years, particularly in the context of the Fourth Industrial Revolution (Kumari & Singh, 2024), and has led to remarkable transformations in banking and finance driven by rapid advancements in information and communication technology (ICT) (Cheng et al., 2021). Most studies provide reliable evidence that ICT plays a pivotal role in fostering economic growth across various regions, country groups, and individual nations worldwide (Haldar et al., 2023; Kumari & Singh, 2024; Verma et al., 2023; Ze et al., 2023). However, in Southeast Asia, characterized by distinct features, the role of ICT in economic growth has yet to be extensively explored. Ha and Chuah (2023) highlight that among the nearly 8 billion people globally, 67.1% are mobile phone users, 62.5% are Internet users, and 58.4% are active social media users. In Southeast Asia, Internet penetration is 75.6%, with over 400 million Internet users across most countries in the region (except Laos, Myanmar, and Timor-Leste). Additionally, Southeast Asia represents an emerging regional market with a rapidly expanding digital economy spanning segments such as e-commerce, transportation and food delivery, online media, online travel, and electronic financial services. The digital economy in Southeast Asia is

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projected to exceed $300 billion by 2025 or reach $1 trillion in gross merchandise value by 2030 (Ha & Chuah, 2023).

Furthermore, the global financial sector's total spending on ICT products and services exceeded $197 billion in 2014, making it the largest buyer of ICT products and services since the mid-1990s (Cheng et al., 2021; Verma et al., 2023). Since the late 1980s, the development of the financial sector has relied on the transmission and operation of digital information (Cheng et al., 2021). Therefore, the interaction between ICT and financial development plays a crucial role in the relationship between ICT and economic growth. While this relationship has been discussed in a few studies (Aziz et al., 2023; Cheng et al., 2021; Das et al., 2018), research specific to Southeast Asia remains limited.

In summary, this study focuses on analyzing the impact of ICT infrastructure and financial development on economic growth in Southeast Asian countries. Our study makes two significant contributions in areas not previously addressed in existing research: First, we detail the specific impacts of ICT infrastructure factors, such as fixed telephone subscriptions, fixed broadband subscriptions, secure Internet servers, and Individual Internet users, on economic growth in Southeast Asia. Second, we examine the role of financial development in fostering economic growth.

The subsequent sections of this paper are structured as follows: Section 2 reviews related literature; Section 3 outlines the estimation model, data, and methodology; Section 4 presents the empirical results; and Section 5 concludes with a summary and policy implications.

2. Literature review

2.1. The Role of ICT Infrastructure in Economic Growth

Most previous studies agree that ICT is a crucial driver of economic growth and a key focus of national policies. Haldar et al. (2023) assert that information and communication technology (ICT), particularly Internet use and technological innovation, plays a significant role in fostering structural changes that drive economic growth. Using data from 16 emerging economies collected between 2000 and 2018, and applying robust estimation methods such as the GMM and Driscoll-Kraay method, the study finds that ICT not only directly enhances economic growth but also amplifies the effectiveness of financial development on growth. Specifically, Internet use significantly boosts growth among low-income and middle-income groups. Consequently, Haldar et al. (2023) recommend that emerging economies strengthen Internet connectivity to create network effects, improve their capital markets, and expand renewable energy production for sustainable economic growth. Similarly, Ze et al. (2023) assess the impact of ICT and financial globalization on the economic growth of G10 economies using the cross-sectional autoregressive distributed lag (CS-ARDL) model on annual data from 1992 to 2020. Their findings provide reliable evidence that ICT fosters economic growth and enhances long-term per capita income. Therefore, they argue that digitization and financial globalization are imperative for countries pursuing sustainable growth policies. In contrast, Fernández-Portillo et al. (2020) express skepticism regarding ICT's positive impact on economic growth. Investigating this issue using a sample of OECD European Economic Community countries and employing the PLS-SEM estimation technique, they ultimately acknowledge that advancements in ICT deployment and usage do promote economic growth in developed European economies. Pradhan et al. (2021) recognize that

while urbanization can lead to positive economic outcomes, the absence of adequate infrastructure, such as ICT and transportation systems, may result in adverse effects like congestion, slum formation, and other diseconomies of scale. Investigating the role of ICT in economic growth across G20 countries over an extended period from 1961 to 2016, they find that economic growth in these countries, both in the short and long term, depends on integrated policies fostering dynamic urban ecosystems supported by smart transportation systems and well-planned ICT infrastructure.

Focusing on different geographical and economic scopes, Sinha and Sengupta (2022) examine the dynamic relationship between foreign direct investment (FDI), ICT expansion, and economic growth in developing Asia-Pacific countries between 2001 and 2017. Their findings highlight the critical role of ICT in boosting productivity and efficiency, particularly in developing economies. Moreover, ICT development positively influences FDI inflows, prompting the recommendation that nations enhance their ICT infrastructure to attract more FDI and achieve better economic growth. Additionally, Tee et al. (2020) provide evidence that ICT development contributed to the growth of service exports in ASEAN-5 countries from 2000 to 2012, thereby bolstering economic growth. In South Asia, specifically Bangladesh, India, Sri Lanka, and Pakistan, Tripathi and Inani (2020) investigate the impact of ICT on economic growth through GDP indicators during 1990-2014. The study finds that telephone density, measured by the number of fixed and mobile phones per 10,000 people, serves as an ICT proxy and significantly positively impacts economic growth. This finding supports recent economic policies emphasizing ICT in these countries.

In leading global economies like China and the United States, ICT infrastructure further underscores its importance for sustainable economic development. For China, Jiao and Sun (2021) construct a digital economic development index from 2011-2018 for 173 cities based on three levels: Internet development, digital literacy, and industrial efficiency improvement. They find that digital economic development positively impacts urban economic growth in China. For the United States, Adedoyin et al. (2020) emphasize the role of the Fourth Industrial Revolution and ICT in driving economic efficiency and productivity.

2.2. The Role of Financial Development in Economic Growth

Numerous prior studies agree that financial development plays a crucial role in promoting economic growth. A well-developed financial system facilitates the efficient regulation and allocation of capital flows, channeling funds from savings mobilization to productive investments across various sectors of the economy (Khan & Senhadji, 2003). However, Kumari and Singh (2024) argue that the role of financial development in economic growth varies across income groups and is influenced by other factors such as trade and government spending. Their findings indicate a positive effect of financial development on economic growth in high-income countries, while the effect is negative in low-income countries. Hassan et al. (2011) examined the role of financial development in economic growth using a large sample of low- and middle-income countries classified by geographical regions. Their results revealed a positive relationship between financial development and economic growth in developing countries. Durusu-Ciftci et al. (2017) and Caporale et al. (2015) suggest that financial development comprises the aggregation of capital resources from credit markets and equity markets, both of which significantly determine the long-term per capita GDP of nations. Among these, stock markets have

been demonstrated to support economic growth more effectively than other financial intermediaries (Valickova et al., 2015). On the other hand, Ductor and Grechyna (2015) analyzed panel data for 101 developed and developing countries over the period from 1970 to 2010, finding that the impact of financial development on economic growth depends on the growth of private credit relative to real output growth. Their findings also highlight that the effect of financial development on economic growth becomes negative if rapid growth in private credit is not accompanied by corresponding growth in real output. In summary, while debates persist regarding the role of financial development, the majority of empirical studies suggest that financial development contributes to economic growth and improves per capita income (Anwar & Cooray, 2012; De Gregorio & Guidotti, 1995; Estrada et al., 2010; Hunjra et al., 2022; Mohamed Sghaier, 2023; Moosa, 2018; Verma et al., 2023).

In summary, based on previous studies, we expect that ICT infrastructure will have a positive impact on the economic growth of Southeast Asian countries, most of which are developing nations. Furthermore, we also anticipate that financial development will play a crucial role in fostering economic growth and significantly enhancing the positive effects of ICT infrastructure on economic growth.

3. Methodology

The Model

Based on the research models proposed by Aziz et al. (2023) and Sassi and Goaied (2013) we propose the following model to examine the impact of ICT infrastructure and financial development on economic growth in Southeast Asian countries:

Economic Growth = f (ICT Infrastructure, Financial development, Control variables)

In this model, the variables are defined, symbolized, and detailed regarding their data sources in Table 1.

Table 1. Name of variables, code, definition, and data source

Variables	Code	Definition	Data sources	
EG	LnGDP PC	GDP per capita (logarithm nature)	World Development Indicators (WDI)	(Appiah-Otoo & Song, 2021; Cheng et al., 2021)
ICT Infrastructure				
Fixed telephone subscriptions	Tele	Fixed telephone subscriptions (per 100 people), measures the number of fixed telephone subscriptions (including both personal and organizational subscriptions) per 100 people in a country or region. Fixed telephone subscriptions refers to the sum of active number of analogue fixed telephone lines, voice-over-IP (VoIP) subscriptions, fixed wireless local loop (WLL) subscriptions, ISDN voice-	World Development Indicators (WDI)	(Kumari & Singh, 2024)

Variables	Code	Definition	Data sources	
		channel equivalents and fixed public payphones.		
Fixed broadband subscription	Broad	Fixed broadband subscriptions (per 100 people), captures the number of fixed broadband subscriptions per 100 people in a country or region. Fixed broadband subscriptions refers to fixed subscriptions to high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This includes cable modem, DSL, fiber-to-the-home/building, other fixed (wired)-broadband subscriptions, satellite broadband and terrestrial fixed wireless broadband.	World Development Indicators (WDI)	(Appiah-Otoo & Song, 2021; Kumari & Singh, 2024)
Secure Internet servers	SecInter	Secure Internet servers (per 1 million people), measures the number of secure Internet servers per one million people. Secure servers are equipped with encryption technologies, such as Transport Layer Security (TLS) or Secure Sockets Layer (SSL), to ensure data protection during online transactions.	World Development Indicators (WDI)	(Cheng et al., 2021; Kumari & Singh, 2024)
Individual Internet users	Internet	Individuals using the Internet (% of the population). Internet users are individuals who have used the Internet (from any location) in the last 3 months. The Internet can be used via a computer, mobile phone, personal digital assistant, games machine, digital TV etc.	World Development Indicators (WDI)	(Appiah-Otoo & Song, 2021; Cheng et al., 2021; Kumari & Singh, 2024)
Financial development				
Financial	FD	Total credit provided to the	World	(Cheng et al.,

Variables	Code	Definition	Data sources	
development		private sectors (% of GDP)	Development Indicators (WDI)	2021; Kumari & Singh, 2024)
Control variables				
Capital formation	Capfor	Capital formation (the gross domestic investment as a share of GDP)	World Development Indicators (WDI)	(Appiah-Otoo & Song, 2021; Cheng et al., 2021)
Government consumption expenditure	GovExpen	General government final consumption expenditure (% of GDP)	World Development Indicators (WDI)	(Kumari & Singh, 2024)
Population growth	Popugr	Total population growth rate	World Development Indicators (WDI)	(Kumari & Singh, 2024)
Inflation	Inf	Inflation (annual %)	World Development Indicators (WDI)	(Cheng et al., 2021)

Source: Compiled by the authors.

Data

The study sample consists of 11 Southeast Asian countries: Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste, and Viet Nam. Data for all variables were collected from the World Bank's World Development Indicators for the period 1990-2023

Table 2 presents the descriptive statistics of the variables used in the research model. The data structure is panel and unbalanced due to the unavailability of complete data for certain indicators across all countries as compiled by the World Bank. The variable SecInter (representing Secure Internet servers) exhibits higher values for mean, standard deviation (S.D.), and maximum compared to other variables due to differences in measurement scales. We chose not to logarithmically transform this variable to preserve its original characteristics and practical interpretation.

Table 2. Descriptive Statistics of Variables

Variable	Obs	Mean	S.D.	Min	Max
LnGDPPC	374	7.69	1.64	3.93	11.39
Tele	357	10.25	12.13	0.04	48.20
Broad	218	5.26	7.67	0.00	28.54
SecInter	154	7950.75	32649.06	0.02	230000.00
Internet	303	29.17	30.23	0.00	98.97
FD	284	57.16	48.10	0.96	180.04
Capfor	303	27.00	8.12	10.44	70.33
GovExpen	303	16.94	21.05	3.46	147.74

Popugr	374	1.60	0.87	-4.17	5.32
Inf	342	6.47	11.29	-2.31	125.27

Source: Calculated by the authors based on the dataset using Stata software.

Table 3 presents the correlation matrix of the variables included in the research model. Most of the correlation coefficients between variable pairs are below 0.8, except for the pairs representing ICT infrastructure, which exhibit high correlation. To avoid estimation errors due to severe multicollinearity, we will not simultaneously estimate the variables representing ICT infrastructure within the same model.

Table 3. Correlation Matrix

	LnGDPPC	Tele	Broad	SecInter	Internet	FD	Capfor	GovExpen	Popugr	Inf
LnGDPPC	1.000									
Tele	0.820	1.000								
Broad	0.775	0.669	1.000							
SecInter	0.483	0.479	0.560	1.000						
Internet	0.704	0.444	0.788	0.375	1.000					
FD	0.619	0.551	0.559	0.197	0.539	1.000				
Capfor	0.061	0.073	0.010	-0.138	-0.065	0.067	1.000			
GovExpen	-0.110	-0.125	-0.173	-0.097	-0.055	-0.261	0.211	1.000		
Popugr	-0.045	0.132	-0.077	-0.004	-0.243	-0.120	-0.036	0.078	1.000	
Inf	-0.456	-0.281	-0.273	-0.053	-0.253	-0.328	0.055	-0.042	0.010	1.000

Source: Calculated by the authors based on the dataset using Stata software.

Estimation Methodology

We employ the Fixed Effects Model (FEM) to estimate the research models. The FEM approach is chosen as it is more suitable for the characteristics of the dataset, which includes multiple countries, and helps control for unobservable country-specific effects (Wooldridge, 2006). Additionally, we perform tests for heteroskedasticity and autocorrelation. If either or both of these issues are present, we use the Generalized Least Squares (GLS) estimation method to address them and ensure reliable estimation results. The discussions on research findings will be based on the GLS estimation results. This approach aligns with methodologies used in prior studies (Ahmed & Ridzuan, 2013; Hunjra et al., 2022; Parwantoa & Wulansari, 2020).

4. The results

Table 4 presents the results of the effects of ICT infrastructure and financial development on economic growth using the FEM estimation method. However, heteroskedasticity (via the Modified Wald test) and autocorrelation (via the Wooldridge test) are detected in all models (p-value < 0.05). Consequently, the FEM results are deemed unreliable. Therefore, the research models are re-estimated using the GLS method, and the corresponding results are displayed in Table 5.

Table 4. The Effects of ICT Infrastructure and Financial Development on Economic Growth Using FEM

Variables	Model 1		Model 2		Model 3		Model 4	
	Coef.	P - value	Coef.	P - value	Coef.	P - value	Coef.	P - value
Tele	-0.004	0.643						
Broad			0.033***	0.000				
SecInter					0.000	0.515		
Internet							0.013***	0.000
FD	0.012***	0.000	0.007***	0.000	0.005***	0.000	0.007***	0.000
Capfor	0.004	0.376	0.011***	0.001	0.000	0.995	0.008**	0.013
GovExpen	-0.005	0.189	-0.011***	0.000	-0.010***	0.001	-0.007**	0.039
Popugr	-0.231***	0.000	-0.057	0.110	-0.029	0.613	0.020	0.618
Inf	-0.009	0.235	-0.006	0.455	-0.011**	0.047	-0.003	0.642
_cons	7.748***	0.000	7.798***	0.000	8.445***	0.000	7.140***	0.000
Observations	230		164		119		218	
R_Square	0.501		0.564		0.571		0.683	
F stat	35.770		32.160		22.860		72.460	
Prob	0.000		0.000		0.000		0.000	
Modified Wald test (p value)	0.000		0.000		0.000		0.000	
Wooldridge test (p value)	0.000		0.000		0.000		0.000	

Source:Calculated by the authors based on the dataset and using Stata software.

The Impact of ICT Infrastructure on Economic Growth (GDP per capita)

Table 5 presents the results of the effects of ICT infrastructure and financial development on economic growth using the GLS estimation method. Overall, the estimation results from Model 5 to Model 8 consistently provide evidence that ICT infrastructure positively impacts economic growth (per capita income) in Southeast Asian countries. Model 5 show that the regression coefficient of the variable Tele is positive and statistically significant at the 1% level. Model 6 indicate that the regression coefficient of the variable Broad is positive and statistically significant at the 1% level.

Model 7 reveal that the regression coefficient of the variable SecInter is positive and statistically significant at the 1% level. Model 8 demonstrate that the regression coefficient of the variable Internet is positive and statistically significant at the 1% level. In other words, ICT infrastructure plays a crucial role in promoting economic growth and improving per capita income. These findings align with initial expectations and most prior studies (Fernández-Portillo et al., 2020; Haldar et al., 2023; Kumari & Singh, 2024; Pradhan et al., 2021; Ze et al., 2023). Consequently, our results support Appiah-Otoo and Song (2021) perspective on the positive impact of ICT infrastructure development on economic growth across various dimensions. Specifically, ICT infrastructure development helps to: Enhance competitiveness (Pradhan et al., 2014); improve decision-making quality and reduce costs (Vu et al., 2020); lower transaction costs in trade activities (Hasbi & Dubus, 2020); create new employment opportunities, promote e-commerce, and enhance human resource development (Adeleye & Eboagu, 2019); indirectly boost growth by enabling the creation of new products and fostering new business models and processes (Stanley et al., 2018).

Table 5: The Effects of ICT Infrastructure and Financial Development on Economic Growth Using GLS

Variables	Model 5		Model 6		Model 7		Model 8	
	Coef.	P - value	Coef.	P - value	Coef.	P - value	Coef.	P - value
Tele	0.065***	0.000						
Broad			0.098***	0.000				
SecInter					0.000***	0.001		
Internet							0.015***	0.000
FD	0.006***	0.000	0.006***	0.000	0.006***	0.000	0.006***	0.000
Capfor	0.007**	0.018	0.013***	0.002	0.002	0.673	0.008***	0.002
GovExpen	-0.003	0.134	-0.011***	0.000	-0.015***	0.000	-0.007***	0.004
Popugr	-0.050*	0.083	0.008	0.875	0.003	0.977	0.009	0.859
Inf	0.000	0.995	0.002	0.760	-0.005	0.588	0.001	0.880
_cons	6.876***	0.000	7.234***	0.000	8.095***	0.000	6.963***	0.000
Observations	230		164		118		218	
Wald chi2	357.050		300.260		85.980		174.160	
Prob (>chi2)	0.000		0.000		0.000		0.000	

Source:Calculated by the authors based on the dataset and using Stata software.

The Impact of Financial Development on Economic Growth (GDP per capita)

We find consistent evidence of a positive relationship between financial development and economic growth in Southeast Asian countries. Across all models (Model 5 to Model 8), the regression coefficient for the FD variable is positive and statistically significant at the 1% level. These results align with expectations and are consistent with prior studies (Anwar & Cooray, 2012; De Gregorio & Guidotti, 1995; Estrada et al., 2010; Hunjra et al., 2022). This indicates that financial development plays a crucial role in fostering economic growth and improving per capita income, especially in the context of Southeast Asian developing countries. Financial development reduces transaction costs, enhances resource allocation efficiency, increases risk management tools, and optimizes the flow of capital, goods, and services (Demirgüç-Kunt & Levine, 1996; Khan & Senhadji, 2003; Verma et al., 2023).

5. Conclusion and implications

This study assesses the impact of ICT infrastructure and financial development on economic growth (GDP per capita) in Southeast Asian countries. The research sample includes 11 countries—Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste, and Viet Nam—over the period 1990-2023. The research employs FEM and GLS estimation methods to evaluate the models. The findings reveal that ICT infrastructure, including fixed telephone subscriptions, fixed broadband subscriptions, secure Internet servers, and individual Internet users, has a positive impact on economic growth, improving per capita income. Additionally, financial development remains a key driver of economic growth.

Based on the findings, we recommend that Southeast Asian governments recognize the critical role of ICT infrastructure and strategically invest in it as part of national strategies to drive sustainable economic growth and improve per capita income. Moreover, economic development policies, along with effective regulation and allocation of capital within the economy, contribute to economic growth and enhance per capita income.

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WHAT IMPACTS THE LIQUIDITY OF LISTED REAL ESTATE COMPANIES IN VIETNAM?

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Abtract: The study was conducted to evaluate the factors affecting the liquidity of real estate companies listed on the stock exchange in Vietnam. The research used the ARDL model with a panel data set comprising 490 observations from 49 listed real estate companies on the Vietnam stock market from 2014 to 2023. The study results serve as a foundation for the author to propose policy implications to improve the liquidity of listed real estate companies in Vietnam.

Keywords: *Liquidity, real estate companies, listed companies...*

JEL code: G10, G30, G32, G33, G34

1. Introduction

The real estate market is considered a major channel for absorbing and holding substantial capital in the economy. According to reports from the State Bank of Vietnam (SBV), by the end of 2023, real estate debt accounted for over 20% of the total credit outstanding in the economy, equivalent to approximately 3 trillion VND. When adding the debt from corporate bonds issued by real estate companies, the total debt in the real estate sector is estimated at around 3.5 trillion VND, roughly 30% of Vietnam's GDP. This ratio reflects the significant dependency of the economy on the real estate sector and related financial activities. Because of its direct contribution to economic growth and its spillover effect on the development of many industries, a collapse in the real estate market would not only lead to the bankruptcy of real estate companies but also trigger a slowdown in numerous other sectors and economic activities, potentially resulting in stagnation, economic recession, and a financial liquidity crisis. This could lead to a lack of confidence and even public outrage among individuals holding corporate bonds.

According to the Ho Chi Minh City Real Estate Association (HoREA), the real estate market is currently in a prolonged difficult phase, despite some signs of light recovery from the end of 2023 and expectations of a more stable period in the second half of 2024. The "storms" that have constantly hit the real estate market have diminished the confidence of businesses and investors. The number of newly licensed projects and market transactions is at record lows. 2022 was one of the harshest years, with nearly 1,200 real estate companies going bankrupt, a 38.7% increase compared to 2021. 2023 has been a "critical" year for the survival of real estate companies. Many businesses face severe liquidity shortages, resulting in cash flow problems, which might lead to being "stuck with assets" and thus forcing companies to restructure aggressively, halt or postpone investments and projects, stop IPOs, downsize operations, and even reduce labor costs by up to 50-70%. Therefore, finding solutions to overcome the liquidity

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challenges faced by real estate companies is essential for clearing bottlenecks and unlocking resources for the economy's growth, as well as releasing financial system debts tied to unfinished real estate projects.

2. Literature review and Hypothesis

Liquidity is a term used to describe the ability of an asset to be bought or sold in the market without affecting its market value. Liquidity is considered the lifeblood of businesses, and effective liquidity management is one of the requirements for an organization's survival (Truong Ba Thanh, 2018). Since the onset of financial crises, liquidity has become a key topic of interest, with many studies conducted on both theoretical and empirical aspects.

To measure a company's liquidity, some ratios such as the current ratio, quick ratio, cash ratio, and cash holding ratio are often used. However, these indicators have certain limitations:

• The current ratio and quick ratio assume the liquidation of most current assets to pay short-term debts, which is unrealistic as companies are generally considered ongoing concerns. The time it takes to convert current assets into cash is a critical factor for liquidity.

• The cash ratio and cash holdings are also impractical if a company holds too much cash to pay off short-term debts, as this indicates inefficient use of highly liquid assets.

To overcome these limitations, the cash flow ratio has become increasingly popular among financial analysts. This ratio reflects the company's ability to generate cash flow, calculated as cash flow from operations divided by total short-term debt. A company has positive cash flow when its cash inflows are equal to or greater than its outflows. Liquidity's essence lies in the company's ability to meet obligations as they become due, making cash flow management closely related to liquidity management.

Keynes' liquidity preference theory (1936) is the first theory to explain liquidity. According to Keynes, there are three reasons for holding cash: transactions, precautionary, and speculative motives. This theory laid the foundation for many studies on liquidity and its influencing factors.

Many authors throughout the world now use Keynes's theory as the theoretical basis for their empirical studies on liquidity and the identification of the variables influencing corporate liquidity.

i. Revenue

Revenue is an important factor to ensure the liquidity of a business. Stable revenue helps businesses maintain reasonable inventory levels, manage receivables effectively, and ensure timely payments to suppliers. High revenue often brings in greater cash flow, improving the ability to pay short-term debts and operating expenses. Conversely, if revenue decreases or is disrupted, a slowdown in cash inflow will increase liquidity risk. Businesses with high and stable revenue often build trust with stakeholders, including suppliers, customers, and credit institutions. This can help the business easily access funding sources in case of needs to supplement liquidity.

Hypothesis H1 proposed by the research team is:

H1: The revenue positively impacts the liquidity of listed real estate companies in Vietnam.

ii. The Market Capitalisation

The market capitalization of a company is the total market value of its outstanding

shares. It is not a direct factor in determining liquidity, but it plays an important role in building credibility, the ability to raise capital, and maintaining market confidence. Companies with large market capitalization are often highly regarded for their reputation and stability, thereby attracting investors and easily raising capital through the issuance of stocks or bonds. High market capitalization helps businesses access loans or other sources of capital under more favorable conditions, supporting better liquidity in both the short and long term. High market capitalization is often accompanied by stock price stability, thereby instilling confidence in shareholders and suppliers. This can reduce short-term payment pressure and increase the ability to negotiate debts. If capitalization decreases significantly, the business may face pressure from shareholders and a decline in market reputation, negatively impacting liquidity. The research team expects a positive relationship between the market capitalization of the enterprise and its liquidity, therefore the proposed hypothesis H2 is:

H2: The market capitalization positively impacts the liquidity of listed real estate companies in Vietnam.

iii. Financial Leverage

Financial leverage is the use of borrowed capital to increase a company's profitability. However, financial leverage has a dual impact on a company's liquidity: When using reasonable financial leverage, businesses can raise additional loans to invest in profitable projects or fund business activities, thereby improving short-term cash flow. With the additional borrowed capital, the business can use it to pay off short-term debts, improving liquidity. If the loan interest rate is lower than the return on investment assets, using financial leverage will yield higher profits without negatively affecting liquidity. However, using financial leverage also increases the obligation to make periodic interest and principal payments. If the business does not have enough cash flow, the pressure to repay debts will directly affect its liquidity. When financial leverage is too high, the business faces the risk of financial imbalance, reducing its ability to pay short-term debts. If revenue or profit decreases, the burden of interest expenses will erode cash flow, leading to a liquidity shortage (Opler et al., 1999). The research team expects a positive relationship between the use of financial leverage and liquidity. Therefore, the proposed hypothesis H3 is:

H3: Financial leverage positively impacts the liquidity of real estate companies listed in Vietnam.

iv. Company Size

Bruinshoofd & Kool (2004) when studying the liquidity of companies in the Netherlands, during the period 1977 - 1997, with a sample of 453 non-financial companies, confirmed that liquidity increases with the size of the enterprise. Isshaq & Bokpin (2009) when studying the liquidity management of companies listed on the Ghana Stock Exchange also pointed out that the liquidity has a positive relationship with the size. This can be explained by the fact that larger enterprises often have higher reputations and better relationships with banks and investors, making it easier for them to raise short-term capital and improve liquidity. Large scale allows businesses to have lower production and operating costs, increasing profits and cash flow, thereby improving their payment capacity. In addition, large enterprises often can maintain higher levels of cash resreserves and short-term assets, which helps ensure better liquidity when necessary. Therefore, the H4 hypothesis proposed by the research team is:

H4: Company size positively impacts the liquidity of real estate companies listed in Vietnam.

v. Average Collection Period

The average collection period helps assess the ability to convert receivables into cash, or in other words, the company's ability to collect debts from customers. This ratio also provides information about the company's credit policy. A long average collection period means that money is "stuck" in receivables for a longer time, causing cash flow from business operations to decline. This reduces the ability to meet short-term payment obligations, negatively affecting liquidity. A long collection period can lead to the risk of some customers not paying on time or being unable to pay, which diminishes asset quality and puts pressure on liquidity. If cash flow is short due to a long collection period, the business may have to take short-term loans to maintain operations, thereby increasing interest costs and negatively impacting liquidity. The research group expects a negative relationship between the average collection period and the liquidity of businesses, therefore the proposed hypothesis H5 is:

H5: The average collection period negatively impacts the liquidity of listed real estate companies in Vietnam.

vi. Profitability

A high ROE indicates that the company uses capital efficiently to generate profits. Higher profits help businesses increase cash flow from operations, thereby improving liquidity. High ROE often increases the trust of investors and financial institutions. This helps businesses raise capital more easily (through bank loans or issuing shares), thereby supporting liquidity when needed.

Katerina & John (2000) conducted a study analyzing the liquidity of Greek companies in the food and beverage industry in 1997. The research methods used by the authors include residual analysis, correlation coefficient, T-test, and regression analysis. The company's profitability indicators include return on investment (ROI), return on equity (ROE), and net profit margin (NPM). The results show that liquidity and profitability do not have a linear relationship, except in the case of the cash conversion cycle with ROI and net profit margin (NPM), where a positive relationship exists.

Thai & Tran (2018) used data collected from 24 Vietnamese commercial banks over 10 years (2006 - 2015). By collecting, processing, and analyzing data, the study applied the regression method, using the fixed effects model (FEM) to determine the relationship between factors affecting liquidity at commercial banks. The research results show that only the profitability variable (ROE) has a positive correlation with the liquidity ratio of commercial banks.

Companies with high ROE often have large retained earnings, which help maintain cash reserves or short-term assets, reducing liquidity pressure. Therefore, the research team expects hypothesis H6 to be:

H6: Profitability has a positive impact on the liquidity of listed real estate companies in Vietnam.

vii. Fixed Assets Investment

Fixed assets are a part of the means of production, serving as the primary means of labor in the production process, and are the material and technical foundation that plays an important role in production and business activities; they are the conditions for increasing social labor productivity and developing the economy... With rental assets such

as shopping centers, offices, or serviced apartments, high utilization rates help generate a steady cash flow from business operations. This improves the short-term liquidity of the business. Good management of fixed assets minimizes unnecessary costs, such as maintenance, management, or waste from not fully utilizing capacity. Good fixed asset utilization helps increase asset value, thereby improving the ability to use the asset for bank loans or bond issuance. This creates a source of funds to supplement liquidity when necessary. In this study, the research team expects that fixed asset investment will have a positive impact on the liquidity of listed real estate companies in Vietnam, therefore the proposed hypothesis H7 is:

H7: Fixed asset investment has a positive impact on the liquidity of listed real estate companies in Vietnam.

viii. Economic Growth

GDP is included in the research model as an external factor representing the impact of the socio-economic environment on the liquidity of listed real estate companies. Economic growth is often accompanied by higher affordability for customers. This helps real estate businesses reduce payment periods, increase cash flow recovery speed, and maintain stable liquidity. When the economy grows, confidence in the market increases. Banks, investors, and financial institutions are willing to provide capital or invest in real estate businesses, thereby improving liquidity. However, there are also some studies, such as Trần Mạnh Dũng et al. (2018), which have indicated that GDP growth does not affect the liquidity of listed food processing companies on the Vietnamese stock market. However, the research team expects the relationship to be a positive correlation. Hypothesis H8 proposed by the research team is:

H8: Economic growth has a positive impact on the liquidity of listed real estate companies in Vietnam.

ix. Inflation

The inflation rate is measured by the increase in the Consumer Price Index (CPI). The inflation rate is incorporated into the model to examine the impact of the socio-economic environment on the liquidity of listed real estate companies in Vietnam. When the inflation rate is high, it will cause production costs to soar, leading to an increase in the prices of output products. All these factors directly affect the company's profits. Furthermore, the increase in selling prices reduces shopping demand, decreases the demand for the products being manufactured by the business, and the consumption of goods declines significantly. Customers may extend the payment period, directly affecting the company's cash flow. Therefore, the correlation here is expected by the research team to be negative. Hypothesis H9 is proposed as:

H9: Inflation has a negative impact on the liquidity of listed real estate companies in Vietnam.

x. The COVID-19 Pandemic

The COVID-19 pandemic and the extended lockdowns have weakened consumption and investment, limiting the growth prospects of Vietnam and creating significant challenges for businesses in general, particularly real estate companies. Therefore, in addition to other factors, the research team has chosen to examine the COVID-19 pandemic (C19) as a dummy variable, assigning a value of 1 for the year 2020 (the year the COVID-19 pandemic began) and 0 for all other years. In the context of COVID-19, social distancing orders, travel restrictions, and customer reluctance have significantly

reduced real estate transactions, leading to a decline in revenue. Many customers faced financial difficulties during the pandemic, resulting in delays or cancellations of sales/rental contracts, disrupting the cash flow of businesses. Real estate companies engaged in leasing (such as office spaces, shopping centers, serviced apartments) have faced high vacancy rates due to tenants reducing activities or cutting costs. The research team expects an inverse correlation here. The proposed hypothesis is:

H10: The COVID-19 pandemic has a negative impact on the liquidity of listed real estate companies in Vietnam.

3. Research Methodology

3.1 Research Model

Based on a review of both domestic and international studies, within the scope of this research, the research team has chosen to examine 10 key factors that impact the liquidity of listed real estate companies in Vietnam, including: Revenue (TUR), Market capitalization (CAP), Financial leverage (DFL), Firm size (SIZE), Average collection period (RE), Profitability (ROE), Fixed asset investment (EUFA), Economic growth (GDP), Inflation (IF), COVID-19 pandemic (C19). The linear regression model is constructed as follows:

$$LC_{it} = \beta_0 + \beta_1 TUR_{it} + \beta_2 LogCAP_{it} + \beta_3 DFL_{it} + \beta_4 SIZE_{it} + \beta_5 RE_{it} + B_6 ROE_{it} + \beta_7 EUFA_{it} + \beta_8 GDP_{it} + \beta_9 IF_{it} + \beta_{10} C19_t + \varepsilon_{it}$$

In addition to the internal factors within the companies, the research team has chosen to examine several macroeconomic external factors that may impact the liquidity of listed real estate companies in Vietnam, such as Economic Growth (GDP), Inflation (IF), and the COVID-19 pandemic (C19).

3.2 Data Collection and Processing

To estimate the factors affecting the liquidity of listed real estate companies in Vietnam, the study uses secondary data collected from audited financial reports of 49 listed real estate companies in Vietnam from 2014 to 2023. Using data from the Balance Sheet and Income Statement, the research team calculated the dependent variable LC (Cash Flow Ratio) and the independent variables in the research model. Data on Vietnam's Gross Domestic Product (GDP) and Inflation Rate (IF) were obtained from the General Statistics Office of Vietnam (GSO). With 49 listed real estate companies, the authors collected a time series dataset consisting of 490 observations, meeting the requirements for time series analysis (at least 30 observations). After the data is collected, it will be encoded and checked. The study employs a quantitative research method by using a panel linear regression model, utilizing STATA 17 software to process the data and analyze the impact of these factors on the business performance of listed real estate companies in Vietnam.

4. Research Results

4.1 Descriptive Data

Table 1. Descriptive Statistics of the Research Data

Variable	Obs	Mean	Std. dev.	Min	Max
TUR	490	3462.963	14992.41	1	161453
CAP	490	126.6408	855.7969	2.146	10602.9
DFL	490	1.500748	2.663339	.0109	54.3171

```
    SIZE |    490   16009.9  58482.36     3   667656
     RE |    490   434.721  1390.064  -107.26  18935.07
-------------+--------------------------------------------------------
     ROE |    490 .0703086 .2074941    -2.8   .87
    EUFA |    490  47.02597  359.8526  -10.3344  7602.97
     GDP |    490  5.889796  1.794596    2.56    8.02
      IF |    490  2.631306 .8589671    .6    3.54
     C19 |    490 .3040816 .4604875     0     1
-------------+--------------------------------------------------------
      LC |    490 .0513612  1.193095  -10.4941   5.4872
```

Source: Extracted from STATA 17 software

The table above shows the mean, median, maximum, and minimum values for each independent variable. This helps summarize the dataset and provides the reader with a preliminary understanding of the characteristics of the research sample.

4.2 Test of Cross-Dependence

Table 2. Results of the Cross-Dependence Test

```
-------------------------------------------------------------------------------+
  Variable  | CD-test  p-value  average joint T | mean ρ  mean abs(ρ) |
----------------+-----------------------------------+---------------------|
     LC    + -.643   0.520     10.00   + -0.01   0.30   |
    TUR    + 11.643   0.000     10.00   + 0.11    0.35   |
    CAP    + 40.233   0.000     10.00   + 0.37    0.47   |
    DFL    +.076    0.940     10.00   + 0.00    0.37   |
    SIZE   + 34.207   0.000     10.00   + 0.32    0.64   |
     RE    + 5.572   0.000     10.00   + 0.05    0.36   |
    ROE    + 5.09    0.000     10.00   + 0.05    0.34   |
    EUFA   + 3.694   0.000     10.00   + 0.03    0.33   |
    GDP    + 107.2   0.000     10.00   + 0.99    0.99   |
     IF    + 103.437  0.000     10.00   + 0.95    0.95   |
    C19    + 106.915  0.000     10.00   + 0.99    0.99   |
-------------------------------------------------------------------------------+
```

Notes: Under the null hypothesis of cross-section independence, CD ~ N(0,1)

P-values close to zero indicate data are correlated across panel groups.

Source: Extracted from STATA 17 software

Based on the results of the cross-dependence test, there is no cross-dependence for the variables LC and DFL, while the remaining variables exhibit cross-dependence

4.3 Stationarity Test

Table 3. Results of the Stationarity Test for Variables with Cross-Dependence

No	Variables	Level (CIPS)	First Different (CIPS)	Two Different (CIPS)	Conclusion
1	TUR	-2.156	-2.851		I(1)
2	CAP	-1.287	-2.321	-3.440	I(2)
3	SIZE	-1.636	-2.061	-2.839	I(2)

4	RE	-1.394	-2.604		I(1)
5	ROE	-2.193	-2.944		I(1)
6	EUFA	-1.771	-2.582		I(1)
7	GDP	-2.088	-3.612		I(1)
8	IF	-2.193	-4.283		I(1)
9	C19	-1.780	-2.366	-6.190	I(2)
Critical values (10%; 5%; 1%) = -1.98; -2.04; -2.16					

Source: Research Team's Own Compilation

Through the stationarity test for the variables with cross-dependence, in order to include them in the model, the variables CAP, SIZE, and C19 need to be different at the second order, while the remaining variables should be differenced at the first order.

Through the stationarity test for the variables without cross-dependence (LC and DFL), these variables can be directly included in the model.

4.4 Cointegration Test

For the variables with cross-dependence:

Table 4. Results of the Stationarity Test for Variables with Cross-Dependence

Westerlund test for cointegration

H0: No cointegration Number of panels = 49
Ha: All panels are cointegrated Number of periods = 10

Cointegrating vector: Panel specific
Panel means: Included
Time trend: Not included
AR parameter: Same

	Statistic	p-value
Variance ratio	-0.9521	0.1705

Source: Retrieved from STATA 17

Because the p-value = 0.1705 > 5%, there is no cointegration.

- For variables with cross-dependence:

Table 5. Results of the stationarity test for variables without cross-dependence.

Kao test for cointegration

H0: No cointegration Number of panels = 49
Ha: All panels are cointegrated Number of periods = 8

Cointegrating vector: Same
Panel means: Included Kernel: Bartlett
Time trend: Not included Lags: 1.12 (Newey-West)
AR parameter: Same Augmented lags: 1

	Statistic	p-value

Modified Dickey-Fuller t	-1.3863	0.0828
Dickey-Fuller t	-7.3052	0.0000
Augmented Dickey-Fuller t	-24.9973	0.0000
Unadjusted modified Dickey-Fuller t	-10.8012	0.0000
Unadjusted Dickey-Fuller t	-12.4526	0.0000

Vì Pvalue có đồng liên kết vì nhỏ hơn 5%

Source: Retrieved from STATA 17

Cointegration is found in the model, so we use ARDL.

4.5. ARDL Model due to Cointegrated Variables

The results of running the ARDL model are as follows:

Table 6. Regression results of the model

LC	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
dTUR	6.17e-06	.0000179	0.34	0.731	-.000029	.0000413
ddCAP	.0000616	.000105	0.59	0.557	-.0001442	.0002675
DFL	-.01888	.0631638	-0.30	0.765	-.1426787	.1049187
ddSIZE	-2.26e-06	6.19e-06	-0.37	0.715	-.0000144	9.87e-06
dRE	-.0000447	.0000417	-1.07	0.012	-.0001265	.000037
dROE	.2425897	.3958813	0.61	0.041	-.5333234	1.018503
dEUFA	-.0008707	.0003183	-2.74	0.006	-.0014946	-.0002468
dGDP	.2119933	.1672706	1.27	0.025	-.115851	.5398376
dIF	-.0354305	.1053111	-0.34	0.737	-.2418365	.1709754
ddC19	-.7681105	.732576	1.05	0.029	-.6677121	2.203933

Source: Retrieved from STATA 17

Thus, the results of running the regression model show that there are 5 variables that impact the dependent variable LC, specifically RE (Average Collection Period), ROE (Profitability), EUFA (Fixed Asset Investment), GDP (Economic Growth), and C19 (COVID-19 Pandemic), which have a strong correlation with LC at the 5% significance level. The coefficients of the independent variables indicate the degree of fluctuation of the dependent variables when the independent variables change.

5. Conclusion and Policy Implications

i. RE (Average Collection Period) has an inverse effect on the liquidity of listed real estate companies in Vietnam.

In the real estate sector, the average collection period can negatively impact a company's liquidity, which can be explained as follows: When the average collection period is prolonged, the company must wait longer to receive payments from customers. This leads to a shortage of short-term cash flow, reducing the ability to meet financial obligations as they become due.

A longer collection period requires the company to maintain a higher level of working capital to cover daily operational costs. Without sufficient working capital, the company may face difficulties in maintaining continuous business operations. A long average collection period may reflect the company’s acceptance of loose credit terms or customers facing payment difficulties. This increases the risk of uncollected debts,

negatively impacting financial conditions and liquidity. To compensate for slow payments, the company may have to borrow short-term funds to sustain operations, leading to higher interest expenses and affecting profits. Therefore, effectively managing the average collection period is crucial to maintaining good liquidity, especially in the real estate sector, where transactions are often large and payment periods are long.

ii. Profitability has a positive impact on the liquidity of real estate companies.

When a company achieves high profitability, revenues and profits increase, generating more cash flow. This cash flow helps the company easily meet short-term financial obligations, improving liquidity. High profits allow the company to reduce short-term debt or restructure debt, easing financial pressure and improving liquidity ratios such as the current ratio. High profitability also enables the company to invest in income-generating assets, creating a stable cash flow that strengthens liquidity. Furthermore, a profitable company is often more highly regarded, attracting more investors and partners, which improves access to capital and enhances liquidity.

However, it is important to note that the relationship between profitability and liquidity can be influenced by other factors such as capital structure, business strategy, and market conditions. Therefore, companies must maintain a balance between profitability and liquidity to ensure sustainable development.

iii. Fixed Asset Investment has an inverse effect on the liquidity of real estate companies.

This can be explained as follows: The real estate sector relies heavily on fixed assets, such as land, buildings, and construction projects. Companies may increase the use of fixed assets to maximize revenue, but this often comes at the cost of reducing cash or easily liquidating financial resources since fixed assets are less flexible and harder to quickly convert into cash. Investment in fixed assets requires significant capital, which reduces available cash flow, weakening liquidity. Increasing the utilization of fixed assets may push the company into a financial strain, especially if revenues have not yet been converted into cash flow. Due to the nature of the industry, real estate assets are hard to sell quickly when cash is needed. Real estate projects typically have long cycles, requiring companies to advance significant capital before receiving revenue. Therefore, companies need to balance optimizing the use of fixed assets with ensuring short-term cash flow, avoiding liquidity shortages that could lead to financial risks.

iv. Economic Growth has a positive impact on the liquidity of real estate companies.

Economic growth positively affects the liquidity of real estate companies through the following factors: When the economy grows, the income and living standards of people improve, leading to an increased demand for housing and real estate. This creates opportunities for real estate companies to sell their products quickly, boosting revenue and improving liquidity. Economic growth is often accompanied by infrastructure investments, facilitating real estate development. This not only increases the value of real estate but also attracts customers, enhancing the liquidity of the company.

As the economy develops, credit institutions tend to expand lending, including loans for home purchases and real estate investments. This helps customers access capital more easily, driving sales and improving liquidity for businesses. Economic growth builds confidence among investors and consumers, encouraging them to invest in real estate. This not only increases the company's revenue but also helps them raise capital more easily and improve liquidity. However, it is important to note that the relationship

between economic growth and the liquidity of real estate companies can be influenced by other factors such as fiscal policies, interest rates, and specific market conditions.

v. The COVID-19 pandemic has an inverse effect on the liquidity of real estate companies.

The COVID-19 pandemic has severely impacted the liquidity of real estate companies, mainly through the following factors: Many real estate companies experienced a significant decline in revenue due to business disruptions and reduced market demand. According to surveys, 52.5% of companies reported a decrease in liquidity during this period. The ability to collect receivables from customers was affected, leading to increased bad debts and reduced cash inflows, which diminished the ability to meet financial obligations. COVID-19 disrupted supply chains, raising material and construction costs, affecting profitability and the company's ability to make payments. Many companies faced difficulties in accessing credit as banks tightened lending, reducing the ability to finance projects and business operations. Companies also had to spend additional funds on disease prevention measures, increasing operating costs and impacting profits. To improve liquidity, the State Bank of Vietnam could continue to lower interest rates to reduce financial costs for businesses. Providing mechanisms for debt repayment extensions would give companies more time to recover and maintain their business operations.

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A BIBLIOMETRIC REVIEW OF REVERSE LOGISTICS PRACTICES TOWARD A CIRCULAR ECONOMY IN SMALL AND MEDIUM ENTERPRISES

Dr. Vũ Thị Yến[1]

Abstract: This study provides an overview of the development of international research on reverse logistics practices in small and medium enterprises (SMEs) toward a circular economy. Using bibliometric analysis, it offers insights into research trends in this field based on 131 documents published from 2013 to August 2024 in the Scopus database. The results reveal that the number of documents produced has been increasing over time. Furthermore, there has been a substantial increase in the number of publications per year, especially post-COVID-19. In addition, five main themes were identified from the keywords, reflecting research trends in this area, with "sustainable development","supply chain management" and "green manufacturing" being the most prominent. It is widely distributed across four continents, including Asia, the Americas, Europe, and Oceania. Among these, Asia stands out as the continent with the best research performance, with the highest number of published studies during the period from 2013 to August 2024. This study provides valuable insights into the main themes and emerging topics in the field that will shape future research trends.

***Key words**:* Bibliometric analysis, Circular economy, SMEs, Reverse logistic

1. Introduction

The **circular economy (CE)** plays an important role in promoting sustainability by transforming traditional linear economic models into regenerative systems. It emphasizes resource management through the principles of reduction, reuse, and recycling, which are essential for minimizing waste and conserving natural resources *(Batani Raghavendra Rao, Manoj Melangadi, 2024; Rejaul Karim et al., 2024).* The circular economy not only supports environmental conservation but also drives economic growth and innovation, making it a critical strategy for sustainable development across various sectors *(K. Moorthy et al., 2024).* For the circular economy to be effective, the comprehensive participation of stakeholders is required, with businesses who are directly involved in production, resource consumption, and waste generation being the most critical actors. Several studies have shown that effective **reverse logistics (RL)** practices can significantly enhance sustainability by facilitating product recovery and recycling, thereby reducing waste and optimizing resource utilization *(Fabrini Quadros Borges et al., 2024; Temitayo Oluwadamilola Adesoga et al., 2024).* Furthermore, reverse logistics activities not only improve economic performance by recovering value from returned products but also contribute to social benefits by creating jobs in recycling and refurbishing industries *(Temitayo Oluwadamilola Adesoga et al., 2024).* In the global economy, small and medium-sized enterprises (SMEs) make up the majority. To promote the transition to a circular economy, relying solely on the participation of large enterprises is insufficient. SMEs play a crucial role in the shift towards the circular economy.

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Successfully adopting reverse logistics practices enables SMEs to contribute to sustainable development goals while fostering the growth of the circular economy *(Atif Saleem Butt et al., 2023; Fabrini Quadros Borges et al., 2024).* However, this has mostly been implemented in large enterprises. SMEs, due to their resource constraints, have not prioritized or widely adopted reverse logistics practices. SMEs often face challenges in implementing RL due to limited knowledge and resources *(Pravin Mallick et al., 2023).* The number of publications on RL in the context of CE has increased significantly, indicating a rising awareness among stakeholders *(Noor Irdiana Ngadiman et al., 2024).* However, studies on reverse logistics practices in SMEs aimed at advancing the circular economy remain limited.

This paper fills in the gap by conducting a comprehensive bibliometric analysis to identify research productivity, current state of research and uncover emerging trends that will shape future research in this field. A bibliometric analysis reveals significant trends and insights into how RL practices can enhance sustainability and operational efficiency in SMEs.

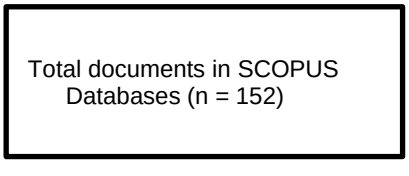
2. Methodology and data

2.1. Data collection

This study utilizes data from the Scopus database, which is a widely-used resource for research and indexes serial publications such as journals, trade journals, book series, and conference series that have been assigned an ISSN. Scopus is one of the most popular online databases for research, offering an extensive range of publications that enable citation and abstract searches, making it highly valuable for bibliometric analysis. According to Elsevier (2023) by March 2023, Scopus has a huge document with 26,591 active peer-reviewed journals, 192 trade journals, 1,167 book series, and more than 11.7 million conference papers in various fields (the sciences, technology, medicine, social sciences, art, and humanities.) (Elsevier, 2023). This database is essential for analyzing the development of research on reverse logistics practices in SMEs toward a circular economy.

To locate documents relevant to our topic, we selected three key search terms: "reverse logistic practice", "small and medium enterprise" and “circular economy”. In addition, we also searched other closed terms to ensure that we did not omit relevant documents. All keywords are added in the string query of the Scopus database.

An advanced search was conducted in mid-August 2024, focusing on documents written in English. This search yielded 152 results. To mitigate publication bias on the research topic, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were utilized. The main stages of the PRISMA diagram are shown in Figure 1.



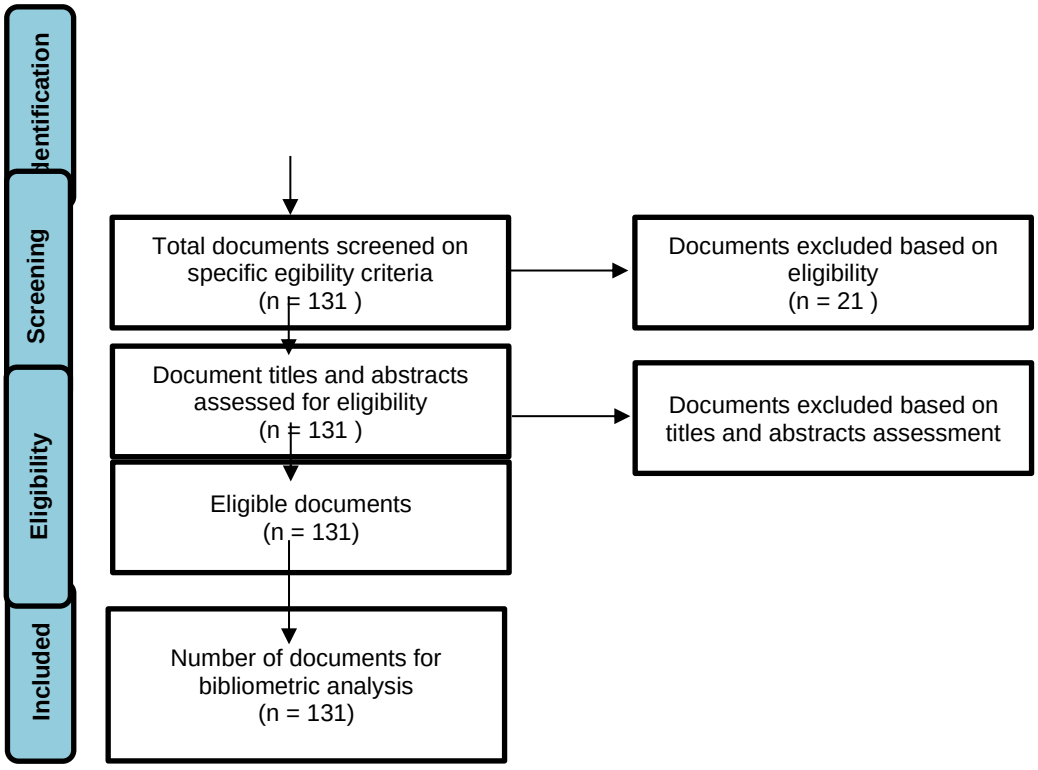


Figure 1: PRISMA diagram

In the first step, the 152 publications were filtered, and any documents still in process were excluded, resulting in 131 final publications. Next, the abstracts and keywords of these documents were examined to identify those specifically related to the research topic of reverse logistics practices in SMEs toward a circular economy. In the final step, 131 publications were selected, including journal articles, books, book chapters, conference papers, conference reivew, and review for comprehensive analysis. The dataset was then downloaded as a CSV file, containing bibliometric elements such as document titles, authors, abstracts, keywords, publication year, source title, document type, references, and affiliations.

2.2. Data analysis

This study employs a bibliometric analysis method, which allows for the analysis of vast volumes of data and high research impact on a lot of topics in business research (Ellegaard & Wallin, 2015). There are two main techniques for bibliometric analysis, including performance analysis and science mapping (Donthu et al., 2021). Performance analysis applies mathematical and statistical methods to uncover the intellectual structure of a research field and visualize specific study areas (Broadus, 1987; Pritchard, 1969). It helps identify the structure of keywords and explore research development by analyzing relevant documents. Techniques such as co-keyword analysis, co-citation analysis, and co-authorship analysis provide an objective overview of the academic context and scholars' interests in a particular research field (Baker et al., 2020; Ramos-Rodríguez & Ruíz-Navarro, 2004). Science mapping illustrates research trends, including the emergence of prominent keyword clusters combined with bibliographic coupling analysis, and helps identify research gaps within the topic (Cobo et al., 2011).

VOS viewer software is used to create graphics that display bibliometric data. The program is free and accessible to all researchers (Van Eck & Waltman, 2010). It

aggregates information from CSV datasets and then creates science maps based on bibliographic data from various options such as co-authorship, keyword co-occurrence, citation, bibliographic coupling, or co-citation (Arruda et al., 2022; Van Eck & Waltman, 2010).

3. RESULT

Development of documents

Research on reverse logistic practice in SMEs toward a circular economy began in 2013, though the number of publications was quite modest at that time. Figure 2 illustrates the development of research in this area from 2013 to August 2024. Publications are diverse, with journal articles accounting for the highest proportion at 85%, followed by conference papers, book chapters, books, and reviews.

Before 2020, the field saw a minimal number of publications (only 17 publications in more than 6 years). However, this number increased rapidly, nearly sevenfold over the next half- decade (from 2020 to August 2024), reaching its peak in 2023. It is evident that this research topic has increasingly attracted the attention of scholars. This can be explained by the fact that, after the outbreak of the COVID-19 pandemic in 2020, the vulnerabilities in the supply chains of SMEs became more apparent. SMEs and their stakeholders have been keen on finding effective solutions to address these challenges. Reverse logistics has emerged as an effective solution, while also contributing to the goal of advancing toward a circular economy.

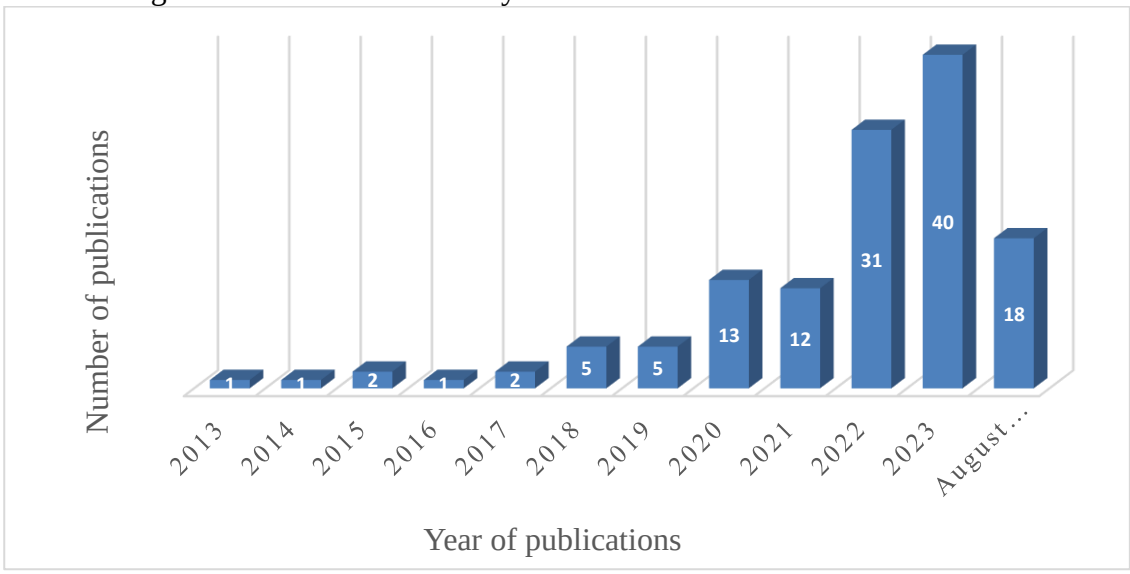


Figure 2: Total documents on reverse logistics practice in SMEs toward a circular economy from 2013 to August 2024.

The most published authors

More than a hundred and fifty authors have published research on the topic of reverse logistics practice in SMEs toward a circular economy. Table 1 details the publication productivity of these authors. The author with the highest number of publications and citations is Dey, P.K., who stands out as the most actively researched and productive author in this field. He has published four articles, with a total of 324 citations, starting with his first publication in 2020. The two authors have the same publications (four publications) but have the less number citations are Garza-Reyes, J.A. and Raut, R.D. Following Dey, P.K., authors such as Paul, S.K. and Chowdhury, P., have also published

high-citation works. However, their research articles are not as numerous or influential as those of Dey, P.K.,.

Table 1: The authors have the most publications

Author Name	Number of publications	Number of Citations	1st published year
Dey, P.K.	4	324	2020
Garza-Reyes, J.A.	4	121	2019
Raut, R.D.	4	44	2022
Paul, S.K.	3	753	2020
Chowdhury, P.	3	753	2020
Chowdhury, S.	3	317	2020
De, D.	3	299	2020
Malesios, C.	3	299	2020
Agyabeng-Mensah, Y.	3	193	2020

The most influential publications

A list of the 10 most influential publications on the topic of reverse logistics practice in SMEs toward a circular economy was classified and selected, as detailed in Table 2. The number of citations was used to evaluate the quality and reliability of these documents.

Topping the list is the article *"Implementation of circular economy business models by small and medium-sized enterprises (SMEs): Barriers and enablers"* by Rizos V. et al (2016), which received the highest number of citations at 667. Ranked second is the paper *"COVID-19 pandemic related supply chain studies: A systematic review"* by Chowdhury P. et al (2021), with 619 citations. Despite being recently published, this article has garnered four times as many citations as many older articles on this topic, demonstrating its significant influence in the research field. The study by Dey P.K. et al (2020) ranks third with 206 citations.

It is notable that more than half of the top ten most cited publications focus on sustainable supply chain management in SMEs, highlighting the importance of this area within the broader topic of reverse logistics practice in SMEs toward a circular economy.

Table 2: The most cited documents

Rank	Authors (Year)	Document Title	Journal	Total Citations
1	Rizos V. et al (2016)	"Implementation of circular economy business models by small and medium-sized enterprises (SMEs): Barriers and enablers"	Sustainability (Switzerland)	667
2	Chowdhury P. et al (2021)	"COVID-19 pandemic related supply chain studies: A systematic review"	Transportation Research Part E: Logistics and Transportation Review	619
3	Dey P.K. et al	"Circular economy to	Business Strategy	206

	(2020)	enhance sustainability of small and medium-sized enterprises”	and the Environment	
4	Singh R.K. et al (2019)	“Applications of information and communication technology for sustainable growth of SMEs in India food industry”	Resources, Conservation and Recycling	130
5	Zhou F. et al (2018)	“Sustainable recycling partner selection using fuzzy DEMATEL-AEW-FVIKOR: A case study in small-and-medium enterprises (SMEs)”	Journal of Cleaner Production	130
6	Seth D. et al (2018)	“Green manufacturing drivers and their relationships for small and medium(SME) and large industries”	Journal of Cleaner Production	123
7	Centobelli P. et al (2021)	“Determinants of the transition towards circular economy in SMEs: A sustainable supply chain management perspective”	International Journal of Production Economics	121
8	Sharma N.K. et al (2021)	“The transition from linear economy to circular economy for sustainability among SMEs: A study on prospects, impediments, and prerequisites”	Business Strategy and the Environment	116
9	Afum E.et al (2020)	“Green manufacturing practices and sustainable performance among Ghanaian manufacturing SMEs: the explanatory link of green supply chain integration”	Management of Environmental Quality: An International Journal	111
10	Marchi B.; Zanoni S. (2017)	“Supply chain management for improved energy efficiency: Review and opportunities”	Energies	111

The most productive journals

There are total of 61 journals that have published documents on the topic of reverse logistics practice in SMEs toward a circular economy. Table 3 shows the fifteen most productive journals that have the most prominent publications in 2013 and August 2024. The analysis results show that “*Sustainability Switzerland”* has published 15 documents

on this topic with the highest total number of citations, reaching 919. Followed by "*Journal Of Cleaner Production",* which has published 13 documents and has 577 citations. In terms of publication productivity on this topic, the *"Business Strategy And The Environment",* is ranked third, with 8 documents and received a total of 524 citations. *"Journal Of Business Research"* stands at the fourth position with 7 papers and 194 citations.

Table 3: The most productive journals

No	Journals	Number documents	Number of Citations	1st published year
1	Sustainability Switzerland	15	919	2016
2	Journal Of Cleaner Production	13	577	2015
3	Business Strategy And The Environment	8	524	2020
4	Journal Of Business Research	7	194	2022
5	Benchmarking	5	62	2020
6	Circular Economy And Sustainability	3	10	2023
7	Energies	3	124	2017
8	Production Planning And Control	3	209	2019
9	Resources Conservation And Recycling	3	157	2019
10	Systems	3	8	2023
11	IEEE Transactions On Engineering Management	2	19	2024
12	International Journal Of Production Economics	2	207	2021
13	Journal Of Manufacturing Technology Management	2	105	2021
14	Management Of Environmental Quality An International Journal	2	111	2020
15	TQM Journal	2	25	2024

The most influence countries

A total of 131 publications have been issued by various nations worldwide (Figure 3). As shown in Table 4, the India is the most influential country in this field, with 40 documents accounting for approximately 31% of the total publications. United Kingdom holds the second position, contributing 26 publications, which make up 20% of the total. China ranks third, with 14 papers comprising nearly 11% of the total. Australia ranked fourth, respectively, with 12 articles, accounting for about 9% of the total.

Table 4: The most influence countries

No	Countries	Number of publications	Percentage in total %
1	India	40	30.5%
2	United Kingdom	26	19.8%
3	China	14	10.7%

4	Australia	12	9.2%
5	Indonesia	8	6.1%
6	Italy	8	6.1%
7	Malaysia	7	5.3%
8	Saudi Arabia	7	5.3%
9	France	6	4.6%
10	Germany	5	3.8%
11	Greece	5	3.8%
12	Bangladesh	4	3.1%
13	Brazil	4	3.1%
14	Portugal	4	3.1%
15	United States	4	3.1%

It can be observed that research on reverse logistics practices in SMEs toward a circular economy is widely distributed across four continents, including Asia, the Americas, Europe, and Oceania. Among these, Asia stands out as the continent with the best research performance, with the highest number of published studies during the period from 2013 to August 2024.

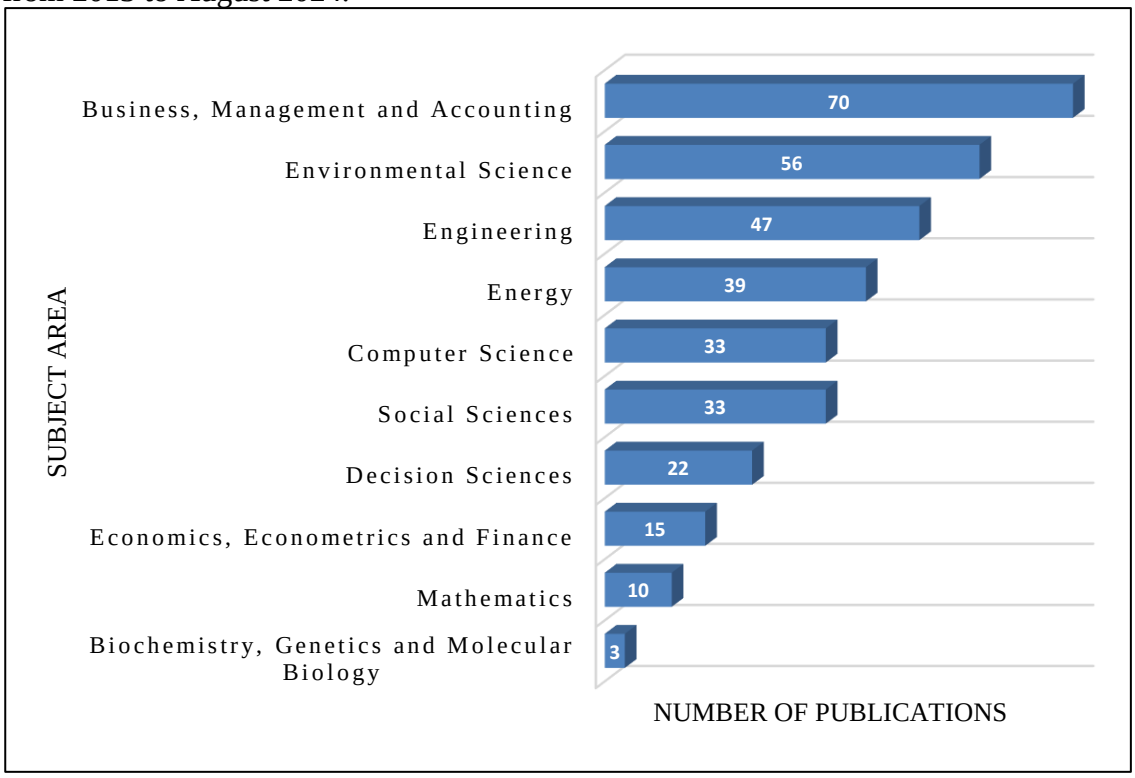


Figure 3: Subject area of research on Reverse logistic practices in SMEs toward a circular economy

Figure 4 shows that, the subject which conducts the most research is "Business, Management and Accounting" with 70 publications. Followed by the subject "Environmental Science" with 56 publications. Third is the subject "Engineering" with 47 publications.

The main themes research

To answer the second research question of this article, the author uses the co-citation analysis technique. This method allows for the measurement of interactions between cited

documents to understand the development of foundational themes in Reverse logistic practices in SMEs toward a circular economy research. In additional, the co-citation network map is established to find out the structure in this research field (McCain, 1990). Out of a total of 11,440 cited references, the analysis filtered out 136 references with at least three citations. Figure 5 presents a scientific map that generalizes the co-citation network of research on the reverse logistic practices in SMEs toward a circular economy. The network is divided into five main clusters, each containing numerous articles sharing a common research theme.

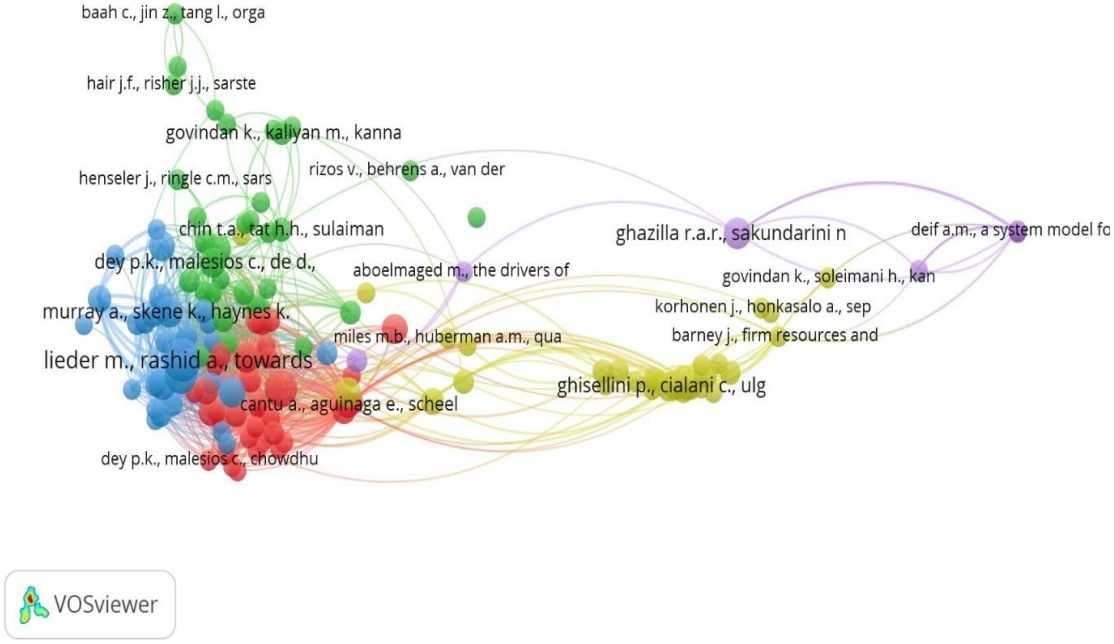


Figure 4: The map of the co-citation network with the most cited references

The development trends of research

To address the development trends of research, a co-occurrence analysis was conducted. This method helps identify major topics and trends in a dataset by analyzing words or phrases that frequently appear together, allowing for the identification of related topics and their development over time (Barberán et al., 2012; Gotelli, 2000). In this research, the co-occurrence analysis technique was applied to examine key phrases and uncover the evolution of the research field, as well as explore future trends in the topic (Zucker & Terzopoulos, 1980). Additionally, a science map was used to visually represent the trend of prominent keywords in the research field of reverse logistic practices in SMEs toward a circular economy (Sedighi, 2016).

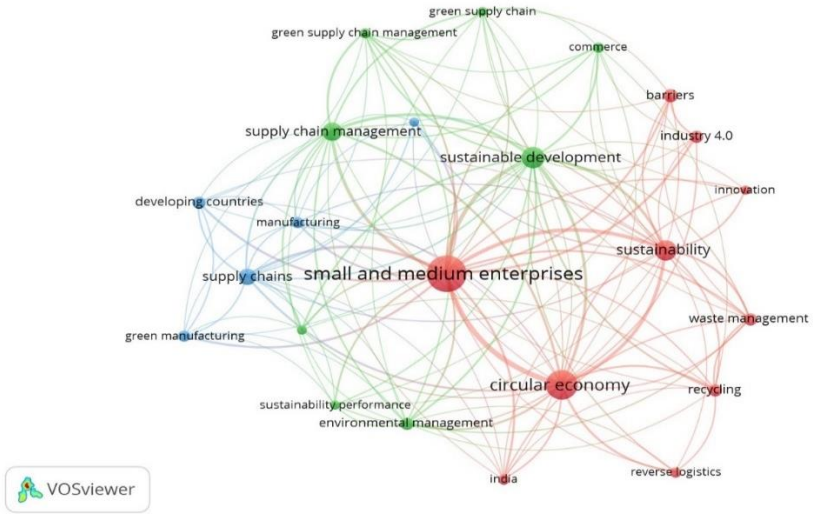


Figure 5 : The map of co-occurrence keywords with all keywords between 2013 and 2024

Between 2013 and 2019, there were 17 publications on reverse logistic practices in SMEs toward a circular economy, generating 185 different keywords. From 2020 to June 2024, 114 documents on this topic were published, producing 806 different keywords. For both research periods, a co-occurrence analysis was conducted using all keywords, with a minimum occurrence threshold of five times. Keywords irrelevant to the analysis, such as those related to research methods, were removed. The results for both stages are visualized using a science map, similar to the co-citation map. Each node in the map represents the number of articles containing a specific term, and the thickness of the network represents the frequency of the keyword.

It is evident that during the period from 2013 to 2019, prominent keywords included “small and medium enterprises”, “circular economy”, “sustainable development”, “supply chain management” and “green manufacturing”. Publications during this period focused on analyzing the green supply chain and supply chain management in SMEs. Additionally, articles from 2013 to 2024 examined the green manufacturing drivers for sustainable growth of SMEs. Some studies from this period highlight trends and propose solutions for adoption of circular economy business models in SMEs. However, research on reverse logistics was less prominent, and the phrase "reverse logistics" appeared infrequently in research keywords.

4. Conclusion

This study offers a comprehensive overview of the research landscape surrounding reverse logistic practices in SMEs toward a circular economy. While the study provides valuable insights, it is important to acknowledge its limitations. First, the analysis is based solely on data from the Scopus database and includes only English-language publications. As a result, the findings may not fully capture studies published in other languages or from other databases, potentially overlooking relevant research. Additionally, the categorization of topics and identification of main research themes may have been influenced by the authors’ perspective, introducing some subjectivity. Lastly, relying on keywords to group research topics might not fully capture the span of research themes due to the limitations of keyword selection within individual documents.

In summary, this study significantly contributes to the understanding of research trends and thematic developments in the field of reverse logistic practices in SMEs toward

a circular economy. By mapping the evolution of research focus from 2013 to 2024, this study highlights the shift towards more innovative approaches and the growing importance of reverse logistic practices in SMEs toward a circular economy. This research provides a foundational understanding that informs future research directions and practical applications in the circular economy.

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GOVERNMENT MANAGEMENT OF LOGISTICS SERVICES IN NGHE AN PROVINCE

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Abstract: Nghe An possesses significant potential for logistics service development, notably a synchronous, modern, and diversified transportation infrastructure that facilitates both domestic and international connectivity. The provincial government has shown a keen interest in developing logistics services through the issuance of logistics development planning and the organization of investment promotion activities. However, there are still limitations in the government's governance, which has not fully fulfilled its role in guiding and supporting the development of logistics services in line with the province's potential and societal needs, thus contributing to local economic growth. Employing primarily a qualitative and quantitative analysis approach, and utilizing secondary data from government agencies, this paper delves into an evaluation of the current state of government management of logistics services in Nghe An province and proposes several solutions to address the existing limitations and inefficiencies, thereby enhancing the effective management of logistics services in the future.

Keywords: *Logistics, state management, provincial government, Nghe An*

1. Introduction

Logistics is a key sector in promoting economic growth and enhancing the competitiveness of localities. With its strategic geographical location, Nghe An is considered an important gateway on the North-South and East-West economic corridors. State management in the logistics sector plays a vital role in providing direction and creating a favorable environment for business development. However, state management of logistics services in Nghe An still faces several limitations, such as ineffective planning and development policies, unsynchronized technical infrastructure, weak human resource quality, lack of coordination among management agencies, overlapping functions and responsibilities, insufficient focus on inspection and supervision, low application of information technology, and poor regional linkages in logistics activities. These shortcomings reduce the efficiency of logistics operations, negatively impacting the province's competitiveness and economic development.

By studying fundamental theories of local government management in the logistics sector, this article will delve into an assessment of the current state management of logistics services by the Nghe An provincial government in recent years. Based on this analysis, the article proposes solutions to address these limitations, enhance state management, and develop logistics services to match their potential and societal demands, thereby contributing positively to the province's economic development

2. Theoretical basis and research methods

2.1. Some concepts

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According to the United Nations, "Logistics is the management of the flow of materials through warehousing, production, and delivery to consumers according to customer requirements" [1].

According to the Council of Logistics Management (USA), "Logistics is the process of planning, selecting optimal solutions to manage and control the movement and storage of materials, semi-finished products, and finished goods, as well as the corresponding information, in a cost-effective and time-efficient manner. This process spans from pre-production stages to the delivery of goods to the final consumer to meet customer requirements" [2].

According to the Council of Logistics Management (CLM), "Logistics is a supply chain process responsible for planning, implementing, and controlling the efficient flow and storage of goods, services, and related information from the point of origin to the final consumption point in alignment with customer requirements" [2].

Doan Thi Hong Van (2003) affirmed that "Logistics is the process of optimizing transportation and storage activities for goods from the production site to the final consumption point through a series of economic activities." Logistics is described as activities (services) related to logistics and transportation, including tasks such as procurement, transportation, production tracking, warehousing, distribution procedures, customs, and more [6].

According to the Vietnam Commercial Law of 2005 (Article 233), "Logistics services are commercial activities in which traders organize the execution of one or more tasks, including receiving goods, transportation, warehousing, storage, customs procedures, other paperwork, customer consultancy, packaging, labeling, delivery, or other services related to goods as agreed with customers for remuneration."According to Nguyen Quoc Tuan (2015), port logistics services are a chain of commercial activities within systems, including loading and unloading, transportation, vessel voyage support, port entry services, warehousing, and transit goods services in the seaport logistics chain to meet the demands of import and export activities [7].

2.2. The role of logistics in the economy

Logistics contributes not only to the efficient and safe transportation of goods but also ensures a seamless connection between the various components of the export process. The economy can only develop in a synchronized and smooth manner if the logistics chain operates continuously. Therefore, the role of logistics in the economy is more crucial than ever in the current context of deep integration. Specifically:

- *Connecting activities in the national economy:* Logistics is the foundation for the economic activities of production, business, and distribution, ensuring a close connection between these processes. When these activities run smoothly, it encourages the development of the manufacturing sector. However, if logistics activities stop, it will hinder trade between regions and countries, negatively impacting overall production and daily life. Therefore, when the efficiency of logistics activities in the economy is affected, improving them can, to some extent, enhance the overall effectiveness of the socio-economic system.

- *Strengthening regional economic relations:* Logistics is one of the key factors enhancing relationships in the international economy. Specifically, the role of logistics in the economy and its integration with the development of multinational corporations (TNCs), trade activities, and investment has become more crucial than ever. Additionally,

these TNCs implement global logistics systems that help ensure the efficiency of production and business activities, while minimizing and maximizing the impact of time, geography, natural conditions, and social factors on goods production.

- *Enhancing national competitiveness:* Efficient logistics activities help improve national competitiveness. The development of logistics can reduce transportation costs, lower product prices, and shorten delivery times, thereby enhancing delivery capacity and leading the way in production, sales, and distribution activities. Along with the growth of logistics, there is also an increased ability to attract investment. Investors are more likely to prioritize countries with favorable development conditions, not only in terms of infrastructure but also due to the level of development of logistics activities.

- *Modernizing the supply chain in the digital economy context:* The Covid-19 pandemic has highlighted the need for digitization and technology. Along with the continuous development in all sectors of the economy and integration measures, the logistics industry is rapidly specializing and becoming a crucial service.

However, it is important to note that these roles of logistics goes beyond a simple activity; it is a chain linking activities that includes the storage of goods, product manufacturing, and distribution. Logistics not only plays an essential role in the economy but also has significant implications for domestic companies and contributes positively to promoting international trade activities. These roles can only be fully realized with effective state management, in which the involvement of local governments is crucial.

2.3. State Management of Provincial Governments for Logistics Services

State management of logistics services refers to the organized and lawful impact by the State on the activities of organizations within the logistics service system. This aims to effectively utilize domestic and international economic resources and opportunities to achieve economic development goals within the overall national economy. It encompasses building and implementing mechanisms, policies, laws, and development plans for logistics services, as well as coordinating and supporting local associations and professional agencies to develop logistics services, enhance the capacity of logistics enterprises, promote the market, and connect logistics service providers with manufacturing and import-export businesses.

At the local level, various studies have examined state management of logistics services, focusing on specific aspects:

According to Nguyen Quoc Tuan (2015), state management of port logistics involves issuing legal documents, guiding agencies to implement state management tasks, and formulating and executing strategies and plans. It also includes directing the development of port logistics services to align with international integration, inspecting and supervising state management processes, providing information to meet management requirements, and organizing scientific research and human resource training.

Nguyen Hai Quang (2016) affirmed that state management of logistics in the aviation transportation sector includes issuing legal frameworks (laws, decrees, circulars) and guiding their implementation. It also involves developing and implementing strategies and plans for integration, managing licenses for operations and business activities, monitoring the activities of related organizations, and conducting scientific research and training for aviation logistics services.

The research of Mai Le Loi (2022) also affirmed that the research identifies key aspects such as formulating strategies, planning, and programs for logistics infrastructure

development; implementing policies for infrastructure development; managing investment capital and attracting investment; managing land use; and inspecting, supervising, and enforcing laws, policies, and plans related to logistics infrastructure.

These studies typically focus on specific aspects of local government management in logistics development. In this article, state management by provincial governments for logistics services is concentrated on the following fundamental areas: Developing logistics sector plan; Formulating policies and issuing legal regulations for logistics; Implementing logistics development plans; Inspecting, monitoring, and supervising the logistics sector.

2.4. Research Methods

To analyze and assess the state management of logistics services in Nghe An province, the author primarily utilizes secondary data collected from various sources such as books, published works in journals, conference proceedings, reports from the Ministry of Industry and Trade, the Department of E-Commerce and Digital Economy, the Vietnam Logistics Business Association, the Nghe An Department of Industry and Trade, the Nghe An Department of Planning and Investment, and the Nghe An Department of Science and Technology.

This research employs a systematic and comparative approach. Based on the collected data, the authors organize and calculate it into tables for easier comparison, commentary, and analysis. These methodologies aim to clarify the current state of state management for logistics services in Nghe An and propose solutions to strengthen local government management in the future.

3. Results and Discussion

3.1. Potential for logistics development in Nghe An

Nghe An province, the largest locality in Vietnam with an area of 16,490 km², had a population of 3,441,971 in 2023, an increase of 21,982 people or 0.64% compared to 2022. The urban population accounted for 15.69%, or 540,045 people, while the rural population made up 84.31%, or 2,901,926 people. The male population was 1,724,496 people. Over 1.2 million people (36% of the province's total population) reside in ethnic minority and mountainous areas, with 491,267 ethnic minority residents accounting for 14.76% of the provincial population and 40.93% of the population in the mountainous region. The province ranks fourth nationwide in population size, with the working-age group comprising over 2 million people, approximately 60% of the total population.

Nghe An is centrally located in the North Central region and serves as a crucial trade hub connecting the North and South of Vietnam. The province boasts a modern and synchronized transportation infrastructure, including an international airport, deep-water seaports, railways, and an extensive network of roads and waterways, enabling seamless domestic and international connections. This infrastructure facilitates the transportation of goods and passengers, supporting economic activities and investments on both national and regional scales. As a result, Nghe An has become an attractive destination for strategic investors and is regarded as a province with significant potential for industrial and service development.

The transportation system in Nghe An is relatively well-developed, featuring 16 national highways spanning a total length of 1,768 km and 32 provincial roads with a total managed length of 662.1 km. The North-South railway section passing through Nghe An covers 128 km and includes one mid-sized passenger station. The seaport system

comprises the international Cua Lo port cluster, the specialized The Vissai port, the DKC oil port, and the Dong Hoi port, all included in the government's master plan. Inland waterways have a total length of 907.6 km, of which 217.1 km are managed by central authorities, 45.1 km by the provincial Department of Transport, and 647.5 km by district, city, and town governments, forming a comprehensive transportation network conducive to logistics development.

Thanks to its outstanding geographical advantages and the decisive leadership of the provincial authorities, Nghe An has witnessed rapid development, particularly in the synchronized and modern investment in industrial and industrial cluster infrastructure. In recent years, turnover of transport, storage and transportation supporting servies of Nghe An province has increased rapidly from VND 10,221.81 billion in 2019 to VND 15,889.56 in 2023 (table 1). These are proofs of the development of the logistics service industry in this locality.

Table 1. *Turnover of transport, storage and transportation supporting servies of Nghe An province from 2019 through 2023 (current price, unit: billion dong)*

By types of ownership	**Year 2019**	**Year 2020**	**Year 2021**	**Year 2022**	**Year 2023**
Passenger transport	2,399.55	2,347.55	1,875.85	2,962.51	3,206.93
Freight transport	6,448.64	6,907.69	7,650.17	9,512.49	10,161.54
Storage	1,366.03	1,454.49	1,711.66	1,968.83	2,506.89
Transportation supporting services	7.59	9.52	12.25	16.44	14.19
TOTAL	**10,221.81**	**10,719.25**	**11,249.93**	**14,460.26**	**15,889.56**

Source: Statistics Office of Nghe An Province

The integration and digitalization of the economy have elevated logistics services to a new level, not only as an investment attraction factor but also as a driving force for economic growth. The success of leading global e-commerce conglomerates, which have fully leveraged the advantages of efficient supply chains, serves as a testament to this. In the past three years, Nghe An has consistently ranked among the top 10 provinces in Vietnam attracting the largest FDI inflows and has successfully lured six leading global technology giants, including Foxconn, Luxshare, Goertek, Everwin, Juteng, and Sunny, with a combined investment of over 1.5 billion USD. This achievement is partly attributed to the province's potential and its efforts to remove bottlenecks and rapidly develop logistics services.

Nghe An is becoming an attractive destination for investors due to the rapid development of its interconnected infrastructure. The operation of the North Central Regional Transport and Warehouse Center at VSIP Industrial Park since May 2020 not only meets the growing demand for goods transportation but also contributes to improving the operational efficiency of businesses. With a modern conveyor system capable of processing 12,000 parcels per hour and optimized operational processes, the center promises to give a significant boost to the development of the local logistics industry.

However, Nghe An still faces numerous challenges in logistics development, especially in integrating different modes of transportation. Limited funding for transportation infrastructure investment has resulted in small-scale and outdated facilities. Additionally, the connection between import-export enterprises and logistics service providers remains weak. The number of logistics service providers is still modest, mainly comprising small and

medium-sized enterprises with limited capital, weak management capacity, and inadequate training to meet the demands of deepening international integration.

3.2. Current status of provincial government management of logistics services in Nghe An

3.2.1. Status of logistics service development planning

In accordance with Decision No. 221/QĐ-TTg dated February 22, 2021, issued by the Prime Minister, which amends and supplements Decision No. 200/QĐ-TTg dated February 14, 2017, regarding the approval of the Action Plan to enhance the competitiveness and develop Vietnam's logistics services until 2025, the province has issued Plan No. 496/KH-UBND on August 27, 2021, to enhance the competitiveness and develop logistics services in Nghe An province until 2025. Accordingly, Nghe An aims to develop logistics services into a high-value-added sector, integrating logistics services with the development of goods production, trade, import-export, transportation infrastructure, and information technology in the province. The logistics services market will be developed in a healthy direction, creating equal opportunities for businesses of all economic sectors, and encouraging investment attraction from both domestic and foreign sources in accordance with Vietnamese law and international treaties of which Vietnam is a member.

Additionally, the province will leverage its geographical advantages, enhancing connectivity to make Nghe An an important logistics hub in the North Central region and nationwide, particularly strengthening the flow of goods to provinces within the East-West Economic Corridor linking Vietnam, Laos, Thailand, Myanmar, and beyond. Resolution No. 39/NQ-TW dated July 18, 2023, by the Politburo has set a target for 2030: Nghe An will become a relatively developed province with a fast and sustainable economy, reflecting the distinctive cultural identity of Vietnam and Nghe, and will be a center for diverse, modern trade and logistics in the North Central region, becoming a key service sector.

Most recently, the People's Committee of Nghe An province issued Decision No. 1769/QĐ-UBND on July 16, 2024, approving the outline and tasks for the development project "Developing Nghe An Province into a logistics center of the North Central region by 2023, with a vision to 2045". The goal of this task and project is to objectively and accurately analyze the current state of logistics service development in the province and propose perspectives, objectives, tasks, resources, solutions, and policies to develop logistics services, aiming to establish stronger regional and international linkages, contributing to the development of Nghe An as a logistics center of the North Central region by 2030, with a vision to 2045.

It is clear that the development of a logistics plan in Nghe An province is being carried out systematically and in coordination with national and regional strategic directions. Nghe An has effectively implemented government policies, especially Decision No. 221/QĐ-TTg and Plan 496/KH-UBND, with the goal of making logistics a high-value-added service sector contributing to the overall development of the province. A key highlight is the focus on exploiting the potential of the province's geographic location and enhancing connections within the North Central region, particularly the East-West Economic Corridor. The Politburo’s issuance of Resolution No. 39/NQ-TW and Decision No. 1769/QĐ-UBND has laid the foundation for Nghe An to strive to become an important logistics hub in the North Central region and the whole country, with a long-term vision to 2045, demonstrating the province's strategic vision and commitment to

building modern logistics infrastructure, enhancing regional integration, and fostering international cooperation. However, in order to achieve these set objectives, the province must continue to improve transportation infrastructure, boost the application of information technology, e-commerce, and attract investment from various economic sectors, particularly foreign direct investment (FDI).

3.2.2. About policy making and law making in the field of Logistics

The logistics development policies of Nghe An province are a collection of guidelines, regulations, and specific measures issued by local authorities to develop the logistics sector in the province. These policies focus on infrastructure planning and development, business support, technology application, human resource development, and enhancing cooperation to improve logistics capacity, contributing to the socio-economic development of the locality.

- *Policy on planning and developing logistics infrastructure:* The provincial government of Nghe An has planned the development of a port system, including seaports, dry ports, and deep-water ports. This includes policies to attract investment for the construction of the Cua Lo deep-water port, capable of accommodating international container ships with capacities ranging from 30,000 DWT to 50,000 DWT. Logistics centers at the Eastern Southeast Economic Zone (about 20 ha), and the Nghi Thiet deep-water port are being developed to serve international cargo transport. These projects include the construction of a dock for 30,000 DWT vessels and one for 50,000 DWT vessels. Other maritime infrastructure projects include a 1,470-meter breakwater, shipping channels, and safety navigation systems. Logistics centers and ICDs will be developed in areas like Vinh City, Hoang Mai, and the Eastern Southeast Economic Zone.

In addition, the development of transportation infrastructure is a priority, with efforts to upgrade roads connecting ports and logistics centers. The seaport system of Nghe An is connected to the Nghi Son port (Thanh Hoa) and Vung Ang port (Ha Tinh), facilitating strong socio-economic development. The coastal road from Nghi Son to Cua Lo, phase I, has been planned, with expectations for significant breakthroughs in development.

The development of ports in Nghe An will connect with neighboring countries and the world, particularly the northeastern region of Thailand, Laos, Cambodia, and China. This is linked to the construction of the Nam Cam station and the railway connecting Nam Cam and Cua Lo, as well as optimizing the Hanoi-Thanh Thuy (Thanh Chuong - Nghe An) expressway leading to Vientiane (Laos).

Nghe An has invested in railways and Vinh airport to enhance regional and international transportation capacity. On February 27, 2024, the provincial People's Committee approved Decision No. 30/QD-UBND to upgrade and expand Vinh airport with an investment of 233.6 billion VND. The project will focus on improving and expanding aircraft parking spaces, increasing the total number of parking slots from 6 to 9 for Code C aircraft, with completion expected within 12 months. According to the Vietnam airport system plan for 2021-2030, Vinh International Airport will be a 4E-class airport with a total area of 557 ha, designed to serve 8 million passengers annually, ranking fourth among the 14 international airports in Vietnam.

The North-South expressway passing through Nghe An spans 87.84 km, including two subprojects. The first subproject, from Nghi Son to Dien Chau, covers 50 km, of which 43.5 km lies in Nghe An and was opened on October 18, 2023. The Dien Chau -

Bai Vot expressway section (from Dien Chau to the 46B National Highway interchange) is expected to be operational by June 30, 2024.

- *Policy to support logistics enterprises:* This includes investment incentives such as corporate income tax exemptions or reductions for large logistics projects when investing in Nghe An, especially attracting foreign direct investment (FDI) into the logistics sector. Businesses in the logistics sector are also supported through exemptions or reductions in land rental fees in industrial zones and economic zones. Logistics companies in Nghe An are given priority access to preferential loans from banks and local development funds. The provincial government also supports businesses in accessing funding from innovation funds and providing training on applying information technology to logistics operations. The government encourages and supports startups in logistics services and enterprises engaged in research and development in logistics technology.

- *Policy to promote the application of information technology in logistics:* The provincial government encourages businesses to adopt digital technologies in managing warehouses, transportation, and supply chains. This includes implementing transportation management systems integrated with e-commerce platforms to optimize the delivery process. The digital transformation of state management and the deployment of online monitoring systems for logistics operations are also part of the strategy to improve management efficiency and reduce costs for businesses.

- *Policy on regional cooperation and international collaboration in E-commerce logistics development*: In the North Central region, Nghe An has actively coordinated with neighboring provinces such as Thanh Hoa and Ha Tinh to establish an inter-regional logistics network to support e-commerce development. This collaboration focuses on developing warehousing centers and strategic transit points, optimizing transportation processes, and reducing logistics costs for businesses. In particular, the provincial governments have shared information on logistics infrastructure and jointly developed key transportation routes, facilitating the distribution of goods within and outside the region.

On the international front, Nghe An has established partnerships with foreign countries such as China, South Korea, and Japan to learn from modern logistics management practices and technology transfer. These collaborative programs not only help enhance the logistics infrastructure capacity but also open up opportunities to attract investments into transportation and warehousing, contributing to the completion of e-commerce supply chains and cross-border logistics.

- *Policy on developing logistics human resources:* Recognizing the critical role of human resources in logistics development for e-commerce, Nghe An has developed training policies to meet the growing needs of the sector. The province has collaborated with local universities such as Vinh University and Nghe An Economics University to offer specialized logistics and supply chain management programs. These programs not only provide theoretical knowledge but also emphasize practical skills, ensuring that students are well-equipped to manage and operate modern logistics systems. Additionally, the province focuses on enhancing the practical skills of the existing workforce through short-term training programs. These courses focus on specific skills such as warehouse management, transportation system operations, and the use of information technology in logistics management. This policy aims to develop a highly skilled workforce capable of meeting the rapid growth of the logistics sector at both provincial and national levels.

3.2.3. About organizing the implementation of logistics service development plan

To raise awareness about logistics and encourage participation from various economic sectors in the logistics field, Nghe An province, in collaboration with relevant professional agencies, has implemented several communication methods. Common communication channels such as newspapers, online media, radio, and television have conveyed information about logistics policies, legal regulations, technological trends, and logistics market activities in the province and nationwide. Public discussions, seminars, scientific workshops, and sharing sessions on logistics have been widely organized, attracting significant attention from businesses, local residents, and managers. Through these communication efforts, both the public and businesses have come to realize the benefits of logistics, leading to increased participation in logistics activities and supply chains. The People's Committee of Nghe An province requires relevant departments, agencies, and localities to effectively apply and organize the implementation of policies and legal regulations related to logistics service development; continue administrative reforms to attract logistics infrastructure investment; and study and propose mechanisms and policies to effectively support the development of logistics services in Nghe An, in line with the province's socio-economic development conditions and legal regulations.

3.2.4. About inspection, supervision, and monitoring in logistics sector

The inspection, supervision, and monitoring of the logistics sector in Nghe An are carried out by authorized state agencies, such as the Department of Industry and Trade and the Department of Transport. These activities mainly focus on ensuring compliance with legal regulations related to transportation, warehousing, customs procedures, environmental protection, and occupational safety. Relevant authorities inspect the quality of logistics services provided by businesses, ensuring that services meet the required standards and are effective. Additionally, the detection and handling of administrative violations in the logistics sector are carried out regularly, from traffic safety violations to errors in administrative procedures. The development of logistics infrastructure projects is also monitored to ensure progress and effectiveness.

Furthermore, Nghe An province pays particular attention to supervising the application of information technology and automation in logistics to improve efficiency, reduce errors, and save costs and time for businesses and the public. These activities contribute to enhancing the quality, efficiency, and sustainable development of the logistics industry in Nghe An.

3.3. Some existing problems in the management of Nghe An provincial government regarding logistics services

In recent years, the management work of the provincial government in Nghe An regarding logistics has made significant changes, creating favorable conditions for the rapid and stable development of logistics in the area. However, alongside the achievements, there are still several shortcomings in the provincial government's management of logistics:

- *About strategy and planning for logistics service development:* Despite recognizing the importance of logistics for economic development, the strategy and planning for logistics development in Nghe An still lack coherence and long-term vision. The provincial logistics development strategies mainly focus on transportation infrastructure development, but they lack close integration with other sectors like manufacturing, commerce, and services. This has led to disjointed implementation of logistics projects in the province. Furthermore, the

logistics development strategy is not flexible enough to adjust to rapid changes in the domestic and international logistics market, such as the development of new technologies (Logistics 4.0, automation, AI). Additionally, logistics development plans have not been fully integrated into the provincial economic and social development plans, meaning resources for the sector are not optimized and effectively utilized.

- *About policy and legal regulations on logistics*: A major issue in logistics management in Nghe An is the lack of clear and coherent policies and legal regulations. While some policies to promote logistics development exist, these policies are not strong enough to create a competitive environment or encourage investment in logistics. The policies are also not aligned with national regulations and international factors, making it difficult for logistics businesses to comply with customs, transportation, warehousing, and environmental protection laws. Moreover, the formulation and promulgation of policies and regulations have not been timely, especially as the logistics industry develops rapidly, requiring regular updates to legal provisions. Furthermore, there is insufficient legal support for small and medium-sized enterprises, making it challenging for them to access resources and expand logistics services domestically and internationally.

- *About implementation of logistics service development plans and policies:* The implementation of logistics development plans and policies in Nghe An still faces many limitations. Firstly, human resources, which are essential for logistics, remain insufficient. Although the province has some universities offering logistics programs, the quantity and quality of the workforce are not yet adequate to meet industry needs. Educational institutions have not updated their curricula in line with market demand, leading to a shortage of skilled personnel in areas such as supply chain management, warehousing operations, and logistics technologies. Furthermore, the coordination between government agencies and businesses in implementing logistics development plans is not as tight as it should be. Some policies are either not applied effectively or fail to achieve the expected results. Notably, resource allocation for the logistics sector has been inefficient, causing delays or incomplete implementation of logistics projects.

- *About inspection, supervision and monitoring in logistics sector*: The inspection, supervision, and monitoring of logistics in Nghe An still face several challenges. One significant issue is the lack of resources for regular inspections and monitoring, especially as the logistics market continues to grow in scale and expands into new markets. Agencies such as the Department of Industry and Trade, the Department of Transport, Customs Department, and Market Management Department face difficulties controlling logistics activities at the enterprise level, especially with the rapid growth of online logistics services and small logistics companies. There is still overlap in inspection and monitoring efforts, meaning violations or lapses in logistics service provision are not always identified and addressed in time. Furthermore, the monitoring of new technologies in logistics has not been given adequate attention, such as the use of supply chain management information systems, warehouse management, or automation technologies in logistics operations. The lack of monitoring of technological advancements prevents the provincial government from fully leveraging opportunities for sustainable and efficient development in the logistics sector.

4. Recommending some solutions to enhance the management of logistics services by Nghe An provincial authorities

4.1. Solution to improve the strategy and development plan for logistics:

To improve state management, Nghe An province needs to develop a long-term logistics development strategy that is in line with the province's socio-economic development strategies. This strategy should be based on the province's internal factors, such as geographical location, transportation infrastructure potential, and key industries, while being flexible and adaptable to the development of both domestic and international logistics markets. In addition, Nghe An needs to develop a detailed logistics development plan, focusing on the development of transportation infrastructure, warehouses, large logistics centers, and the application of technology in supply chain management. These plans need to be integrated into the development programs for key industries like processing, trade, and services to ensure synchronization and effectiveness.

4.2. Solution to encourage and support logistics businesses

Nghe An needs to establish programs that support logistics businesses, especially small and medium-sized enterprises (SMEs), through tax incentives, preferential loans, and reducing administrative procedures. The government should also create opportunities for these businesses to connect with each other, build an efficient logistics network, and promote public-private partnerships in developing logistics infrastructure. Logistics businesses should be encouraged to invest in new technologies such as automation and artificial intelligence to improve operational efficiency and reduce operating costs. The provincial government could also assist through training programs and technology transfer to small logistics businesses, helping them improve their competitiveness and meet the needs for sustainable development.

4.3. Solution to improve the construction and issuance of policies and legal Frameworks for logistics

Nghe An’s government needs to focus on building and completing the logistics policy system, ensuring consistency with national and international regulations. These policies should encourage the participation of logistics businesses, especially SMEs, by offering financial support, reducing administrative procedures, and providing tax incentives. The province should also pay more attention to updating and issuing legal regulations related to transportation, environmental protection, and labor safety in logistics, to create a clear and favorable legal environment for businesses. These legal regulations need to be feasible and in line with the actual operations of the logistics industry in the province.

4.4. Solution to enhance the implementation of logistics development plans and policies

To improve implementation, Nghe An's government should organize conferences, forums, and discussions between government agencies and logistics businesses to listen to feedback and contributions from businesses. This helps to build partnerships between stakeholders and create an effective coordination mechanism between government agencies in implementing logistics development plans. In addition, the province needs to strengthen human resource development for the logistics sector, focusing on areas such as supply chain management, warehouses, transportation, and technology applications. Universities and training institutions must regularly update their curricula to align with the sector's requirements, in order to provide quality human resources for logistics businesses.

4.5. Solution to improve the effectiveness of logistics inspection, supervision and monitoring

To improve supervision effectiveness, Nghe An needs to increase resources for key agencies such as the Department of Industry and Trade and the Department of Transport to conduct more frequent and effective inspections. These agencies should be equipped with technological tools to assist in monitoring, from customs control and transportation to environmental monitoring in the logistics sector. A coordination mechanism between government agencies is essential to supervise logistics activities. Agencies like Customs, the Department of Natural Resources and Environment, the Department of Industry and Trade, and other relevant units need to conduct synchronized monitoring and share information to detect and handle violations in a timely manner. Particularly, monitoring the application of technology in logistics, including supply chain management information systems, will help improve the efficiency of supervision and management.

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THE IMPACT OF TECHNOLOGY AND DIGITAL TRANSFORMATION ON ECONOMIC GROWTH IN VIETNAM IN THE NEW CONTEXT

Nguyen Thi Luong Anh[1]

Summary: In the context of Vietnam's economy increasingly focusing on digital transformation and the application of technology to promote sustainable development, understanding the impact of these factors on economic growth has become crucial. Technology and digital transformation have played a key role in improving labor productivity and enhancing the efficiency of core industries, while also contributing to Vietnam's GDP growth in recent years. Specifically, the development of information technology infrastructure and the widespread adoption of advanced technologies such as Artificial Intelligence (AI) and Big Data have enabled businesses to optimize production processes, reduce costs, and improve product quality. The article highlights the strong correlation between the national digital transformation index and economic growth, as regions with higher levels of digital transformation tend to experience faster economic growth. These results suggest that digital transformation is not only a driver of innovation but also a vital force that helps Vietnam enhance its competitiveness in the global economy.

Keywords*: Science and technology, economic growth, labor productivity, digital transformation*

1. Introduction

In the context of globalization and the Fourth Industrial Revolution, science and technology have become key drivers of economic development. Particularly for Vietnam, the application of science and technology not only helps improve labor productivity but also creates opportunities for transforming the growth model and enhancing global competitiveness. Vietnam has achieved significant economic milestones, with GDP per capita reaching approximately 4.620 USD (according to data from the International Monetary Fund (IMF) updated in April 2024), driven by factors such as infrastructure investment and technological innovation. However, the country's investment in research and development (R&D) accounts for only 0,4% of GDP (2023), much lower than the average of ASEAN countries (1%) and developed nations (over 2%). This reflects a shortfall in technology investment and application across the economy. According to the General Statistics Office, the application of technology in agricultural production reached 23% in 2023, a significant increase compared to previous years. The processing industry also saw remarkable growth, with export turnover reaching 295,23 billion USD in the first 10 months of 2024, thanks to the adoption of high technology in production. However, Vietnam still faces significant challenges in applying science and technology, including a shortage of skilled technical labor and an underdeveloped technological infrastructure. Surveys show that approximately 45% of businesses face difficulties in adopting new technologies. In this context, the article will analyze the impact of science

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and technology on Vietnam's economic growth and propose solutions to maximize the potential of technology in driving sustainable growth in the future.

2. Literature Review

Globally, there have been significant studies and reports from authors, international organizations, and domestic research agencies that aim to clarify the factors related to the impact of science and technology and digital transformation on economic growth. These studies not only highlight the link between technology, digital transformation, and economic development but also identify the challenges that Vietnam faces in applying technology across key sectors of the economy.

Robert Solow, in his study *A Contribution to the Theory of Economic Growth*, demonstrated that technology is a key factor in long-term economic growth through improvements in total factor productivity.

Paul Romer, in his work *Endogenous Technological Change*, presented the theory of endogenous growth, emphasizing the role of technology and innovation in driving economic growth and labor productivity.

Robert Lucas, in *On the Mechanics of Economic Development*, analyzed the relationship between human capital and economic growth, pointing out that education and scientific research play a crucial role in advancing economic development.

The 2023 report from the Ministry of Science and Technology of Vietnam summarized the advancements in science and technology and their impacts on key economic sectors, particularly the processing industry and agriculture.

A study by CIEM highlighted the application of technology in the processing, manufacturing, and agricultural industries and analyzed the factors that both promote and hinder the adoption of technology in Vietnam.

The World Bank's 2023 report analyzed the role of digital transformation and digital technologies in promoting economic development in Vietnam, providing data on industries related to digital technologies.

An article by Bui Quang Vinh in the *Economic and Forecasting Journal*, titled *Science, Technology, and Economic Development: Opportunities and Challenges for Vietnam*, examined the opportunities and challenges Vietnam faces in applying science and technology, offering recommendations for developing a sustainable economy through technological advancements.

Although these studies have clearly emphasized the important role of science and technology in economic growth, particularly in improving labor productivity and driving digital transformation in Vietnam, there are still some gaps that need to be addressed. Specifically, most studies focus on the relationship between technology and economic growth but do not delve into the social and environmental impacts, nor do they offer concrete solutions for training human resources and building technological infrastructure.

3. Research Methodology

This article uses data collected from the reports on Vietnam's socio-economic situation over the years by the General Statistics Office, the 2023 National Digital Transformation Report, and other relevant sources. It employs Excel software to calculate and create comparison tables for GDP growth rates over the years, growth indicators for Vietnam’s economy, and charts comparing the national digital transformation index. Additionally, the article applies statistical methods and aggregates economic growth indicators to analyze and evaluate the impact of technology and digital transformation on

Vietnam's economic growth.

4. Research Findings

4.1. Application of Science and Technology in Key Sectors

Science and technology have made significant contributions to the development of Vietnam's key economic sectors, particularly in the processing, manufacturing, and agricultural industries. The application of advanced technologies has helped improve labor productivity, product quality, and production efficiency. Below are data illustrating the development of these sectors over the past five years.

Table 1: GDP Growth of Key Sectors from 2018 to 2023

Unit: %

Year	GDP Growth	Growth in the Processing and Manufacturing Industry	Growth in the Service Industry	Growth in the Agriculture Industry
2018	7,08	3,76	8,85	7,03
2019	7,02	2,01	8,90	7,30
2020	2,91	2,68	3,98	2,34
2021	2,58	2,90	4,05	1,22
2022	8,02	3,36	7,78	9,99
2023	5,05	3,83	3,74	6,82

Source: *General Statistics Office of Vietnam*

Based on the data from 2018 to 2023, Vietnam's GDP growth showed significant fluctuations, especially in the context of the COVID-19 pandemic. Although 2020 recorded the lowest growth rate during this period (2,91%), the economy rebounded strongly in the following years, with GDP growing by 8,02% in 2022 and 5,05% in 2023.

The industrial and construction sectors have continued to make a significant contribution to GDP, particularly the manufacturing and processing industry. From 2018 to 2023, the manufacturing and processing sector experienced steady growth, although there was a decline in 2020 and 2021. In 2023, the industrial and construction sectors grew by only 3,74%, but still accounted for 28,87% of GDP, underscoring the importance of this sector to Vietnam's economy.

The development of the industrial sector in recent years has been strongly influenced by science and technology, especially in manufacturing, automation, and advanced technologies. For instance, Industry 4,0 technologies, such as the Internet of Things (IoT), Artificial Intelligence (AI), and Big Data, have helped improve production efficiency and labor productivity. Companies in the manufacturing and processing industries have implemented automation in production lines, improving quality and reducing costs. However, to maintain and enhance its competitive position, Vietnam needs to continue promoting the application of modern technologies, such as 3D printing, AI in management and production, and biotechnology in food processing and agriculture.

The service sector played the most important role in Vietnam's economy, contributing 62,29% to GDP in 2023. This sector's growth rate reached 6,82%, higher than those of other sectors, driven by digital transformation and the application of technology across various fields. Services such as e-commerce, finance, banking, and online services saw significant growth during the pandemic, and this trend is expected to continue in the future.

Although the agriculture, forestry, and fisheries sectors contributed 8,84% to GDP

in 2023, this sector still faces many challenges in applying science and technology to improve productivity and quality. Vietnamese agriculture remains largely reliant on manual labor and traditional production methods, resulting in low labor productivity and added value in this sector.

4.2. The Impact of Digital Transformation on Economic Growth

Digital transformation is a key factor in driving economic growth, particularly in sectors such as e-commerce, finance, and education. According to a report from the Ministry of Information and Communications, the standing agency of the National Committee on Digital Transformation, Vietnam has made significant progress in applying digital technology to these industries.

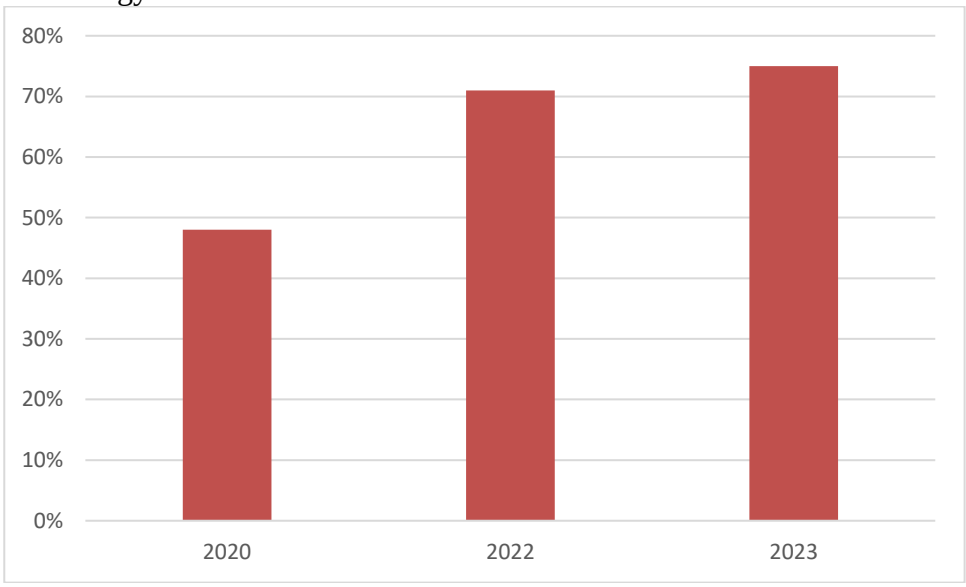

Figure 1: Vietnam's National Digital Transformation Index

Source: Ministry of Information and Communications

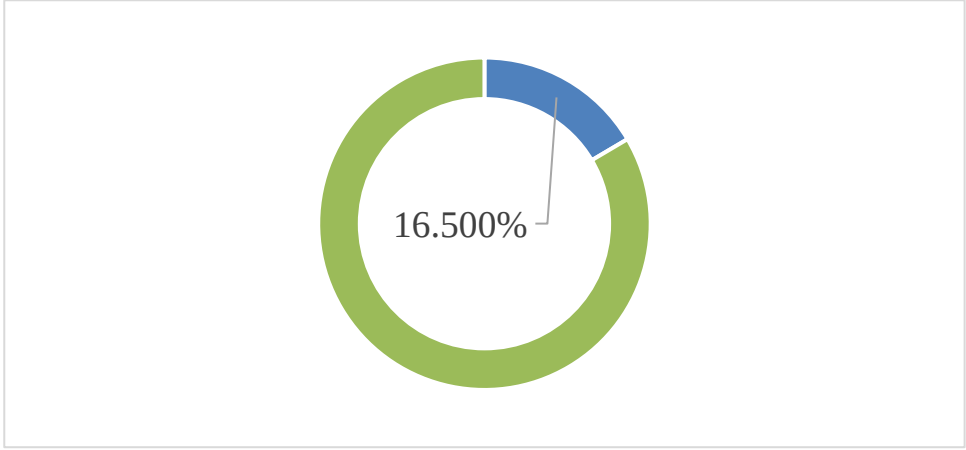

Figure 2: Proportion of the Digital Economy/GDP in Vietnam in 2023

Source: Ministry of Information and Communications

Science and technology, particularly digital transformation, play a crucial role in driving economic growth in Vietnam in the current context. Vietnam launched its national digital transformation strategy in 2020, with the national digital transformation index reaching 48% in 2020, rising to 71% in 2022, and reaching 75% in 2023. This increase

reflects Vietnam's strong efforts to promote the application of information and digital technology across various sectors of the economy and society. Science and technology, especially digital transformation, have helped enhance Vietnam's national competitiveness by optimizing production processes, improving service quality, and boosting the efficiency of state management. The digitalization of public services, the promotion of e-commerce, and the development of digital platforms for industries have helped reduce transaction costs, expand markets, and increase opportunities for small and medium-sized enterprises.

Digital transformation also plays an important role in promoting the development of the digital economy, a sector experiencing strong growth. Vietnam's digital economy is currently growing at a rate of 20% annually, three times the rate of GDP growth, indicating that this sector is a major driver of economic development. The proportion of the digital economy in GDP reached 16.5% in 2023, a clear sign of a significant shift from a traditional economy to a technology-driven, digital economy.

Sectors such as agriculture, manufacturing, finance, and education are becoming key drivers in digital transformation, thanks to the application of new technologies like Artificial Intelligence (AI), Big Data, and the Internet of Things (IoT). These technologies not only enhance productivity and work efficiency but also help address social issues such as reducing pollution, protecting the environment, and creating sustainable development models.

4.3. Labor Productivity and Economic Production Efficiency

The application of science and technology has also improved labor productivity in Vietnam. According to the report from the Ministry of Science and Technology (2023), labor productivity in Vietnam showed remarkable growth in 2023, driven by technology transfer and investment in information technology infrastructure.

Table 2: Economic Growth Indicators in Vietnam, 2021-2023

Indicator	Unit	2021	2022	2023
Economic Structure				
Agriculture, forestry, and fisheries	%	12,36	11,88	11,96
Industry and construction	%	37,86	38,26	37,12
Services	%	40,95	41,33	42,54
Taxes on products minus subsidies	%	8,83	8,53	8,38
GDP Usage				
Final consumption growth	%	2,09	7,18	3,52
Asset accumulation growth	%	3,96	5,75	4,09
Exports of goods and services growth	%	14,01	4,86	-2,54
Imports of goods and services growth	%	16,16	2,16	-4,33
GDP Size				
GDP at current prices (trillion VND)	Trillion VND	9,261	9,513	10,222
GDP per capita (USD)	USD	4.110	4.483	4.284,5
Labor Productivity				
Labor productivity (USD/labor)	USD	7.398	8.083	8.380
Labor productivity growth (real)	%	4,71	4,8	3,65
Share of labor force with certificates or	%	26,1	26,2	27

qualifications				

Source: *General Statistics Office*

In recent years, the structure of Vietnam's economy has undergone significant changes. The share of the services sector in GDP increased from 40,95% (in 2021) to 42,54% (in 2023), while the share of agriculture, forestry, and fisheries decreased from 12,36% to 11,96%. This shift reflects a strong trend of digital transformation within Vietnam's economy, particularly in the services sector. Sectors such as finance, banking, e-commerce, and digital services are rapidly developing and contributing increasingly to the national GDP. Digital transformation is not only driving changes in the structure of industries but also helping to improve labor productivity, achieve sustainable growth, and enhance production efficiency.

Reports from the government highlight that digital transformation and technology development are central to the strategy for socio-economic development in the 2021-2030 period. The government has actively implemented policies to encourage the application of technology across all sectors, especially in industrial production and services. High-tech applications in areas such as automation, artificial intelligence, and e-commerce are driving the rapid transformation of Vietnam's economy. The economic structure is gradually shifting from one primarily dependent on agriculture to one based on industry and services, particularly those sectors that offer high value-added benefits through technology.

According to data from government reports, in 2023, final consumption contributed 41,04% to the overall economic growth rate, while exports and imports of goods and services decreased slightly. This indicates that the Vietnamese economy is facing difficulties due to external factors such as supply chain disruptions and global trade conditions. However, to maintain sustainable growth, it is essential to boost the export of high-tech products and digital services. Digital transformation is the key to maintaining and increasing the value of exports. High-tech sectors such as software, digital services, and technology products will play a crucial role in generating value-added for the economy. Additionally, the application of science and technology in production will help reduce costs, improve productivity, and enhance product quality, thus increasing the competitiveness of Vietnam's economy on the global stage. The government has recognized the need to enhance production capacity, innovate technology, and develop digital infrastructure to meet the demands of the global economy.

A key factor in evaluating the quality of economic growth is labor productivity. According to reports, Vietnam's labor productivity in 2023 reached 199,3 million VND per worker (equivalent to USD 8.380 per worker), an increase of USD 274 compared to 2022. However, this labor productivity growth is still low compared to the economy's potential. This suggests that while labor productivity has increased, Vietnam still faces many challenges in improving the quality of its labor force.

The government has focused on improving the quality of the labor force through vocational training and encouraging the development of a highly skilled workforce. The percentage of trained labor with certificates or degrees increased from 26,1% (in 2021) to 27% (in 2023), reflecting efforts to prepare the workforce for the digital economy. However, to achieve sustainable development goals and optimize labor productivity, Vietnam needs to further strengthen policies for training and developing digital skills, especially in high-tech industries.

The government has set a goal for Vietnam to become a digital nation by 2030, with a high national digital transformation index. To achieve this, in addition to investing in technology infrastructure, it is necessary to create an innovative ecosystem, encourage technology startups, develop high-tech products and services, and train a highly skilled workforce in this field. The rapid development of science and technology not only enhances labor productivity but also provides the impetus for the growth of creative industries and high-tech sectors, contributing to the quality of economic growth.

4.4. Supporting and Hindering Factors

The application of science and technology and digital transformation in Vietnam faces numerous challenges, particularly in terms of human resources and infrastructure. One of the key factors to promote the application of science and technology is the development of a skilled workforce and the establishment of integrated technology infrastructure.

Table 3: Factors Favorable and Unfavorable to the Application of Science and Technology in Vietnam

Factor	Favorable	Unfavorable
Government Policies and Strategies	- The government has developed strong national digital transformation strategies, especially in industries, services, and e-commerce. - The National Digital Transformation Program and the 4.0 Industry Resolution have promoted the development of high-tech sectors. - The government actively calls for investment from large countries like the U.S. in sectors such as semiconductors.	- Although the government has clear strategies, implementation is uneven across sectors and regions, particularly in rural and remote areas. - Some policies supporting small and medium enterprises in digital transformation are still incomplete or lack specific mechanisms. - There are still many limitations in the connection between government agencies, businesses, and international partners.
Labor Capacity and Training	- The proportion of trained labor is increasing, with 27% of the workforce holding degrees and certificates in 2023. - Training programs for digital technology personnel have been strengthened, especially in fields such as AI, semiconductors, and Industry 4.0. - The government and international partners, such as the U.S., Qualcomm, and Synopsys, are collaborating to develop a high-quality workforce for the semiconductor industry.	- The proportion of trained labor remains low compared to the demand for the labor market in high-tech fields. - There is a high demand for skilled labor in technology sectors, especially semiconductors and Industry 4.0, but it is still not sufficiently met. - Training programs have not kept up with the rapid development of technology, especially in emerging fields like semiconductor circuits and 5G.

Technology Infrastructure	- Strong investments in technology infrastructure, including 5G networks and research centers such as the National Innovation Center (NIC), have begun to show results. - Viettel has successfully deployed 5G base stations according to the Open RAN standard, a breakthrough for Vietnam and the world. - The development of 5G networks in Vietnam and international markets will be accelerated in 2024.	- Despite strong development in technology infrastructure, in some remote areas, network infrastructure has yet to be fully developed. - Some areas still lack investment in cloud infrastructure, data centers, and critical networks for the digital economy. - The current technology infrastructure is not robust enough to support the needs of high-tech industries such as semiconductor manufacturing, AI, and automation.
Application of Science, Technology, and Innovation	- Vietnam has made a breakthrough in the semiconductor industry with the establishment and development of the National Innovation Center (NIC), attracting investment from international partners like the U.S., Synopsys, and Qualcomm. - Viettel has achieved significant success with the deployment of Open RAN 5G base stations, which will help commercialize 5G networks in Vietnam and internationally. - Domestic enterprises are increasingly participating in the global supply chain, particularly in high-tech industries.	- The application of new technologies has not been uniformly deployed across all industries. - The development of traditional industries such as agriculture and food processing has been slow in adopting digital technology. - The legal and policy environment is sometimes not conducive to testing and developing new technological products, especially in sensitive areas like semiconductors and 5G.
Financial Resources and Investment	- Investment in science, technology, and digital transformation from international partners, particularly in the semiconductor sector, has increased significantly, with large investments from companies like Intel, Amkor, Hana Micro, and others. - Vietnam has attracted strategic cooperation agreements with major tech corporations from the	- Small and medium enterprises still face challenges in accessing investment for digital transformation projects and the application of new technologies. - While improvements have been made, domestic venture capital funding for technology is still limited compared to other countries. - Financial support policies for research and development in

	U.S., including initiatives to develop talent in the semiconductor sector.	high-tech fields like semiconductors and AI are not yet clear and coordinated.

Source: *Author's synthesis and analysis from government reports*

5. Conclusion

The impact of science, technology, and digital transformation on Vietnam's economic growth in the current context is undeniable, playing a decisive role in improving labor productivity, product quality, and production efficiency. Vietnam has made significant achievements in applying advanced technologies such as artificial intelligence (AI), the Internet of Things (IoT), and big data (Big Data), contributing to higher labor productivity and enhanced production processes, thereby creating opportunities for sustainable development. The increasing share of the service sector in GDP and the strong growth of the digital economy demonstrate the importance of technology in shifting the structure of the economy from agriculture to industry and services. Digital transformation not only leads to changes in the industry structure but also helps to enhance labor productivity, sustainable growth, and production efficiency. Additionally, the development of manufacturing industries and agriculture through high technology, automation, and other advanced technologies has helped Vietnam increase its international competitiveness.

However, the technological transformation process in Vietnam still faces significant challenges. One of the biggest challenges is the shortage of highly skilled labor, particularly in manufacturing industries and agriculture. This highlights the need for a more suitable strategy for training and developing professional skills to meet the demands of the digital economy, thus promoting labor productivity and sustainable growth. Moreover, technological infrastructure is still not fully integrated, with significant regional disparities, leading to limited access to and application of technology, especially in rural areas. To maximize the potential of science, technology, and digital transformation, Vietnam needs strong measures to build synchronized technological infrastructure and enhance the access of small and medium-sized enterprises, particularly in agriculture, to technology. While Vietnam has achieved certain successes in technology application, the investment in R&D remains low, accounting for only 0.4% of GDP, which makes it difficult for Vietnam to produce high-tech products with significant added value. Therefore, appropriate policies are needed to increase investment in research and development, thereby promoting innovation and technology transfer in key sectors.

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FINTECH AND GREEN ENTREPRENEURSHIP DERIVED ECONOMIC, SOCIAL AND ENVIRONMENTAL (ESE) SUSTAINABILITY IN DEVELOPED ECONOMIES

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Abstract: The present study contributes to the literature by empirically estimating the role of fintech and green entrepreneurship in sustainable development. In particular, the study assesses the relationship between green entrepreneurship, fintech and economic, social and environmental dimensions of sustainability. In this regard, panel data of 23 developed countries over 2000 to 2021 period is analyzed using Driscoll-Kraay Standard Error approach. The findings of the study indicate that fintech plays positive role in promoting environmental and social sustainability, but it has negative impact on economic sustainability. Green entrepreneurship, on the other hand, is found to be conducive for environmental and economic sustainability, but does not seem to be beneficial for social sustainability. These findings create a roadmap for developed countries to utilize fintech and green entrepreneurship and recommend them to implement integrated policies in social, environmental and economic sectors to achieve sustainable development goals.

Keywords: *Fintech; green enterpreneurship, economic, environmental and social sustainability, developed countries.*

1. Introduction

Core societal issues including population growth, climate change and environmental degradation are growing more pressing despite the recent century's significant economic growth and advances in human development. Therefore, sustainable development (SD) has become the need of the hour which simultaneously creates environmental, social and economic value and fulfills the needs of the present generations without compromising the ability of the coming generations to fulfill their needs (Hanif, Bakar, & Nawaz, 2022; Neumann, 2022). SD is a broader concept which encompasses environmental sustainability (ENVS), economic sustainability (ECONS) and social sustainability (SS). The capability of an economy to sustain a particular level of gross domestic product (GDP) is referred to as ECONS. SS is defined in capabilities terms as the development which guarantees the improvement in the capabilities of well-being of present as well as future generations through the objective of equity (intra-generational distribution) as well as the transmission of capabilities across generations (Younis & Chaudhary, 2017). Sen (2000) define SS which encompasses diversity, social cohesion and equity, quality of life, democracy, maturity and human well-being. The social dimension of SD includes factors such as health, social concerns and safety (Alwakid, Aparicio, & Urbano, 2021). On the other hand, ENVS refers to the rational consumption of natural resource, maintaining stable resource base, and avoiding the overuse of renewable resources. ENVS secures atmospheric stability, biodiversity, and other environmental activities, lessens

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environmental pollution, manages the hazardous and solid waste and minimizes the effects of natural disasters and climate change (Dat & Hung, 2023).

Among several factors contributing to achieve ENVS, SS and ECONS, fintech (FT) is of utmost importance because of its ability to increase the efficiency and effectiveness of sustainable practices in social, economic and environmental aspects (Berawi, 2019). The financial landscape has been revolutionized with the rise of FT, with companies and products advancing innovative technologies to automate and improve conditional financial services. The value of investments in FT startups has been increased from 1 billion US$ in 2008 to 247 billion dollars in 2022. FT has the power to transform financial systems and expand financial inclusion for underserved populations. Therefore, FT can enhance economic growth through financial and technological innovations that decrease the cost of financial services, reduce the risks in financial transactions, and ultimately strengthen the financial intermediation (Cevik, 2024). Likewise it has been argued that FT companies can tackle various key climate and environmental issues. FT can enhance the green finance development, which addresses climate change and environmental protection and therefore is an opportunity for the developed countries to achieve SD mainly due to its power and ability to decrease information asymmetry for the investors who are interested in investing in green financial services. Therefore, FT companies have become more willing to involve in green financial services as it has positive effect on their book and market values (Pawłowska, Staniszewska, & Grzelak, 2022). Likewise, FT has significant potential to address extreme poverty and inequality as it has been observed to promote financial inclusion in developing and developed economies by promoting mobile technology for money access in remote and rural areas and therefore bring many individuals under banking facilities via easy financial services Emara (2023); (C. Li, Razzaq, Ozturk, & Sharif, 2023). By offering equal financial services across various economic groups, such initiatives can reduce income disparities and spur economic growth (Zhu & Niu, 2024).

Likewise, Green entrepreneurship (GE) and SD are also closely related. GE refers to a systematic process which enables entrepreneurs to get assistance from the stakeholders which enables them briskly follow their entrepreneurial and environmental activities (Audu, 2022). It is hypothesized that green entrepreneurs who address market failures and have robust environmental orientation encourage both the environmental and economic development Neumann (2022) as the new green ventures have high innovativeness, strong social orientation and turnover performance- which affect all three dimensions of sustainability (Méndez-Picazo, Galindo-Martín, & Castaño-Martínez, 2021). In other words, GE is related with the action to deal with environmental and social problems and solve them with new cost effective technical ideas that balance economic and social sustainability while simultaneously deal with support environment related issues (Chandel, 2022). However, the macro level analysis regarding the role of GE in ECONS, SS and ENVS has gained little attention previously. Therefore, the main goal of the present research is to analyze the role of FT and GE in ECONS, ENVS and SS over 2000 to 2021 period in 23 developed countries.

The motivation for this research arises from the need for strategic efforts and policy interventions that promote sustainable economic development to fit with environmental sustainability requirements and developed countries play an important role in achieving global SD goals. There is no doubt that most of the developed countries are successful in

transitioning towards SD by relocating their environmentally polluting sectors. This shift has enabled them to fulfill their economic needs while concurrently eliminating the environmental burdens (Adebayo, Özkan, & Eweade, 2024). But the rapid growth in developed countries is associated with huge energy demands which increase the environmental degradation day by day in these countries as shown in Figure 1 (Xu, Adebayo, Khan, Özkan, & Shukurullaevich, 2024). That is why it is important to examine the influential factors which affect ENVS, SS and ECONS that contribute to achieving SD in developed countries (Duran, Bozkaya, Rehman, & Hossain, 2024).

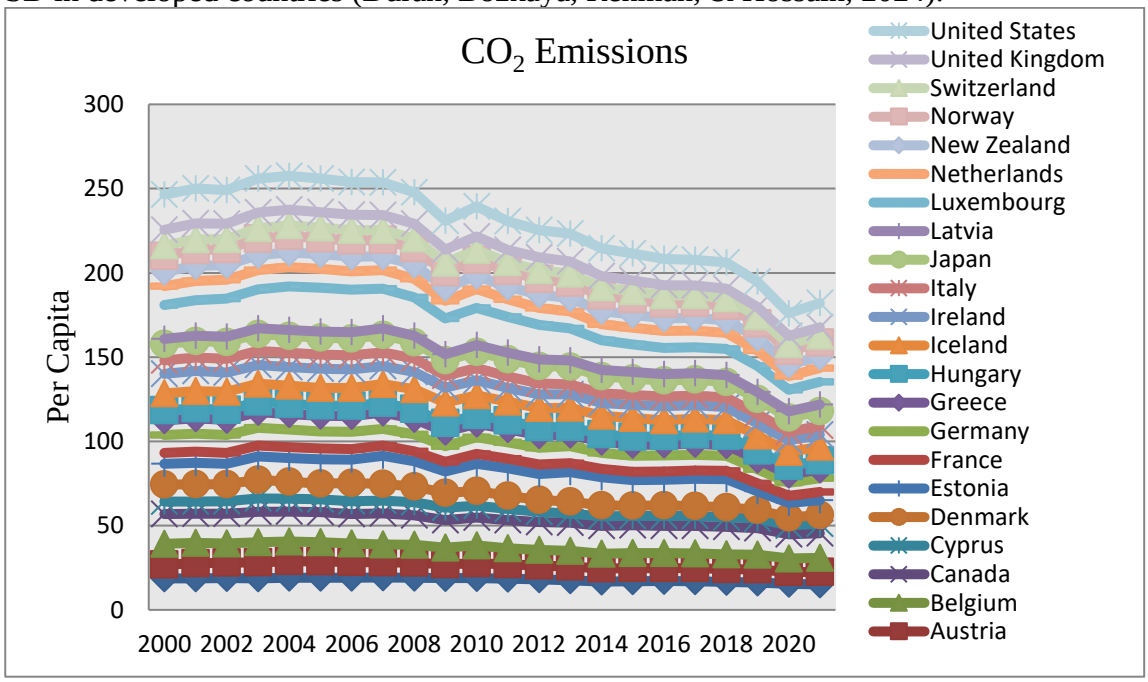

Figure 2: Trend in Carbon Emissions in Selected Developed Countries (2000-2021)

Source: WDI (2022)

The present study has several contributions to the literature by filling some significant research gaps: First and foremost, the study has been conducted in the context of developed countries, and to the author's best knowledge, no existing study can be found in the literature to analyze the long-run relationship between GE, FT and SD in the case of developed economies. Second, the previous studies have mostly used single indicator for SS, ES and ECNS, while the present study combines all distinct indicators to make comprehensive indices to measure respective components of sustainability. Third, the prior studies have used several individual country's data or different groups of the countries for empirical analysis, but the present study has selected a panel comprising of 23 developed countries and also used proper econometrics techniques for empirical analysis. The findings of the present study would provide governments, policymakers, and academics with comprehensive information about the contribution of GE, FT in achieving SD.

This research is structured as follow: Section 2 provides literature review. Section 3 contains data and method of empirical estimation. Empirical results are discussed in section 4 and section 5 gives conclusion and policy recommendations.

2. Literature Review

This section is divided into two sub-parts: i) FT and economic, social and environmental sustainability and ii) GE and economic, social and environmental sustainability.

2.1 Fintech and Social, Economic and Environmental Sustainability

Previously, only a hand full of studies are present in the literature which have analyzed the relationship between FT and SD. Out of these limited studies, Udeagha and Ngepah (2023) analyzed the role of FT in CO_2 emissions in BRICS countries over 2000 to 2018 period. According to the CS-ARDL, AMG and CCEMG estimates, FT enhanced ES by reducing CO_2 emissions. in another study for BRICS countries, Udeagha and Muchapondwa (2023) studied the relationship between FT and CO_2 emissions over 1990 to 2020 period and reached the same conclusion from CS-ARDL estimation that FT enhanced environmental sustainability by reducing CO_2 emissions. Likewise, in case of top 6 manufacturing countries, B. Li, Wang, and Wang (2024) estimated the effect of FT on CO_2 emissions using GMM-PVAR regression approach. The outcomes of the study indicated that FT reduced CO_2 emissions in concerned countries. In case of ASEAN countries, Tang, Ma, Sun, and Xu (2024) studied the role of FT in CO_2 emissions over 1990 to 2021 period. According to the results of the CS-ARDL analysis, FT was found to reduce CO_2 emissions. In the case of developing countries, Azmeh and Al-Raeei (2024) studied the role of FT in EG in developing countries. The outcomes of PCSE and FGLS regressions indicated that FT promoted EG in selected countries. Narayan (2019) studied the role of FT in EG in Indonesia over 1998 to 2018 period. FT was found to impact EG positively according to the study findings. Likewise, Cevik (2024) studied the relationship between FT and EG by considering a panel of 198 countries over 2012 to 2020 period. The authors used GMM estimation approach and the findings established positive relationship between FT and EG. In case of China, Bu, Yu, and Li (2023) studied the relationship between FT and EG using threshold regression analysis. The results of the study revealed that U-shaped relationship exists between FT and EG i.e., FT initially reduced but later increased EG in China.

In continuation, Bu et al. (2023) studied the impact of FT in poverty alleviation by considering data of different provinces of China over 2011 to 2017. The outcomes established significant positive role of FT in alleviating poverty in China. In case of Sub Saharan African countries, Emara (2023) analyzed the relationship between FT and poverty over 2004 to 2020 period. According to the GMM estimation, FT reduced poverty but at decreasing rate. Demir, Pesqué-Cela, Altunbas, and Murinde (2022) analyzed the role of FT in income inequality in 140 countries and the findings of panel quantile regression revealed that FT reduced income inequality through financial inclusion. Deng, Huang, and Cheng (2019) analyzed the role of FT in SD in 31 Chinese provinces. The findings indicated that U-shaped relationship existed between FT and SD in China. Elias et al. (2024) provided an in-depth analysis of the role of FT and AI in attaining SD goals. The authors concluded that FT had significant impact on financial inclusion, poverty reduction and economic growth.

2.2 Green entrepreneurship and Economic, Social and Environmental sustainability

GE is considered to be a fundamental pillar of SD. They support the SD by providing green services and products, developing green production technologies, encouraging demand for green finance, and giving green jobs opportunities (Vasilescu, Dimian, &

Gradinaru, 2023). However little attention has been paid to its role in all three dimensions of SD. For instance, Sharma and Singh (2024) analyzed the role of GE and environmental quality in 11 Asian countries over 2000 to 2019 period. The findings of Panel Quantile regression revealed that GE reduced CO_2 emissions and ecological footprints. Wei, Ren, Ullah, and Bozkurt (2023) analyzed the impact of GE on green economic development in Asian countries for the period 1990 to 2019. The outcomes of PMG-ARDL regression indicated that GE enhanced green economic development. H. Sun, Pofoura, Mensah, Li, and Mohsin (2020) studied the impact of environmental entrepreneurship on sustainable development measured by CO_2 emissions in Sub-Saharan African countries over 2000 to 2014 period. The study findings indicated that environmental entrepreneurship reduced CO_2 emissions. Singh, Kumar, and Sharma (2023) studied the impact of GE on economic development in 34 countries over 2000 to 2019 period. According to the findings of regression, GE had positive impact on economic development. Mondal (2023) analyzed the relationship between GE and economic, environmental and social sustainable development measured by environmental pollution, credit policy and financial development by considering panel of 114 countries. The results of the study indicated that GE reduced environmental pollution, but increased financial development and credit policy.

In continuation, Neumann (2022) analyzed the role of GE in three measures of sustainable development (measured by CO_2 emissions, human development index and GDP) in 53 countries. The findings of the OLS regression approach indicated that GE had significant impact on social and economic sustainability, but had no significant impact on environmental sustainability. In the context of 13 cities of Saudi Arabia, Alwakid et al. (2021) analyzed the role of GE in economic, social and environmental sustainability over 2012 to 2017 period. According to the study estimates, GE has positive association with all three measures of sustainability. In case of Nigeria, Audu (2022) analyzed the role of GE in SD in Kogi State Nigeria by collecting data from entrepreneurs engaged in green businesses. The study used descriptive research method and according to the outcomes, GE was found to reduce poverty in Kogi State.

2.3 Research Gap

The review of the extant literature presented above revealed some certain literature gaps. First, the existing studies have mainly focused on estimating the effect of FT and GE in CO2 emissions, economic growth and social development and only limited studies explored the role of FT and GE in SD. Second, it is not evident from the previous studies that how FT and GE impact SD in developed countries. Third, although some of the studies have studied the impact of FT and GE in social, economic and environmental sustainability using any single indicator, however, only a limited studies have measured these dimensions of sustainability by making comprehensive indices encompassing all relevant indicators. These literature gaps encourage the researchers to make an attempt in the context of developed countries to analyze whether FT and GE can facilitate the goal of achieving SD.

3. Econometric Modeling and Estimation Strategies

3.1 Model Specification

3.1.1 Model 1: ENVS

As the objective of the study is to analyze the role of GE and FT in ENVS, ECONS and SS in selected developed countries, the empirical models of study are specified taking

the support from Stochastic Impact on Regression by Population, Affluence and Technology (STIRPAT) framework proposed by (Dietz & Rosa, 1997), Triple Bottom Line (TBL) theory proposed by (Elkington, 1994) and Cobb-Douglas production function. TBL theory assumes that sustainability is mainly determined by the values of environmental quality, social equity and economic prosperity. According to TBL theory, entrepreneurship has important contribution in promoting social sustainability, economic development and environmental conditions (Gu, Pan, Hu, & Liu, 2022). According to STIRPAT framework, environmental impacts are the product of affluence (A), technology (T) and population (P). The basic form of STIRPAT framework is given as follows:

$$I_i = \alpha P_i^{\beta} A_i^{\gamma} T_i^{\delta} \varepsilon_i \quad (1)$$

And the logarithmic form of this model is given as:

$$logI_i = \alpha + \beta logP_i + \gamma logA_i + \delta logT_i + \varepsilon_i \quad (2)$$

Where β, γ and δ are the parameters indicating the relationship between dependent and independent variables (Yasmeen, Zhang, Sharif, Shah, & Dincă, 2023). In a nutshell, according to STIRPAT model environmental quality basically depends on human demand (population), technological progress (technology) and economic growth (affluence). Accordingly, under the framework of TBL and STIRPAT frameworks, the model for ENVS is formulated as:

$$ENVS_{it} = \beta_0 + \beta_1 FT_{it} + \beta_2 GE_{it} + \beta_3 EG_{it} + \beta_4 URB_{it} + \beta_5 NR_{it} + \varepsilon_{it} \quad (3)$$

Where, T component of STIRPAT model is measured by FT, P by urbanization and A by economic growth. In addition, following Neumann (2022) and (Alwakid et al., 2021), GE is added to the model because it is an answer to many environmental issues. Furthermore Hanif, Nawaz, Fazal, and Ibraheem (2022) and Leng et al. (2024), natural resources are also added to the model as a control variable.

3.1.2 Model 2: SS

Moreover, TBL model emphasizes that it is of utmost importance to consider the social well-being of the population along with maintaining profitability of an organization. According to this concept, FT would suffice social sustainability as they act as lubricants for different financial services by easing the access of the masses to financial services and give financial inclusion for the under banked and unbanked which enhances social equality (Geylan, 2021). Accordingly, we take GE and FT as the main determinants of SS and baseline model for SS is specified as:

$$SS_{it} = \beta_0 + \beta_1 GE_{it} + \beta_2 FT_{it} + \varepsilon_{it} \quad (4)$$

In addition, following, Wu, Zhang, and Phommilath (2022), population and economic growth are added as control variables and the final form of the model becomes as follows:

$$SS_{it} = \beta_0 + \beta_1 GE_{it} + \beta_2 FT_{it} + \beta_1 EG_{it} + \beta_1 POP_{it} + \varepsilon_{it} \quad (5)$$

3.1.3 Model 3: ECONS

The third model for ECONS is specified on the basis of TBL theory and Solow (1956) growth model. According to this model, economic productivity depends on labor, capital, and technological progress. The basic form of the Solow's growth model is

represented in following equation.

$$Y_{(t)} = f\ (L_{(t)}, K_{(t)}, A_{(t)},) \quad (6)$$

Where, Y, K, L, and t represent productivity, capital, labor and time period, respectively.

Later on, economists expanded this production function by incorporating entrepreneurship as the fourth determinant of production and a substitute for capital due to its economic significance. Furthermore, according to TBL theory, fintech increases the productivity and profitability. Therefore, we incorporate FT and GE as potential determinants of ECONS and specified the corresponding model. Also following (Zheng, Mousa, Mat Nawi, Nawaz, & Hanif, 2024) and S. Sun, Meng, Nawaz, and Hanif (2024), natural resources are added to the model and the model takes the following form:

$$ECONS_{it} = \beta_0 + \beta_1 FT_{it} + \beta_2 GE_{it} + \beta_3 LAB_{it} + \beta_4 CAP_{it} + \beta_5 NR_{it} + \varepsilon_{it} \quad (7)$$

Where, FT, GE, LAB, CAP and NR denote fintech, green entrepreneurship, labour, capital and natural resources, respectively.

3.2 Data and variables

Due to limited data availability, a balanced panel data of 23 developed countries is considered in this study and the analytical period of the study spans over 2000 to 2021. To measure ENVS, SS and ECONS, three separate indices are constructed using Principle Component (PCA) Analysis following Nguyen and Su (2021) and (Singh, Jyoti, Kumar, & Lenka, 2021). The detail of the indicators for ENVS, SS and ECONS is provided in Table 1 to Table 3, respectively. The first main explanatory variable of the models i.e., FT is also constructed by combining three indicators using PCA. GE is taken as another main explanatory variable measured as environment related technological innovations (as percent of total technologies). The control variables of the models include economic growth, population, urbanization and natural resources. The measurement of these variables is also given in Table 4.

Table 1: Indicators to measure ENVS

Variable	Indicators	Unit	Data Source
	CO_2 emissions	(metric ton per capita),	
	Energy intensity primary energy level	MJ/2011 PPP US$ GDP	
	Renewable energy consumption	% of total energy consumption	
	Forest area	% of land area	
	Agriculture land area	% of land area	
	Arable land	% of land area	
	Infant mortality rate	per 1000 live births	World Development Indicators
Environmental	Incidence of	per 100,000 people	

sustainability index	tuberculosis	
	Total Fertility rate	births per woman
	People having access to (at least) basic sanitation services	% of population
	People having access to (at least) basic drinking water services	% of population
	Population growth	Annual %

Table 2: Indicators to Measure SS

Variable	Indicators	Unit	Data Source
Social Sustainability Index	Female to male labour force participation rate ratio	percent	World Development Indicators
	Sex ratio at birth (Male to female births)	number	
	Female unemployment	% of female labour force	
	Female labour force	% of total labour force	
	Life expectancy at birth, total	years	
	Infant mortality rate, female	Per 1000 lives birth, number	
	Fixed telephone subscriptions	Per 100 people	
	Age dependency ratio	% of working age population	

Table 3: Indicators to Measure ECONS

Variable	Indicators	Unit	Data Source
	GDP per person employed	2011 PP $ constant	
	GDP per capita (constant 2010	MJ/2011 PPP US$ GDP	

	US$)		
	Wage and salaried workers, total	% of total employment	
	Total self employed	% of total employment	
	Vulnerable employment, total	% of total employment	
	Inflation GDP deflator	Annual %	
	Net inflows of foreign direct investment	% of GDP	World Development Indicators
Economic sustainability index	Gross capital formation	% of GDP	
	Exports of goods and services	% of GDP	
	Gross fixed capital formation	% of GDP	
	Total labour force participation rate	% of total population ages 15+	
	Final consumption expenditures	% of GDP	
	Total employers,	% of total employment	
	Total unemployment	% of labour force	

Table 4: Explanatory and Control Variables of the Study

Variables	Measurement	Data Source
FinTech	Index comprising of Mobile celluar subscription, Fixed Broadband Subscription (both per 100 people) and individuals using internet (% of population)	WDI
Green	Environment related	OECD

entrepreneurship	technological innovations (% of total technologies	
Economic growth	GDP per capita (constant US$)	WDI
Population	Population growth (annual %)	WDI
Urbanization	Urban population (% of total population)	WDI
Natural Resources	Total natural resource rents (% of GDP)	WDI

3.3 Techniques of Empirical Estimation

3.3.1 Cross-sectional dependence (CSD) Test

The empirical analysis is carried out in four steps: First of all, the presence or absence of CSD is assessed using Pesaran (2004) test. The null hypothesis of this test assumes that data is free from the issue of CSD, and the alternative hypothesis states the presence of CSD issue in data (Chien et al., 2021) The basic equation of the test is given as follows:

$$CD = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}\right) \sim N(0,1) i,j \qquad (8)$$

Where, $\hat{\rho}_{ij}$ shows the coefficients of pairwise correlation.

3.3.2 Slope Heterogeneity Test

The second step involves the application of the slope homogeneity test initially developed by Pesaran and Yamagata (2008) to assess the homogeneity or heterogeneity of slope parameters. This test is more efficient as compared to other traditional heterogeneity tests because of its ability to consider CSD issue (Hanif, Nawaz, Hussain, & Bhatti, 2022). The basic equations of the slope heterogeneity test are given as:

$$\tilde{\Delta} = \sqrt{N}\left(\frac{N^{-1}\tilde{S}-k}{\sqrt{2k}}\right) \qquad (9)$$

$$\tilde{\Delta}_{adj} = \frac{\sqrt{N}\left[N^{-1}\tilde{S}-E(\tilde{Z}_{it})\right]}{\sqrt{Var(\tilde{Z}_{it})}} \qquad (10)$$

Where, $\tilde{\Delta}$ and $\tilde{\Delta}_{adj}$ represent delta tilde and adjusted delta tilde, respectively.

3.3.3 Unit Root Analysis

In the third step, we perform unit root analysis to assess the order of integration among study variables. For this purpose, CIPS and CADF unit root tests proposed by Pesaran (2007) are used which perform better than conventional unit root tests in the presence of CSD problem. The CADF test statistics is given as follows:

$$\Delta y_{it} = \alpha_i + \rho_i^* y_{it-1} + d_0\bar{y}_{t-1} + \sum_{j=0}^{p} d_{j+1}\overline{\Delta y}_{t-j} + \sum_{k=1}^{p} c_k \Delta y_{it-k} + \varepsilon_{it} \qquad (11)$$

And we can get the CIPS test statistics from CADF as follows:

$$\text{CIPS} = \frac{1}{N}\sum_{i=1}^{N} CADF_i \qquad (12)$$

3.3.4 Regression Analysis Using Driscoll-Kraay Standard Error (DK-SE) Approach

Finally, to estimate the long-run relationship between dependent and independent

variables, we use DK-SE which efficiently deals with the issues of CSD of autocorrelation and heteroskedasticity (Shah, Hussain, Nawaz, & Iqbal, 2021). This approach also permits fixed effects to function in the regression. Furthermore, this approach is applicable to unbalanced and balanced panel data sets equally because of its ability to properly deal with missing values (Liu, Ur Rahman, Jóźwik, & Doğan, 2024). Figure 2 illustrates the steps of empirical estimation.

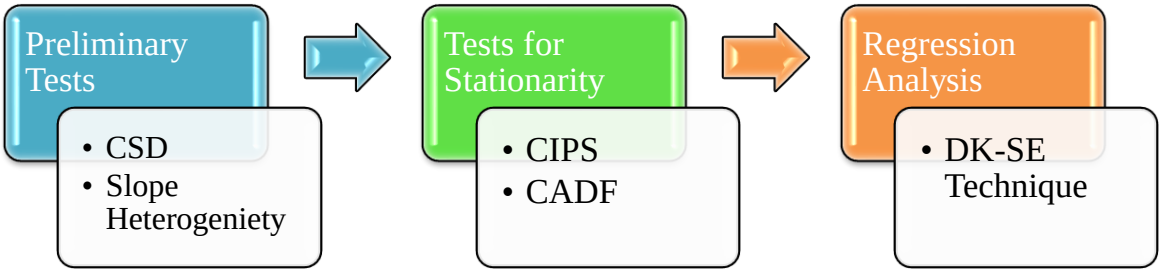

Figure 2: Graphical illustration of Methods of Analysis

4. Results and Discussions

Firstly, in this section the descriptive statistics for all variables are given in Table 5. Descriptive statistics provide all basic data properties including mean, standard deviation and data range of all variables. It can be observed that ENVS and ECONS have negative mean values among all data series. EG has the highest value for mean and standard deviation and ENVS has the lowest values for mean and standard deviation among all data series. In addition, minimum and maximum values indicating data range of all variables is also given in Table 5.

Table 5: Summary Statistics

Variables	Mean	Standard Deviation	Minimum value	Maximum value
ENVS	-1.2009	1.000	-1.872	2.454
ECONS	-1.5509	1.712	-2.254	7.447
SS	4.67001	1.000	-1.1801	6.056
GE	10.814	4.207	0.8426	26.615
FT	5.2500	1.000	-3.010	1.299
EG	43608.6	21807.8	6336.38	112417.9
POP	0.601	0.766	-2.081	2.890
URB	78.351	10.135	57.115	98.11
NR	1.134	2.142	0.000	13.357
CAP	23.025	4.603	11.888	53.713
LAB	61.262	6.207	48.13	78.54

The results of CSD test are reported in Table 6. According to the results, all of the data series are cross-sectionally dependent as indicated from highly significant test statistics. Likewise,

Table 6: CSD Test Outcomes

Variables	Test Statistics	P-value
ENVS	52.265***	0.000
ECONS	9.16***	0.000
SS	14.215***	0.000
GE	36.455***	0.000
FT	70.279***	0.000
POP	4.797***	0.000
URB	42.567***	0.000
NR	20.233***	0.000
CAP	19.05***	0.000
LAB	5.422***	0.000
EG	51.016***	0.000

Where, *** shows significance at 1%

Next, the findings under Table 7 reveal that the null hypothesis for slope homogeneity has been rejected with high significance as delta and adjusted delta tilde statistics are highly significant and assert that slope coefficients are heterogeneous.

Table 7: Outcomes of Slope Heterogeneity Analysis for all Models

DV=ENVS	Model 1	
Delta Tilde	16.142***	0.000
Adjusted delta tilde	19.595***	0.000
DV=SS	Model 2	P-value
Delta Tilde	16.182***	0.000
Adjusted delta tilde	19.011***	0.000
DV=ECONS	Model 3	
Delta Tilde	13.763***	0.000
Adjusted delta tilde	16.707***	0.000

Where, *** shows significance at 1%

Next, as far as the order of integration among the study variables is concerned, the findings of the unit root analyses shown in Table 8 confirm that mixed order of integration is present among all variables as some of the variables are stationary at level and other are stationary at the first difference.

Table 8: Outcomes of Unit Root Tests

Variables	CIPS		CADF	
	Level	First difference	Level	First difference
ENVS	-0.655	-4.176***	-1.011	-3.097***
ECONS	-1.694	-4.155***	-1.629	-3.258***
SS	-1.897	-3.636***	-1.895	-2.300**
GE	-3.072***	----------	-2.229**	---------
FT	-2.294**	----------	-2.691***	---------
POP	-1.315	-3.224***	-1.633	-3.053***
URB	-1.123	-2.542***	-1.443	-2.986***
NR	-2.031	-3.833***	-1.427	-2.700***
CAP	-2.036	-4.042***	-1.969	-3.226***

LAB	-1.558	-3.704***	-1.534	-2.788***
EG	-0.802	-2.889***	-0.939	-2.016*

Where, ***,**&* show significance at 10, 5 and 1%, respectively.

After performing all necessary prerequisites, the outcomes of DK-SE estimation are discussed. In the context of Model 1, FT is positively associated with ENVS in concerned countries as shown in Table 9. The corresponding coefficient indicates that for 1 unit increase in FT, ENVS increases by 0.029 units. Consistent with the finding of the present study, Leng et al. (2024) also report that FT promotes ENVS by reducing carbon emissions through promoting carbon trading funds, energy transition and green finance. Likewise, S. Li, Hu, and Kang (2024) also evidenced the positive role of FT in ENVS by reducing environmental degradation. Similarly, GE is also found to be positively associated with ENVS. In terms of the magnitude, the regression coefficient indicates that ENVS increases by 0.0013 units for 1 unit increase in GE. This outcome implies that GE promotes environmentally sustainable practices by encouraging the establishment of businesses that prioritize waste reduction and promote resource efficiency. Consistent with the outcomes of the present study, Alwakid et al. (2021) and Wagner (2015) also found that GE is positively associated with environmental dimension of sustainability. As far as the control variables in Model 2 are concerned, the outcomes do not provide evidence for any significance of EG, NR and URB in promoting ENVS as the concerned coefficients are statistically insignificant. Consistent with the outcomes of this study, Ali, Bakhsh, and Yasin (2019) and Liao et al. (2024) also reported that URB has insignificant impact on environmental quality. Likewise, Hajilary, Shahi, and Rezakazemi (2018) and Liao et al. (2024) support the findings of the present study by revealing insignificant impact of EG on environmental quality. The insignificant impact of NR on ENVS is also evident from (Yang, Bashiru Danwana, & Issahaku, 2022).

Table 9: DK-SE Estimation for Model 1 (ENVS)

Variables	Coefficient	P-value
FT	0.029***	0.000
GE	0.0013**	0.006
URB	-0.0013	0.176
EG	-0.00002	0.962
NR	-0.0011	0.300

Where, ***,**&* show significance at 1 and 5%, respectively

On the other hand, the regression outcomes for Model 2 provided in Table 10 show that FT is found to be conducive for promoting SS in developed countries as evident in Table. Notably, the regression coefficient indicates an increase of 0.188 units in SS for 1 unit increase in FT. Consistent with the outcome of the study, Demir et al. (2022) conclude that FT reduce income inequality. Likewise, Zhu and Niu (2024) support the outcomes of the present study by arguing that FT promote social equality in G-10 countries. In contrast, the outcomes of Model 1 endorsed the irrelevancy of GE in promoting SS in concerned countries as according to the estimation, the concerned coefficient is positive but statistically insignificant. This contradictory outcome can be explained by the discrepancy between entrepreneurs rewards and sustainable development goals (Pacheco, Dean, & Payne, 2010). Furthermore, lack of support mechanism, environmental regulations and inclusive policies may hinder the benefits of GE for social equality (Salaheldeen et al., 2024). Contrary to the results of this study, the

outcomes of Neumann (2022) and Alwakid et al. (2021) provided evidence regarding the significant role of GE in promoting SS.

Table 10: DK-SE Estimation for Model 2 (SS)

Variables	Coefficient	P-value
FT	0.1882*	0.088
GE	0.0027	0.771
POP	-0.410***	0.000
EG	-0.00004**	0.030

Where, ***,**&* show significance at 1, 5 and 10%, respectively.

Furthermore from the findings of Model 2, it is evident that POP is not conducive for promoting SS in developed countries -a finding contradictory to Demir et al. (2022). The coefficient estimated indicates 0.410 units decline in SS for 1 unit increase in POP. Likewise, the concerned parameter for EG reveals 0.00004 units decline in SS for 1 unit increase in EG. Consistent with this study's outcome, Wahiba and El Weriemmi (2014) and Sarker (2009) evidenced that EG reduced social development by increasing inequality.

Moving towards regression outcomes for Model 3 shown in Table 11, FT is found to be non-conducive for ECONS. The coefficient indicates 0.252 units decrease in ECONS for one unit rise in FT. This finding thus indicates that these technological innovations in financial sector are failed to promote ECONS in developed countries. In the same vein, Bu et al. (2023) argued that FT reduced ECONS at later stages in China. In contrast, GE enters the estimation with positive sign and significant impact on ECONS consistent with the outcomes of Alwakid et al. (2021) and (Neumann, 2022). The estimated coefficient reveals an increase of 0.023 units in ECONS for a unit rise in GE. As far as control variables are concerned, not all of them behaved as expected. Only LAB is found to have positive and significant impact on ECONS consistent with theoretical expectation and partially in line with the findings of S. Sun et al. (2024). In contrast, CAP is shown to have negative and insignificant role in ECONS. Similarly, contrary to expectations, NR is evident to be non-conducive for ECONS in line with (Arslan, Khan, Latif, Komal, & Chen, 2022).

Table 11: DK-SE Estimation for Model 3 (ECONS)

Variables	Coefficient	P-value
FT	-0.252***	0.000
GE	0.0233**	0.007
CAP	-0.0019	0.745
LAB	0.0419**	0.001
NR	-0.0452***	0.000

Where, *** and ** show significance at 1 and 5%, respectively

5. Conclusion and Policy Recommendations

The growing concern of climate change and global warming has made SD a biggest challenge globally. Previously, literature has documented the contribution of FT and GE in achieving SD, however, little attention has been paid to environmental, social and economic dimensions of SD to analyze the conduciveness of these factors in achieving sustainability in these dimensions especially in developed countries. Therefore, to fulfill this literature gap, the present study aimed at analyzing the role of FT and GE in ENVS, SS and ECONS in 23 developed countries over 2000 to 2021 period. Empirical estimation

was conducted using DK-SE regression approach. According to its outcomes, FT has a conducive role in enhancing SS and ENVS but does not play a favourable role in ECONS. In contrast, GE is found to enhance ENVS and ECONS, but has insignificant impact on SS in selected developed countries.

On the basis of these findings, the following recommendations are proposed by the study. First of all, the selected countries should promote use and diffusion of FT. In this regard, the governments should make FT more inclusive by providing subsidies to FT firms to fulfill the needs of more and more underserved population particularly in rural areas. Similarly, grants for research and development activities and investments in FT projects facilitating green finance and green energy must be promoted by the governments. As far as its negative impact on ECONS is concerned, it is recommended that governments must set cap on interest rates and transaction charges for FT services to prevent the consumers from extra charges. Similarly, government should encourage collaborations between community and green enterprises so that business practices become aligned with social needs. They should encourage new startups that focus on social impacts along with environmental and economic impacts. These recommendations would create favourable environment in which FT and GE would sustain their economic, environmental and social contributions.

Data availability is the major limitation of the present study. Also its scope is limited only to 23 developed countries which can be extended by future studies. In addition, the models of the study can be extended by adding some pertinent indicators for environmental policy and regulations to assess their impacts on the dimensions of sustainability. Besides, for policy implications, the causal relationships among these variables can also be studied by future studies.

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THE ROLE OF VENTURE CAPITAL AND PRIVATE EQUITY IN FINANCING TRAVEL STARTUPS IN VIETNAM

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Abstract: This research addresses the question of how venture capital and private equity funding impacts tourism startups in Vietnam, a topic that has been underexplored in developing countries where tourism ecosystems are still emerging. It seeks to fill the gap in understanding how these funding mechanisms reshape the competitive landscape, drive digital transformation, and promote sustainable tourism in Vietnam's fragmented and underdeveloped tourism market. The research was conducted to explore the challenges, opportunities, and transformative effects of venture capital and private equity investments on tourism startups, with the aim of providing actionable insights for stakeholders, including founders, investors, and policymakers. A qualitative methodology was employed, combining semi-structured interviews with 15 stakeholders - founders, investors, and policymakers - and a literature review to analyze key trends and outcomes. The research found that venture capital - and private equity-backed startups, such as Luxstay, VnTrip, and Triip.me, have significantly modernized Vietnam's tourism sector by introducing digital solutions and sustainable practices. However, challenges such as limited investor readiness, regulatory risks, and scalability issues persist. These findings are significant as they highlight the unique context of tourism startups in developing markets, offering practical recommendations for improving investment readiness, aligning with global trends, and fostering a more supportive regulatory environment. This study contributes to the broader understanding of tourism entrepreneurship in emerging economies.

Keywords: Economics, business administration, finance, private equity, tourism start-up, venture capital, Vietnam

JEL classification: P10, M13, Z30, F65, M20

1. INTRODUCTION

The tourism and travel industry in Vietnam has become one of the most dynamic economic sectors of the country, contributing about 9.2% of GDP in 2019 before the COVID-19 pandemic disrupted global tourism (World Travel and Tourism Council, 2020). According to a report of the Vietnam National Administration of Tourism (2024), the number of international visitors to Vietnam in November 2024 is estimated at

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1,711,512 visitors, an increase of 20.5% compared to October 2024 and an increase of 38.8% compared to the same period in 2023. Overall, the 11 months of 2024 are estimated at 15,836,661 visitors, an increase of 41.0% over the same period in 2023. The Korean market continued to be a "gold mine" of Vietnamese tourism in November as well as the last 11 months, reaching nearly 400,000 arrivals. China ranked second with nearly 340,000 visits in November. With the increasing demand for tourism, especially for international visitors, tourism startups in Vietnam have emerged as the main innovators driving growth and differentiation in the industry. These startups, often leveraging innovative technology and business models, are playing an important role in enhancing the competitiveness of the industry. For example, travel platforms such as Luxstay or Triip.me have introduced innovative solutions by connecting travelers to local experiences and sustainable tourism initiatives (Tseng et al., 2018; Hung, 2023).

Despite their huge role and advantages, tourism startups in Vietnam have faced significant financial barriers, including limited access to traditional funding sources such as bank loans due to the lack of collateral, high risk, and limited operating history (Pham et al., 2022). As a result, alternative funding mechanisms such as venture capital (VC) and private equity (PE) have become increasingly important and are seen as key sources of funding for these emerging businesses. Venture capital and private equity are two alternative forms of investment that provide capital to businesses in exchange for equity ownership. Venture capital often focuses on early-stage startups with high growth potential, providing not only financial resources but also strategic direction and development policy advice (Wright & Robbie, 1998; Gompers & Lerner, 2001). Private equity, on the other hand, is often tied to later-stage companies and involves larger investments aimed at scaling up the business or restructuring for profit (Gilligan & Wright, 2020). Both VCs and PEs differ from traditional funding sources in their approach as they are actively involved in the management and strategic direction of the companies they invest in, aiming for high investment returns over a medium to long-term period (Metrick & Yasuda, 2021).

In countries around the world, VCs and PEs have played an important role in fostering the startup ecosystem, providing both financial resources and strategic supports (Gompers & Lerner, 2001). For tourism startups in Vietnam, venture capital and private equity play a transformational role in overcoming financial challenges and driving growth. These funding mechanisms not only provide the capital needed for startups to scale their operations, but also access to networks, industry expertise, and market knowledge. By investing in travel startups, VC and PE companies contribute to building innovative travel solutions, enhancing customer experiences, and promoting sustainable tourism development. Moreover, the participation of VC and PE investors often shows credibility to other stakeholders, such as customers, suppliers and government agencies, thus promoting trust and cooperation in the tourism ecosystem. However, the attraction of venture capital and private equity in financing tourism startups may be dominated by the scalability and growth potential of the startup, the attractiveness of the tourism market, the expertise, the risk tolerance of investors, and the regulatory environment in Vietnam. In addition, the ability of tourism startups to adapt their business models to meet investor expectations, especially in terms of innovation, sustainability, and profitability, plays an important role in securing funding (Nguyen et al., 2021). Understanding these factors is essential to identify the challenges and opportunities associated with leveraging VC and

PE funding in Viet Nam's tourism sector.

Although there have been studies on the role of venture capital and private equity in funding startups, research clearly targeted at tourism startups is still scarce. In Viet Nam, current studies mainly focus on quantitative analyses of other industries, such as financial technology, information technology or e-commerce, ignoring the distinctive characteristics of the tourism industry. The tourism industry is influenced by seasonality, consumer behavior, and external shocks such as the COVID-19 pandemic, creating unique challenges for startups operating in the industry (UNWTO, 2021). Moreover, the dynamics of VC and PE funding in emerging markets such as Vietnam are significantly different from that of developed economies. Investors face higher risks due to regulatory shifts, underdeveloped financial markets, and cultural differences in business practices (Nguyen & Le, 2020; Hung, 2023). For travel startups, these challenges are further complicated by the need to balance profitability with sustainability and innovation. Although VC and PE companies are increasingly present in Vietnam and increasingly interested in tourism-related projects, there is a lack of qualitative insights into how these funding mechanisms affect the growth, scalability, and competitiveness of tourism startups (Vinh & Hien, 2024). The gap in this document underscores the need for further exploration of the topic. Therefore, a qualitative study that delves into the experiences, challenges and strategies of tourism startups in Vietnam in ensuring VC and PE funding is timely and necessary. Specifically, this study aims at the following objectives:

(i) Research the role of VC and PE in supporting the development and innovation of tourism startups.

(ii) Identify the challenges and opportunities faced by travel startups when accessing alternative funding sources.

(iii) Assess the long-term impact of VC and PE funding on the scalability and sustainability of tourism startups in Vietnam.

By achieving the above-mentioned objectives, this study makes sense both theoretically and practically. Theoretically, the study provides new insights into alternative financing mechanisms in emerging markets by focusing on an under-researched area - travel startups. In practical terms, the study provides valuable guidance to tourism startup founders, investors, and policymakers, helping them make appropriate decisions and develop strategies to support the sustainable growth of Vietnam's tourism industry.

2. LITERATURE REVIEW

2.1. Overview of venture capital and private equity

Venture capital and private equity are two vital forms of alternative financing that play a significant role in supporting business development, particularly in high-growth and emerging sectors. Both forms of funding involve investments in exchange for equity ownership, yet they cater to businesses at different stages of their lifecycle and operate with distinct characteristics. Venture capital primarily focuses on early-stage startups with high growth potential. These investments are typically smaller in size and are accompanied by active involvement from investors, who provide not only financial resources but also strategic guidance, mentorship, and access to networks (Gompers & Lerner, 2001). In contrast, private equity generally targets more mature companies, with investments geared toward scaling operations, restructuring, or achieving operational efficiency. Private equity investors often aim for larger investments and focus on long-

term profitability, employing strategies such as leveraged buyouts or minority stakes (Kaplan & Strömberg, 2009).

The fundamental difference between VC and PE lies in their risk profiles and investment objectives. VC investments are inherently high-risk due to the early-stage nature of startups but offer the potential for substantial returns if the startup succeeds. Conversely, PE investments involve lower risk as they focus on established companies with proven business models, making the returns more predictable (Cumming, 2009). Despite these differences, both funding mechanisms share the goal of creating value by fostering business growth and improving operational performance.

In recent years, venture capital and private equity investments have grown rapidly in Southeast Asia, reflecting the region's increasing appeal to global investors. Southeast Asia is seen as a burgeoning startup hub, fueled by a young and tech-savvy population, strong economic growth, and improving digital infrastructure. Countries like Singapore, Indonesia, and Vietnam have emerged as key destinations for VC and PE investments, with Vietnam standing out as an attractive market due to its dynamic economic transformation and rapidly growing middle class (Nguyen & Le, 2020).

In Vietnam, the VC and PE landscape has evolved significantly over the past decade. The country's startup ecosystem has expanded, driven by advancements in technology, government support, and a thriving entrepreneurial culture. In 2021, Vietnam recorded over $1.4 billion in startup funding, a tenfold increase compared to 2016, with venture capital accounting for the majority of these investments (Thuong & Sinh, 2024). Notable VC firms such as VinaCapital Ventures, Mekong Capital, and 500 Startups have established a strong presence in the country, focusing on sectors like e-commerce, fintech, and logistics. While the travel and tourism sector is not yet a dominant recipient of VC and PE funding, there is growing interest in tourism-related ventures due to Vietnam's potential as a global tourism destination (Nguyen et al., 2021).

A key trend in Vietnam's VC and PE market is the increasing presence of international investors. As local startups gain traction, global firms such as SoftBank, Sequoia Capital, and Temasek are actively seeking opportunities in Vietnam, contributing to the rapid growth of the investment ecosystem (Nguyen et al., 2021). In addition, the government has introduced policies to promote startup development, such as the establishment of the Vietnam National Innovation Center and tax incentives for investors. These initiatives reflect a broader regional trend, as Southeast Asian governments recognize the critical role of VC and PE funding in fostering innovation and driving economic growth (Nguyen, 2020).

While significant progress has been made, challenges persist in Vietnam's VC and PE environment. Regulatory complexity, limited exit opportunities, and a lack of investor readiness among startups are key barriers to sustained growth (Le & Nguyen, 2021). These challenges are particularly pronounced in the travel and tourism sector, where businesses often struggle to align their operations with investors' expectations of scalability and profitability. Despite these obstacles, the increasing interest in travel startups and the broader tourism industry suggests that VC and PE funding could play a transformative role in unlocking the sector's growth potential.

2.2. Travel startups and financial challenges

One of the most prominent challenges is limited access to traditional banking loans. Startups in the travel sector are typically seen as high-risk ventures by financial

institutions due to their lack of collateral, short operational histories, and vulnerability to external factors such as seasonality and global economic shocks (UNWTO, 2021). Without the stable revenue streams or tangible assets required to secure loans, many travel startups struggle to obtain the capital needed to scale their operations or invest in innovative technologies.

This issue is further exacerbated by the nature of the travel industry itself, which is highly sensitive to external disruptions. For example, the COVID-19 pandemic severely impacted the global tourism sector, leading to prolonged periods of reduced demand and cash flow instability for travel businesses (Gössling et al., 2021). Even in normal circumstances, the seasonal nature of tourism means that startups often experience fluctuating revenues, making them less attractive to traditional lenders who prioritize stability and predictability. As a result, travel startups in Vietnam and other emerging markets find themselves in a precarious financial position, unable to access the resources required to sustain their growth.

Given these challenges, there is a growing recognition of the need for alternative funding sources to support travel startups. Alternative financing mechanisms, such as venture capital, private equity, and crowdfunding, have emerged as critical avenues for addressing the financial constraints faced by startups in the tourism sector (Cumming, 2009). Unlike traditional loans, VC and PE funding provide capital in exchange for equity, allowing startups to access the resources they need without the pressure of immediate repayment. This form of financing is particularly appealing to startups because it often comes with additional benefits, such as access to mentorship, strategic guidance, and networks that can help them navigate the complexities of the industry (Gompers & Lerner, 2001).

The importance of alternative funding sources is underscored by their ability to foster innovation and business expansion. Travel startups, by their nature, require substantial investment in technology, marketing, and product development to differentiate themselves in a crowded market. For instance, companies like Airbnb and Klook initially relied on venture capital funding to develop their platforms and scale their operations globally, demonstrating the transformative potential of such investments (Guttentag, 2015). In Vietnam, travel startups like Luxstay and Triip.me have similarly leveraged alternative financing to drive innovation, offering unique solutions that cater to the growing demand for experiential and sustainable tourism (Nguyen & Tran, 2021).

However, while alternative funding sources offer significant advantages, they are not without their challenges. Securing VC or PE funding requires startups to meet stringent criteria, including presenting a scalable business model, demonstrating high growth potential, and aligning with investors' strategic goals (Nguyen & Le, 2020). Additionally, the travel industry's inherent volatility can make it difficult for startups to attract investors who are often wary of the risks associated with tourism-related ventures.

2.3. The role of venture capital and private equity in startup growth

Many studies have shown how these funding mechanisms can help startups scale their operations, drive innovation, and achieve long-term sustainability. For instance, global success stories such as Airbnb and Uber highlight the importance of VC funding in supporting startups during their early stages. Airbnb, a travel and accommodation platform, received its first significant round of VC funding in 2009 from Sequoia Capital, which provided the financial resources necessary to expand its platform and enter new

markets (Guttentag, 2015). Similarly, Uber leveraged multiple rounds of VC funding from firms like Benchmark and SoftBank to rapidly scale its operations across continents, revolutionizing the transportation industry (Hall & Krueger, 2018; Wansley & Weinstein, 2022).

Private equity, on the other hand, has been instrumental in helping businesses at later stages of their development. PE funding focuses on mature startups or established companies with proven business models, offering the capital and strategic direction required to optimize operations and achieve growth. An illustrative case is that of Flipkart, an Indian e-commerce giant, which benefited from PE investments by firms like Tiger Global and SoftBank. These investments helped Flipkart expand its logistics network, improve its supply chain, and compete with global players like Amazon (Krishna, 2019). Such case studies emphasize the ability of PE funding to drive operational efficiency and market expansion, particularly in industries where competition is intense.

For other industries, the benefits of VC and PE funding extend beyond capital infusion, addressing a number of critical needs for startups. First and foremost, VC and PE provide startups with the financial resources needed to develop products, expand operations, and gain market traction. Startups often require substantial capital in their early stages to cover high upfront costs, such as technology development, marketing, and hiring skilled personnel. For instance, in the case of Grab, the Southeast Asian ride-hailing giant, early-stage VC investments enabled the company to invest in mobile app technology and expand its services across multiple countries (Tang, 2019).

However, the advantages of VC and PE funding are not limited to financial support. These investors often bring valuable expertise and mentorship to the startups they back. VC and PE firms typically have experienced professionals who offer strategic guidance and help founders navigate the complexities of scaling a business. According to Gompers and Lerner (2001), this mentorship often proves as valuable as the capital itself, as it enables startups to avoid common pitfalls and make informed decisions. For example, VinaCapital Ventures, a prominent VC firm in Vietnam, has been noted for its active involvement in guiding startups in sectors like technology and e-commerce, ensuring they align their strategies with market demands (Nguyen & Le, 2020).

Furthermore, VC and PE funding grant startups access to extensive networks, including potential partners, suppliers, and other investors. These connections are instrumental in helping startups enter new markets, secure additional funding, and establish their credibility in competitive industries. In the case of Klook, a travel and activity booking platform, VC investments not only provided the financial resources to scale but also opened doors to strategic partnerships with major tourism companies, further enhancing its market position (Guttentag, 2015). This access to networks is particularly crucial for startups in emerging markets like Vietnam, where navigating fragmented supply chains and regulatory complexities can be challenging.

In addition to financial and strategic support, VC and PE investors often play a critical role in helping startups achieve operational excellence. By leveraging their expertise, these investors assist startups in streamlining processes, improving efficiency, and adopting best practices in management and governance. For instance, private equity-backed companies often benefit from improved financial discipline and enhanced reporting standards, which make them more attractive to future investors or acquirers (Kaplan & Strömberg, 2009). This strategic direction allows startups to transition from

early-stage ventures to sustainable businesses capable of competing on a global scale.

3. METHODOLOGY

To meet research objectives, this study uses qualitative research design to explore the role of venture capital and private equity in funding tourism startups in Vietnam. The research focuses on exploring the perspectives and experiences of stakeholders directly involved in the investment and operation of these startups. The qualitative approach is thought to be consistent with this study as it provides insight into how these funding mechanisms affect the growth and development of start-ups in the tourism sector.

The study used intentional sampling methods to select participants with direct experience with VC and PE funding in the Vietnamese tourism industry, a total of 15 people were selected for interviews, including: 6 people were CEOs/founders of travel startups (Luxstay; Triip.me; VnTrip; Oxalis Adventure; Vexere; The Coffee House Travel), companies that operate in the tourism sector in Vietnam and have successfully raised capital from VC or PE in the past five years; 6 persons are Investment Directors/CEOs of VC and PE investment firms (CyberAgent Ventures; ESP Capital; Gobi Partners; VinaCapital Ventures; Hendale Capital; and Temasek), investors who have directly funded at least one tourism startup in Vietnam and have experience evaluating tourism-related projects; 3 industry experts and policymakers under the Vietnam National Administration of Tourism, Vietnam Chamber of Commerce and Industry, World Tourism Organization (UNWTO), Vietnam Office, experts with extensive knowledge of Vietnam's tourism start-up ecosystem or involved in policymaking or industry analysis.

Key data were collected through semi-structured interviews with three key groups. The founders or senior executives of the travel startup are selected to share their experiences in securing VC or PE funding, the challenges faced, and the impact of the funding on growth and innovation, including the influence of investors on their strategies. VC and PE investors are interviewed to understand investment criteria, motivations, perceived risks, and how they support startups beyond financial contributions. Industry experts and policymakers provide deeper insights into Vietnam's regulatory environment, government initiatives and market trends shaping VC and PE investments in the tourism sector. Each interview takes place between 45 - 60 minutes, conducted in person between April and July 2024. The interview process is recorded and transcribed for analysis with the consent of the interview subjects. In addition, secondary data is collected by reviewing investment reports, industry publications and case studies on VC and PE investment in Vietnam. Sources include reports from the Vietnam National Administration of Tourism, venture capital firms, and academic studies focused on tourism startups in Vietnam to complement the interview findings and verify key information.

The collected data are analyzed by means of thematic analysis, a method that involves the identification, analysis and interpretation of models or topics in qualitative data (Braun & Clarke, 2006). Interview transcripts are coded to identify recurring topics related to investors' motivations, challenges faced by startups, and the impact of funding on business growth and innovation. Thematic analysis is particularly effective in exploring the underlying drivers and relationships shaping VC and PE investments in the tourism sector.

4. FINDINGS AND DISCUSSION

4.1. Motivations for VC and PE investments in travel startups

The results from both interviews and the literature review reveal that venture capital

and private equity investors are motivated to fund tourism startups in Vietnam primarily due to the sector's high growth potential, the increasing demand for innovative travel solutions, and the unique opportunities presented by Vietnam's dynamic tourism ecosystem. However, investors also consider the specific challenges and risks associated with the tourism sector, such as seasonality, regulatory uncertainty, and external shocks like the COVID-19 pandemic, when making investment decisions.

A key motivation highlighted by investors is the rapid growth of Vietnam's tourism sector, which has consistently been one of the fastest-growing in Asia. According to a senior investment manager at CyberAgent Ventures, *"Vietnam's tourism is a low-hanging fruit. It's growing faster than many other industries, and startups in this space have access to a booming market of both domestic and international travelers".* This aligns with findings in the literature, which show that Vietnam welcomed over 18 million international tourists in 2019, a significant increase from previous years (UNWTO, 2021). The country's natural attractions, coupled with increased investment in infrastructure such as Long Thanh airport and the North-South expressway, make it a promising market for tourism startups. Investors also see the growing middle class and a tech-savvy younger generation as drivers of demand for innovative travel solutions. A VC partner from Gobi Partners stated, *"Vietnam's young population is hungry for new travel experiences, and startups that cater to this demand with tech-enabled solutions - including apps for booking, tours, or transport - are especially attractive to us".* This view is echoed by the CEO of Luxstay, who noted during the interview, *"Investors were drawn to the fact that we were tapping into Vietnam's fast-expanding middle class, offering them modern, convenient ways to book short-term stays".* These insights illustrate that VC and PE investors are motivated by the opportunity to capitalize on Vietnam's demographic trends and rising disposable incomes.

Another major factor motivating investments is the innovative potential of tourism startups, particularly those leveraging technology to disrupt traditional models. Many investors cited startups like VnTrip and Vexere as examples of companies that successfully digitized fragmented travel services, creating value for customers and partners alike. According to a managing director at Hendale Capital, *"Tourism startups are solving real problems with technology - whether it's streamlining hotel bookings, improving transportation logistics, or personalizing travel experiences. That's what makes them attractive for long-term investments".* The literature supports this perspective, noting that innovations such as online booking platforms, digital payment systems, and AI-driven recommendations have transformed the tourism industry globally (Guttentag, 2015). In Vietnam, startups like Triip.me stand out for their use of blockchain technology to promote sustainable tourism, attracting investors who are interested in both innovation and social impact. As one investor from Temasek explained, *"We are increasingly looking at startups that combine profitability with purpose. Companies like Triip.me are not just meeting market demand but also addressing global concerns like sustainability, which aligns with our investment goals".*

Investors are also motivated by the untapped potential in Vietnam's fragmented tourism market. Many interviewees highlight the inefficiencies in traditional travel services, particularly in rural areas and smaller cities, as opportunities for startups to innovate. A senior analyst from VinaCapital Ventures stated, *"Vietnam has a lot of hidden gems - places that are not yet on the radar of international tourists. Startups that can*

bridge the gap between these destinations and travelers stand to capture a significant market". Startups like Oxalis Adventure, which promotes cave exploration tours in rural provinces, were frequently mentioned as examples of businesses that have successfully tapped into niche markets. The founder of Oxalis noted, *"Investors were excited about the uniqueness of our product. We offered something no other company in Vietnam could - adventure tourism in places like Son Doong Cave. That exclusivity was a major selling point".* This aligns with findings from the literature that highlight the growing interest in experiential and adventure tourism, particularly among millennial travelers (Tang, 2019).

While financial returns are a priority, another critical motivation is the opportunity for VC and PE firms to play an active role in shaping the strategic direction of tourism startups. Several investors emphasized their desire to contribute to the long-term growth of the companies they invest in. As one investor from ESP Capital explained, *"Tourism startups often lack the strategic resources to scale effectively. We're not just providing money; we're helping them with everything from market expansion strategies to operational improvements".* This motivation was confirmed by the CEO of Vexere, who stated, *"Our investors didn't just fund us - they helped us forge partnerships with bus operators and refine our tech platform to better serve customers. Their strategic guidance was invaluable".* Such active involvement appeals to investors who want to ensure their portfolio companies achieve sustainable growth and profitability.

Despite these motivations, investors acknowledged the unique risks associated with tourism startups, including seasonality, regulatory hurdles, and external shocks like pandemics. However, these risks are mitigated by the sector's long-term potential. As one partner from Gobi Partners summed up, *"Tourism is cyclical, but it's also resilient. In Vietnam, the fundamentals are strong - rising demand, growing infrastructure, and a young, dynamic workforce. That's why we're willing to take the risk".* The literature echoes these sentiments, noting that while tourism is vulnerable to external disruptions, its ability to recover and adapt makes it a valuable long-term investment (Gössling et al., 2021).

4.2. Impact of VC and PE funding on travel startups

The results from both interviews and document research reveal that venture capital and private equity funding has had a transformative impact on travel startups in Vietnam. One of the most significant impacts of VC and PE funding has been the rapid growth of travel startups across key performance metrics, particularly revenue, market share, customer base, and geographic presence. Many founders highlighted how funding allowed them to scale their operations and capture a larger share of Vietnam's expanding tourism market. The CEO of Luxstay, for example, shared, *"After securing $6 million from CyberAgent Ventures and ESP Capital, we were able to double our property listings within a year and introduce advanced features on our platform, which directly led to a 150% increase in revenue".* This rapid growth is reflective of the increasing demand for short-term rentals in Vietnam's urban and tourist hubs, fueled by both domestic and international travelers.

Similarly, the CEO of Vexere, a digital bus ticketing platform, noted that the funding they received from Spiral Ventures and CyberAgent Ventures allowed them to digitize Vietnam's traditionally fragmented bus transportation system. *"We used the investment to onboard hundreds of bus operators into our platform and expand into smaller cities like Da Nang and Nha Trang, which were previously underserved. Our customer base grew*

by 70% within 18 months", he explained. This growth was particularly impactful in Vietnam's Tier 2 and Tier 3 cities, where travel infrastructure is less developed compared to urban centers like Hanoi and Ho Chi Minh City. This differs from startups in developed countries, where infrastructure is already mature, and funding is often focused on customer acquisition and product diversification rather than basic operational expansion.

The ability to expand geographically was another common theme among interviewees. The founder of Oxalis Adventure, which specializes in cave exploration tours, highlighted how funding helped them position Vietnam as a global destination for adventure tourism. *"With private equity funding, we were able to invest in marketing campaigns targeting international travelers and build the infrastructure needed to host larger groups at Son Doong Cave. This doubled our market share in the adventure tourism segment,"* he said. In contrast, tourism startups in developed countries typically focus on scaling through technology and partnerships rather than physical infrastructure, as these elements are already established in developed markets.

Beyond the financial resources, VC and PE investors have provided invaluable non-financial support to travel startups in Vietnam, including mentorship, access to networks, and strategic guidance. These benefits have been particularly impactful in Vietnam's tourism ecosystem, where many startups are run by first-time entrepreneurs with limited experience in scaling businesses or navigating the complexities of the tourism market. One startup founder from Triip.me, a blockchain-based sustainable tourism platform, emphasized the importance of mentorship: *"Our investors didn't just give us money; they helped us refine our business model to better align with global sustainability trends. They also connected us with partners in the tourism industry who were instrumental in helping us scale".* This highlights the critical role of investors in providing strategic advice and opening doors to partnerships, which are particularly important in fragmented and underdeveloped markets like Vietnam.

Networking opportunities facilitated by investors were also cited as a key benefit. The COO of VnTrip, a hotel booking platform, shared, *"When Hendale Capital came on board, they introduced us to international hotel chains and tech providers. This gave us the credibility and partnerships we needed to compete with global players like Agoda and Booking.com".* These connections are often difficult to establish for startups in Vietnam, which lack the established networks and ecosystems available to startups in developed countries. In countries like the United States or Singapore, startups often operate within robust ecosystems where accelerators, industry forums, and investor networks are already well-established, providing easier access to resources.

Strategic guidance from investors was another recurring theme. The CEO of The Coffee House Travel, a subsidiary of Seedcom, explained how Openspace Ventures provided critical input on product development and market positioning: *"Their team helped us identify gaps in the experiential travel market and tailor our services to an emerging demographic of younger, tech-savvy travelers. This strategic alignment was a game-changer for us".* Such guidance has been instrumental in helping Vietnamese startups navigate a rapidly evolving tourism landscape characterized by shifting consumer preferences and increasing competition.

The results also highlight how VC and PE funding has helped Vietnamese tourism startups overcome unique local challenges that differ from those faced by startups in developed countries. For example, infrastructure gaps and inefficiencies in Vietnam's

tourism sector present significant barriers to scalability. Startups like Vexere and Oxalis Adventure have used funding to address these gaps by building digital platforms and physical infrastructure, respectively. In developed countries, VC and PE investments are more likely to focus on enhancing customer experience through AI or big data rather than addressing foundational issues such as operational inefficiencies or lack of access to remote destinations.

In addition, the fragmented nature of Vietnam's tourism market creates opportunities for consolidation and innovation. Many investors see the lack of centralized services as a chance to build scalable solutions. As one investor from CyberAgent Ventures noted, *"In Vietnam, the tourism market is still very fragmented. This creates opportunities for startups to become market leaders by offering integrated solutions that connect travelers with accommodation, transportation, and activities all in one place".* This emphasis on consolidation and integration is less pronounced in developed markets, where such services are already well-established.

4.3. Challenges in securing VC and PE funding

Research results show that one of the barriers most mentioned by startup founders is the lack of investor readiness. Many tourism startups in Vietnam are run by first-time entrepreneurs with limited experience in presenting their businesses to investors. As the CEO of Triip.me explained, *"When we first approached investors, we didn't know how to build an introduction or communicate our value proposition effectively. Tourism is a complex industry and we had a hard time explaining how our blockchain-based solution would generate sustainable profits".* Sharing with the above, a policymaker at the Vietnam National Administration of Tourism (VNAT) commented: *"Many founders of tourism startups are very passionate and innovative but lack the professional knowledge to present realistic financial projections or growth strategies in a way that appeals to international investors".* This lack of preparation often leads to missed opportunities, as investors often expect detailed financial projections, a clear growth strategy, and a clearly defined business model - all of which many startups fail to provide.

The limited financial knowledge of startup founders exacerbates the problem. Some investors noted that many travel startups lack a basic understanding of key financial metrics, undermining their credibility in funding discussions. A senior partner at CyberAgent Ventures commented, *"We've met founders who are passionate about their businesses but don't capture essential financial data like cost structures or customer acquisition costs. This makes it difficult for us to assess the viability of their business".* In developed countries, where the startup ecosystem is more mature, founders often have access to mentoring programs, accelerator programs, or formal training in financial management, which is less common in Vietnam. The Deputy Director of the Vietnam Chamber of Commerce and Industry (VCCI) also agreed with this view when stating: *"Financial literacy is the main weakness in Vietnam's tourism startup ecosystem. More founders need more training and support to understand what investors look for and how to manage their finances effectively".*

Cultural challenges and communication gaps also emerged as a significant barrier. Founders often find it difficult to adjust their business vision to the expectations of international investors, especially investors from Western countries. *"Western investors prioritize scalability and rapid returns, while we focus on building long-term relationships with property owners," said the Luxstay founder. This mismatch in priorities*

has complicated our fundraising efforts". A representative of the World Tourism Organization, Vietnam Office, added: *"Vietnamese entrepreneurs often focus on the needs of the local market, which is very valuable, but they need to learn to shape their business as part of a global opportunity to attract foreign investors".* This cultural difference poses a unique challenge for Vietnamese startups compared to developed countries, where founders are often more familiar with global investment standards.

From the perspective of investors, market volatility in Vietnam's tourism sector is a key concern. Tourism in Vietnam is highly sensitive to external shocks such as economic downturns, geopolitical tensions, and global events like the COVID-19 pandemic. A managing director at Hendale Capital explained, *"Tourism is always a risky sector, but in Vietnam, the risks are amplified because the market is still developing. A sudden drop in international arrivals can wipe out a startup's earnings for months".* This contrasts with developed countries, where diversified tourism ecosystems and more stable demand patterns help mitigate market volatility.

Scalability is another major concern for investors. Many tourism startups in Vietnam operate in niche markets or are tailored to local needs, which can limit their potential for regional or global expansion. An investor from Gobi Partners shared, *"We're looking for scalable models, but many Vietnamese tourism startups are too localized. For example, a business catering exclusively to domestic travelers may struggle to attract international interest or expand to other markets".* The founder of Oxalis Adventure, which specializes in cave exploration tours in Quang Binh, acknowledged this issue, saying, *"Our product is unique to Vietnam, which makes it hard to scale outside the country. Investors often ask how we plan to grow revenue without expanding geographically".* A policymaker from VNAT added, *"While Vietnam's tourism sector has immense potential, startups need to think beyond the domestic market to attract larger investments. This requires a shift in mindset and strategy".*

Regulatory risks also pose significant challenges for both startups and investors. Vietnam's tourism sector is governed by a complex regulatory framework that can vary across provinces, creating uncertainty for businesses. The founder of Vexere, a digital bus ticketing platform, explained, *"We had to deal with inconsistent licensing requirements and a lack of clarity about regulations, which slowed our expansion and made investors hesitant to commit".* A senior consultant from the UNWTO, Vietnam Office, remarked, *"Regulatory unpredictability is a major deterrent for investors. Clearer and more consistent policies are needed to build confidence in Vietnam's tourism startups".* These concerns are less pronounced in developed countries, where regulatory frameworks are more transparent and stable, reducing risks for investors.

Policymakers and experts emphasized the need for targeted interventions to address the barriers faced by tourism startups in Vietnam. A representative from VCCI highlighted the importance of financial education: *"We need more programs to train startup founders in financial management and investment readiness. This will not only help them attract funding but also enable them to manage their businesses more effectively".*

The VNAT Deputy Director suggested creating initiatives to bridge the gap between startups and investors: *"We are working on platforms to connect tourism startups with local and international investors. These platforms will provide mentorship opportunities, networking events, and resources to help startups better understand investor expectations".*

The UNWTO, Vietnam Office, stressed the role of government in reducing regulatory risks: *"The government must streamline licensing processes and create a more consistent regulatory framework across provinces. This will make it easier for startups to scale and for investors to commit to long-term funding".*

The challenges faced by Vietnamese tourism startups differ significantly from those in developed markets. In developed countries, startups often benefit from mature ecosystems that include accelerators, government support programs, and access to experienced mentors. These resources help founders prepare for investor engagement and address concerns about scalability and financial readiness. In Vietnam, however, such support systems are still in their infancy, leaving many founders to navigate the funding process without adequate guidance.

In addition, the fragmented nature of Vietnam's tourism market creates unique hurdles. While startups in developed countries typically operate in well-organized markets with strong infrastructure, Vietnamese startups often need to build foundational systems themselves. For example, startups like Vexere are addressing basic logistical challenges such as digitizing intercity bus ticketing, which would already be well-established in developed nations. As one investor from VinaCapital Ventures remarked, *"Vietnamese tourism startups are essentially building the infrastructure they need to operate. This adds an extra layer of complexity that investors in developed countries don't have to consider".*

4.4. Transformative effects on the travel industry

VC- and PE-backed startups in Vietnam are fundamentally altering the competitive dynamics of the travel industry by introducing innovative solutions that challenge traditional business models. One of the most significant ways these startups are driving change is by increasing accessibility and convenience for travelers. Platforms such as Vexere, a digital bus ticketing startup, have disrupted Vietnam's fragmented transportation sector by streamlining the booking process for intercity travel. The CEO of Vexere highlighted, *"Before we entered the market, bus ticketing was a manual and highly localized process, making long-distance travel cumbersome for both domestic and international tourists. With the funding we received, we scaled our platform to cover over 600 bus operators nationwide, effectively consolidating the market and becoming the go-to choice for travelers".* This disruption has not only enhanced the traveler experience but also forced traditional bus operators to adopt digital solutions to remain competitive.

Similarly, Luxstay, a short-term rental platform, has challenged Vietnam's traditional hotel industry by offering travelers alternative accommodations that are often more affordable and personalized. The founder shared, *"Our VC funding allowed us to rapidly grow our property listings and invest in marketing campaigns targeting younger travelers. This has put pressure on traditional hotels to innovate and cater to changing consumer preferences".* The competitive pressure created by startups like Luxstay reflects a broader shift in the travel industry, where technology-driven solutions are increasingly shaping consumer expectations.

Experts also emphasized the role of funded startups in leveling the playing field for smaller businesses. A representative from the Vietnam National Administration of Tourism explained, *"Startups like Luxstay are helping smaller property owners compete with large hotel chains by giving them access to a digital platform and a wider customer base".* This democratization of the market is a unique characteristic of Vietnam's tourism

sector, where many small and medium-sized enterprises dominate the landscape. In contrast, tourism startups in developed countries often operate in more consolidated markets, where competition is driven by large corporations with established digital infrastructure.

One of the most profound impacts of VC- and PE-backed startups is their role in driving the digital transformation of Vietnam's travel sector. Startups are leveraging technology to address inefficiencies and create new opportunities for growth, fundamentally changing how travel services are delivered and consumed.

Several investors highlighted the importance of digital transformation in their decision to fund tourism startups. A partner at CyberAgent Ventures stated, *"Vietnam's tourism sector was ripe for disruption. Most services were still offline, and there was a clear opportunity for startups to digitize the industry. We saw this as a chance to back companies that could lead this transformation".* This sentiment was echoed by the CEO of VnTrip, a hotel booking platform, who explained, *"Our funding allowed us to build a cloud-based hotel management system that not only streamlined operations for hotels but also made it easier for travelers to book accommodations online. This was a game-changer in a market where digital adoption was previously very low".*

Startups like Triip.me are also at the forefront of digital innovation, using blockchain technology to promote sustainable tourism. The founder shared, *"Our platform uses blockchain to incentivize eco-friendly travel behaviors, such as choosing green accommodations or participating in conservation activities. With the funding we received, we were able to scale this model and partner with international organizations focused on sustainability".* This use of cutting-edge technology is a defining feature of Vietnam's tourism startups, which are leveraging digital tools not only for operational efficiency but also to address global challenges such as climate change.

In comparison, tourism startups in developed countries typically focus on enhancing customer experience through technologies like artificial intelligence and big data analytics, as the basic infrastructure for digital operations is already in place. In Vietnam, however, funded startups are playing a dual role: introducing digital solutions and building the foundational infrastructure necessary for the industry to thrive in the digital age.

Another transformative effect of VC and PE funding has been the promotion of sustainable tourism practices, a trend driven by the unique characteristics of Vietnam's tourism landscape. With its rich natural resources and cultural heritage, Vietnam has significant potential for sustainable tourism, but this potential has historically been underutilized due to a lack of investment and awareness. Funded startups are now stepping in to fill this gap, aligning their growth strategies with sustainability goals.

Oxalis Adventure, for instance, has used private equity funding to promote eco-tourism and adventure travel in Quang Binh province, home to the world-renowned Son Doong Cave. The founder explained, *"Our investors were particularly interested in our commitment to sustainable tourism. With their support, we were able to develop infrastructure that minimizes environmental impact, such as eco-friendly campsites and waste management systems. This has set a new standard for adventure tourism in Vietnam".* A consultant from the World Tourism Organization, Vietnam Office, commented on the significance of such efforts: *"Startups like Oxalis are not only creating unique travel experiences but also demonstrating that tourism can be a force for good.*

Their approach aligns with global trends toward sustainability, which is increasingly important for attracting international travelers".

Triip.me's blockchain-based platform is another example of how funded startups are advancing sustainable tourism. The founder noted, *"Our platform rewards travelers for making environmentally conscious choices, such as supporting local communities or choosing green-certified accommodations. This creates a win-win situation where travelers, businesses, and the environment all benefit".* Experts from VNAT emphasized the importance of such initiatives, stating, *"Sustainability is the future of Vietnam's tourism industry. Startups that integrate environment and social responsibility into their business models are setting the stage for long-term growth".*

In contrast, sustainable tourism initiatives in developed countries are often led by government policies or established corporations, while in Vietnam, startups are playing a pioneering role. This reflects the unique opportunities and responsibilities faced by tourism startups in emerging markets, where they are often at the forefront of driving both economic and environmental transformation.

5. POLICY IMPLICATIONS

For Travel Startups: To attract VC and PE funding, tourism startups in Vietnam must prioritize enhancing their investor readiness and building scalable business models. Founders need to improve their financial literacy and prepare detailed business plans that include robust financial projections and clear growth strategies. This includes identifying key metrics such as customer acquisition costs, revenue streams, and long-term profitability. As the CEO of Triip.me noted, *"Investors want to see not just passion but also a clear roadmap for growth".* Additionally, startups must focus on scalability by developing products or services that can expand beyond local markets. For instance, startups like Luxstay and Vexere leveraged funding to scale their platforms across Vietnam, setting a precedent for others to follow. Finally, founders should actively seek mentorship and networking opportunities to better understand investor expectations and align their strategies with market demands, ensuring they can effectively compete for funding.

For Investors: VC and PE investors looking to capitalize on Vietnam's tourism market should focus on high-growth potential areas such as digital transformation, sustainable tourism, and underserved markets. The fragmented nature of Vietnam's tourism sector presents unique opportunities for startups to consolidate and modernize traditional services. As highlighted by a Hendale Capital partner, *"Digital platforms that address inefficiencies, like transportation and accommodation booking, are particularly attractive".* Sustainable tourism is another promising area, as startups like Oxalis Adventure and Triip.me demonstrate the increasing demand for eco-friendly and experiential travel options. Moreover, investors should explore opportunities in emerging destinations and niche markets outside major urban centers, where there is significant untapped potential. By identifying startups that can address these gaps while aligning with global trends, investors can not only achieve high returns but also contribute to the long-term development of Vietnam's tourism sector.

For Policymakers: To encourage VC and PE investment in tourism startups, policymakers must create a more supportive regulatory and business environment. Simplifying licensing procedures and ensuring consistent enforcement of regulations across provinces will reduce barriers for startups and make the sector more attractive to

investors. A VNAT official emphasized, *"Clearer policies and faster approval processes are essential for scaling tourism businesses".* In addition, the government should invest in infrastructure, such as improving digital connectivity in rural and emerging destinations, to support the growth of tourism startups. Policymakers can also introduce incentives, such as tax breaks or grants, to encourage investment in high-potential areas like sustainable tourism and digital platforms. Finally, fostering collaboration between startups, investors, and government agencies through industry forums and networking events will help bridge gaps and align efforts to drive the growth of Vietnam's tourism ecosystem.

6. CONCLUSION

This study highlights the transformative role of venture capital and private equity funding in Vietnam's tourism startup ecosystem, emphasizing unique characteristics that distinguish it from developed markets. Unlike startups in developed countries, where ecosystems are already mature, Vietnamese tourism startups face the dual challenge of scaling their businesses while addressing foundational inefficiencies in a fragmented market. Funded startups such as Luxstay, VnTrip, and Vexere are reshaping Vietnam's competitive travel landscape by digitizing traditional services and expanding access to underserved regions, a contribution less common in developed economies where digital infrastructure is already established.

The study also reveals that VC and PE funding in Vietnam has driven emerging trends such as digital transformation and sustainable tourism. Startups like Triip.me and Oxalis Adventure are pioneering eco-tourism and leveraging technology to address global sustainability goals, reflecting the growing importance of responsible tourism in developing markets.

However, the findings also highlight unique challenges for Vietnamese startups, including limited financial literacy, cultural gaps in aligning with investors, and regulatory inconsistencies. These barriers, largely absent in developed markets, emphasize the need for tailored strategies to support tourism startups in Vietnam. This includes improving investor readiness, fostering scalable business models, and implementing supportive policies to attract investments. By addressing these challenges, Vietnam's tourism startups can unlock their full potential, driving innovation and contributing to the broader growth of the country's travel industry. These findings offer valuable insights for stakeholders in developing countries with similar market conditions.

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THE ROLE OF ACCOUNTING IN SUSTAINABLE DEVELOPMENT AND NET-ZERO TRANSITION

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Summary: The relationship between accounting, sustainable development and Net-zero transition (not adding to the total amount of greenhouse gases emitted into the atmosphere) has become increasingly important in the current economic context. Along with the goal of efficient business, maximizing profits requires businesses to aim at protecting the environment and ensuring a balance between economic goals and sustainable development. As global awareness of environmental issues increases, accounting plays an increasingly important role in promoting sustainable development. This article studies the role of accounting in sustainable development and Net-zero transition through analyzing modern accounting models, thereby proposing a number of solutions to enhance support for the country's progress towards sustainable development and Net-zero goals.

Keywords: transformation, accounting, environment, net-zero, sustainable development

1. Problem statement

Accounting, which plays a vital role in managing corporate finances, has now expanded its influence beyond the scope of traditional financial content. Accounting not only helps in managing and operating finances, but also creates a positive impact on the environment and society, through the implementation of sustainable policies and actions of a business or an organization.

Over the past decade, we have seen a rapid increase in the trend towards the goal of Net-Zero - a carbon-neutral environment. This not only reflects a change in awareness of the importance of environmental protection, but is also part of a global effort to achieve sustainable development. The Net-Zero goal is not only about reducing carbon emissions but also about creating a sustainable economic system. This requires a major change in the way we produce and consume goods. Sustainable development, a concept defined by UNESCO, refers to "meeting the needs of the present without compromising the ability of future generations to meet their own needs". Thus, the Net-Zero goal and sustainable development are closely linked.

In the current global context of moving towards the goal of Net-zero transformation and sustainable development, the role of accounting has become more important than ever. This article will focus on studying how accounting can participate and contribute to the achievement of these important goals in Vietnam, to help businesses, organizations and communities gain more understanding and support to maximize the use of accounting resources in creating a sustainable future for the country.

2. Research overview

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The role of accounting in sustainable development and the Net-zero transition is a research topic that is receiving special international and regional attention. Studies have shown that accounting makes a strong contribution to promoting environmental and social goals.

Specifically, accounting plays an important role in achieving sustainable development goals. According to Hahn and Kühnen (2013), by providing financial and non-financial information, the accounting profession supports business decision-making, facilitates the implementation of strategies, and thereby leads to sustainable development.

Furthermore, according to Hummel and Schlick (2016), accounting is not only limited to providing information but also creating sustainable value for stakeholders. This is done by increasing transparency and implementing social responsibility of each business and organization. Thereby ensuring that stakeholders can clearly understand business activities and their impact on the environment and social community.

Recent studies have highlighted the important role of accounting in the Net-zero transition.

Bebbington and Larrinaga (2014) have pointed out that accounting contributes to the identification, assessment and management of emissions-related risks. This not only helps businesses and organizations better understand the environmental issues they are facing, but also assists them in developing more effective strategies to reduce those negative impacts. In addition, accounting tools can also help businesses and organizations monitor and improve their emissions performance. As Stanny and Ely (2008) have pointed out, through the use of accounting tools, businesses and organizations can monitor and adjust their performance, ensuring that they are working towards the Net-zero target.

Although, this issue is still quite new in Vietnam. However, there have been some initial studies showing the potential role of accounting in supporting sustainable development goals and Net-zero transition in Vietnam (Nguyen, Le & Pham, 2020).

Overall, studies have confirmed the important role of the accounting profession in promoting sustainable development and the Net-zero transition. However, more research is needed to understand how the accounting profession can contribute to these goals, especially in the specific context of countries such as Vietnam.

3. Research methods

The paper adopts a qualitative approach to explore the role and relationship between accounting and sustainable development, as well as the Net-zero transition. The data collection process consisted of two main stages: a systematic literature review and a content analysis. In the first stage, a comprehensive search was conducted to identify relevant academic articles, books and research papers published in reputable journals and databases. The search terms used included combinations of keywords, such as: “accounting”, “sustainable development”, “Net-zero”, “social responsibility” and “emissions performance”. The search covered a wide range of disciplines, including environment, accounting, management and economics. Specific inclusion criteria were established to ensure the inclusion of studies that were directly related to the nature of sustainable development, Net-zero and accounting. The retrieved articles were carefully screened, based on their titles and abstracts. Only articles that met the established inclusion criteria were moved to the full-text analysis phase. During this phase, the author conducted a thorough analysis of the selected articles to extract relevant data and identify key themes.

4. Some concepts

Sustainable Development

Besides sustainable business, sustainable development is a macro concept, which aims to define a development in all issues in current society while still ensuring continued development in the distant future, ensuring the development of social subjects and balance in the present time. In the future, this concept is currently the target of many countries in the world, each country will rely on its own economic, social, political, geographical, cultural characteristics... to plan and implement the most suitable strategy for that country and territory.

The term "Sustainable Development" first appeared in 1980 in the *World Conservation Strategy* (published by the International Union for Conservation of Nature and Natural Resources - IUCN) with a very simple content: "Human development cannot only focus on economic development but must also respect the essential needs of society and the impact on the ecological environment". By 1987. The Brundtland Report of the World Commission on Environment and Development - WCED. The report stated the point of view: Sustainable development is *"development that can meet current needs without affecting or harming the ability to meet the needs of future generations... "*. Sustainable development must ensure effective economic development, social equity and the environment. To achieve this, all economic and social components, authorities, social organizations... especially businesses must join hands to achieve the goal of harmonizing the three main areas: Economy - Society - Environment.

Therefore, the Asian Development Bank (ADB) stated: "Sustainable development is a new type of development, integrating the production process with resource conservation and improving environmental quality. Sustainable development must meet the needs of the current generation without compromising our ability to meet the needs of future generations".

The goal of sustainable development is to ensure both material and spiritual cultural abundance, equality among social classes, and harmony between humans and the natural environment. The goal is to ensure the development of the following three basic pillars (goals): Sustainable economic growth; Sustainable social growth; Sustainable environmental growth.

Net-zero

Net-zero or "Net-zero Emissions", is an environmental goal to reduce human-caused greenhouse gas emissions (such as CO2, CH4, N2O) to a level that is equal to the Earth's ability to absorb or remove the emissions, to the point where total net emissions are reduced to zero. This not only requires reducing emissions from sources such as transportation, industrial production and electricity generation, but also includes increasing the ability to absorb carbon through measures such as afforestation, forest conservation, carbon capture and storage (CCS) technology.

The goal of achieving net zero emissions is to mitigate the impacts of climate change under the Paris Agreement, with the hope of keeping global temperature increases below 2°C above pre-industrial levels and pursuing efforts to limit the increase to 1.5°C above pre-industrial levels. To achieve this, governments, businesses and individuals must commit to reducing emissions and supporting carbon sequestration solutions, creating a lower carbon and more sustainable global economy.

5. The role of accounting in sustainable development and the Net-zero transition

Current research suggests that accounting can play a key role in the creation and implementation of sustainable business models.

Hahn and Kühnen (2013) clarified that accounting can create sustainable value for businesses, organizations and society through providing useful financial and non-financial information.

Transparent financial reporting, accurate risk assessment and providing reliable information to stakeholders will not only improve business decisions, but also create trust and strengthen relationships between businesses, organizations and stakeholders (Hummel & Schlick, 2016). This provides an overview of how the accounting profession can contribute to creating a sustainable business environment and creating value for both businesses, organizations and society.

Accounting plays a crucial role in ensuring the reliability and transparency of sustainability reports. Traditional accounting practices that focus primarily on financial reporting need to evolve further with sustainability accounting. This involves verifying non-financial information, assessing the organization's sustainability practices and performance. The practice of sustainable accounting is still in its infancy and a number of challenges remain. One of the key issues is the need for commonly accepted auditing standards for sustainability reporting. The development of International Financial Reporting Standards (IFRS) is essential to ensure consistency and comparability of information across organizations and industries.

Traditional accounting methods are no longer effective for public and hybrid organizations because they go beyond simply recording financial transactions or ensuring regulatory compliance, and include a broader perspective that integrates economic, environmental and social aspects. This holistic approach, often referred to as sustainability accounting, aims to provide a more holistic view of an organization’s performance. It involves recording and reporting financial and non-financial information, enabling stakeholders to make informed decisions consistent with long-term sustainable development goals.

One of the key challenges in sustainability accounting is identifying and measuring non-financial indicators. Unlike financial data, which is standardized and quantifiable, sustainability indicators often involve qualitative aspects that are difficult to quantify. These can include factors such as carbon emissions, clean water issues, employee benefits, community involvement and work ethics.

The development and implementation of standardised frameworks, such as those by organisations such as the Global Reporting Initiative (GRI) and the Sustainability Accounting Standards Board (SASB), have played an important role in addressing these issues. These frameworks provide guidance for organisations to systematically measure, manage and report their sustainability performance.

The GRI framework, for example, provides comprehensive reporting standards that cover a wide range of topics such as climate change, human rights, governance and social welfare. By adhering to GRI standards, organizations can enhance transparency and accountability, which is essential for building stakeholder trust and ensuring long-term sustainable development.

Similarly, SASB provides a set of industry-specific standards that identify sustainability issues that are likely to impact financial performance. These standards guide organizations in disclosing sustainability information that has financial

implications for investors. By focusing on materiality, SASB standards help organizations prioritize the sustainability issues that are most relevant to their business and stakeholders.

The role of accounting in sustainable development is also reflected in the following contents:

Increased transparency and accountability: These standards enable organizations to provide clear and consistent sustainability reports, making it easier for stakeholders, including investors, regulators and the public, to assess their sustainability performance.

Supporting decision making: Standardized sustainability metrics enable organizations to make more informed decisions, leading to better resource allocation, risk management, and strategic planning.

Increased investor confidence: Investors increasingly consider sustainability factors in their investment decisions. By adopting recognized sustainability standards, organizations can attract more investment by demonstrating their commitment to sustainable practices and creating long-term value.

Complying with international standards: Complying with global frameworks such as GRI and SASB helps organizations practice and access international markets, strengthen partnerships and global integration opportunities.

Positive social and environmental impact: By systematically measuring and managing sustainability performance, organizations can minimize negative environmental and social impacts, while contributing to national and global sustainability goals, such as the United Nations Sustainable Development Goals (SDGs).

One way in which accounting can contribute to the Net-zero transition is through the management and mitigation of emissions-related risks. As Bebbington and Larrinaga (2014) point out, accounting can help identify, assess and manage emissions-related risks, helping businesses and organisations to understand and reduce their own negative impacts on the environment.

In addition, accounting can also provide detailed and accurate information on a firm's emissions performance. As Stanny and Ely (2008) point out, accounting tools can help firms monitor and improve their emissions performance, facilitating the implementation of effective emission reduction measures.

Achieving Net-zero is not just an environmental commitment, it has far-reaching implications for the global economy. When a country or community decides to shift to a low-carbon economy, a whole new set of opportunities will emerge. The renewable energy industry will boom, creating millions of new jobs in the development, production and operation of green technologies. Imagine the wind and solar markets becoming the crown jewels of the economy, bringing with them related professions, including accounting. These transformations will not only create jobs for people but also promote sustainable development.

Achieving net zero not only benefits countries economically, but also improves public health. Studies show that reducing greenhouse gas emissions and improving air quality will reduce pollution-related illnesses. When we live in a cleaner environment, we are healthier, which in turn boosts productivity. The link between the environment and the economy, including accounting, is clearer than ever - when we invest in the planet, we are actually investing in the health and well-being of all.

Thus, in general, we can see deeply the role of accounting in achieving the goal of Net-zero transformation. From there, it helps businesses, organizations and stakeholders

better understand the important role of accounting in environmental protection and sustainable development.

6. Some solutions to enhance support for sustainable development and Net-zero transition

From the analysis and synthesis of studies in the specific context of Vietnam, with the aim of understanding how accounting can support sustainable development and Net-zero transition for Vietnam. Based on the analysis of previous studies and international principles (Hahn & Kühnen, 2013; Hummel & Schlick, 2016; Bebbington & Larrinaga, 2014; Stanny & Ely, 2008). The author proposes a number of solutions that the accounting industry in Vietnam can apply to enhance support for sustainable development and Net-zero transition, specifically as follows:

Firstly, there is a need to create policy frameworks, incentives and incentives linked to the United Nations Sustainable Development Goals (SDGs) and the 2015 global Paris Climate Agreement, providing companies with a clear roadmap to set and achieve their climate and long-term sustainability goals.

For Vietnam, to ensure a just and environmentally sustainable transition, the role of the Government and policymakers is crucial. Large multinational companies operating in Vietnam can play a key role in influencing their supply chain partners, especially in supporting small and medium-sized enterprises (SMEs) to reduce emissions and achieve sustainability goals. An effective corporate governance policy, with clear roles and responsibilities for the board of directors and subcommittees, is essential to ensure effective oversight of sustainability and ESG. Understanding the consequences and costs of inaction, as well as the benefits and costs of taking action now to achieve Net-zero and sustainability goals, will help clarify the business case and drive commitment from businesses.

Second, accounting has a key role to play in the Net-zero and sustainability transition, including: ensuring that relevant data is available for decision-making and that sustainability priorities are integrated into business processes. It is important to improve and standardise sustainability-related reporting and disclosure, ensuring global consistency and comparability should be promoted, by adopting the standards of The international sustainability standards board (ISSB).

Third, prioritizing education and upskilling of accountants is indispensable. Finance professionals and accountants need to be equipped with knowledge on climate and sustainability issues, from scope 1-3 emissions, transition risk to environmentally-linked finance.

Fourth, Enterprises must strictly comply with environmental standards and other regulations related to sustainable development. In today's business environment, businesses need to demonstrate their social responsibility through obtaining internationally recognized certifications and codes of conduct that are required by the market. Enterprises must comply with world environmental standards and apply them to Vietnam in a flexible and appropriate manner.

Fifth, businesses must strictly comply with the Laws related to environment and sustainable development. For example, enterprises must strictly comply with Law No. 59/2010/QH12 of the National Assembly of Vietnam, the Law on Consumer Protection. Decree No. 99/2011/ND-CP detailing and guiding the implementation of a number of articles of the Law on Consumer Protection and regulations in other relevant Laws.

Sixth, there needs to be coordination between the state, businesses and training institutions in supporting sustainable development and Net-zero transition. The Ministry of Finance must soon establish a pilot carbon trading platform, and the Ministry of Natural Resources and Environment must inventory greenhouse gases. Currently, the Ministry of Natural Resources and Environment is implementing it, but it must be completed soon and announced to each business to know the level of emissions as well as the amount of emissions. At the same time, there needs to be the participation of businesses and stakeholders when participating in the carbon market, as well as urgently seeing potential problems such as: market manipulation; incomplete information... Therefore, the carbon market needs to have early regulations. In addition, there also needs to be policies to encourage and support, financial incentives for businesses to invest in low-emission technologies and renewable energy. It is necessary to develop and perfect regulations on inventory, emission standards and regulations on emission reporting and provide information on the carbon market to facilitate businesses to proactively develop plans and roadmaps for converting production technology and resources. While Vietnam has not yet formed a carbon market, many markets have been very developed, for example in China, Korea, and the European Union (EU). Korea and China are operating very fully and even expanding not only in the scope of businesses but also in homes, right in Vietnam and Korea, there are preparations for the carbon market. At the same time, businesses need to grasp the operating principles of the carbon market and legal regulations related to the market. From there, proactively balance the capacity and readiness of businesses to participate in this market when it comes into operation.

7. Conclusion

As sustainable development goals and the Net-zero transition gain global attention, the role of accounting becomes increasingly important. Research has shown that accounting can make a strong contribution to achieving sustainable development goals and the Net-zero transition. Accounting not only provides useful financial and non-financial information to support business decisions, but also facilitates the implementation of sustainable development strategies and creates sustainable value for stakeholders. This is achieved through increased transparency and social responsibility, helping stakeholders understand the impact of business activities on the environment and the community. Although this issue is still new in Vietnam, there has been initial research showing the potential role of accounting in supporting sustainable development goals and the Net-zero transition./.

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FACTORS AFFECTING THE ABILITY TO APPLY FINTECH IN PAYMENT ACTIVITIES AT VIETNAMESE COMMERCIAL BANKS

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Abstract: In the era of digital transformation, financial technology (Fintech) tends to have a great impact on payment activities at commercial banks. Fintech is expected to create added value and new services at lower costs than traditional technology on the basis of providing modern payment methods (Lee & Teo, 2015). This study aims to evaluate the application of Fintech services in payment activities at commercial banks through survey methods and regression analysis from data of 59 banks and commercial bank branches in Vietnam. The results show that there are 5 factors affecting the ability to apply Fintech in payment activities. Of which, the bank's infrastructure is the strongest factor, customer convenience is the weakest factor. From the results of this study, the author analyzed and suggested some recommendations for commercial banks in Vietnam on the application of Fintech services in payment activities. This research result is completely consistent with previous domestic and foreign studies and is a necessary part of information to support commercial banks in Vietnam in improving the efficiency of applying Fintech services in payment activities.

Keywords: Fintech, payment activities, commercial banking

1. Introduction

Fintech is the application of innovative and creative scientific and technological achievements in the financial sector to provide customers with transparent and effective financial services at lower costs than traditional ones. In payment transactions, there are two payment methods: (i) cash payment; and (ii) non-cash payment. To carry out non-cash payment transactions, it is necessary to apply technology to the payment process and since the birth of Fintech, new breakthroughs have been created in this payment method.

In recent years, banks have gradually applied Fintech to provide modern and convenient payment products to customers. According to ECB (2018), Fintech includes four priority areas: Blockchain; electronic customer identification e-KYC; application of biometric technology and API & Open APIs technology.

(i). Application of Blockchain technology

Blockchain is mainly applied in interbank money transfers and recording international payment transactions.

(ii). Electronic customer identification e-KYC

Blockchain is also applied by some banks to support the acceleration of online identification eKYC. The use of this technology aims to: reduce search costs in connecting transaction parties; achieve economies of scale in collecting and using big data; achieve cheaper and safer information transmission and reduce verification costs.

(iii). Application of biometric technology

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Biometric technology has only been applied in payment activities in Vietnam for a few years now but has great potential for development. According to Decision No. 2345/QD-NHNN on implementing safe and secure solutions in online payments and bank card payments, customers must authenticate biometrics when making their first banking transaction using Mobile Banking; All money transfers with a value of VND 10 million or more must go through a biometric authentication step for the sender; the total amount of transactions over VND 20 million/day must be authenticated by biometrics. This regulation ensures that the owner is actually making the money transfer, thereby contributing to ensuring the safety of the account holder, while preventing damage to the account holder when a fraudster withdraws money many times in large amounts.

(iv) API and Open API

API and OpenAPI are technologies that allow customers' applications, software, and digital platforms to connect and exchange data with banking services effectively and safely. OpenAPI is considered a development trend of open banking, helping to expand the digital ecosystem and improve customer experience in the digital space. The deployment of API and OpenAPI applications helps simplify payment processes and procedures, shorten waiting times, and meet the increasing needs of customers. Internal management activities are also gradually digitized and automated, helping to increase labor productivity as well as improve management efficiency in banks, thereby helping commercial banks provide payment services to keep up with developments worldwide.

According to current regulations in Vietnam, most forms of electronic payment need to be linked to a bank account to ensure identity verification, so the role of commercial banks in payment activities is increasingly affirmed. Commercial banks have focused on investing in information technology infrastructure and modern techniques to apply Fintech in payment activities to shorten customer waiting time, minimize risks in operations, and improve employee work efficiency. At the same time, commercial banks continuously update and apply new technologies to improve and launch new products and services from products and features on electronic channels, such as: e-banking, ATM, products on mobile phones; deploying branchless banking models and e-banking branches; cardless payment applications... to increase convenience for customers in payment activities. Based on that reality, the author conducted this study to provide useful information on the application of Fintech services in payment activities at commercial banks in Vietnam to increase bank value.

2. Theoretical basis and research overview

2.1. Theoretical basis

The term Fintech has been studied in depth by many organizations and researchers. The FSB (Global Financial Stability Board) defines FinTech as technology-based innovation in financial services that can lead to business models, applications, processes or products that have a significant impact on the provision of financial services. Fintech is the application of new technological inventions to increase the number of customers who can access financial services such as; online fundraising, peer-to-peer lending, automated payments and transfers, personal financial management, investment management, insurance, risk management, etc. (Gregor Dorfleitner et al., 2017). The Financial Stability Board (FSB) defines Fintech as financial innovation based on technology support aimed at creating new business models, processes, applications or products that have a significant impact on financial markets and institutions as well as the

provision of financial services. In a broader sense, Fintech is considered a new market that integrates finance and technology (Arner et al., 2015), and replaces traditional financial structures with new technology-based processes (Nguyen Nhat Minh & Pham Duc Anh, 2022). Fintech is the application of innovative, creative and modern technologies to the financial sector, aiming to provide customers with transparent, efficient and convenient financial solutions/services at lower costs than traditional financial services (Blakstad & Allen, 2018; Kieu Huu Thien et al., 2021).

In short, the concept of Fintech has been mentioned by many organizations and some authors, but in general, they all affirm the role of Fintech in helping financial institutions provide products and services quickly while saving costs and improving service quality.

2.2. Research Overview

There are a number of empirical studies in the world on the application of Fintech in commercial banking operations.

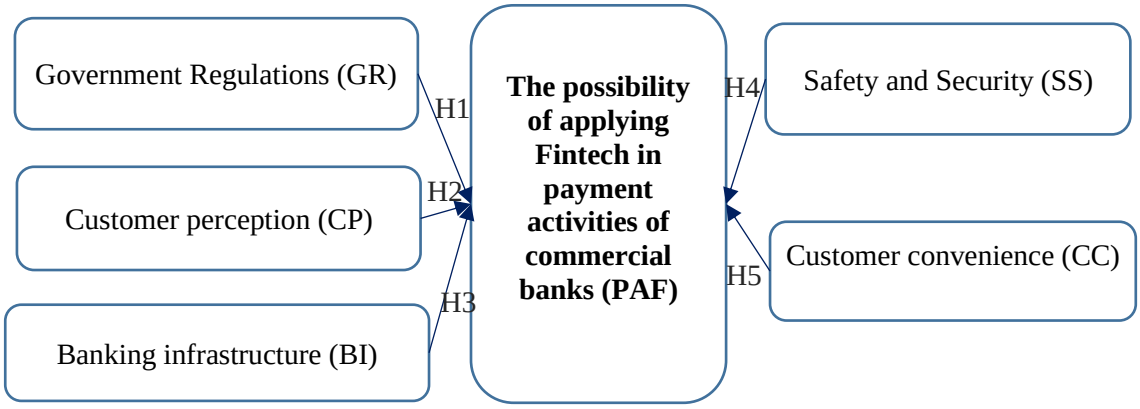
Senior Lecturer (2023) studied the factors affecting the application of Fintech in the banking industry. The method used was a survey by distributing questionnaires using a convenience sampling method among 200 employees working in Indonesian banks. The data were analyzed using the partial least squares (PLS) method. The results showed that bank infrastructure, external pressure and government support have a positive impact on the adoption of financial technology. However, customer perceived risk has a negative impact on adoption. The results of this study can support the decision-making process to take advantage of good opportunities from financial technology not only for the banking industry but also for the government to develop regulations on financial technology.

The study by Egi Arvian Firmansyah et al. (2023) found that customer awareness, safety and security are the factors that are important determinants of fintech service adoption in banking operations. Mohammad Abdel Mohsen Al-Afeef et al. (2023) used structured questionnaire and least square equation model (PLS-SEM) was used to test the research model. The study demonstrated that customer awareness has the strongest impact on the likelihood of commercial banks adopting Fintech, followed by bank infrastructure and customer convenience. This study may be useful for fintech companies operating in Middle Eastern countries, policy makers and researchers interested in Fintech adoption. Thus, the application of Fintech in payment activities helps commercial banks to be more convenient and flexible while saving time for customers, but due to differences in geographical location and operating methods, such activities will depend on many factors, which are different for commercial banks in different countries and need to be verified through specific empirical research. Therefore, the author has synthesized these studies and formed hypotheses for studying factors affecting the ability to apply fintech services to payment activities at commercial banks in Vietnam.

3. Research methods

3.1. Research model

The author has referred to previous studies, combined with related theoretical foundations, thereby proposing a research model of factors affecting the ability to apply Fintech in payment activities of commercial banks in Vietnam including: (i) Government regulations, (ii) Customer awareness, (iii) Bank infrastructure, (iv) Safety and security, (v) Customer convenience.



Source: Compiled by author

The specific research model is as follows:

$$PAF_i = \alpha + \beta_1 GR_i + \beta_2 CP_i + \beta_3 BI_i + \beta_4 SS_i + \beta_5 CC_i + \varepsilon$$

In which:

* Dependent variable:

PAF: The possibility of applying Fintech in payment activities of commercial banks

* Independent variables:

GR: Government regulations

CP: Customer awareness

BI: Banking infrastructure

SS: Safety and security

CC: Customer convenience

α is a constant, β is an explanatory variable, ε is the residual and i is the number of observations

3.2. Research hypothesis

Based on the proposed 05 factors affecting the ability to apply Fintech services in payment activities of commercial banks in Vietnam, the author builds the following research hypothesis:

(i) Government regulations

Government regulations are related to policy regulation to encourage the application of Fintech in payment activities of banks (Park & Kim, 2021). Government regulations have a positive impact on the application of Fintech by commercial banks (Kiwanuka, 2015). The rapid development and expansion of the scope of Fintech requires the Government to manage and monitor the risk of money laundering, ensure network security, protect data and user rights. Therefore, if the Government builds a reasonable management framework in the form of a Decree regulating the operating mechanism for the application of Fintech services in payment activities of commercial banks to promote innovation, limit unfair competition, prevent violations of the law in the name of Fintech, and protect the interests of customers.

From the above analysis, it is possible to establish hypothesis H1: Government regulations have a positive impact on the ability to apply Fintech services in payment activities of commercial banks in Vietnam.

(ii) Customer awareness

People's awareness and habits as well as other factors related to Fintech differ between developed and developing markets (Lehmann, 2020). According to Forsythe et

al. (2006), customers' awareness of the benefits received and the risks that occur are factors affecting the ability to apply Fintech in payment activities of commercial banks. If customers believe that their payments at commercial banks are subject to product and time risks, the ability of commercial banks to apply Fintech will be negatively affected. According to Maignan & Lukas (1997); Kuisma et al. (2007), many customers are afraid of losing money when making transactions and transferring money through banks. On the contrary, if customers believe that their payments at commercial banks when applying Fintech will be quick, easy to connect, and shorten waiting time, it will positively affect the ability of commercial banks to apply Fintech (Zavolokina et al., 2016).

From the above analysis, it is possible to establish hypothesis H2: customer awareness has a positive impact on the ability to apply Fintech services in payment activities of commercial banks in Vietnam.

(iii) Banking infrastructure

According to DeLone - McLean (2003), (Hiran & Henten, 2019), infrastructure greatly affects the ability of commercial banks to apply Fintech services. Infrastructure is reflected in meeting the requirements of high-tech development, especially security technology. Good infrastructure helps standardize technical standards, business processes, ensure security and safety when sharing data, connecting services, especially with payment services on the Open Banking platform. For commercial banks, good infrastructure will help reduce the complexity of legal implementation, reduce security risks, save costs and resources, and increase the ability to expand services and opportunities to reach customers. On the contrary, if the infrastructure is not good, commercial banks will face risks when deploying Fintech applications in payment activities for customers.

From the above analysis, we can establish hypothesis H3: the bank's infrastructure has a positive impact on the ability to apply Fintech in payment activities of commercial banks in Vietnam.

(iv) Safety and security

Sheng (2021) shows that fintech has changed the way banks overcome information asymmetry and helps them obtain more information. Lapavitsas & Santos (2008) analyzed the positive impact of technological advances on banking operations and argued that the development of Fintech can allow commercial banks to understand their credit customers more comprehensively and minimize credit risks. However, in addition, the application of Fintech poses financial risks to commercial banks, which are potential losses due to transaction errors and misuse of bank accounts when safety and security are not guaranteed. Customers can have their information stolen when using online payment services from banks (Lee, 2009).

From the above analysis, we can establish hypothesis H4: safety and security have a positive impact on the ability to apply Fintech in payment activities of commercial banks in Vietnam.

(v) Convenience for customers.

The more convenience for customers is improved, the more favorable the ability to apply Fintech in payment activities of commercial banks. Commercial banks apply Fintech on the basis of improving and introducing new products and services from products and features on electronic channels, such as: electronic banking, ATM, products on mobile phones; deploying branchless banking models and electronic banking branches; cardless payment applications... to increase convenience for customers in

payment activities. Customers will benefit from an optimized experience, access to a wide range of information and services, handle financial needs more quickly and securely, and save costs (Kuisma et al., 2007).

From the above analysis, we can establish hypothesis H5: customer convenience has a positive impact on the ability to apply Fintech in payment activities of commercial banks in Vietnam.

3.3. Building a scale

The scale of factors affecting the ability to apply Fintech in payment activities of commercial banks in Vietnam is shown in Table 1.

Table 1: Scale of factors affecting the ability to apply Fintech in payment activities of commercial banks in Vietnam

Numerical order	The scale	Encode	Reference	Expectation Sign
Dependent variable				
The possibility of applying Fintech in payment activities of commercial banks (PAF)	Meet the need for argument conversion	PAF1	Dorfleitner et al. (2017)	
	Enhance competitiveness with Fintech companies	PAF2		
	Meet customer needs and experiences in payment activities	PAF3		
Independent variables				
Government regulations (GR)	Regulating policies to encourage Fintech applications	GR1	Park & Kim (2021)	+
	Money laundering risk management and monitoring	GR2	Kiwanuka (2015)	
	Ensure network security, protect data and user rights	GR3		
Customer perception (CP)	Payments via Fintech apps are subject to timing risks	CP1	Forsythe et al. (2006)	+
	Fear of losing money when making transactions and transferring money through banks	CP2	Maignan & Lukas (1997); Kuisma và cộng sự (2007)	
	Payment via Fintech application is quick, easy to connect, shortens waiting time	CP3	Zavolokina et al (2016).	
Banking infrastructure (BI)	Meet the requirements of high technology development	BI1	DeLone - McLean (2003), Hiran & Henten (2019)	+
	Ensuring security and safety when sharing data on the Open Banking platform	BI2		
	Standardize technical standards and business processes	BI3		
Safety and Security (SS)	Overcoming information asymmetry	SS1	Sheng (2021)	+
	Minimize credit risk	SS2	Lapavitsas &	

	Ensure customer information security	SS3	Santos (2008)	
Customer convenience (CC)	Experience the ultimate payment service	CC1	Kuisma et al. (2007)	+
	Handle financial needs quickly and securely	CC2		
	Cost savings	CC3		

Source: Compiled by author

Research using Likert scale: Attributes of Fintech applicability in payment activities at Vietnamese commercial banks were measured using a 5-point Likert scale (Likert, 1932), from 1 "No influence" to 5 "Very strong influence".

3.4. Quantitative research methods

Research sample

The research sample was collected from 59 banks and commercial bank branches in Vietnam. The author collected data on 5 attributes representing the Ability to apply Fintech in payment activities of banks and commercial bank branches in Vietnam over a three-year period, from 2022 to 2024, by sending survey forms directly or indirectly (via email or google.doc tool).

Data collection objects: At each bank or commercial bank branch, the author will choose to send 01 survey form to each survey subject, specifically as follows:

(i) 01 survey to managers who are Directors or Deputy Directors of banks/commercial bank branches

(ii) 01 survey to representatives of the Board of Directors of the bank

(iii) 01 survey to Head or Deputy Head of Customer Service Department

(iv) 01 survey to each employee with 03 years or more of working experience in the customer service department

Research sample size: In this study, the author distributed 236 questionnaires and collected 235. After cleaning the data, the author included 231 questionnaires in the analysis. This sample size is appropriate. The reason is that the article uses the method of exploratory factor analysis (EFA) and multivariate regression analysis. Therefore, the research sample size is established based on the following bases:

- For exploratory factor analysis (EFA): the minimum sample size is 5 times the total number of observed variables (Comrey, 1973; Hair et al., 2010; Roger, 2006).

- For multivariate regression analysis: the minimum sample size required is calculated according to the formula: N = 50 + 8*m (where m is the number of independent variables) (Tabachnick and Fidell, 1996).

Based on the above argument, the author calculated and selected the minimum sample size of 125 observations.

Data Analysis

After being collected, the information of the survey form was checked to ensure its suitability, data was coded, declared, and entered into SPSS 22 software, then the research data was analyzed according to the following process:

(1). Descriptive statistics of data

(2). Checking the reliability of the scale of factors in the research model:

The scale is assessed as having good quality when the Cronbach Alpha coefficient of the whole is > 0.6 and the correlation coefficient of the variable - total of the observed

variables is > 0.3 (Nguyen Van Thang, 2015). Then it can be affirmed that the observed variables of the scale have reliability in terms of cohesion to be able to synthesize into independent variables (Nunnally & Bernstein, 1994).

(3) Exploratory factor analysis EFA:

To group variables that are closely related to each other to form new factors, and at the same time separate other groups of less related observed variables, the author uses the exploratory factor analysis method (Mai & Hung, 2015). EFA testing is conducted in 5 steps: checking the suitability of the data, selecting the extraction method, determining the factors to retain, selecting the factor rotation method, and interpreting the analysis results (Hair et al., 2010)

(4). Person correlation analysis: indicates whether there is a relationship between the research variables in the model or not.

(5). Multivariate regression analysis: indicates the level of influence of each factor on the ability to apply Fintech in payment activities at Vietnamese commercial banks.

4. Research results and discussion

4.1. Research results

Descriptive statistics of the data:

The descriptive statistics results of the data are shown in Table 2.

Table 2: Descriptive statistics of data

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
PAF	231	1	5	2.94	0.00266
GR	231	1	4	2.21	0.00262
CP	231	1	4	2.22	0.05153
BI	231	1	5	2.96	0.00652
SS	231	1	5	3.13	0.00214
CC	231	1	5	3.15	0.16872
Valid N (listwise)	231				

Source: SPSS analysis results

Table 2 describes the research data of commercial banks in Vietnam. The average PAF value representing the ability to apply Fintech in payment activities is 2.99 with a standard deviation of 0.00266. Meanwhile, the range of values of the independent variables is different. The standard deviation of the independent variables is relatively small, proving that the fluctuations between the independent variables are not large.

Scale quality control

The quality of the scale is tested by the author through Cronbach's Alpha coefficient and shown in Table 3.

Table 3: Scale testing using Cronbach's Alpha coefficient

Observational variables	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Cronbach's Alpha = 0.923				
PAF1	10.93	9.204	.897	.980
PAF2	10.87	9.039	.954	.965
PAF3	10.91	9.057	.950	.966
PAF	10.93	9.256	.945	.963
Cronbach's Alpha =0,805				
GR1	11.75	4.434	.641	.827
GR2	12.12	3.813	.571	.884
GR3	11.77	4.322	.655	.821
GR	11.88	4.234	.699	.898
Cronbach's Alpha = 0,817				
CP1	12.00	5.031	.558	.917
CP2	12.06	4.025	.753	.852
CP3	12.12	3.831	.755	.856
CP	12.06	4.175	.798	.870
Cronbach's Alpha = 0,822				
BI1	8.62	1.895	.716	.898
BI2	8.39	1.801	.725	.896
BI3	8.47	1.823	.718	.875
BI	8.60	1.835	.709	.801
Cronbach's Alpha = 0,806				
SS1	8.57	1.987	.725	.830
SS2	8.36	1.864	.685	.882
SS3	8.45	1.872	.651	.824
SS	8.50	1.936	.764	.832
Cronbach's Alpha = 0,812				
CC1	8.12	1.882	.656	.857
CC2	8.15	1.888	.678	.862
CC3	8.17	1.876	.615	.832
CC	8.22	1.893	.631	.841

Source: SPSS analysis results

The results of Cronbach's Alpha testing of factors in the research model show that the PAF variable has Cronbach's Alpha = 0.923 > 0.6, so it meets the criteria for retention (Hair et al., 2010). The component scales (PAF1, PAF2 and PAF3) all have correlations with the total variable > 0.3, so they meet the requirements for retention. Similar arguments for the remaining variables show that the observed variables and scales all ensure reliability. From the above results, it can be seen that the factors are statistically significant and achieve the required reliability coefficient. The research model after assessing the reliability of the scale using the Cronbach's Alpha coefficient has 5 factors with 15 observed variables.

Exploratory factor analysis EFA

Table 4: KMO and Bartlett coefficient test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,539
Bartlett's Test of Sphericity	Approx. Chi-Square	471.1607
	df	105
	Sig.	0,000

Source: SPSS analysis results

The results of KMO and Bartlett coefficient tests show that KMO coefficient = 0.539 > 0.5, proving that the factor analysis table is suitable for the research data. On the other hand, Bartlett test is statistically significant (Sig. < 0.05). That confirms that the EFA results are completely reliable for analysis.

Table 5: Total explained variance

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.273	15.156	15.156	2.273	15.156	15.156	2.254	15.025	15.025
2	1.321	10.809	25.965	1.321	10.809	25.965	1.319	10.794	25.819
3	1.281	8.539	35.505	1.281	8.539	35.505	1.252	8.350	35.169
4	1.206	8.042	42.546	1.206	8.042	42.546	1.180	7.865	42.033
5	1.095	7.301	50.847	1.095	7.301	50.847	1.172	7.814	50.847

Source: SPSS analysis results

Table 5 shows that the initial eigenvalues from 1.095 to 2.273 are all >1 and meet the requirements, the extracted variance value is 50.847%.

Table 6: Rotation matrix

Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
GR1	.672				
GR2	.550				
GR3	.523				
CP1		.553			
CP2		.634			
CP3		.516			
BI1			.601		
BI2			.618		
BI3			.627		
SS1				.774	
SS2				.815	
SS3				.546	
CC1					.736
CC2					.755
CC3					.575

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 8 iterations.

The results of factor analysis based on the rotation matrix showed that the factor groups were drawn from the observed variables with loading factors on the factors being quite high (> 0.5), the loading factors were considered to be meaningful.

Pearson correlation analysis

Table 7: Pearson correlation analysis

Correlations

		PAF	GR	CP	BI	SS	CC
PAF	Pearson Correlation	1	.053	.027	.055	-.063	.023
	Sig. (2-tailed)		.426	.487	.406	.339	.429
	N		231	231	231	231	231
GR	Pearson Correlation		1	.146*	.069	.056	.016
	Sig. (2-tailed)			.026	.295	.401	.811
	N			231	231	231	231
CP	Pearson Correlation			1	-.061	.002	.032
	Sig. (2-tailed)				.357	.975	.633
	N				231	231	231
BI	Pearson Correlation				1	-.081	.056
	Sig. (2-tailed)					.219	.393
	N					231	231
SS	Pearson Correlation					1	-.013
	Sig. (2-tailed)						.844
	N						231
CC	Pearson Correlation						1
	Sig. (2-tailed)						
	N						

*. Correlation is significant at the 0.05 level (2-tailed).

Table 7 shows the correlation between the independent variables and the dependent variable as follows: Sig. of the 5 independent variables including GR, CP, BI, SS, CC compared to the dependent variable are all less than 0.05. Thus, these 5 independent variables have a statistically significant correlation with the dependent variable (Dormann et al., 2013).

Model fit testing

Table 8: Model fit test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.687[a]	.524	.519	.502	1.933

a. Predictors: (Constant), CC, SS, CP, BI, GR

b. Dependent Variable: PAF

The research results from Table 8 show that: Durbin - Watson index = 1.933 in the range of 1.5 < D < 3 indicates that there is no autocorrelation phenomenon. The adjusted R^2 correlation coefficient value is 0.519 > 0.5. Therefore, this is a suitable model to use to evaluate the relationship between independent variables and dependent variables. The adjusted R^2 coefficient in the model is 0.519, meaning that the linear regression model built fits the data set at 51.9%. This also means that the ability to apply Fintech in payment activities of commercial banks in Vietnam is explained by 5 independent variables with an influence level of 51.9%, the remaining parts are due to random errors.

Regression analysis

Table 9: ANOVA regression analysis

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.040	5	1.008	.459	.000[b]
	Residual	494.527	225	2.198		
	Total	499.567	230			

a. Dependent Variable: PAF

b. Predictors: (Constant), CC, SS, CP, BI, GR

In the ANOVA analysis table above, it shows that: Sig. value = 0.000 < 0.05, which concludes: the linear regression model with 05 independent variables: GR, BI, CP, SS and CC is suitable.

Table 10: Multiple regression analysis

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.368	.667		3.549	.465		
	BI	.114	.155	.049	.732	.000	.969	1.032
	CP	.051	.158	.042	.325	.000	.972	1.028
	GR	.089	.127	.037	.699	.021	.980	1.021
	SS	-.065	.070	.032	.630	.018	.989	1.011
	CC	.018	.067	.018	.271	.007	.995	1.005

a. Dependent Variable: PAF

From Table 10, it can be seen that the variance inflation factor (VIF) of the 5 independent variables with values from 1.005 to 1.032 is less than 2, so there is no multicollinearity phenomenon. All 5 variables GR, BI, CP, SS and CC have Sig. < 0.05, proving that all these variables are significant in the regression model. We can write the equation about the factors affecting the ability to apply Fintech in payment activities of

commercial banks in Vietnam as follows:

$$PAF_i = 2{,}368 + 0.037\ \text{GR} + 0{,}042\ CP + 0{,}049\ \text{BI} + 0.032\ \text{SS} + 0{,}018\ \text{CC}$$

The results of Table 10 show that hypotheses H1, H2, H3, H4 and H5 are all accepted. Specifically, the variables GR, CP, BI, SS and CC (equivalent to hypotheses H1, H2, H3, H4 and H5) have a positive impact on the dependent variable (PAF). In which, the strongest impact is the variable BI (β_3=0.049), followed by the variable CP (β_2=0.042); the variable GR (β_1=0.037), the variable SS (β_4=0.032) and the variable CC (β_5= 0.018).

4.2. Discussion

The research results show that there are 05 accepted hypotheses, which are Government regulations, customer awareness, banking infrastructure, safety and security; customer convenience affect the ability to apply Fintech in payment activities of commercial banks in Vietnam. In fact, commercial banks in Vietnam are currently facing certain difficulties: there is no complete legal corridor guiding the application of Fintech in payment activities, customer awareness is not complete, infrastructure is not synchronized along with safety and security risks in the banking system. These difficulties explain more clearly the 05 accepted hypotheses affecting the ability to apply Fintech in payment activities of commercial banks in Vietnam. In which:

Government regulations have a positive impact on the ability to apply Fintech in payment activities of commercial banks. If the Government regulations are clear and transparent, it will help the ability to apply Fintech well. On the contrary, if the Government's regulations are not transparent, it will negatively affect the ability of commercial banks to apply Fintech. This result is similar to the research results of Park & Kim (2021).

Customer awareness has a positive impact on the ability to apply Fintech in payment activities of commercial banks. If customer awareness is not adequate, it will negatively affect the ability to apply Fintech. On the contrary, if customer awareness is adequate, it will help the ability to apply Fintech effectively. This result is also similar to the research results of Maignan & Lukas (1997).

Bank infrastructure has a positive impact on the ability to apply Fintech in payment activities of commercial banks. That is, if the infrastructure is good, it will help the ability to apply Fintech smoothly. On the contrary, if the infrastructure is outdated and lacks synchronization, the ability to apply Fintech will not achieve high results. This result is also similar to the research results of DeLone - McLean (2003).

Safety and security have a positive impact on the ability to apply Fintech in payment activities of commercial banks. That is, ensuring information safety and security will help the ability to apply Fintech well and vice versa, if information safety and security are not guaranteed, the ability to apply Fintech is not effective. This result is also similar to the research results of Sheng (2021).

Customer convenience has a positive impact on the ability to apply Fintech in payment activities of commercial banks. That is, good customer convenience will help the ability to apply Fintech effectively and vice versa, if customer convenience is not good, the ability to apply Fintech is not effective. This result is also similar to the research results of Kuisma et al. (2007).

The research results are the basis for commercial banks in Vietnam to have an orientation in applying Fintech in payment activities to maximize bank value. However,

this study has some limitations:

First, the sample size is still small, if there are enough resources and conditions to survey all commercial bank branches in Vietnam, the results may be more representative.

Second, further in-depth qualitative studies may be needed to further improve the research model and measurement scale.

5. Recommendations

To enhance the ability to apply Fintech in payment activities of commercial banks in Vietnam, the author makes a number of recommendations including:

(i) For banking infrastructure

Commercial banks need to create infrastructure, common technology platforms and build, form the necessary ecosystem for digital technology development, create connections, interconnections, and convenient information and data sharing between information technology systems of the whole economy in general, and organizations providing Fintech payment products in particular.

(ii) For customer awareness

Technology application is a trend in all sectors of the economy, so having knowledge and experience in using modern technology products will help users integrate with the wave of global development. Therefore, commercial banks need to diversify the forms and channels of propaganda and education, especially digital forms and means to improve users' understanding, thereby helping them confidently use technology properly, make the right decision to use modern payment products, suitable to their needs and capabilities and maximize their benefits.

(iii) Regarding Government regulations

The Government needs to create the necessary legal framework to support the ability of commercial banks to apply Fintech. In particular, clearly stipulate payment product standards, obligations of payment product providers according to international standards and practices. At the same time, Government regulations need to clarify the differences between product types so that commercial banks can more easily develop and deploy products. In addition, the Government needs to issue a separate system of legal documents to protect, create trust and peace of mind for customers when choosing Fintech payment products instead of paying in cash.

(iv) Regarding safety and security

Commercial banks applying Fintech in payment activities need to strengthen network security management to increase customer trust and protect their operations from hacker attacks. In addition, commercial banks need to update information security standards to gradually approach international information security standards and measures to ensure security and safety for the payment system.

(v) Regarding customer convenience

To increase the competitiveness of Fintech payment activities, commercial banks need to continue to update and add new features, improving user experience. To do this, commercial banks should research and apply technologies such as Blockchain, cloud computing, etc. to develop features and improve products to meet customer needs.

6. Conclusion

The impact of the digital revolution on the development of the banking system is increasingly evident with the emergence of a series of innovative banking products and services, as well as the emergence of new banking service distribution channels based on

the Fintech platform. Fintech has been developing along with technological breakthroughs and innovations in data science, cybersecurity, computing and communications. Traditional banks with a long history and brand, large operating network, have advantages in large amounts of customer data, financial capacity and operational experience compared to other financial service providers in the market. However, compared to Fintech companies, banks always have a certain lag in terms of technology. However, banking is also an industry with a high ability to adapt to changes in the business environment, including technological breakthroughs. Accessing and investing in technology, people, and then changing business models and strategies are the directions that banks are aiming for. Therefore, improving the ability to apply Fintech in payment activities of commercial banks in Vietnam is an urgent issue to increase the value of banks.

Based on the synthesis of theoretical foundations and research overview, this article has used empirical research methods to clearly show that there are 05 factors affecting the ability to apply Fintech in payment activities of commercial banks in Vietnam. From there, the author has made a number of recommendations to help bank managers improve the ability to apply Fintech in payment activities to increase convenience for customers.

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THE RELATIONSHIP BETWEEN HERD MENTALITY, OPTIMISM, PESSIMISM, OVERCONFIDENCE AND TRADING VOLUME IN THE VIETNAMESE STOCK MARKET: SPECTRUM GRANGER CAUSALITY APPROACH

Phan Ngoc Yen Xuan[1]

Summary: The paper studies the Granger causality spectrum between trading psychological factors including herd mentality, optimism, pessimism, overconfidence and trading volume of investors in the Vietnamese stock market. The study uses daily price and trading volume data of the VN30 index and its constituent stocks in the period from January 1, 2020 to June 30, 2024. The results show that there is a close causal relationship between investor psychological factors, and pessimism has a close relationship with trading volume in the market. Therefore, to invest more effectively, investors must have solutions to simultaneously control different psychological factors in relation to controlling trading volume.

Keywords: trading volume, herd mentality, optimism, pessimism, overconfidence, Vietnam stock market

1. Introduce

Recently, despite being affected by the Covid-19 pandemic, the Vietnamese stock market as well as a number of other countries have witnessed significant recovery and growth, attracting the attention of not only investors but also managers. The stock market plays an extremely important role in economic development in any country in the world, any fluctuations in the stock market will significantly affect the stability of the economy and investors. For the government, the stock market is a place where the government can mobilize financial resources without inflationary pressure, especially when investment capital from the state sector is limited. For businesses, this is an important capital mobilization channel through many forms of capital mobilization by issuing stocks, bonds, etc., avoiding high-interest loans. This is also a channel to evaluate the performance of businesses, motivating businesses to constantly improve and become more effective. For investors, the stock market provides diverse investment and profit-seeking opportunities for the public, suitable for many types of investors and capital sizes.

In particular, the Vietnamese stock market has a very large participation rate of domestic individual investors, the investment decisions of that group of individual investors have a significant impact on the price movements of the market. Vietnamese individual investors are considered to be quite young compared to world investors, most of the current individual investors are amateur investors and are greatly influenced by psychological factors as well as led by crowd psychology in trading decisions, greatly affecting the stability and long-term development of the Vietnamese stock market.

The important role of psychological factors of investors in the stock market as well as the important role of the stock market for the economy shows that the study of

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psychological factors in the stock market is extremely necessary. Therefore, this article will evaluate the relationship between psychological factors in investment and trading volume in the stock market in order to make appropriate recommendations so that investors can limit the negative effects of psychological issues in investment, improve trading efficiency as well as help the stock market become more effective.

2. Research Overview

Investors in the stock market are greatly influenced by psychological factors (Oprean, 2014)therefore studying investor psychology can explain many developments in market prices and volumes leading to more accurate predictions (Barberis, 2018).

Naqvi, Jiang, Miao, and Naqvi (2020) found that personality and sensation seeking have a significant influence on investors' financial risk tolerance. Xia and Madni (2024) provided evidence that individual investors' decisions are influenced by factors including herd mentality, overconfidence, and loss aversion, regret aversion, in which herd mentality and overconfidence have a significant impact, especially in times of increased uncertainty when overconfidence is more beneficial. Arik and Sri (2021) showed that investors are affected by overconfidence and optimism, while Kartini and NAHDA (2021) showed that factors including: anchoring, typical situation, loss aversion, overconfidence, overoptimism, herding behavior, cognitive accounting all have significant influence on stock investors.

The impact of herd behavior on investors varies across markets. Research by Prasetyo and Ratnawati (2023) shows that herd behavior does not affect investors. Similar results were found in research by Antony and Joseph (2017) or Kanojia, Singh, and Goswami (2018) when they found that herd behavior has little impact on investment decisions. Instead, investors are strongly influenced by optimism and pessimism (Joo, 2017). However, Gamage, Wijekumara, and Sugathadasa (2021) showed that herd behavior has a significant impact on investment decisions.

Another factor that significantly affects investors is overconfidence (Kanojia et al., 2018), there are significant differences in the impact of psychological factors among investors of different age groups, different income groups, and different experience, in which overconfidence increases with age. Aziz and Khan (2016) show that overconfidence affects investors more than other psychological factors. In contrast, Rekik and Boujelbene (2013) find that overconfidence has no impact on individual investors. Overoptimism has a positive impact on decision making (Chen, Ishfaq, Ashraf, Sarfaraz, & Wang, 2022).

In Vietnam, Kallinterakis (2007) or Dao and Tu (2014) found the significant existence of herding effect in the stock market, and swing trading had a positive impact on herding effect. Ton and Dao (2014) found that over-optimism, risk-taking, and over-pessimism positively affected investors' long-term investment while over-confidence and herding behavior had negative impacts. Quang, Linh, Van Nguyen, and Khoa (2023) showed that investors' emotions, over-confidence, over-reaction, and herding behavior all had a significant impact on investment decisions.

Hu, Zhong, and Cai (2019) showed that investor sentiment has a positive impact on market liquidity while information perception has a negative impact on market liquidity. Asghari, Abbasian Fredoni, and Naslmosavi (2020) showed that investor sentiment in the studied countries has a positive impact on stock market trading volume and can increase stock market trading volume and liquidity. Stock market trading volume of investors

decreases when they are optimistic and increases when they are pessimistic, when investors' confidence level increases, trading volume increases, rational expectations and trading volume show signs of inverse correlation (Rashid, Tariq, & Rehman, 2021). Andleeb and Hassan (2024) showed that optimism and pessimism have a significant impact on the conditional volatility of trading volume in the market, similar results were found in the study of Yang and Chuang (2024). In Vietnam, Anh, Nhung, and Loan (2022) found no evidence of the impact of overconfidence on trading volume in the Vietnamese stock market, while the impact of pessimism and optimism was positive, in particular, pessimism had the strongest impact on trading volume.

From previous studies, it can be seen that investors in general and Vietnamese investors in particular are significantly affected by many different psychological factors, including herd mentality, optimism, pessimism and overconfidence, which affect trading volume in the market. This study was conducted with the aim of assessing and quantifying the connection between psychological factors as well as trading volume in the Vietnamese stock market, exploring the causal relationship between them to propose some policy implications from the research results.

3. Data sources and research methods

3.1. Data Source

The objective of the study is to examine the causal relationship between herd mentality, optimism, pessimism, overconfidence and trading volume in the Vietnamese stock market. The study uses daily time series data from January 1, 2020 to June 30, 2024 (1180 observations) collected from https://www.investing.com/ of the VN30 index and its constituent stocks to calculate the VN30 index. The study period represents relatively complete stages in a stock market cycle, so it is possible to assess the overall relationship between psychological factors in different market periods. The names of the variables in the model, measurement methods and reference sources are shown in Table 1 below:

Table 1: Research variables and measurement methods

Symbol	Variable description	Measurement	Source
TV	Trading volume	Nepe logarithm of trading volume of VN30 index $TV_t = \ln(TV_t)$	Baker and Stein (2004)
over	Overconfidence	Calculated through price and trading volume of component stocks in VN30 index $over_t = a_t in Ln(TV_{i,t}) = a_t . R_{i,t-1} + b_t$ $R_{i,t-1} = \ln(\frac{P_{i,t-1}}{P_{i,t-2}})$	Dhaoui, Bourouis, and Boyacioglu (2013)
optim	optimism	Calculated through closing prices of component stocks in VN30 index $optim_t = \frac{1}{N}\sum_1^N (RR_{i,t} \mid RR_{i,t} > E[RR_i])$ $RR_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}}$	Sharot (2011)
pessim	Pessimism	Calculated through closing prices of component stocks in VN30 index $pessim_t = -\frac{1}{N}\sum_1^N (RR_{i,t} \mid RR_{i,t} < E[RR_i]$ $RR_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}}$	Sharot (2011)

herd	Herd mentality	Calculation through beta coefficient in CAPM model of each component stock in VN30 index and VN30 index herd $_t = h_{mt} = 1 - \exp(H_{mt})$ $\begin{cases} \text{Log}[\text{Std}_c(\beta^b_{imt})] = \mu_m + H_{mt} + \vartheta_{mt}, \ \vartheta_{mt} \sim \text{iid}(0, \\ H_{mt} = \phi_m H_{mt} - 1 + \eta_{mt}, \quad \eta_{mt} \sim \text{iid}(0, \sigma^2_{\eta} \end{cases}$	Hwang and Salmon (2004)

Source: Author

3.2. Research methods

The study uses the Granger spectral causality test model developed by Breitung and Candelon to capture the causal relationship between variables in the research model in Vietnam. This tool allows testing non-linear causality tests on different frequency domains (Breitung & Candelon, 2006).

The main difference between the traditional Granger causality test and the spectral Granger causality model is that the traditional Granger causality test is performed to show the connection between variables in the time domain while the spectral Granger causality test shows the relationship in the frequency domain, each frequency corresponding to a specific periodic period with the periodic unit measured in trading days. A low frequency time series also means a longer periodic period of the series, whereas a high frequency series will have a short periodic period. The time domain approach can show where the change is in a time series and the frequency domain assesses the extent of a particular variation in different time scales. This technique allows to distinguish between long-run and short-run causality between time series. The condition for performing the traditional Granger causality test as well as the spectral Granger causality test is that the time series involved in the test must be stationary. Note that the Granger effect only implies that past information in the source series can be useful for predicting future information in the target series rather than concluding about causality according to economic theories.

The traditional Granger causality test in the VAR model is performed by testing the hypothesis $H_0: \alpha_1 = \cdots = \alpha_p = 0$ of the following equation: $Y_t = \beta_0 + \sum_{j=1}^{p} \beta_j Y_{t-j} + \sum_{j=1}^{p} \alpha_j X_{t-j} + \varepsilon_t$

If the null hypothesis H_0 is rejected, it shows that Xt has a Granger effect on Y_t, which means that past information of X_t can predict present and future information of Y_t.

Breitung and Candelon (2006) constructed a spectral Grange causality test that allows determining the Granger causal effect of X_t on Y_t at each frequency of the series. Let $Z_t = (X_t, Y_t)'$, the VAR(p) model of is $Z_t$as follows: $(I_2 - A_1 L - \cdots - A_p L_p) Z_t = \varepsilon_t$

In there: L: backward math

A_i: 2x2 matrix of delays i, i = 1,2,…,p;

I_2: 2nd level identity matrix

$\varepsilon_t = (\varepsilon_{1t}, \varepsilon_{2t})'$ is the error vector where $\varepsilon_{1t}, \varepsilon_{2t}$ are white noise sequences with $E(\varepsilon_t) = 0$ and the covariance matrix $\Sigma = E(\varepsilon_t . \varepsilon_t')$ is positive definite.

Performing the Cholesky decomposition on the covariance matrix Σ, we get $\Sigma^{-1} = H . H^{-1}$ where H is a lower triangular matrix.

The above equation is converted into VMA (Vector Moving Average) form as follows: $Z_t = \Phi(L)\varepsilon_t$ or $\begin{bmatrix} X_t \\ Y_t \end{bmatrix} = \begin{bmatrix} \emptyset_{11}(L) & \emptyset_{12}(L) \\ \emptyset_{21}(L) & \emptyset_{22}(L) \end{bmatrix} \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix}$

Then decompose the error into orthogonal shocks $\eta_t = \begin{bmatrix}\eta_{1t}\\ \eta_{2t}\end{bmatrix} = G\varepsilon_t$, where $E(\eta_t.\eta_t') = 1$. The model after decomposition into orthogonal shocks has the form

$$\begin{bmatrix}X_t\\ Y_t\end{bmatrix} = \begin{bmatrix}\varphi_{11}(L) & \varphi_{12}(L)\\ \varphi_{21}(L) & \varphi_{22}(L)\end{bmatrix}\begin{bmatrix}\eta_{1t}\\ \eta_{2t}\end{bmatrix}$$

With the symbols set as $\Psi(L) = \begin{bmatrix}\varphi_{11}(L) & \varphi_{12}(L)\\ \varphi_{21}(L) & \varphi_{22}(L)\end{bmatrix}$, $\Phi(L) = \left(I_2 - A_1L - \cdots - A_pL_p\right)^{-1}$, respectively $\Psi(L) = \Phi(L)G^{-1}$.

Using the Fourier transform on the time series in the form of a moving average, we obtain the spectral density function of X_t as follows:

$$f_X(\omega) = \frac{1}{2\pi}\left\{|\varphi_{11}(e^{-i\omega})|^2 + |\varphi_{12}(e^{-i\omega})|^2\right\}$$

Geweke (1982) proposed the following formula to measure the impact from X_t to Y_t :$M_{X\to Y}(\omega) = log\left\{\frac{2\pi f_X(\omega)}{|\varphi_{11}(e^{-i\omega})|^2}\right\} = log\left\{1 + \frac{|\varphi_{12}(e^{-i\omega})|^2}{|\varphi_{11}(e^{-i\omega})|^2}\right\}$

If $\left|\varphi_{12}(e^{-i\omega})\right| = 0$, then $M_{X\to Y}(\omega)$ it will also be zero, which means that X_t has no effect on Y_t at frequency ω. Therefore, the H_0 corresponding hypothesis of the Granger causality test X_t to Y_t at frequency ω is: $H_0: M_{X\to Y}(\omega) = 0$

The results are obtained from the frequency range (ω) (0, π) with t = 2π/ω, the frequency ω is related to the period t at different frequencies (0-1, 1-2 and 2-3) showing that the causal relationship is long-run, medium-run and short-run.

4. Research results

The results of descriptive statistical analysis for the research variables of the model are presented in Table 2 below.

Table 2: Descriptive statistics of research variables

Variable	ID	rat	over	optimize	soccer	herd
Medium	5.0714	0.5108	4.8487	0.0079	0.0074	0.0680
Median	5.1218	0.5225	4.7266	0.0058	0.0040	0.0628
Maximum value	6.1445	1	535.6645	0.0566	0.0692	0.6338
Minimum value	3.4828	0.0012	-82.7003	0	0	0.0036
Standard deviation	0.4453	0.2959	32.4256	0.0077	0.0099	0.0315
Sharpness index	3.2951	1.8099	66.4655	10.8193	12.7999	96.7377
Deviation index	-0.6078	-0.0458	3.9563	2.3066	2.8707	5.9801
Jarque-Bera	72.89	66.37	1.9e+05	3840	6009	4.2e+05
Probability	000	000	000	000	000	000
Number of observations	1118	1118	1118	1118	1118	1118

Source: Author's calculation

The stationarity test results in Table 3 show that all research variables in the model are stationary at the original level at the 1% statistical significance level. Therefore, the thesis can proceed with the next analytical models.

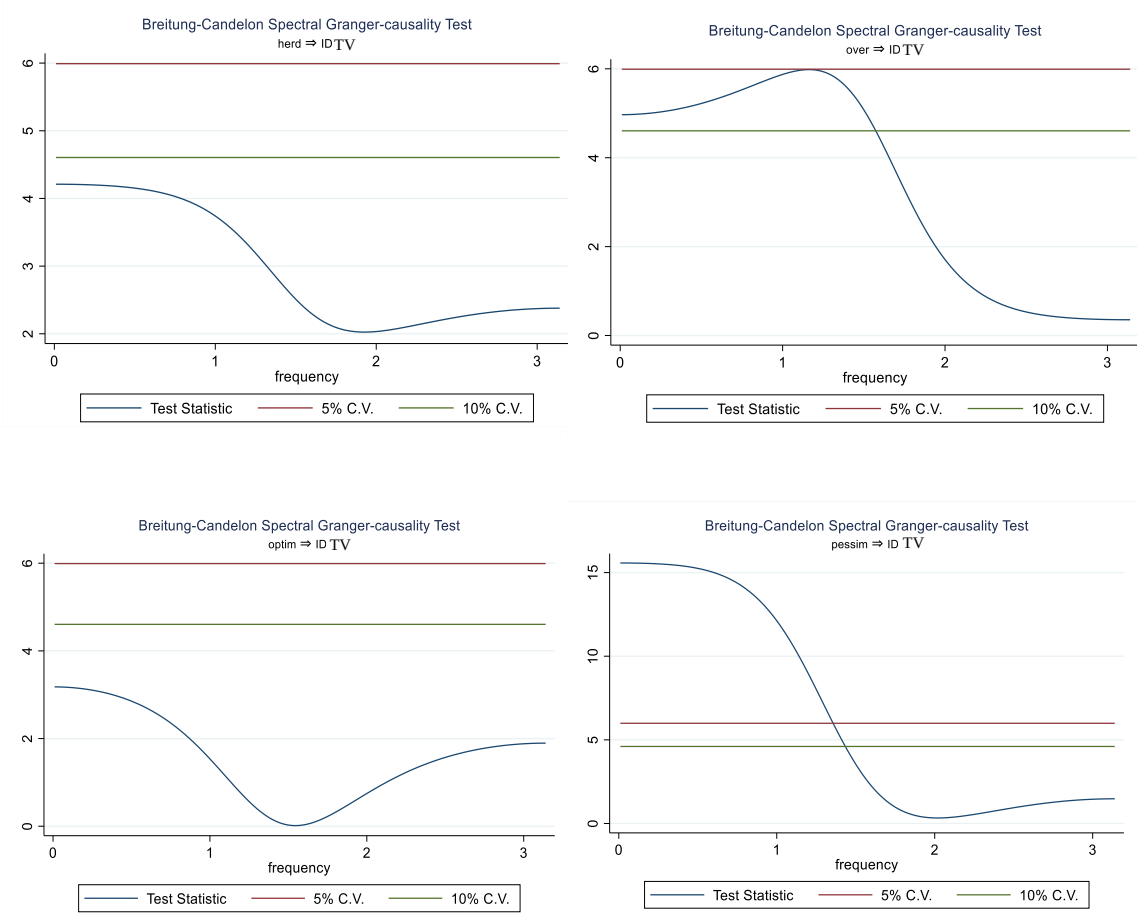
Table 3: Testing stationarity of variables according to ADF criteria

Variable	ADF	P-value	PP	P-value
TV	-9.462	0.0000	-8.249	0.0000
over	-23.376	0.0000	-22.673	0.0000

optimize	-30.163	0.0000	-30.104	0.0000
soccer	-32,994	0.0000	-32.681	0.0000
herd	-21.328	0.0000	-21.576	0.0000

Source: Author's calculation

The results of the spectral Granger causality test are presented in a graph, in which the vertical axis represents the magnitude of the test statistic corresponding to each frequency, the horizontal axis represents the frequency ω, which takes values from 0 to π. On the graph, the horizontal blue line represents the critical value of the 10% significance level and the horizontal red line represents the critical value at the 5% significance level. If the test statistic line is above the critical value line, it means that the causal effect of the source variable on the target variable is statistically significant, implying that past information of the source variable can help predict the value of the target variable.

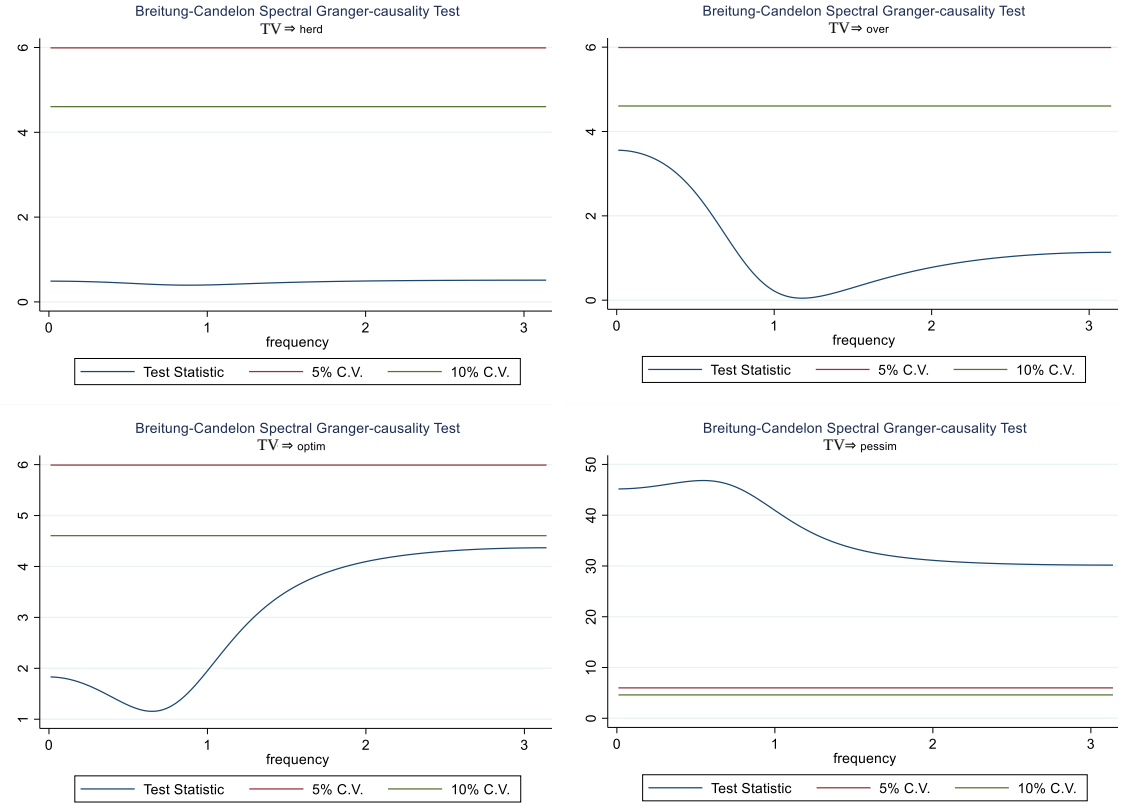


Source: Author

Figure 1: Granger causality test diagram of spectral form between behavioral psychological factors and investor decisions

From Figure 1, it can be seen that pessimism has a Granger effect on investors' decisions, but that effect only occurs in the low frequency domain. In high frequencies, the test results show that there is no Granger effect. This means that in the long term, investment volume can be predicted through investors' pessimism in the market, but in the short term, it cannot be predicted.

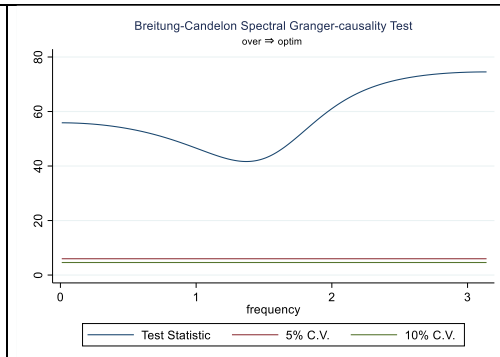
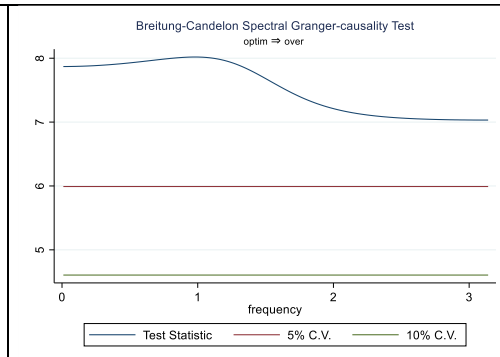
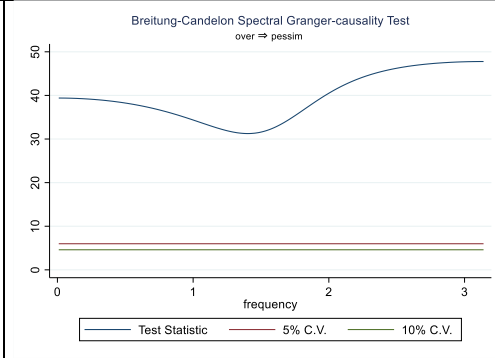
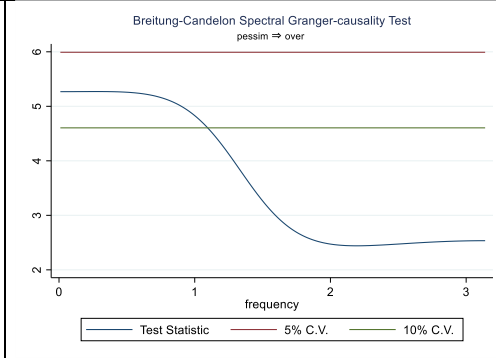
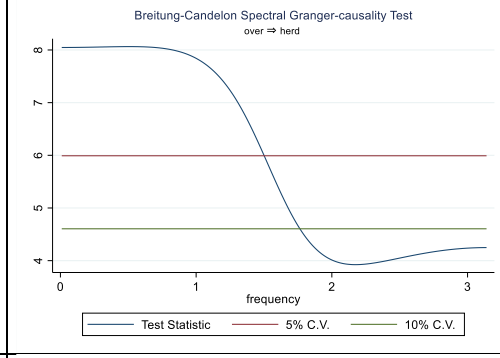
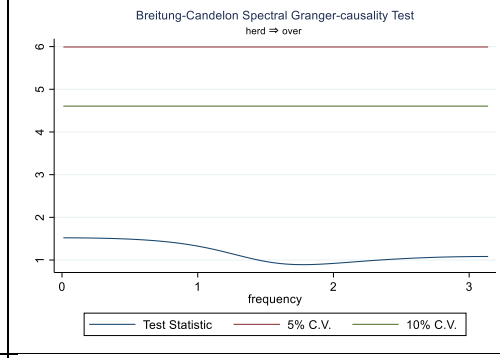
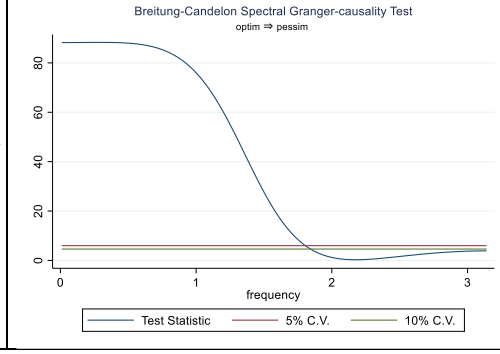
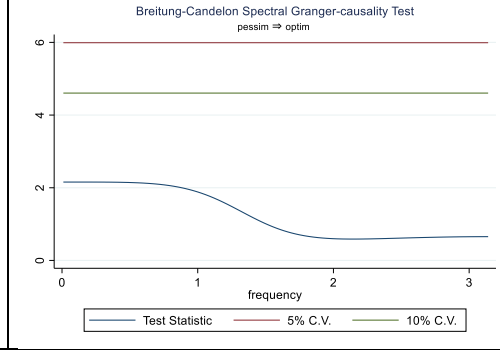
In addition, psychological factors including optimism and herd effect do not have Granger effect on investor decisions at both 5% and 10% significance levels, while overconfidence does not have Granger effect on investor decisions at 5% significance level but has an impact at 10% significance level in low frequency domain.

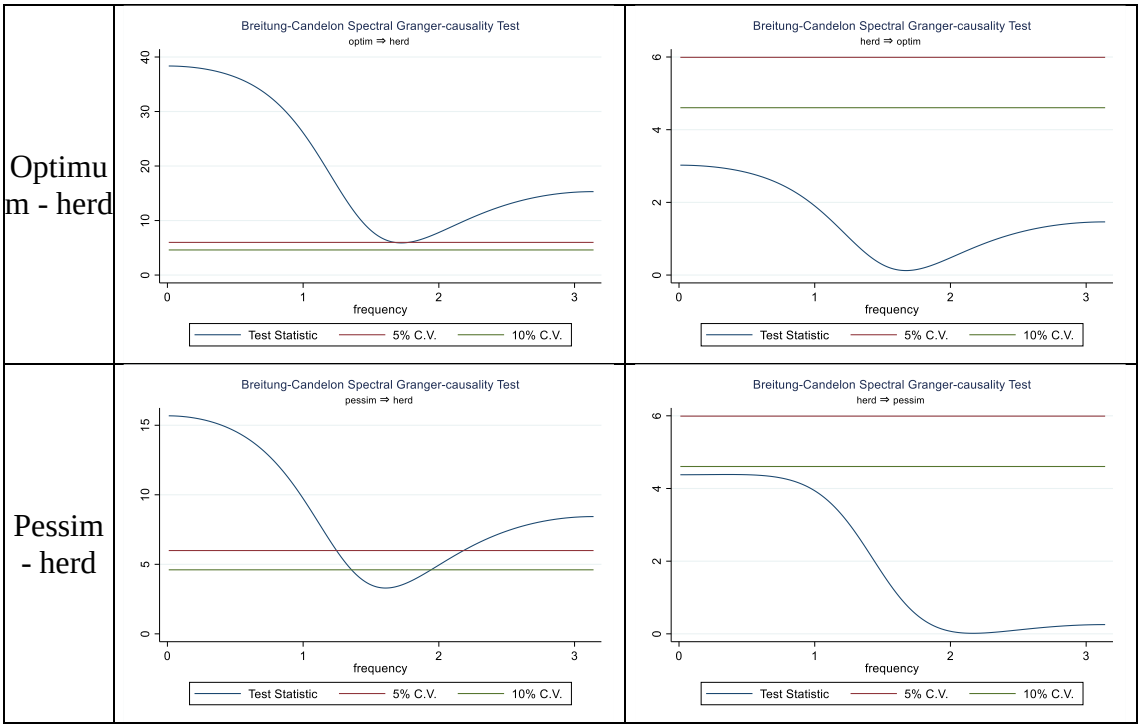


Source: Author

Figure 2: Granger causality test diagram of spectrum form between investor decisions and behavioral psychological factors

On the other hand, Figure 2 shows that investors' trading volume has a Granger causal relationship to their pessimistic sentiment at all frequencies at the 5% significance level, which means that investors' trading volume in the past can be used as a basis to predict their pessimism. However, investors' decisions do not have a Granger causal relationship to the remaining psychological factors such as overconfidence, optimism, and herding effect at the frequency domains at both the 5% and 10% significance levels. Thus, it can be seen that herd mentality has a causal impact on investment decisions in the long run, but conversely, investors' decisions do not have a causal relationship to herding effect.

Over - optim		
Over - pessim		
Over-herd		
Optimum - pessim		



Source: Author

Figure 3: Granger causality test plot of spectral type between investor psychological factors

In addition, investor behavioral psychological factors also have a Granger causal relationship with each other (Figure 3). Specifically, overconfidence and optimism have a bidirectional causal relationship in all frequency domains, however, the causal relationship between overconfidence and pessimism only appears in the direction of the impact of overconfidence on pessimism. In addition, overconfidence, optimism, and pessimism also have a unidirectional causal effect on the herding effect in the medium and long term. Finally, optimism has a causal effect on pessimism but the opposite effect does not exist.

5. Conclusion and policy implications

The study assessed the Granger causality between psychological factors and trading volume in the Vietnamese stock market from 2020 to 2024. The results showed that there is a close two-way causality between pessimism and investment volume. In the long term, pessimism has a granger effect on trading volume, so investors should learn and control their pessimism to be able to decide on trading volume more effectively. On the other hand, investors' trading volume also has a Granger causality to pessimism in both the short and long term, so to control pessimism, investors should manage their trading volume well.

In addition, psychological factors also have a close causal relationship with each other. Specifically, confidence can affect the level of optimism and vice versa, investors who are too optimistic will also lead to overconfidence. Not only that, overconfidence also has a causal relationship with pessimism and the herd mentality, so investors should focus on controlling their confidence to avoid falling into a state of overconfidence. Optimism and pessimism also have a causal relationship in both the short and long term to herd mentality.

Thus, it can be seen that when controlling psychological factors, investors do not only control each factor separately but also need solutions to simultaneously control the above psychological factors because they have a mutual causal relationship. In addition, pessimism greatly affects trading volume and vice versa, so in order to make better trading decisions, investors should pay attention to controlling their pessimism.

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IMPACT OF KNOWLEDGE MANAGEMENT ON INNOVATION EFFICIENCY: A CASE STUDY OF SMALL AND MEDIUM ENTERPRISES IN THE NORTH CENTRAL REGION

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Abstract: This study seeks to analyze the influence of knowledge management relationships on innovation efficiency within small and medium enterprises in the North Central region by employing quantitative research methodologies utilizing exploratory factor analysis (EFA) and structural equation modeling (SEM). The study, based on a sample of 432 employees from various enterprises, has yielded significant scientific and practical insights, illustrating the importance and influence of knowledge management on innovation efficiency. This is evidenced through a positively correlated impact model: knowledge sharing, knowledge acquisition, knowledge autonomy, and innovation efficiency. The study demonstrates that knowledge acquisition and autonomy positively influence trust and cooperation standards, thereby enhancing innovation efficiency in small and medium enterprises in the North Central region. The study indicates a variance in innovation efficiency based on the seniority of CEOs within the enterprise. According to the research findings, the authors suggest several recommendations to enhance the efficiency of innovation in small and medium enterprises in the North Central region.

Keywords: *Knowledge sharing; Knowledge acquisition; Knowledge autonomy; Trust and standards of cooperation; Innovation efficiency.*

1. Introduction

In the context of globalization, swiftly evolving technology, and increasingly diverse customer demands, businesses must consistently innovate through various means, such

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as enhancing production processes to reduce costs or improve product quality (Fazlioglu et al., 2016). Innovation is increasingly pivotal, serving as a critical and essential catalyst for advancements in science and technology, as well as for national development strategies, which are fundamental to achieving rapid and sustainable growth. Innovation is the critical element that enables organizations to establish a sustainable competitive advantage for long-term survival and success.

The significance of knowledge management in organizations has been analyzed in various studies (Gold & et al., 2001; Durst & Edvardsson, 2012). As stated by Plessis (2007), knowledge management helps integrate knowledge inside and outside the business, making this knowledge more accessible. Researchers examining the impact of knowledge management on innovation have employed diverse theoretical frameworks, including resource-based management theory (Alegre et al., 2011), enterprise theory from a knowledge perspective (Zheng et al., 2011; Andreeva & Kianto, 2011), and dynamic competence theory (Zheng et al., 2011).

The World Intellectual Property Organization reports that Vietnam's 2024 global innovation index is placed 44th out of 133 countries, an improvement of 2 positions from 2023 and 4 positions from 2022. Additionally, the UN's 2024 e-government development index rose 15 places, from 86th to 71st out of 193 countries. In Vietnam, small and medium firms constitute 98% of all enterprises, contributing approximately 41.24% of total capital and 42.11% of job opportunities (Ministry of Planning and Investment, 2023). Moreover, SMEs significantly contribute to sustainable development, enhancing social security and alleviating poverty. Consequently, enhancing competitiveness is essential for these businesses to evolve positively and sustainably. Nonetheless, for the majority of enterprises with constrained operational scale, the organization is disjointed and diminutive. Simultaneously, numerous small and medium firms in Vietnam have not adequately prioritized innovation activities, hence hindering the growth momentum of these enterprises and the overall economic development of the nation.

This study seeks to analyze the influence of knowledge management on the efficacy of innovation in small and medium firms in the North Central area. The study's results indicate significant contributions both scientifically and practically, illustrating the importance and impact of knowledge management on innovation efficiency through the sequential impact model: knowledge sharing, knowledge acquisition, knowledge autonomy, and innovation efficiency. The study indicates that knowledge acquisition and autonomy positively influence trust and cooperation norms, consequently enhancing innovation efficiency in small and medium firms in the North Central region. The study indicates a disparity in innovation efficiency based on the seniority of CEOs inside the firm. The authors provide several recommendations to enhance innovation efficiency in small and medium firms in the North Central region, based on the research findings.

2. Literature review and hypotheses

2.1. Literature review

Durst and Edvardsson (2012) contend that SMEs face challenges in implementing a standardized framework for knowledge management processes. The authors enumerate various knowledge-related activities commonly utilized in these organizations, such as knowledge identification, knowledge autonomy, knowledge creation, knowledge storage, knowledge transfer, and knowledge application.

Knowledge sharing is identified as a fundamental process within knowledge

management. Knowledge sharing will mitigate the loss of expertise resulting from workforce transitions, retirements, or departmental rotations. Gharakhani and Mousakhani (2012) characterize knowledge sharing as the exchange or dissemination of learning, knowledge, skills, and experiences among individuals or departments within an organization. This process encompasses knowledge exchange activities among individuals, groups, and departments within the company, as well as between various organizations. Knowledge sharing, both tacit and explicit, is characterized as a technique that facilitates the distribution of knowledge inside the company (Zhang et al., 2020). The process of knowledge dissemination and transfer is crucial. Knowledge sharing occurs across individuals, groups, departments, and organizations to improve organizational creativity and performance (Alavi & Leidner, 2001). Krough et al. (2000) asserted that, relative to the generation of new information, the matter of knowledge sharing is of greater significance and serves as a crucial solution for enhancing company performance. Tsui et al. (2006) assert that knowledge sharing encompasses activities that facilitate employees in exchanging experiences and insights to expedite the execution of projects and plans efficiently and cost-effectively. Knowledge sharing inside the firm is founded on experiences acquired both internally and externally (Maponya, 2004).

Knowledge acquisition entails recognizing the requisite knowledge for the business and the sources from which to obtain it, so generating innovative and beneficial ideas and solutions. The acquisition of knowledge encompasses all facets of the company, including production technology, product manufacturing, and managerial competencies (Nonaka & Von Krogh, 2009). Knowledge acquisition includes the processes of searching, identifying, selecting, gathering, organizing, and mapping information and knowledge (Pinho et al., 2012). Lopez and Esteves (2013) assert that the acquisition of knowledge is facilitated by both external and internal organizational networks, capturing the interest of senior management. Egbu et al. (2005) characterize this process as the identification of requisite knowledge for the business and the sources for its acquisition, therefore facilitating the generation of innovative and beneficial ideas and solutions. Pinho et al. (2012) contend that knowledge acquisition encompasses the processes of searching, recognizing, selecting, gathering, organizing, and mapping information and knowledge within organizations.

Zaheer & Harris (2006) define trust as the extent to which a member has confidence in the business. Beliefs encompass various levels, including perceptions, attitudes, and behaviors; if trust is not established, reliance on partners is constrained (Moorman et al., 1992). Trust and cooperative norms are critical elements that foster positive values in the workplace, establish enduring connections between individuals and organizations, and enhance the creative productivity of employees. Bakiev (2013) contends that high-performance work systems via intermediaries establish a connection between employee trust, engagement, and perceptions of organizational success, which positively influences business performance.

Innovation is essential for competitiveness, growth, profitability, and the establishment of sustainable value for businesses (Palacios et al., 2009; Gunday et al., 2011; Purcarea et al., 2013; Atalay et al., 2013; Ramadani et al., 2016; Wahyono, 2020). Innovation positively influences the success of SMEs in both low- and multi-technology sectors (Purcarea et al., 2013). The OECD's conceptualization of innovation capabilities (2005) encompasses product innovation, process innovation, marketing innovation, and

organizational innovation. Every type of innovation influences the performance of small and medium-sized enterprises (SMEs).

2.2. Research hypothesis:

2.2.1. Knowledge management and innovation efficiency

Knowledge management constitutes a fundamental aspect of human resource management, significantly contributing to the establishment of a robust foundation and a cohesive collective strength rooted in the value of knowledge. Bromiley and Rau (2015) assert that a company with unique, uncommon, inimitable, and irreplaceable resources can attain sustainable competitive advantage by executing innovative and distinctive value creation strategies relative to its competitors (Huang & Li, 2009). The internal atmosphere of the organization accounts for its exceptional success. Consequently, the firm should concentrate on resources that are important, unusual, and challenging to replicate, such as reputation, innovative capacity, knowledge, and adaptability.

Knowledge management refers to operations that enhance the volume of knowledge within a company (Obeidat et al., 2016). Numerous studies indicate that knowledge management enhances innovation outcomes in organizations (Andreeva & Kianto, 2011; Obeidat et al., 2016; Teixeira et al., 2020). Knowledge management encompasses various facets of the company, including production technology, product manufacturing, and managerial competencies (Nonaka & Von Krogh, 2009). Tiwana (1999) contends that this involves the generation and cultivation of insights, talents, and relationships within the company. Darroch's (2005) research indicates that knowledge management positively influences innovation. Choo (2003) contends that knowledge acquisition entails the development of an organization's knowledge resources. Lopez and Esteves (2013) assert that the acquisition of information is facilitated by both external and internal organizational networks, capturing the interest of senior management and fostering creativity within the business. Durst and Edvardsson (2012) assert that knowledge management encompasses knowledge identification, autonomy, generation, storage, transfer, and application. Knowledge management encompasses interrelated elements that influence the creative ability within an organization (Bromiley & Rau, 2015). Consequently, to elucidate the influence of knowledge management on the efficacy of creative capacity in small and medium firms in the North Central region, the study posits the following hypotheses:

H1: *Knowledge sharing has a positive impact on knowledge acquisition in small and medium enterprises in the North Central region.*

H2: *Knowledge acquisition has a positive impact on knowledge autonomy in small and medium enterprises in the North Central region.*

H3: *Knowledge autonomy has a positive impact on the efficiency of innovation in small and medium enterprises in the North Central region.*

2.2.2. Knowledge management and trust, standards of cooperation

Lee and Kim (2001) regard knowledge management as a significant element influencing the product development process of organizations. According to the governance framework, Lee and Kim (2001) suggest a knowledge management model comprising the stages of initialization, diffusion, integration, and linkage. During the initialization phase, firms recognize the significant role of ICT in sustaining competitiveness and preparing for the enhancement of knowledge management inside the organization. The second stage involves the dissemination of activities aimed at

developing knowledge infrastructure, including creation, sharing, storage, and utilization. The third step is knowledge integration, wherein enterprises regard knowledge-related activities as an integral part of daily operations. Phase four involves establishing connections with external information sources, including universities, colleges, research centers, suppliers, and clients.

Trust and cooperative standards are regarded as fundamental elements in the establishment and evolution of partnerships. The research conducted by Guinot et al. (2014) and Bakiev (2013) has demonstrated the significance of trust, cooperation standards, and their beneficial effects on organizational performance and management systems. Employees with confidence in the organization will exhibit a more positive work ethic, enhanced comfort, and heightened drive and performance. Enhanced trust facilitates more knowledge sharing (Anderson & Narus, 1990; Ardichvili, 2003). Abbas and Sagsan (2019) contends that employee satisfaction and confidence in career prospects will influence knowledge management within the organization. Wheatley (2000) asserts that numerous employees will willingly disseminate their knowledge if they regard sharing as significant to their work and simultaneously feel motivated to do so. Research indicates that trust is an individual attribute in the context of knowledge management models, highlighting its positive influence on knowledge management inside organizations (Ismail & Yusof, 2009; Al-Qadhi et al., 2015). Wu et al. (2009) similarly demonstrated that trust and cooperative practices within firms are established through information sharing among personnel in the organization.

Consequently, numerous studies demonstrate the significance of knowledge management elements for fostering trust and establishing cooperative standards inside organizations. In the context of small and medium firms in Vietnam, this study posits the following hypotheses on the influence of knowledge management on trust and cooperation standards:

H4: *Knowledge sharing has a positive impact on trust and standards of cooperation in small and medium enterprises in the North Central region.*

H5: *Knowledge acquisition has a positive impact on trust and standards of cooperation in small and medium enterprises in the North Central region.*

H6: *Knowledge autonomy has a positive impact on trust and standards of cooperation in small and medium enterprises in the North Central region.*

2.2.3. Trust, standards of cooperation, and efficiency of innovation

Nonaka (1991) asserts that leading corporations in knowledge creation have also excelled in establishing new markets, swiftly generating innovative products, promptly addressing the needs of new clients, and controlling rising enterprises. Numerous studies have indicated that knowledge creation favorably promotes innovation outcomes in enterprises (Andreeva & Kianto, 2011; Soon & Zainol, 2011; Abbas & Sagsan, 2019; Zhang et al., 2020). Trust among members positively influences creativity by preserving the integrity of knowledge throughout time, hence enabling swift access to information (Bermejo et al., 2016). Majchrzak et al. (2004) asserted that establishing trust through equitable collaboration significantly and positively influences basic creativity within companies. In the present setting, innovation has become an essential strategy for many organizations seeking to sustain and advance. The research team hypothesized the influence of trust variables and cooperation norms on innovation efficiency in small and medium firms in the North Central region.

H7: *Trust and standards of cooperation have a positive impact on innovation efficiency in small and medium enterprises in the North Central region.*

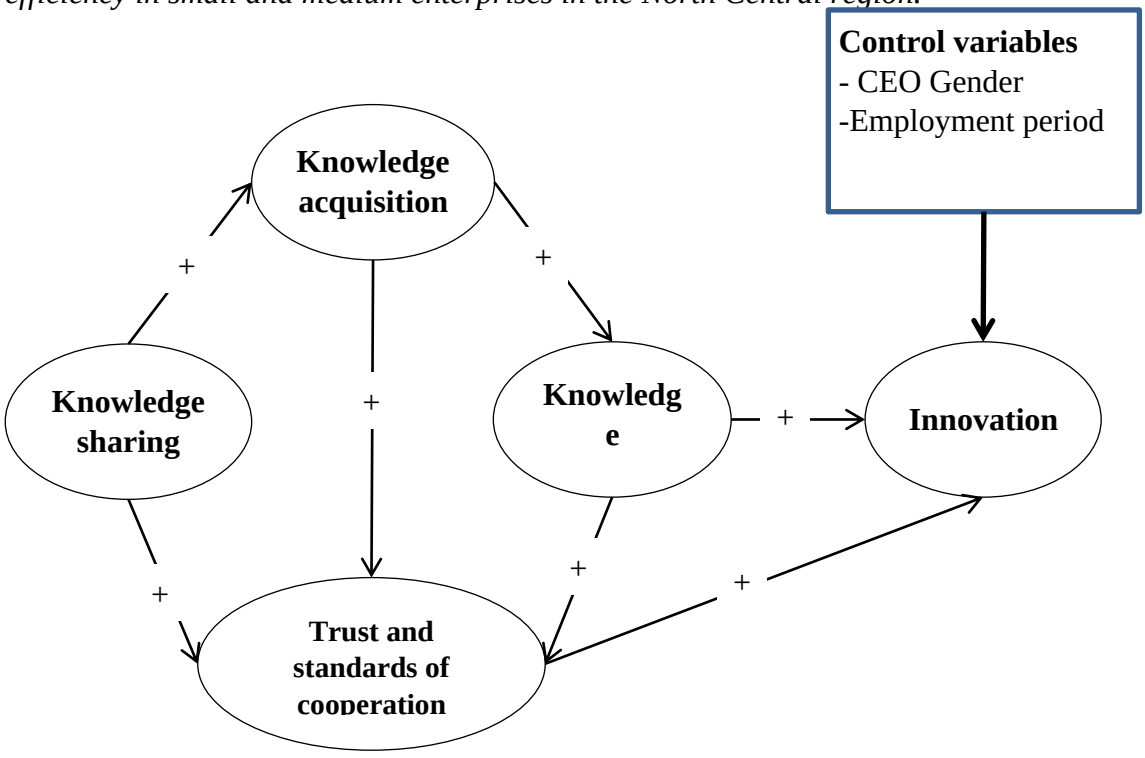

Figure 1. The proposed research model

3. Research methodology

3.1. Research scale

The article provides a research model whereby the independent variable is knowledge sharing (biogas) and the dependent variable is the efficiency of innovation activities (TNO), based on the theoretical overview and associated research studies. Intermediate variables comprise knowledge acquisition (KAC), knowledge autonomy (KAU), and trust and standards of cooperation (Tru). The study used a Likert scale with five ratings. (1) strongly disagree; (2) disagree; (3) neutral; (4) agree; (5) strongly agree. Indicators assessing applicable variables are modified based on sample characteristics from prior research.

Table 1. Origin of the scale of variables

No.	*Variable*	*Symbol*	*Number of observations*	*Origin of scale*
1	Knowledge sharing	KSH	6	Chennamaneni (2006)
2	Knowledge acquisition	KAC	6	Durst and Edvardsson (2012)
3	Knowledge autonomy	KAU	5	Durst and Edvardsson (2012)
4	Trust and standards of cooperation	TRU	6	Morgan and Hunt (1994)
5	Innovation efficiency	INO	5	Koene et al. (2002); Knippenberg and

				Hogg (2003)

3.2. Research samples

The selection research pertains to a small and medium-sized firm located in the North Central region. Owing to the disparate distribution across several regions of the sample and for the sake of convenience in the sampling procedure, the study employed a non-probability sampling method, specifically convenience sampling. Data is gathered using stratified sampling throughout various areas in the North Central region of Vietnam, encompassing the provinces of Thanh Hoa, Nghe An, Ha Tinh, Quang Binh, and Thua Thien Hue.

The research sample consisted of individuals employed in firms. The data collection method is executed through both live interactions and an online survey utilizing the Google Form tool. The total number of votes cast was 300, the number of votes collected was 236, and the number of valid votes was 224. The online survey distributed 300 votes, gathered 218 votes, and yielded 208 usable votes. The aggregate count of valid votes utilized for analysis is 432. The research by Hair et al. (2010) indicates that the minimum sample size should be five times the total number of observed variables.The paper has 28 observations, whereas the research encompasses a total of 492 samples that fulfill the analytical criteria. The data collection period for this project is from June 2024 to November 2024.

Out of a total of 432 samples collected, 237 samples were collected from employees working at enterprises with male leaders (accounting for 54.86%), and 195 samples were collected from employees working at enterprises with female leaders (accounting for 45.14%). The number of samples collected from employees who are working at enterprises where the leader has worked in the current position for less than 05 years is 94, accounting for 21.76%; with a working seniority of 05 to less than 10 years is 112, accounting for 25.93%; with a working seniority of 10 to 15 years is 101, accounting for 23.38%; and with a working seniority of 15 years or more is 125, accounting for 28.94%. Of the 432 samples gathered, 237 were from employees at firms led by males (54.86%), whereas 195 were from employees at enterprises led by females (45.14%). The total number of samples gathered from employees at enterprises where the leader has held the current position for less than 5 years is 94, representing 21.76%; for those with 5 to less than 10 years of tenure, the count is 112, constituting 25.93%; for employees with 10 to 15 years of experience, there are 101 samples, accounting for 23.38%; and for those with 15 years or more, the total is 125, comprising 28.94%.

Table 2. Sample characteristics

Characteristic	*Quantity*	*Percentage (%)*
Gender		
Male	237	54.86
Female	195	45.14
Employment period		
Less than 5 years	94	21.76
From 05 to less than 10 years	112	25.93
From 10 to less than 15 years	101	23.38
From 15 years or above	125	28.94

3.3. Data processing

The study employs a quantitative method, with data collected, cleaned, and analyzed

using SPSS and AMOS software version 22.0. The study initially evaluated the scale's reliability using a Cronbach's alpha coefficient threshold of > 0.7 and a total variable correlation coefficient of > 0.3. Additionally, if the Cronbach's Alpha If Item Deleted value exceeds the Cronbach's Alpha coefficient of a variable, that observed variable should be taken into account. The subsequent exploratory factor analysis (EFA) investigation is to assess the convergence and discriminant validity of the variable and indicator scale. The criteria for exploratory factor analysis (EFA) are factor loading greater than 0.5, a KMO coefficient between 0.5 and 1, a significance value less than 0.05, and an extracted variance percentage over 50%. The employed factor extraction method is the Varimax rotation technique. The study employs AMOS software to evaluate the model's suitability with the research data via confirmatory factor analysis (CFA) and subsequently tests the research hypotheses by analyzing the structural equation modeling (SEM) linear structure model, adhering to the criteria of chi-square/df index < 5 (Hair et al., 2010); P < 0.05; GFI, TLI, CFI > 0.8 (Segars & Grover, 1993); RMSEA < 0.08 (Taylor et al., 1993).

4. Research results and discussion

4.1. Testing the reliability of the scale

The examination of Cronbach's alpha test indicates that the scale's reliability and the data values are satisfactory when the Cronbach's alpha coefficient for all variables exceeds 0.7 and the total variable correlation coefficient for all variables is larger than 0.3. The value of Cronbach's alpha If Item Deleted is less than the coefficient of the overall Cronbach's alpha variable.

Table 3. Evaluate the reliability of the scale through Cronbach's alpha coefficient

No.	*Variable*	*Symbol*	*Cronbach's alpha*
1	Knowledge sharing	KSH	0.854
2	Knowledge acquisition	KAC	0.874
3	Knowledge autonomy	KAU	0.850
4	Trust and standards of cooperation	TRU	0.817
5	Innovation efficiency	INO	0.930

4.2. Exploratory factor analysis (EFA)

Following the assessment of the scale's appropriateness, the study performed an exploratory factor analysis (EFA). The analysis process was conducted once for the variable groups, revealing that the data satisfied the criteria with factor loadings exceeding 0.5. The KMO coefficient for the analysis of independent and intermediate variables was 0.903, while for the dependent variable it was 0.853 (both within the range of 0.5 to 1). The P-values were 0.000 (less than 0.05). The percentage of variance extracted exceeded 50%. The two conditions met were "convergence value" (the observed variables converge to the same factor) and "distinction value" (the observed variables associated with this factor are distinguishable from other factors).

Table 4. Exploratory Factor Analysis Results

EFA analysis	*KMO coefficient*	*P-value*	Variance extracted	*Factor loading*	*Conclusion*
Independent and	0.903	0.000	59.226	All coefficients >	Meet requirements

mediating variables				0.5	
Dependent variable	0.853	0.000	78.319	All coefficients > 0.5	Meet requirements

4.3. Confirm factor analysis (CFA)

To demonstrate the convergent and discriminant validity of the theoretical framework, the convergence value indicates a robust interrelationship among indicators within the same scale, while the discriminant value illustrates a lack of strong correlation between distinct concepts within the framework. The study performed a confirmatory factor analysis (CFA), revealing the appropriateness of the measurement model. All indicators satisfied the criteria: Chi-square = 1021.444; df = 340; P = 0.000 (< 0.05); Chi-square/df = 3.004 (< 5); GFI = 0.838 (> 0.8); TLI = 0.891 (> 0.8); CFI = 0.902 (> 0.8); RMSEA = 0.068 (< 0.08).

4.4. Structural equation modeling analysis (SEM)

The study employed a structural equation modeling (SEM) analysis to evaluate the hypotheses. The analytical results indicate that the composite indicators fulfill the criteria. Specifically, Chi-square = 1133.663; df = 343; P = 0.000 (< 0.05); Chi-square/df = 3.305 (< 3); GFI = 0.832 (> 0.8); TLI = 0.875 (> 0.8); CFI = 0.887 (> 0.8); RMSEA = 0.073 (< 0.08).

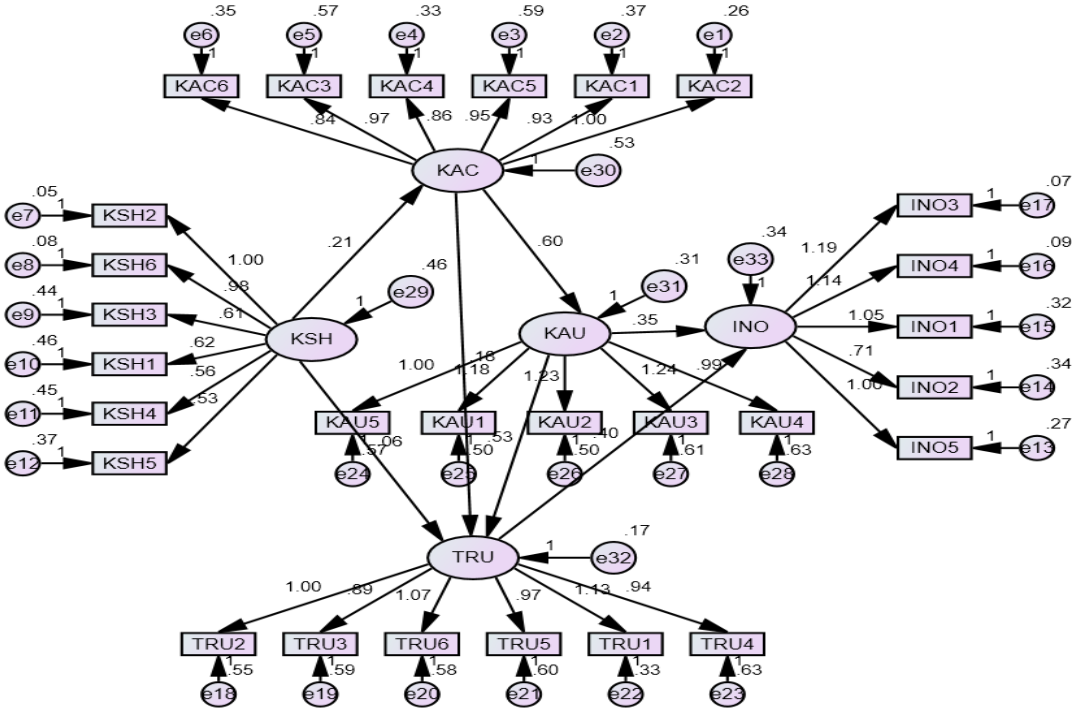

Figure 2. SEM model analysis

The findings from the model relationship estimations indicate that the research model is suitable. All hypotheses are accepted, except for the two H4 theories.

Hypotheses H1, H2, and H3 are accepted, exhibiting significance levels in the test of less than 0.05 and regression weights more than 0. This indicates that information sharing positively influences knowledge acquisition, which in turn positively affects knowledge autonomy, and knowledge autonomy subsequently enhances innovation

efficiency in small and medium firms in the North Central region. These findings are analogous to the research outcomes of Huang and Li (2009); Andreeva and Kianto (2011); Bromiley and Rau (2015); Obeidat et al. (2016); Teixeira et al. (2020).

Likewise, hypotheses H5 and H6 are accepted, exhibiting significance levels in the test of less than 0.05 and possessing regression weights greater than 0. Consequently, with a significance level of 0.159 (> 0.05), hypothesis H4 is rejected. Consequently, of the three components of knowledge management identified in the study, only knowledge acquisition and knowledge autonomy positively influence trust and collaboration standards in small and medium firms in the North Central region. These findings align with the research of Ardichvili (2003); Ismail and Yusof (2009); Wu et al. (2009); Abbas and Sagsan (2019); Al-Qadhi et al. (2015); Simultaneously, knowledge sharing has been demonstrated to exert little influence on trust and collaboration standards within organizations.

The results of testing hypothesis H7, which examines the influence of trust and cooperation norms on innovation efficiency in firms, indicate acceptance of the hypothesis with a significance level of < 0.05 and a regression weight of 0.396 (> 0). Consequently, it can be inferred that standards of trust and cooperation positively influence innovation efficiency in small and medium firms in the North Central area. This outcome further corroborates the research of Andreeva and Kianto (2011); Soon and Zainol (2011); Abbas and Sagsan (2019); Zhang et al. (2020).

Table 5. Results of SEM analysis for relationships in the model

Hypothesis	*Relationship*	*Weightage*	*S.E.*	*C.R.*	*P*	*Conclusion*
H1	KAC <--- KSH	0.212	0.057	3.688	0.000	Accepted
H2	KAU <--- KAC	0.599	0.058	10.415	0.000	Accepted
H3	INO <--- KAU	0.345	0.082	4.193	0.000	Accepted
H4	TRU <--- KSH	0.055	0.039	1.407	0.159	Rejected
H5	TRU <--- KAC	0.179	0.052	3.401	0.000	Accepted
H6	TRU <--- KAU	0.530	0.068	7.822	0.000	Accepted
H7	INO <--- TRU	0.396	0.095	4.171	0.000	Accepted

4.5. Discrepancy testing

This study employs ANOVA to evaluate the disparity in innovation efficiency between small and medium firms in the North Central region, based on the gender and seniority of their CEOs.

The ANOVA test findings indicate that the significance value is 0.148, which is greater than 0.05, when examining the variation in innovation efficiency based on the CEO's gender. Consequently, it can be inferred that there is no disparity in the innovation efficiency of small and medium firms in the North Central region based on the gender of their CEOs.

To evaluate the disparity in innovation efficiency among small and medium firms in the North Central region based on the seniority of CEOs across three groups. Group 1 comprises leaders with fewer than 5 years of seniority; Group 2 consists of leaders with 5 to less than 10 years of seniority; Group 3 encompasses leaders with 10 to less than 15 years of seniority; and Group 4 includes leaders with 15 years or more of seniority. The ANOVA test results indicate that the significance value is 0.000, which is less than 0.05. Consequently, it may be inferred that a statistically significant disparity exists in innovation efficiency based on CEO seniority.

The study performed a comprehensive examination using ANOVA to evaluate the mean and variance in innovation efficiency based on CEO seniority. The accreditation results indicate that Group 2 comprises leaders with 5 to fewer than 10 years of experience, exhibiting the highest average innovation performance value compared to other groups (3.8625). Group 3 comprises leaders with 10 to less than 15 years of seniority (3.7921), group 4 includes leaders with 15 years of seniority or more (3.4304), and group 1 consists of leaders with less than 5 years of seniority, exhibiting an average innovation performance value of 3.1298.

Table 6. Average value of innovation performance of small and medium enterprises in the North Central region according to their seniority

Employment period	*N*	*Mean*	*Std. Deviation*
Group 1 (less than 5 years)	94	3.1298	0.81212
Group 2 (from 05 to less than 10 years)	112	3.8625	0.69440
Group 3 (from 10 to less than 15 years)	101	3.7921	0.61379
Group 4 (15+ years)	125	3.4304	0.82816
Sum	432	3.5616	0.79552

Consequently, hypothesis H4 is rejected, but all other hypotheses remain accepted. The study has reached results of significant scientific and practical importance. This study has illustrated the influence of knowledge management on the innovation efficiency of small and medium-sized firms in the North Central region through a model of incremental and significant impact. The dissemination of knowledge positively influences knowledge acquisition; knowledge acquisition positively affects knowledge autonomy, which in turn positively impacts innovation efficiency. Secondly, the study indicates that of the three components of knowledge management identified in the research model, knowledge acquisition and autonomy positively influence trust and cooperation standards, thereby enhancing the innovation efficiency in small and medium enterprises in the North Central region. Thirdly, the research indicates a disparity in innovation efficiency based on the seniority of CEOs inside organizations. The firm possesses a leader with 5 to 10 years of seniority, demonstrating the highest innovation efficiency. The subsequent order pertains to firms led by individuals with 10 to fewer than 15 years of experience, those with 15 years or more, and finally, enterprises with leaders possessing less than 5 years of service.

The study demonstrates the significance of knowledge management activities in enhancing innovation efficiency inside organizations. The findings of this study will serve as valuable resources for managers to implement successful strategies and solutions aimed at enhancing innovation efficiency within the contemporary framework of international recognition and globalization in Vietnam, as well as in regional and worldwide contexts.

5. Conclusions and recommendations

This study seeks to analyze the influence of knowledge management on innovation effectiveness. In the context of small and medium enterprises in the North Central region, the study's findings indicate that knowledge management influences innovation efficiency through a sequential and significant model: knowledge sharing, knowledge acquisition, knowledge autonomy, and innovation efficiency. Simultaneously, knowledge exerts a beneficial influence on creativity and fosters trust, hence benefiting small and

medium firms in the North Central region. The study indicates a variance in innovation efficiency based on the seniority of CEOs inside the firm.

According to the research findings, the authors suggest some solutions to enhance the effectiveness of innovation in small and medium firms in the North Central region:

Firstly, firms must establish policies that promote knowledge sharing among employees, facilitate the creation and transfer of information through timely and appropriate procedures, as well as provide incentives and rewards for significant contributions to the organization. Simultaneously, enterprises must cultivate a work environment that fosters creativity and knowledge exchange among employees to promote a culture of collaboration and organizational involvement.

Secondly, organizations must enhance professional training and retraining initiatives for employees, particularly through internal training conducted by experienced personnel who can mentor newcomers. Simultaneously, enhance communication and elevate awareness among organizations and employees regarding the significance of information transfer.

Thirdly, regarding knowledge autonomy, organizations must equip individuals with the necessary tools and information to execute their responsibilities effectively. Training is a fundamental method of knowledge dissemination that significantly influences the organization's success. Establish a workplace that promotes open communication by enabling employees to comprehend one another and cultivate trusted relationships.

Fourth, firms must establish rules to foster employee trust and create a work atmosphere that promotes innovation through trust and cooperative principles. Establish cooperative principles inside the firm that promote healthy, collective, long-term, and stable development.

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TOWARDS MODIFYING GREEN CREDIT POLICIES: CAN ASEAN BANKS ENHANCE FINANCIAL PERFORMANCE THROUGH INVESTING GREEN CREDIT?

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Abstract

Purpose: This study examines the impact of Green Credit on the Financial Performance of banks in ASEAN, focusing on listed banks in Vietnam, Thailand, Indonesia, and Malaysia from 2019 to 2023. It highlights the importance of green finance in addressing climate change and promoting sustainability within the banking industry.

Design: Data from 20 listed banks were analyzed using STATA 18, employing various methods including Generalized Method of Moments (GMM), Ordinary Least Squares (OLS), Fixed Effects Model (FEM), and Random Effects Model (REM). This study investigates the influence of the Green Credit Ratio and Green Credit Disclosure on financial performance.

Findings: The analysis reveals that the Green Credit Ratio and Green Credit Disclosure have a significant positive impact on financial performance, emphasizing the value of green initiatives in enhancing bank profitability. Conversely, other variables, such as Bank Size and Capital Adequacy Ratio, showed no significant effect on financial performance.

Originality: This research provides empirical evidence on the role of green credit in enhancing financial performance, addressing a gap in the existing literature on green finance within the ASEAN region. The findings offer practical recommendations for Vietnamese banks to develop and implement effective green credit policies as part of their sustainability strategies.

Practical implications: The implementation of green credit policies leads to improvements in both financial performance and environmental outcomes.

Social implications: Banks adopting green credit contribute to climate change mitigation and sustainable development in ASEAN.

Keyword: *Green Credit Ratio, Green Credit Disclosure, Financial Performance, Climate Change*

Research paper

1. Introduction

Climate change poses global challenges, driving nations and financial institutions toward a sustainable economy (Nawaz et al., 2021). Green finance, particularly green credit, has emerged as a key tool for funding environmental projects such as renewable energy, energy efficiency, and sustainable agriculture (Akomea-Frimpong et al., 2022). The global green credit market is expanding rapidly, with green bond issuances

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surpassing USD 500 billion in 2021 (Gordon, 2023).

In this context, transparency in green credit disclosure has become essential for fostering trust in the financial market (Xi et al., 2022). Clear disclosure helps investors, businesses, and the public understand the impact of projects funded through green credit, encouraging stakeholder engagement and supporting financial institutions' sustainability efforts (Xing et al., 2021). Prior studies have demonstrated that green credit transparency is associated with improved financial performance metrics, specifically Return on Assets (ROA) and Return on Equity (ROE) (Xing et al., 2021). Green credit disclosure enhances public interest and can positively influence banks' ROA and ROE through higher interest rates for loans with environmental goals (Xi et al., 2022). This allows banks to optimize green credit operations and achieve better financial results while supporting environmentally beneficial projects. Thereby, this study will contribute to the literature by answer a following question: "How can ASEAN banks improve their financial performance through green credit, and which policies should be amended?"

The remaining of this paper is presented with the following structure: **Part 2** will present the literature review and hypotheses development; Methodology approach in **Part 3**; research findings along with discussions based on the results in **Part 4**; **Part 5** on discussion policy implications. Finally, the study concludes with and overall conclusions.

2. Literature review and Hypothesis development

Allen and Yago (2011) argued that "environmental finance" is a specific market-based financial instrument designed to convey environmental quality and mitigate environmental risks. They also suggested that the increasing prevalence of environmental issues has driven innovation in financial products and encouraged banks to consider environmental issues in their lending and investment activities. Similarly, Twidell and Cabot (2003) identified two key functions of "sustainable finance." The first is to provide advisory and lending services for sustainable business projects. The second is that banks leverage their informational advantage to facilitate resource flow and promote sustainable development by employing various loan allocation methods from a market, development, and regulatory perspective. Weber (2005) clearly pointed out that green credit is a major development direction for sustainable finance; accordingly, banks should implement preferential lending policies to direct capital towards environmentally friendly businesses while restricting capital flow to highly polluting enterprises. In this way, the sustainable development of financial institutions and environmental protection can reinforce each other and co-develop. Scholtens and Dam (2007) analyzed the relationship between green credit and financial performance and found that the implementation costs for banks adopting the "Equator Principles" are significantly higher their counterparts that do not adopt such practices. However, the level of social responsibility awareness among those adhering to the Equator Principles is significantly heightened, which aids in mitigating environmental risks within the lending framework. Additionally, the adoption of green credit by commercial banks is aligned with the objectives of sustainable development and is expected to result in increased revenue (Richardson, 2014).

Research evidence shows that green credit has a positive impact on financial performance, and this beneficial relationship becomes more pronounced as time elapses. (Li & Lin, 2024). Paulík et al. (2015) found that the fulfillment of social responsibility by commercial banks has a significant positive impact on their total return on assets. Moreover, Lian et al. (2022) empirically examined the heterogeneous effects of green

credit on banks' financial performance, concluding that an increase in the proportion of green credit relative to total loans positively influences the net interest margins of commercial banks. Weber (2017) found that banks' disclosure of more green credit indicators has a significant impact on corporate financial performance. Similarly, Xi et al. (2022) found the relationship between green credit and credit performance and the risk of capital enterprises in banks implementing green credit policies. Furthermore, banks' green credit activities limit the capital supply to high-emission industries, thereby restricting their output to a certain extent (Wu et al., 2022). Fata and Arifin (2024) found that green credit can reduce operating costs by providing financial support to green enterprises while curtailing financing for high-emission enterprises. Their empirical results also indicate that green credit affects the consolidated service performance of commercial banks primarily through its impact on profitability and safety. Therefore, the effect of green credit on improving return on assets is more significant for joint-stock commercial banks, though they must focus on controlling short-term liquidity. In contrast, large state-owned banks are more likely to meet profit-maximizing conditions due to their ample capital (Firth et al., 2008).

When analyzing the relationship between Green credit disclosure and financial performance, some studies have utilized the "Equator Principles" (Chen et al., 2022). However, in our research, we follow Xing et al. (2021) that the green credit disclosure plays the role of providing clear and transparent information about the bank's green credit activities. This transparency, in turn, creates a green credit reputation, and helps cultivate trust among stakeholders, such as investors and the public. Additionally Geng et al. (2023) concluded that banks could gain the trust of creditors and investors if they practice environmental governance and focus on improving their green reputation through green credit disclosure activities. Furthermore, Eisenbach et al. (2014) demonstrated that banks could use green credit disclosures as a primary means to show their commitment to corporate social responsibility, thereby improving their business performance.

Regarding green credit disclosure, Wu and Shen (2013) conducted an empirical research method to substantiate that the financial performance of banks also significantly improves when they fulfill their social responsibilities. Zhang et al. (2023) proposed findings showing that the formal disclosure of green credit enhances the acquisition of human and customer resources, thereby positively influencing innovation performance through resource acquisition. This indicates that banks that transparently disclose their social responsibilities can build a favorable image and are more likely to gain the trust of stakeholders and society in general, which has a significantly positive impact on their overall return on assets (Liu et al., 2023).

Hypothesis development

The first assumption regarding the development of green credit which defined as the loans provided by banks to enterprises operating in green sectors. Specifically, based on government policies and overall social development, commercial banks will carefully consider whether to grant credit access to enterprises involved in pollution and high energy consumption (Twidell and Cabot (2003). Additionally, Xi et al. (2022) found that banks will also consider the potential loss of profits if a non-green enterprise they have lent to is shut down or has its business license revoked by the government. This implies that green credit serves as a mechanism to control the growth of polluting and energy-consuming businesses by regulating their access to loans, thus promoting the sustainable

and healthy development of banks, enterprises, and society. Fata and Arifin (2024) found that when banks offer green credit, they can invest in numerous green sectors; thus, this creates opportunities to diversify their lending portfolios. Expanding green credit also attracts businesses and individuals in the green sector, allowing banks to provide products to this customer base and increase loan income (Li & Lin, 2024). Moreover, banks can determine the optimal credit level to maximize net benefits, thereby providing financial incentives for the green economy (Lian et al. (2022). By improving green credit, banks can fully leverage their expertise in credit investment, economies of scale, and risk management to achieve the economic goal of maximizing profits within a green development framework. Thus, we proposed a hypothesis:

Hypothesis 1: Green credit ratio benefits the financial performance of banks

The second assumption concerns green credit disclosure, which Geng et al. (2023) define as the process by which financial institutions, such as banks or lending organizations, publicly disclose information about financing and lending activities related to sustainable and environmentally friendly projects. This information includes credits or investments in green projects such as renewable energy, energy efficiency, waste management, and other initiatives aimed at minimizing negative environmental impacts. Accordingly, Liu et al. (2023) argued that a company's transparency in social responsibility leads to better growth prospects, which in turn drives higher profitability with lower investment costs. Consequently, a positive organizational reputation can offer a strategic advantage, leading to operational benefits and laying the foundation for improved business performance (Philippe & Durand, 2011). Additionally, higher profitability can highlight the growth potential of the bank, stimulating increased public demand for the bank's stocks and products (Chen et al., 2022). These factors boost market value, attract more customers, and improve long-term bank revenue and capital. Additionally, by disclosing green credit details, banks can appeal to ESG (Environmental, Social, Governance) funds or investors with similar values. This approach facilitates access to new capital, reduces capital costs, and enhances financial efficiency. Thus, green credit disclosure helps banks not only improve their image and reputation but also attract capital, manage risk, enhance operational efficiency, and comply with regulations. Altogether, these elements contribute to improved financial performance for banks.

Hypothesis 2: Green credit disclosure can enhance banks' financial performance

3. Research Methodology

This chapter will provide an analysis of how green credit profits and green credit disclosure impact the financial performance of the banks under study, based on the two hypotheses proposed earlier. The chapter will address four key aspects: sample selection, modeling, empirical model, and analysis.

3.1 Sample selection and data sources.

Sample selection

In this study, we collected data from 20 ASEAN banks from 2019 to 2023 to evaluate the development of green credit in developing countries such as Vietnam, Thailand, Indonesia, Malaysia. The selected banks were chosen based on their listing on regional stock exchanges, which facilitates greater accessibility to their data and ensures comprehensiveness due to mandatory disclosure requirements for shareholders. Compared to other banks, these listed institutions possess more extensive information

systems, enhancing the feasibility and availability of data for our study. Additionally, these banks have a high responsibility for environmental protection due to significant public law pressures. This results in a broader investment scope, numerous investment activities, standardized management processes, and the establishment of basic green credit frameworks, which help ensure the accuracy of the data collected. Information of banks is divided by country and summarized in **Table 1.**

Table 1. Name of Banks

Countries	Number of Banks	Name of Banks
Thailand	5	Krung Thai
		Bangkok Bank
		Siam Commercial Bank
		TMB-Thanachart (TMB Bank)
		Kasikorn Bank
Malaysia	5	Maybank
		CIMB Bank Berhad
		Public Bak Berhad
		Hong Leong Bank Berhad
		RHB Bank Berhad
Indonesia	3	BCA (Bank Central Asia)
		Bank Mandiri
		BRI (Bank Rakyat Indonesia)
Vietnam	6	BIDV (Joint Stock Commercial Bank For Investment and Development of Vietnam)
		Techcombank (Vietnam Technological and Commercial Joint Stock Bank)
		VPBank (Vietnam Prosperity Joint Stock Commercial Bank)
		MBBank (Military Commercial Joint Stock Bank)
		SHB (Saigon-Hanoi Commercial Joint Stock Bank)
		Vietcombank (Joint Stock Commercial bank For Foreign Trade Of Vietnam)

Source: Authors' calculations

Data resources

The data for this study are sourced from the regular reports and social responsibility or sustainability reports of the banks included in the research sample. Additionally, financial information is obtained from the S&P Global database. The primary measure employed in this study related to green credit is the green credit ratio, which we calculate based on the quotient of two coefficients: green credit balance and total outstanding loans. This calculation method is learned based on the calculation formula for this coefficient previously developed by Xing et al. (2021) and Yin et al. (2021). The second scale we applied is the green credit disclosure scale, which we developed by collecting information on the number of environmental projects financed by the banks in our sample during the

period from 2019 to 2023. banks in ASEAN countries began to actively engage in green credit-related activities around 2018/2019. Moreover, because some countries carried out green credit activities later, we had to exclude some certain observations from the S&P Global data due to some companies not providing the necessary indicators in the dataset, as well as missing data related to green credit in the financial reports of some banks for the year 2018. To ensure the elimination of the impact of outliers, we analyzed all data from the 1st to the 99th percentile.

3.2 Dependent variables and others

3.2.1 Dependent variable

In financial performance, previous studies have evaluated a bank's financial health, profitability, and overall efficiency through financial ratios including: Return on Asset (ROA) (Singh, 2023); Return on Equity (ROE) (Heikal et al., 2014). Therefore, we will use these coefficients to evaluate the Financial Performance variable. Based on numerous previous studies, most have documented a positive impact on these financial metrics.

3.2.2 Independent variables

This study concentrates on analyzing the impact of green credit on the financial performance of banks, aiming to inform the development of effective green credit policies for Vietnam and other developing countries in the region. To achieve this objective, the study evaluates green credit through two dimensions: the green credit ratio and green credit disclosure.

Green Credit Ratio

Green credit ratio, also referred to as green credit balance ratio, in this study, is defined as the quotient of the green credit balance divided by the total outstanding loans. This variable is applied instead of green credit balance because, as noted by Xi et al. (2022), both green credit balance and total credit of banks changes annually. Therefore, the single assessment of green credit balance is not used because it does not fully reflect the level of investment in green credit of banks. It is estimated that this variable has a positive impact.

Green Credit Disclosure

Green credit disclosure, as defined by Xing et al. (2021), refers to the number of positive green credit-related disclosures by banks on banks' websites or government-affiliated newspapers. This variable is anticipated to have a positive impact.

3.2.3 Control variables

The Cost-to-income ratio (CIR) is defined as the ratio of a bank's operating costs to its operating income and is widely recognized as an indicator to assess the operational efficiency and financial stability of banks. Several studies have used CIR as a determinant of bank profitability (Mirzaei et al., 2013); with most findings suggesting that it has a negative impact..

The Loan to deposit ratio (LDR) is an important indicator for assessing a bank's stability and performance, influencing various aspects of its operations and management (Sawitri, 2018). This ratio is believed to have a negative impact on financial performance (Purnomo, 2010; Sochib et al., 2023).

Bank size, measured by the total assets of the institution, is a perspective supported by previous studies (Kumar et al., 2022; Laeven et al., 2016). Prior research suggests that this coefficient has a positive impact on financial performance.

The Capital adequacy ratio (CAR), also known as capital adequacy ratio, is an

important financial indicator used to measure the financial capacity of banks to meet risks and ensure safety for the system. This ratio shows the relationship between the bank's equity and risky assets, this coefficient is considered to have a negative impact (Kumar et al., 2022).

The information for these variables is summarized in **Table 2**, including the calculation formulas and the expected impact of each variable on the financial performance of banks, as indicated in the literature.

Table 2. Variable description and Measurement.

No.	Variable Name	Notation	Measurement	Expectation Signs
Dependent variable				
1	Return on Equity	ROE	Net Income/Total Equity	
2	Return on Assets	ROA	Net Income/Total Assets	
Independent variable				
5	Green Credit Ratio	GCR	Green Credit Balance / Total Outstanding Loans	+
6	Green Credit Disclosure	GCD	Number of projects announced by banks that participated in/received loans.	+
Control variables				
7	Capital adequacy ratio	CAR	[(Tier 1 Capital + Tier 2 Capital)/ Risk-Weighted Assets] x 100	+/-
8	Cost to Income	CIR	Operating expenses/ operating income	-
9	Bank Size	BS	Total Assets	+
10	Loan to Deposit	LDR	Total amount of deposits/ total amount of loans	+

Source: Authors' calculations

3.3 Descriptive statistics

The descriptive statistics for each variable are summarized in **Table 2.** This table provides the coefficients including the mean, standard deviation, minimum, and maximum for each variable.

Table 3. Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Dependent variables				
ROA	1.22	.787	-.238	5.315
ROE	11.455	6.133	-1.533	30.645
Independent variables				
GCD	2.038	3.011	1	5
GCR	0.08	0.03	0.019	0.15
Control Variables				
BS	145.93	41.931	4.23	627.79
CIR	.41	.052	.316	.501

LDR	.801	.029	.658	.94
CAR	13.98	1.83	10.27	16.2

Source: Authors' calculations

Based on the data presented in **Table 3**, the following statistics are observed: ROA has a mean of 1.22 with a standard deviation of 0.787, and ranges from -0.238 to 5.315. ROE has a mean of 11.455 with a standard deviation of 6.133, and ranges from -1.533 to 30.645. BS has a mean of 145.93 with a standard deviation of 41.931, and ranges from 4.23 to 627.79. CIR has a mean of 0.41, standard deviation of 0.052, ranging from 0.316 to 0.501. LDR has a mean of 0.801, standard deviation of 0.029, ranging from 0.658 to 0.94. GCD has a mean of 2.038 with standard deviation of 3.011, ranging from 1 to 5. CAR has a mean of 13.98, standard deviation of 1.83, ranging from 10.27 to 16.2. GCR has a mean of 0.08 with standard deviation of 0.03, and ranges between 0.019 and 0.15.

3.4 Data analysis

To be able to measure the effects of variables on the dependent variable "Financial Performance", the models are:

$$ROA_{it} = \beta 0 + \beta 1 \times GCR_{it} + \beta 2 \times GCD_{it} + \beta 3 \times CAR_{it} + \beta 4 \times CIR_{it} + \beta 5 \times BS_{it} + \beta 6 \times LDR_{it} + u_{it}$$

$$ROE_{it} = \beta 0 + \beta 1 \times GCR_{it} + \beta 2 \times GCD_{it} + \beta 3 \times CAR_{it} + \beta 4 \times CIR_{it} + \beta 5 \times BS_{it} + \beta 6 \times LDR_{it} + u_{it}$$

In this formula, "i" represents the bank, and "t" represents the period. Financial Performance variables, including ROA, ROE, serve as the dependent variables; GCR and GCD are the independent variables, while the control variables include CAR, CIR, LDR, and BS. Additionally, u_{it} represents the error term.

3.4.1 Ordinary Least-square regression (OLS) analysis

Studies that have used ordinary least squares (OLS) regression analysis to investigate the relationship between Green Credit Disclosure, Green Credit Ratio and Financial Performance have adopted either fixed-effects or random-effects methods to handle simultaneous causality and unobserved heterogeneity across banks. Fixed-effects methods address estimation problems related to unobserved heterogeneity (firm-specific characteristics) across firms and are appropriate when this heterogeneity does not vary over time for a particular firm (Schultz et al., 2010). In contrast, random-effects models minimize sample variance by pooling partial data and exploring differences in errors across firms and time periods.

For panel data studies, the Hausman test is the most used econometric test to choose between fixed-effects and random-effects models. This test assesses the orthogonality of the common effects and the regressions (Hausman, 1978; Paxton et al., 2012), determining whether the individual effects (unique error terms) are correlated with other regressions in the model. Based on the results of the Hausman test, which indicated P-value higher than 0.05, we use the random-effects method to test the relationship between GCR, GCD and FP.

3.4.2 Generalized method of moment (GMM) estimation

Overall, panel regression analysis is subject to endogeneity issues, including dynamic endogeneity, simultaneity, and time-invariant unobserved heterogeneity among banks. To address these endogeneity concerns in our bank dataset, we employed the

Generalized Method of Moments (GMM) estimation, initially introduced by Arellano and Bond (1991). This method is widely used to study the determinants of bank profitability (Dietrich & Wanzenried, 2011) and is considered an appropriate estimation method for exploring the dynamic nature of relationships (Flannery & Hankins, 2013).

Our study follows the approach by (Schultz et al., 2010), which operates on the premise that "the chosen lags have the desired instrumental variable properties, being correlated with the regressors but not correlated with the contemporaneous errors." Conversely, in the GMM approach, the generation of a large number of instruments can be problematic. Therefore, we used the Hansen-J test or over-identification test to diagnose the validity of the instruments used in the system GMM estimation (Roodman, 2009). The null hypothesis that the instruments are valid was not rejected, as the p-value was greater than 0.05, confirming that all instruments used in the model are appropriate.

We used one-year lagged dependent variables to capture the effect of past performance and included explanatory variables on the right side of the model to account for unobserved factors that may interact with the relationship between GCR, GCD and FP, as suggested by Wintoki et al. (2012). Additionally, with a one-year lag for the dependent variable, we obtained results significant at the P-value < 0.05 level.

4. Empirical results

4.1 Correlation matrix

Table 4. Matrix of correlation

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) ROA	1							
(2) ROE	0.635	1						
(3) CIR	0.049	0.022	1					
(4) LDR	0.027	0.076	0.031	1				
(5) CAR	0.156	0.381	0.113	0.051	1			
(6) BS	0.350	0.461	0.123	0.317	0.065	1		
(7) GCR	0.412	0.311	0.11	0.011	0.093	0.044	1	
(8) GCD	0.372	0.257	0.342	0.009	0.005	0.019	0.059	1

Source: Authors' calculations

Table 4 presents the correlation matrix between the variables in the research model, highlighting several key points. First, the two coefficients ROA and ROE have a strong correlation with a strong correlation level (0.635). On the contrary, the correlation of CIR, LDR with the two coefficients mentioned above is extremely low, with neither exceeding the threshold of 0.1. In addition, the correlation coefficient between CAR and ROA is also worth noting, specifically, this coefficient is quite low, only at 0.156, showing a poor correlation. On the contrary, for ROE, CAR has a quite high correlation coefficient, close to 0.4. With the remaining independent variables including BS, GCR and GCD compared to the two dependent variables in this study, ROA and ROE, they are all quite high, ranging from 0.257 to 0.461 with the lowest correlation belonging to the relationship between GCD and ROE; the highest correlation belongs to the relationship between BS and ROE.

4.2 Regression results for full sample

Table 5. Regression results of full sample

	Panel A			**Panel B**		
	ROA			**ROE**		
	OLS	**REM**	**GMM**	**OLS**	**FEM**	**GMM**
GCR	.538** [12.501]	0.229* [1.031]	.0418* [4.901]	.618** [3.411]	.079* [1.349]	.394** [2.813]
GCD	.332** [9.202]	.291** [3.814]	.199** [3.316]	.432** [18.614]	0.015 [0.914]	0.009 [0.618]
BS	.619** [19.342]	.228** [9.205]	.258** [13.301]	.701** [18.342]	.349** [9.205]	.488** [8.342]
CAR	.289* [1.842]	.194* [1.922]	.193** [2.891]	.124* [1.942]	.112** [1.809]	.107* [1.722]
LDR	-0.188** [1.825]	-0.163** [1.719]	-0.149** [1.617]	-0.029 [0.913]	-0.009 [0.715]	-0.107 [0.793]
CIR	-0.029 [2.141]	-.017** [1.945]	-.011** [1.785]	0.971 [1.306]	-0.192 [1.045]	-0.102 [1.581]
Constant	-11.429** [-2.196]	-8.13 [-1.315]	-9.134 [-1.522]	-13.09 [-1.597]	-7.332 [-1.298]	-4.091 [-1.407]
R-squared	0.319	0.201	-	0.438	0.337	-
F statistic	58.931	20.782	13.23	62.137	19.223	37.921
AR (1) (p-value)	-	-	0.013	-	-	0.002
AR (2) (p-value)	-	-	0.712	-	-	0.982

Source: Authors' calculations

Table 3 presents the regression results for two equations. In equation 1, the dependent variable is ROA (columns 2,3,4), with the results displayed in panel A. In equation 2, the dependent variable is ROE and presented in panel B (columns 5,6,7). For both panels, we have applied three methods: OLS, fixed-effect method/ random-effect method and GMM.

The results show that Green Credit Ratio has a positive impact on the profitability of banks in the Southeast Asian group. This finding is completely consistent with both measures of financial performance of banks (ROA and ROE) for all the estimation methods employed, including OLS, REM/FEM and GMM. Therefore,_our research results support hypothesis 1: "There is a positive relationship between improving green credit ratio and bank profitability". Conversely, a weakening green credit ratio of banks will also affect their profitability. Our findings align with the research of Banani and

Sunarko (2022) on green credit in developing countries in general and Badriah et al. (2024), suggesting that increasing the number of loans for environmental projects will improve the reputation of banks in the customers' perception. This creates a sense that they have contributed to environmental improvement activities through depositing money with these banks. In addition, our results also support Hypothesis 2, which posits that when banks disclose how loans are utilized for projects through mass media, it has a positive impact on bank profitability (ROA), this result was right for all OLS, REM and GMM estimation methods. As such, it appears that people in these countries are generally very concerned about environmental issues. This creates a positive cycle, as the more banks invest in green projects, the more support they receive from the community and the more their long-term profitability increases.

In addition, among the four control variables included in the study including Bank Size, Capital Adequacy Ratio, Cost-to-income ratio, Loan to Deposit ratio, only BS and CAR have an impact on ROA and ROE in all three testing methods: OLS, FEM/REM and GMM. This research result is supported by the research of Huynh et al. (2024); however, the difference is that no previous studies on this topic have demonstrated a positive impact of CAR on ROA and ROE. This new result assesses that the banks studied share a common characteristic, which is the ability to enhance financial stability and effectively manage risks. As a result, these businesses will have the ability to expand credit activities activities.

5. Discussion and Policies development

Regarding Hypothesis 1, we can conclude that the impact of green credit on short-term profitability of banks in the ASEAN region is still quite limited. ROA and ROE are two main figures measuring the efficiency of using assets and budgets of banks, so when green credit does not have a significant impact on either of these two coefficients, this may indicate that banking activities for projects or businesses that green credit may not have achieved high profits by the time of data collection (2023) and these loans actually have a long payback period. Therefore, it can be seen that green credit loan accounts have not created significant financial value for banks, and even hide higher risks than traditional loan accounts with the ability to recover accounts. This situation is now more firmly confirmed as Rahma and Wedari (2024) and Huynh et al. (2024) also noted that currently green credit brings quite low profits to banks and in the future can become failed accounts if capital cannot be recovered. This can be considered the biggest barrier for banks in implementing green credit loans, as it does not contribute meaningfully to their general development.

With Hypothesis 2, although GCD has the ability to increase profits, it cannot change equity (as it has no impact on Return on Equity). This finding is completely reasonable because it explains the stability of the bank's capital structure over time. However, it also shows the uncertainty in the long-term profitability of green credit because ROE increases only when the profit of the enterprise reaches a higher level than the equity and this is impossible. Even if the number of green credits disclosed is large or the number of enterprises enjoying green credit is larger, it cannot affect ROE. Because projects prioritized for green credit often require significant time to recover capital, so considering the period from 2019-2023, this is impossible. This view is also confirmed by the studies of Rahma and Wedari (2024), and Geng et al. (2023).

To lead to this situation, it is possible to propose some policies in ASEAN countries

as the following causes: (1) Thailand prohibits the arrangement of central policies for green credit investment channels for specialized groups of solar energy, wind energy and renewable energy; however, the nature of these industries has a very long capital recovery time for build infrastructure, R&D to produce products; (2) Vietnam with preferential policies, capital priority along with the decision on "Green Growth Strategy" created a wave of green projects/enterprises. While this strategy compels banks to prioritize loans for green projects, it fails to establish a framework for assessing the risk signals associated with these projects. Additionally, there is a lack of metrics to measure the actual packaging level of the projects, making it difficult for banks to identify their potential and associated risks; (3) Indonesia with preferential policies to reduce interest rates for green projects; however, these policies applied to all types of projects, without clear distinction, this led to some renewable energy projects as well as environmentally friendly infrastructure investments with long payback periods also enjoying the same treatment as specialized types with short payback periods, causing loss of profit for banks; (4) Malaysia prohibits the publication of policies on developing green bonds at the fringe, becoming one of the major gaps in green credit policy. This lack of transparency presents an opportunity for greenwashing to occur, posing a major obstacle for banks attempting to issue bonds and raise capital.

Based on the discussion of the research results, we propose some adjustments to the green credit issuance policy for countries in the ASEAN region as follows. First, countries such as Vietnam and Indonesia need to develop clearer assessment criteria to measure the risk and return of green credit projects. This will enable banks to better identify the risk and potential return of green projects, helping to avoid loans that are not feasible or have excessively long a payback period. Second, Thailand and Indonesia need to adjust their preferential interest rate policies and financial support for green projects based on the characteristics and payback period of each sector. Sectors with long payback periods such as renewable energy need to be considered separately, to ensure that green loans yeild real returns and do not reduce the overall profitability of banks. Third, Malaysia and other countries in the region need to encourage the development of green bonds with a transparent legal framework to prevent greenwashing and ensure that the funds raised are used for the right purposes. This appoarch will not only increase transparency but also enhance investor confidence in green projects. Fourth, for all four countries, countries need to develop a flexible monitoring and policy adjustment mechanism that is suitable for market fluctuations and the feasibility of green projects. This will help ensure that green credit not only contributes to sustainable development but also provides financial benefits to both banks and businesses.

6. Conclusion

The results of our study validate that Green Credit Ratio, Green Credit Disclosure significantly impact on Financial Performance of banks in ASEAN, and highlight the importance of green credit for both developing and developed countries. However, in this study, we did not find a correlation between LDR and CIR on Financial Performance of banks in this bloc. Therefore, we recommend that future studies should collect more data in other countries in the Southeast Asia region to gain a clearer understanding of these correlations.

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CARBON CREDITS: OPPORTUNITIES AND CHALLENGES FOR NGHE AN

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Abtract: Carbon credits are often referred to as a "green gold mine," playing a crucial role in Vietnam's sustainable economic development. Nghe An, a province with significant potential for generating carbon credits, has the opportunity to actively participate in the carbon credit market. This participation can create a substantial source of income for businesses, households, and local communities. However, alongside these opportunities, Nghe An faces several challenges, including an incomplete carbon credit policy framework, a lack of awareness or engagement from businesses, and a shortage of high-quality human resources. This article explores both the opportunities and challenges that Nghe An encounters on its journey to participating in the carbon market. It also provides recommendations to help address these obstacles and unlock the province's full potential in this emerging market.

Keywords: Carbon credits, voluntary carbon markets, mandatory carbon markets

I. Carbon Credits and Carbon Markets

A carbon credit is a permit that allows its owner to emit a specified amount of carbon dioxide or other greenhouse gases (GHGs). One credit permits the emission of one ton of carbon dioxide or an equivalent amount of other greenhouse gases.

According to Clause 35, Article 3 of the Law on Environmental Protection 2020, carbon credits are defined as follows: "A carbon credit is a type of certificate that can be owned or traded to grant the right to emit one ton of carbon dioxide (CO2) or one ton of CO2 equivalent."

Carbon credits can be generated through projects that capture carbon from the atmosphere (e.g., reforestation) or reduce the release of carbon into the atmosphere (e.g., renewable energy projects). The ultimate goal of the carbon credit system is to reduce the amount of GHGs emitted into the atmosphere.

Carbon Market

The carbon market, also known as the greenhouse gas emission reduction credit exchange market, is a type of market where the goods being bought and sold are the amounts of greenhouse gases reduced or absorbed.

There are two main types of carbon markets: the mandatory market and the voluntary market.

1. **Mandatory Carbon Market**

This is a market where carbon trading is regulated based on the commitments of countries under the United Nations Framework Convention on Climate Change (UNFCCC) to achieve greenhouse gas reduction targets. Participation in this market is compulsory and primarily involves projects under mechanisms such as the Clean Development Mechanism (CDM), the Sustainable Development Mechanism (SDM), or

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Joint Implementation (JI).

2. **Voluntary Carbon Market**

This market is based on bilateral or multilateral cooperation agreements between organizations, companies, or countries. Credit buyers participate voluntarily to meet environmental, social, and corporate governance (ESG) policies and reduce their carbon footprints. In this market, organizations, projects, or individuals sell carbon offsets to finance their green initiatives.

II. Opportunities and Challenges in Accessing the Carbon Market in Nghe An

Vietnam is experiencing significant growth in the field of carbon credit trading, with 23 localities currently offering carbon storage services. However, only six localities have been granted authorization for carbon credit trading: Thanh Hoa, Nghe An, Ha Tinh, Thua Thien Hue, Quang Binh, and Quang Tri.

1. Opportunities to Access the Carbon Market in Nghe An

a. Potential from Forests

Nghe An is the province with the largest forestry land area in Vietnam, covering a total of 1,648,649.52 hectares. It boasts significant potential and advantages for forestry economic development, supported by its rich and diverse resources.

The province's total forestry land and forest area amounts to 1,160,242.4 hectares, accounting for 71.6% of its total natural land area. Of this, forested land spans 961,774.37 hectares, which includes 790,352.86 hectares of natural forest and 171,421.51 hectares of planted forest. Additionally, 57,013.87 hectares consist of planted forest that has not yet matured into forest. The province’s forest cover rate stands at 58.33%.

Nghe An's forest area is primarily distributed across 11 districts in the western region, particularly in the southwest. This distribution creates favorable conditions and immense potential for exploiting carbon credits. With its mountainous terrain, Western Nghe An offers excellent opportunities for developing various industries, including forestry (zoning, protection, afforestation), medicinal plant cultivation, clean agricultural production (livestock and crops), and tourism development.

In the future, forest planting and protection are expected to become highly lucrative, potentially generating "million-dollar" revenue as Nghe An gains access to the carbon credit market.

b. Potential from Rice

According to the Food and Agriculture Organization of the United Nations (FAO) and research by the World Bank (WB) in Vietnam, agriculture is the second-largest emitter of greenhouse gases. Nghe An is piloting a project on “creating carbon credits in rice production” with the aim of trading and exchanging greenhouse gas emission quotas. This initiative can be understood as “offsetting” domestic carbon credits, thereby enabling buying and selling transactions on the international market.

If successfully piloted in Nghe An, the model will enhance the value of sustainable rice production, directly generating additional income. Furthermore, it will make a significant contribution to Vietnam’s efforts to achieve its commitment to the goal of net-zero emissions by 2050.

c. Potential from Other Crops and Industries

Nationwide, experiments in creating carbon credits from production have been conducted on various crops, including corn, sugarcane, and rice. For example, raw material areas for growing mulberry for silkworm raising in some mountainous provinces,

such as Lao Cai, Tuyen Quang, Yen Bai, and Cao Bang, have demonstrated potential for selling carbon credits. Similarly, sugarcane-growing localities such as Thanh Hoa, Gia Lai, and Ninh Thuan also show promise for significant benefits from carbon credit trading.

In Nghe An, following the success of carbon credit projects in rice production, the initiative will be expanded to other crops with large cultivation areas and high potential, such as corn, sugarcane, and tea. Additionally, opportunities to generate carbon credits by reducing emissions in cattle farming will be explored, further enhancing the province's contributions to sustainable development and the carbon market.

2. Challenges in Accessing the Carbon Market in Nghe An

The forest carbon credit market, and the carbon credit market in general, face numerous difficulties and challenges related to institutions, policies, the readiness of businesses and individuals, investment resources, technical support, and the capacity of relevant parties.

a. Legal Framework and Policies

One significant challenge is the lack of clarity and consistency in carbon credit policies at both national and local levels. This inconsistency complicates participation in the market and the implementation of projects. Additionally, standards for forest carbon, along with a system for measurement, reporting, appraisal, and credit granting applicable to the domestic carbon market, have yet to be developed.

b. Carbon Credit Pricing

Pricing carbon credits poses a significant challenge due to their intangible nature. These credits must meet stringent quality standards and be certified before they can be traded as commodities. In a multilateral market with diverse processes, determining the quality of carbon credits becomes complex. This diversity often results in varying prices for carbon credits across different projects.

For example, six provinces in the North Central region have sold carbon credits to the World Bank at $5 per ton of CO2, while some other forestry projects have sold them at $17 per ton of CO2. Such disparities highlight the difficulty of establishing consistent pricing mechanisms.

c. Human Resources

Human resources represent a significant challenge for Vietnam, and particularly for Nghe An, in participating effectively in the carbon credit market. The country faces a serious shortage of skilled personnel, especially those with deep technical expertise in emission reduction inventories.

Greenhouse gas inventories must adhere to international standards, requiring sufficient experts to establish and operate appraisal councils. Training carbon appraisers with specialized knowledge and international certification is a critical step. This expertise is essential for Vietnam to effectively manage and operate its carbon credit market.

d. Awareness of Enterprises

A significant challenge lies in the limited awareness among local enterprises about the benefits and requirements of participating in the carbon credit market. Many Vietnamese enterprises, including those in Nghe An, show interest in both the voluntary and mandatory carbon credit trading markets. However, due to insufficient information and the absence of specific greenhouse gas emission quotas, these enterprises are uncertain about whether they need to buy or sell carbon credits.

III. Proposed Solutions to Overcome Difficulties

First, solutions related to the State's legal policy system

Agencies and sectors should improve institutional policies concerning the transfer and financial management of revenue from forest carbon credits. It is essential to develop Vietnam's forest carbon standards and operating mechanisms, as well as guide the development and pilot implementation of several potential projects. The Government should create incentive and support mechanisms to encourage businesses to voluntarily participate in the market. Additionally, support tools related to taxes and access to credit need enhancement. Market organization and management must be improved through coordination mechanisms between ministries and sectors to ensure efficiency in promoting business innovation and emission reduction.

Second, solutions for human resource development

Human resource development for market operations should be prioritized. This includes establishing technical committees under relevant ministries, departments, and sectors to provide expertise on professional issues such as measuring, assessing, and auditing carbon emissions to accurately convert credits and quotas.

Third, raising awareness among enterprises about carbon credits

Efforts should focus on increasing enterprises' awareness and understanding of the carbon credit market. Businesses need to proactively explore the economic potential of carbon credits, thereby adopting greener production methods and swiftly applying green technologies to meet the import requirements of goods from the EU, the United States, and other countries.

Fourth, strengthening the role of universities and training institutions

Relevant universities and training institutions should develop roadmaps for programs and lectures to train human resources equipped to participate in the carbon market in the near future.

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OME CHALLENGES IN THE PROCESS OF OVERCOMING THE INCOME TRAP TOWARD SUSTAINABLE DEVELOPMENT IN VIETNAM

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Abstracts: The middle-income trap is a situation where a country remains stuck at a middle-income level for an extended period after surpassing the threshold of a low-income developing country. The 13th National Congress of the Communist Party has set the goal of striving for Vietnam to become a developed, high-income country by 2045. To achieve this goal, our nation must first overcome the middle-income trap that many countries in the region are facing. This article focuses on analyzing the difficulties and challenges and proposing solutions for Vietnam to escape the middle-income trap.

Keywords: *Income trap; Middle income; Vietnam.*

Introduction

In recent decades, many countries with inherent advantages or reasonable institutional adjustments have risen above the group of low-income countries and joined the ranks of middle-income countries. However, from this point, most countries find themselves mired in the "quagmire" of the middle-income group. In Latin America, although most economies reached middle-income status relatively early, they have only remained stagnant since then. In Asia, aside from Japan and the four Asian Tigers—South Korea, Taiwan, Hong Kong (China), and Singapore—that have advanced to high-income economies, the rest are still stuck in the middle-income category. However, these countries also took 25 to 30 years to transition into the high-income group.

In our country, the renovation process has led to a significant breakthrough in economic growth. From being a poor, low-income nation, Vietnam joined the group of lower-middle-income countries in 2008. However, the reality of economic growth over the past decade also reveals many difficulties and challenges that remain. Without solutions to create breakthroughs in economic growth, the risk of falling into the middle-income trap is imminent.

1. The middle-income trap and characteristics of the middle-income trap

1.1. The middle-income trap

The World Bank categorizes economies into four groups based on gross national income (GNI) per capita calculated using the Atlas method based on exchange rates. According to the criteria set by the World Bank in 2023, a country with a GNI per capita of less than or equal to 1,145 US dollars is classified as a low-income country; from 1,146 to 4,515 US dollars is classified as a lower-middle-income country; from 4,516 to 14,005 US dollars is classified as an upper-middle-income country; and a country with more than

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14,005 US dollars is classified as a high-income country.

	Low Income	Lower-middle Income	Upper-middle Income	High Income
July 1, 2024 – for FY25 (new)	≤ 1,145	1,146 - 4,515	4,516 - 14,005	> 14,005
July 1, 2023 – for FY24 (previous)	≤ 1,135	1,136 - 4,465	4,466 - 13,845	> 13,845

Source: World Bank Group • Figures in United States Dollar (US$)

WORLD BANK GROUP

During the development process, each economy goes through the four aforementioned income stages. However, stages 2 and 3 are the two phases where countries often face the most difficulties and obstacles, and it takes them a long time to overcome these challenges. In fact, many countries that reach an average income level (whether low or high) find it challenging to elevate themselves to a high-income status even after more than half a century. This phenomenon is referred to as the middle-income trap.

The middle-income trap is a situation where an economy reaches average income levels due to existing advantages or appropriate institutional changes but subsequently fails to advance to high-income status. The advantages that help countries escape poverty to become middle-income nations typically include cheap labor, moderate natural resources, several foreign direct investment projects in low-tech sectors, or the immediate effect of institutional changes. Once these advantages are exhausted, the growth rate of these countries decreases, and GNI per capita increases slowly, or even very slowly. That is when economies fall into the middle-income trap.

1.2. Characteristics of the Middle-Income Trap

Resource-based growth: Many countries in this situation rely on the exploitation of natural resources without investing sufficiently in technological innovation or structural economic reforms, resulting in lower productivity and competitiveness compared to high-income countries.

Low investment and lack of balance between sectors: This phenomenon is often accompanied by insufficient investment in the processing and manufacturing industries, leading to inefficiencies in production. These countries need to enhance investment in infrastructure and technology to improve competitiveness.

Non-competitive goods: Products lack competitiveness in terms of price and quality, affecting export capabilities and diminishing the national goods' reputation on the international stage.

Low development investment activity: Countries caught in the middle-income trap often struggle to attract investment in critical infrastructure and industrial sectors necessary for promoting sustainable economic growth. This limits economic growth potential and slows down the development process.

The labor market is sluggish: Despite having a large labor force, these countries often struggle to improve labor productivity and create enough jobs for their workforce. The lack of quality employment can lead to an unequal distribution of income and increased social instability.

Slow development in manufacturing: The manufacturing and production sectors in these countries often lack investment in enhancing production capacity and technological innovation, resulting in dependence on low-value goods and poor competitiveness.

Underdeveloped industries: Countries trapped in the middle-income bracket often do

not invest enough in high-value-added industries. This leads to a significant reliance on the production of raw materials and unprocessed goods, reducing competitiveness and adaptability to global economic changes.

Outdated science and technology: Investment in research and development of technology is often insufficient to maintain and enhance global competitiveness. Countries in the middle-income trap frequently face inefficiencies in adopting new technologies and technical improvements, which diminishes their long-term economic growth potential.

1.3. Signs of the economy falling into the middle-income trap

The middle-income trap is characterized by stagnation in income per capita, despite initial growth. Countries entering this phase typically benefit from inexpensive labor and rapid industrialization, which spur growth. However, as wages rise and the competitive advantage of low-cost labor diminishes, many of these economies fail to cultivate advanced sectors that can drive further growth. One of the primary indicators of an economy trapped in this cycle is a decline in productivity growth. When productivity stalls, it signals an inability to innovate, adapt, and ascend the value chain. Without significant productivity improvements, an economy struggles to compete in the global landscape, ultimately stalling any ambitions of reaching high-income status.

Another telling sign of the middle-income trap lies in the limitations of human capital development. Countries that find themselves stagnating often invest insufficiently in education and workforce skills training. As they move out of the low-income bracket, the skills required for higher-value industries necessitate an educated and adaptable workforce. Inadequate investment in education leads to a mismatch between labor market needs and the capabilities of the workforce. This dissonance results in a labor pool that is either overqualified for low-skilled jobs or underqualified for high-skilled jobs, thereby limiting economic dynamism and growth.

Additionally, innovation stifling is a significant symptom of the middle-income trap. Economies that do not prioritize research and development or foster a culture of innovation risk falling behind in technological advancements. Countries must transition from promoting low-wage, manufacturing-driven economies to facilitating sectors characterized by higher value-added processes—such as technology, services, and knowledge-based industries. This transition requires robust investment in innovation infrastructure, including favorable policies, financial support for research, and a legal framework that encourages intellectual property rights. Without a proactive commitment to innovation, countries may remain mired in low productivity and low growth.

Moreover, the quality of institutions plays a crucial role in determining a nation's ability to escape the middle-income trap. Weak governance, corruption, and ineffective legal systems can severely undermine economic growth. Nations struggling with institutional inefficiencies often witness misallocation of resources, reduced investor confidence, and diminished public trust. Such conditions are detrimental to attracting both domestic and foreign investments, which are vital for fostering a competitive and dynamic economy. A country with strong institutions, on the other hand, can implement policies that enhance economic performance, promote fair competition, and uphold property rights, thus creating a conducive environment for growth.

Furthermore, external economic conditions and reliance on a limited range of exports can also signify a country's susceptibility to the middle-income trap. Economies heavily

dependent on the export of a few commodities or low-value goods are particularly vulnerable to commodity price fluctuations and global economic downturns. Such dependency can limit diversification efforts, stifling internal economic development and resilience. An economy that exhibits a narrow export base or exhibits vulnerability to external shocks may find itself struggling to innovate or grow beyond the middle-income threshold.

Lastly, social inequality can exacerbate a nation's struggle to escape the middle-income trap. As economies grow, disparities in wealth and opportunity often widen, leading to social stratification and unrest. High levels of inequality can stymie overall economic growth by limiting access to education, healthcare, and social services for large segments of the population. Such disparities weaken the purchasing power of significant portions of the workforce and can stifle domestic demand, which is critical for sustained economic expansion during pivotal transformation phases.

2. Challenges for Vietnam in Overcoming the Middle-Income Trap

During the early stage of renewal, with changes in the political, economic, and social systems, the potential and advantages were awakened. Natural resources, capital, and an abundant supply of cheap labor, combined with a strong emphasis on attracting foreign investment primarily in terms of quantity, became important drivers of rapid growth. The average economic growth rate during the period of 1991-1995 reached 8.2% per year; from 1996 to 2000 it was 7.0%, and 7.81% during 2001-2005. Thanks to this, Vietnam rose to join the group of low-middle-income countries in 2008 and set higher goals for the next phase. However, over the past decade, the country's economic growth has shown signs of stagnation. In the 2011-2015 period, the average growth rate was 5.92% and reached 5.9% in the 2016-2020 period, with the target for 2021-2025 set at 6.5%.

Currently, many viewpoints suggest that Vietnam has fallen into the middle-income trap, with quite clear signs from the state of the economy, such as: (1) Economic growth is showing signs of stagnation; (2) Labor productivity and competitiveness indices are low and improving slowly; (3) Economic restructuring is slow, and the export structure is unsustainable and inefficient; (4) Numerous economic, social, and environmental issues are arising, such as resource depletion, environmental pollution, income inequality, corruption, and real estate bubbles... To become a high-income country by 2045, we face many difficulties and challenges, specifically:

- *The level of technology has not met the requirements of in-depth economic growth model innovation for rapid and sustainable growth.* In general, our country's capacity for science, technology, and innovation is still limited. Apart from some areas that take shortcuts and get ahead, the majority are still at a low level. Industry and export rely mainly on processing and assembly. The processing and manufacturing industry has not developed, and its contribution to economic growth is still low. In recent Congresses, our Party has identified the driving role and leading national policy of science and technology and proposed policies to promote the development of science and technology. However, so far, science and technology have not become the key to our country's rapid growth. From 2017 to the present, Vietnam's GII index has continuously improved, increasing from 59th (in 2016) to 42nd (in 2019 and 2020), 44th in 2021, 48th in 2022, and 46th in 2023[4]. According to the Global Innovation Index 2023 (GII) Report in 2023, Vietnam is ranked 46th out of 132 countries and economies, up 2 places compared to 2022. The ecological sustainability index group is ranked 110th out of 132; the Law Enforcement

Effectiveness Index is ranked 72nd out of 132. Innovation input ranking: Up 2 places compared to 2022, from 59th to 57th (Innovation input includes 5 pillars: Institutions, Human resources and research, Infrastructure, Market development level; Enterprise development level). Vietnam's Innovation output increased by 1 place compared to 2022, from 41st to 40th (Innovation output includes 2 pillars: Knowledge and technology products and creative products). Vietnam's spending on research and development (R&D) ranked 66th, no improvement compared to previous years; The value of venture capital deals is still small, ranked 60/132[4].

- *Although the human resources are large in quantity, their quality is low.* The proportion of trained workers with degrees and certificates is only 14.1 million people, accounting for 27.0%, about 38 million workers have not received training from the primary level or higher, the number of informal workers is 33.3 million people, the rate of workers with informal jobs is 64.9%. The unemployment rate of young people is still high (7.63% in 2023). The number of unemployed young people (people aged 15-24) in 2023 is about 437.3 thousand people, accounting for 41.3% of the total number of unemployed people. The number of workers with underutilized potential is 2.3 million people. The rate of underutilized potential in 2023 is 4.3%. The majority of underutilized laborers are people aged 15-34 (49.3%), much higher than the proportion of workers in this age group in the labor force (33.0%). This shows that Vietnam still has a large part of the untapped potential labor force, especially the young labor group [5]. The quality of vocational training and the quality of university education have not met the requirements of economic and social development. For a long time, vocational training has been neglected, focusing only on university training, leading to a shortage of workers and even a shortage of good teachers. In addition, another challenge that needs to be taken into account is the aging population. The advantages of the golden population structure have not been well utilized in the past. Currently, our country's population is aging. According to the report of the General Statistics Office, Vietnam's golden population structure will end in 2039.

- *Economic and social institutions have not kept up with the requirements of national development.* Efforts in building and perfecting development institutions have brought positive results in 35 years of renovation. However, with the requirements of national development in the new context, development institutions, especially the socialist-oriented market economic institutions, still have many shortcomings. The legal system is not synchronous, overlapping, and has many loopholes. Law enforcement is not effective and efficient and sometimes lacks transparency. The mechanism for allocating and using development resources still has many shortcomings and is not completely in line with the market mechanism. The legal framework is not complete, sanctions are not strong enough to prevent corruption, waste, and loss of national assets. Management mechanisms in some sectors and fields have not kept up with the requirements of the market economy. The organization and implementation of major policies of the Party is still slow and not very effective.

- *The economic growth process after 35 years of renovation has been causing negative effects on the environment.* The extensive growth model based on low technology and human resource quality has led to waste and depletion of resources, and environmental destruction. In 2023, Vietnam ranked 36th out of 177 countries with the highest pollution levels in the world. In addition, global climate change with natural disasters, droughts, salinity, high tides, etc. are also worrying challenges to the goal of

rapid growth in our country.

- *Global and Vietnamese inflation is the basis for the World Bank to adjust the threshold for high, low, and middle income.* That means that the high-income threshold that we must strive for does not stop at 12,696 USD per capita, especially in the next few decades. This is also an issue when calculating and building growth targets that we need to pay attention to when calculating the roadmap to overcome the middle-income trap.

3. Some solutions for Vietnam to overcome the middle-income trap by 2045

Theo số liệu từ Tổng cục Thống kê, quy mô GDP của Việt Nam năm 2020 là 343 tỷ USD; dân số trung bình trong năm 2020 là 97,58 triệu người- Economic and social institutions have not kept up with the requirements of national development. Efforts in building and perfecting development institutions have brought positive results in 35 years of renovation. However, with the requirements of national development in the new context, development institutions, especially the socialist-oriented market economic institutions, still have many shortcomings. The legal system is not synchronous, overlapping, and has many loopholes. Law enforcement is not effective and efficient and sometimes lacks transparency. The mechanism for allocating and using development resources still has many shortcomings and is not completely in line with the market mechanism. The legal framework is not complete, sanctions are not strong enough to prevent corruption, waste, and loss of national assets. Management mechanisms in some sectors and fields have not kept up with the requirements of the market economy. The organization and implementation of major policies of the Party is still slow and not very effective. - The economic growth process after 35 years of renovation has been causing negative effects on the environment. The extensive growth model based on low technology and human resource quality has led to waste depletion of resources and environmental destruction. In 2023, Vietnam ranked 36th out of 177 countries with the highest pollution levels in the world. In addition, global climate change with natural disasters, droughts, salinity, high tides, etc. are also worrying challenges to the goal of rapid growth in our country.

- Global and Vietnamese inflation is the basis for the World Bank to adjust the threshold for high, low, and middle income. That means that the high-income threshold that we must strive for does not stop at 12,696 USD per capita, especially in the next few decades. This is also an issue when calculating and building growth targets that we need to pay attention to when calculating the roadmap to overcome the middle-income trap.

i. According to calculations, assuming the average population growth rate in the period 2021-2045 is 1%/year, our country's population in 2045 will be about 125 million people. With this population size, if the average growth rate in the period 2021-2045 is 6%, the GDP scale in 2045 will be 1,475 billion USD, per capita will reach 11,799 USD; The same figure with the growth rate: 6.5%/year is 1,657 billion USD and 13,256 USD; 7% is 1,862 billion USD and 14,899 USD; 7.5% is 2,092 billion USD and 16,738 USD. Thus, to overcome the middle-income trap by 2045, the average growth rate in the 2021-2045 period must reach at least 7%/year[3],[5]. This is also the goal set by the 13th National Congress for the 2021-2030 period. With this task, in the coming time, it is necessary to effectively implement the following solutions:

First, continue to perfect and effectively implement development institutions, especially the socialist-oriented market economic institution. In particular, pay special attention to the management and development mechanism of science and technology,

innovation, and digital transformation. Continue to reform, and create a favorable, transparent, and equal environment for private enterprises to develop, especially technology enterprises and innovative enterprises. Continue to promote administrative procedure reform to improve the effectiveness of policy and law enforcement by ministries, branches, and authorities at all levels; create an equal environment, following the market mechanism in all sectors of the economy; promote prevention, combat, and handling of corruption and waste, create fairness, transparency and trust for society to arouse the desire for development, the driving force for economic growth.

Second, continue to promote innovation of the growth model in the direction of strong in-depth transformation, associated with economic restructuring. To achieve the goal of rapid growth in the long term, ensuring the health of the economy to overcome external shocks, it is necessary to create breakthroughs in productivity, quality, efficiency, and competitiveness. To do so, it is necessary to continue to promote innovation of the economic growth model in depth, in all four aspects: (1) From the input perspective, it is necessary to promote the development of science and technology, innovation, promote digital transformation to gradually change the structure of factors contributing to growth in the direction of increasing the proportion of TFP, reducing the proportion of capital, simple labor, and natural resources; (2) From the output perspective, improve the level of production technology to improve productivity, quality, efficiency and competitiveness of goods, participate deeply and establish a high position in the global value chain to promote the increase of total supply and total demand of the economy; (3) From a structural perspective, it is necessary to restructure the entire economy, with special attention paid to the efficiency of factors contributing to economic growth; (4) From an institutional perspective, continue to improve the management mechanism of industries and fields, management of types of markets, resource allocation mechanisms... End the long-standing mechanism of asking and giving, the half-hearted market, and establish fairness and transparency so that all types of enterprises and all economic sectors can develop together.

Third, improve the quality of human resources, especially high-quality human resources, to meet the requirements of innovation and digital transformation. Accelerate the implementation of fundamental and comprehensive innovation and improve the quality of education and training, focusing on modernizing and changing the methods of education and training, especially university training. To do this, it is necessary to first innovate the apparatus and improve the quality of state management staff in education and training. In addition, training institutions, especially universities, must proactively innovate content, goals, and output standards to meet the requirements of innovation and digital transformation. Continue to promote the training of human resources in science and technology, rectify the training of masters, and doctors, and confer the titles of professor and associate professor to ensure substance and prestige to society. Pay more attention to vocational training, especially for the informal labor market and rural areas; Restructuring production sectors and fields towards increasing the demand for trained labor and reducing the proportion of unskilled labor.

Fourth, strongly developing science and technology, innovation, and digital transformation to create a breakthrough in productivity, quality, efficiency, and competitiveness of the economy. To carry out this task, it is necessary to strongly innovate state management in the field of science and technology; promote the development of the

science and technology market towards creating a legal environment and motivational mechanisms to encourage enterprises to participate in the science and technology market; thoroughly restructure public-sourced science and technology research institutions towards transforming into science and technology enterprises operating under market mechanisms; ending direct or indirect subsidies in science and technology research activities; creating mechanisms to encourage science and technology staff to take the lead in establishing science and technology enterprises; Promote international cooperation in science and technology to ensure the principles of equality, efficiency and mutual benefit.

Fifth, effectively implement solutions for economic recovery after the pandemic. Vietnam's efforts in the context of the strong outbreak of the COVID-19 pandemic to maintain a positive economic growth rate are noteworthy. However, the economic growth rate in 2020-2021 has seriously declined and is the lowest in the past 30 years. This situation makes it more difficult to achieve the goals of the 13th National Congress, requiring more effort. Therefore, economic recovery after the pandemic becomes urgent, in order to regain growth momentum for the economy in the following years. To carry out this task, it is necessary to urgently review and complete legal documents on economic recovery after the pandemic; improve the investment and business environment; overcome disruptions in production, supply, and consumption chains of goods; accelerate the completion of investment procedures, and disburse public investment capital; support small businesses and cooperatives to restore production and consumption of goods.

Conclusion

Becoming a developed, high-income country is the goal and aspiration of the entire Vietnamese people. In the coming years, the entire Party and people must strive to overcome difficulties, promote the development of science and technology, innovation and digital transformation; perfect the socialist-oriented market economic institution; build a socialist rule-of-law state that creates development, integrity, and action; push back corruption, waste and social evils... to restore rapid and sustainable economic growth, bring the economy out of the middle-income trap, and join the group of high-income countries by 2045.

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DEVELOPING HIGH-QUALITY HUMAN RESOURCES IN INDUSTRIAL ZONES IN THÁI NGUYEN PROVINCE

Dr. Duong Thi Tinh[1]

Abstract: To implement a strategy for rapid and sustainable development in the context of the Fourth Industrial Revolution and deep international integration in Vietnam, focusing on human resource development, particularly high-quality human resources in localities is essential. This is especially critical in industrial zones, where a significant labor force is required to support production and business activities. In recent times, the leadership of Thái Nguyên Province and the Industrial Zone Management Board have paid great attention to managing the supply and demand of high-quality human resources in industrial zones. This has contributed to increasing labor productivity and fostering creativity, which are intrinsic factors in the production process. High-quality human resources serve as the core of internal strength and the key resource determining the development process in industrial zones. However, the development of high-quality human resources still faces many difficulties and limitations, leading to instability in both the quantity and quality of high-quality human resources available to enterprises. This significantly impacts sustainable business operations in industrial zones. This article aims to provide a clear assessment of the current state of high-quality human resources in industrial zones, identifying successes and limitations as a critical basis for proposing solutions to develop a stable and sustainable high-quality workforce in the new context.

Keywords: Industrial Zones, High-Quality Human Resources, Enterprises, Labor Productivity, Sustainable Business.

1. Introduction

Human resources refer to all individuals of working age with the ability to participate in labor activities within a country, encompassing physical, intellectual, and financial capacities. To ensure timeliness and relevance in the context of global and regional economic development, the 13th National Congress of the Communist Party of Vietnam reaffirmed that developing human resources, particularly high-quality human resources, is a strategic breakthrough. It is a decisive factor in accelerating the development and application of science and technology, restructuring the economy, transforming the growth model, and serving as the most critical competitive advantage, ensuring rapid, efficient, and sustainable development.

High-quality human resources refer to workers with good physical and mental health; advanced professional skills, excellent work performance, and strong expertise in their fields; as well as admirable social qualities, such as a humanistic spirit, teamwork, and adaptability to multicultural work environments. High-quality human resources play a crucial role in the current context as the country opens up and integrates deeply into the global economy. This importance is evident in the fact that high-quality human resources

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are a prerequisite for ensuring the success of the accelerated industrialization and modernization process, narrowing the development gap, and maintaining rapid and sustainable growth. They are a decisive factor in promoting research, applying science and technology, restructuring the economy, transforming the growth model, and driving access to and development of the knowledge economy. Moreover, they are a vital condition for the process of international economic integration. Recognizing the vital role of high-quality human resources in the country's development, the Communist Party of Vietnam has long adopted sound policies on developing high-quality human resources, especially since the 11th National Congress.

As of the end of 2023, Thai Nguyen Province has six centralized industrial zones: Song Cong 1, Song Cong 2, Southern Pho Yen, Western Pho Yen, Quyet Thang, and Diem Thuy. The establishment and development of these industrial zones have contributed to economic restructuring, job creation for workers, and the development of the province's supporting industries and services. The industrial zone system is considered the backbone of the economy and a critical factor in driving socio-economic development, playing a decisive role in the success of Thai Nguyen Province.

In recent years, high-quality human resources in Thai Nguyen Province's industrial zones have achieved remarkable progress in both quality and quantity. However, compared to other localities in the region, Thai Nguyen still faces disparities in labor productivity. Therefore, in the new context of international integration and the Fourth Industrial Revolution, appropriate solutions are essential to attract and develop high-quality human resources, meeting the demands of industrialization, modernization, and global integration in Thai Nguyen's industrial zones. With a high density of enterprises and a growing number of industrial zones, Thai Nguyen shows significant development potential soon. It is necessary to implement feasible solutions to further enhance the sustainable quality of human resources, ensuring long-term benefits for the province's economic growth and social welfare.

The article “Developing High-Quality Human Resources in Industrial Zones in Thai Nguyen Province” focuses exclusively on the three largest industrial zones in the province: Song Cong 1, Song Cong 2, and Diem Thuy. The results of the study are highly relevant and aligned with the urgent context of international economic integration.

2. Research methodology

The article employs both secondary and primary data collection methods.

Secondary data collection: The study synthesizes data from annual summary reports on labor union activities published for Diem Thuy Industrial Zone, Song Cong 1 Industrial Zone, and Song Cong 2 Industrial Zone in Thai Nguyen Province, as well as from the Thai Nguyen Provincial Labor Federation.

Primary data collection: The research team conducted interviews with 100 stakeholders, including business owners, managers, and workers employed in companies within these industrial zones. These interviews aim to provide a clearer and more detailed evaluation and analysis of the high-quality workforce in the Diem Thuy Industrial Zone, Song Cong 1 Industrial Zone, and Song Cong 2 industrial zones.

Statistical, analytical, and comparative methods: These methods were applied to analyze the current state of high-quality human resources from 2021 to 2023. The study's findings serve as a crucial basis for identifying strengths to be further developed and weaknesses to be addressed in the future. Based on these insights, practical and

appropriate solutions are proposed to continue the development of high-quality human resources in the new context.

3. Results for Developing High-Quality Human Resources in Industrial Zones in Thái Nguyên Province

3.1. Overview of the Industrial Zones in the Scope of Research

- Song Cong I Industrial Zone was established under Decision No. 181/1999/QĐ-TTg dated September 1, 1999, by the Prime Minister. It has a total area of 196.88 hectares and is invested by Th ai Nguyen Industrial Zone Infrastructure Development Joint Stock Company. The zone is located in Bach Quang Ward, Song Cong City, Thai Nguyen Province.

Industry Characteristics: Areas of investment and development include automobile assembly, mechanics, electronics, food and beverage processing, fast food production, vegetable and root processing, pharmaceuticals, medical equipment, textiles, footwear, ceramics, glass, construction material production, and clean industries with minimal pollution.

- Song Cong II Industrial Zone was approved under Decision No. 1107/QĐ-TTg dated August 21, 2006, by the Prime Minister. The zone covers an area of 250 hectares and is managed by the Thai Nguyen Industrial Zones Management Board. It is in Tan Quang Commune, Song Cong City, Thai Nguyen Province.

Industry Characteristics: Investment is encouraged in industries, sectors, programs, and projects with high added value, utilizing advanced and modern technologies to support infrastructure development, the digital economy, digital transformation, and green growth. These include fields such as mechanical engineering, machinery manufacturing, automobile production and assembly, electronics manufacturing, electrical equipment production, wood panel production, medical equipment manufacturing, and sports equipment manufacturing.

- Diem Thuy Industrial Zone was approved by the Prime Minister under Decision No. 1107/QĐ-TTg dated August 21, 2006. The zone covers an area of 361.1 hectares and is managed by the Thai Nguyen Industrial Zones Management Board.

Industry Characteristics: Priority is given to attracting projects with high-tech content, advanced technologies, modern management, high added value, and a wide-reaching impact, including technology transfer. Focus areas include mechanical assembly, parts manufacturing, electrical and electronic production, consumer goods and household appliance manufacturing, as well as agricultural and forestry product processing.

3.2. High-Quality Human Resources in Industrial Zones

Recognizing the critical role of human resources in determining their survival and development, Diem Thuy Industrial Zone, Song Cong 1 Industrial Zone, and Song Cong 2 Industrial Zone have always prioritized recruitment efforts to build a workforce that meets both quantitative and qualitative requirements. This ensures that labor demands are fulfilled and aligns with their business development strategies to achieve industrial zone objectives.

Focusing on recruiting high-quality human resources creates favorable conditions for enterprises to enhance the intellectual capacity of their workforce. It also motivates employees to strive for self-improvement in their skills and expertise, enabling them to better align with their assigned roles.

Table 1. Human Resources in the Industrial Zones of Thai Nguyen Province

No.	Indicator	Unit	2021	2022	2023
I	Total Workforce	People	**18.355**	**22.463**	**24.015**
1	Diem Thuy Industrial Zone	People	15.861	17.795	19.872
2	Song Cong 1 Industrial Zone	People	2.130	2.842	3.483
3	Song Cong 2 Industrial Zone	People	364	572	660

(Source: Diem Thuy Industrial Zone, Song Cong 1 Industrial Zone, Song Cong 2 Industrial Zone)

Diem Thuy Industrial Zone has the largest workforce among the three zones, with 18,355 workers in 2021, rising to 22,463 in 2022, and peaking at 24,015 in 2023. Meanwhile, Song Cong 2 Industrial Zone has the smallest workforce, starting with only 364 workers in 2021 and increasing to 660 workers in 2023. These industrial zones - Diem Thuy, Song Cong 1 and Song Cong 2 - have consistently developed their annual labor plans based on business production requirements. They ensure that labor growth does not outpace productivity growth while implementing measures to enhance workforce quality. In recent years, most new recruits in these zones have successfully completed their probationary periods and signed formal employment contracts with their respective companies.

However, the industries in the industrial zones primarily focus on sectors such as automobile assembly, mechanics, electronics, food and beverage processing, fast food production, pharmaceuticals, medical equipment, textiles, footwear, ceramics, glass, construction materials, clean industries, wood panel production, equipment manufacturing, household appliances, and agricultural and forestry product processing. These industries require the application of modern production technologies to meet demand and remain competitive in both domestic and international markets. Competitiveness depends on various factors, including capital scale, the level of science and technology application, production and business management efficiency, human resources, and government policies. Among these, human resources, particularly high-quality human resources, play a crucial role, especially in the context of deeper integration into the global economy. FTAs have significantly boosted foreign investment flows into localities, both directly and indirectly. Enterprises in Thai Nguyen Province's industrial zones face challenges in sustaining their operations if they do not innovate their technologies. In this context, the industrial zones have actively worked on developing high-quality human resources, focusing on training and improving workforce quality as a key factor for organizations to remain competitive and succeed in a challenging environment. Specifically, enterprises in Diem Thuy Industrial Zone, Song Cong 1 Industrial Zone, and Song Cong 2 Industrial Zone organize annual training programs to develop skills and enhance the professional qualifications of their workforce. The training programs organized have had a positive impact, improving both intellectual capacity and the overall quality of human resources. Workforce training can take various forms, but it is generally divided into two main types within the companies. The first is on-the-job training, conducted directly within enterprises in Diem Thuy Industrial Zone, Song Cong

1 Industrial Zone, and Song Cong 2 Industrial Zone. The second is external training, where companies send their employees or workers to participate in courses offered by professional training institutions outside the enterprises to improve their expertise in specific fields.

Table 2. Number of People Trained to Improve Qualifications in Industrial Zones

Form of Training	2021		2022		2023	
	Number of People	Structure (%)	Number of People	Structure (%)	Number of People	Structure (%)
1. External Training	769,4	20	1.210,5	25	1.471,9	25,9
2. Internal Training	3.077,6	80	3.631,5	75	4.211,1	74,1
Total	**3.847**	**100**	**4.842**	**100**	**5.683**	**100**

(Source: Diem Thuy Industrial Zone, Song Cong 1 Industrial Zone, Song Cong 2 Industrial Zone)

The table above shows that, during the 2021-2023 period, the number of workers trained was relatively large, with internal training playing a dominant role in training personnel within the industrial zones. This includes on-site training, retraining, and organizing classes adjacent to enterprises. This indicates that businesses primarily focus on internal training and retraining their personnel to adapt to the operational models and new demands of the enterprises. Notably, companies place significant emphasis on improving employees' skills in management and enhancing the overall quality of human resources.

In recent years, the training and development of human resources have always been a priority for the leadership of industrial zones, aiming to gradually standardize the workforce according to technical and professional rank standards as required. The focus has been on training workers in professional and technical skills, improving the proportion of highly skilled workers, and increasing the number of employees with postgraduate, university, and college degrees. Efforts have also been made to rejuvenate the workforce with capable individuals who can meet the development needs of the industrial zones.

In addition to updating and modernizing training curricula at direct training institutions, industrial zones have sent personnel for international training in technical and technological fields. Furthermore, they have invited experts to teach workers new skills and knowledge, creating opportunities for employees to access and apply updated knowledge in practical settings.

Table 3. Human Resources in Industrial Zones by Qualification

Unit: People

Năm / Phân loại	2021	2022	2023	Change 2022/2021		Change 2023/2022	
				±Δ	%	±Δ	%
Total	**18.355**	**22.463**	**24.015**	4.108	22,38	1.552	6,90
1. Postgraduate	1.173	1.653	1.859	480	40,92	206	12,46

2. University Degree	9.541	11.533	13.011	1.992	20,87	1.478	12,81
3. College/Vocational	6.791	8.590	8.537	1.799	26,49	-53	-0,7
4. High School Education	850	687	608	-163	-19,17	-79	-11,49
Percentage: *(%)*							
1. Postgraduate	6,39	7,36	7,74				
2. University Degree	51,98	51,34	54,18				
3. College/Vocational	37,00	38,24	35,55				
4. High School Education	4,63	3,06	2,53				

(Source: Diem Thuy Industrial Zone, Song Cong 1 Industrial Zone, Song Cong 2 Industrial Zone)

Analyzing Table 3, the number of workers with postgraduate qualifications in Điem Thuy, Song Cong 1, and Song Cong 2 industrial zones has seen a significant increase. In 2021, there were 1,173 workers with postgraduate degrees, rising to 1,859 by 2023, with an increase of 480 workers in 2022 compared to 2021, and an additional 206 workers in 2023 compared to 2022. The second-largest group consists of workers with university degrees, which increased from 9,541 in 2021 to 13,011 in 2023. Meanwhile, the number of workers with college or vocational training qualifications has decreased yearly as many have completed long-term training programs to enhance their expertise and meet the demands of modern jobs. However, the proportion of workers with postgraduate qualifications remains relatively small compared to the demand for high-quality human resources in enterprises within the industrial zones.

Table 4. Workforce in Industrial Zones by Qualification Level

Year / Classification	2021	2022	2023	Change 2022/2021		Change 2023/2022	
				±Δ	%	±Δ	%
Total	**18.355**	**22.463**	**24.015**	4.108	22,4	1.552	6,9
1. Male	7.746	9.525	10.302	1.779	22,9	777	8,2
2. Female	10.609	12.938	13.713	2.329	21,9	775	5,9
Percentage: *(%)*							
1. Male	42,2	42,4	42,9				
2. Female	57,8	57,6	57,1				

(Source: Diem Thuy Industrial Zone, Song Cong 1 Industrial Zone, Song Cong 2 Industrial Zone)

The table shows that the number of female workers is higher than male workers, with this ratio remaining consistent across the study years. This is consistent with the reality in Thai Nguyen, where industrial zones are focused on development. In Diem Thuy, Song Cong 1, and Song Cong 2 industrial zones, many enterprises involved in electronic component production employ more female workers than male workers, with female workers accounting for approximately 63%. Additionally, many company activities require female employees, such as union-related tasks, outreach activities, and internal office duties.

Specifically, workers under 30 years old account for 13.3%, those aged 31 to under 40 make up 46.5%, workers aged 41 to under 50 account for 36.7%, and those aged 51 to

under 60 make up 3.5%. Overall, the workforce is relatively young, with most workers falling into the 31-40 age group (46.5%) and the 41-50 age group (36.7%). This is due to the development of enterprises in Diem Thuy, Song Cong 1, and Song Cong 2 industrial zones, which primarily rely on a younger workforce. Consequently, employees in joint-venture companies or those with 100% foreign investment are typically in the 31-40 age range, accounting for a significant proportion.

Table 4. Workforce in Industrial Zones Participating in Training and Workshops

Unit: Person Count

Results Achieved / Count	2021	Percentage vs. Plan	2022	Percentage vs. Plan	2023	Percentage vs. Plan
1. KCN Điềm Thụy	659	659/600 (109%)	758	758/750 (101%)	890	890/850 (105%)
2. KCN Sông Công 2	422	422/400 (105%)	465	465/430 (108%)	487	487/450 (108%)
3. KCN Sông Công 1	218	218/200 (109%)	241	241/220 (109%)	300	300/300 (100%)

(Source: Trade Unions of Diem Thuy, Song Cong 1, and Song Cong 2 Industrial Zones)

Over the past three years, the number of workers receiving training has steadily increased, with a significant rise by 2023 compared to the planned figures. This increase reflects the growing demands of organizations and society, requiring workers in industrial zones to acquire more knowledge and skills to meet the quality standards of high-quality human resources.

In recent years, the industrial zones in Thai Nguyen Province have focused on investing in the development of high-quality human resources to meet the demands of production and business activities. Despite facing many challenges alongside their successes, the leadership of the industrial zones has consistently regarded human resource development, particularly high-quality human resources, as one of the three key breakthroughs in the strategic development of enterprises within these zones.

4. Evaluation of Successes and Limitations in Developing High-Quality Human Resources in Industrial Zones in Thai Nguyen Province

4.1. Successes

The quality of high-quality human resources has always been a priority for the leadership of Thai Nguyen Province and the Industrial Zone Management Board, regarded as a strategic focus for development in industrial zones. Thai Nguyen Province is continuing to review and adjust its planning for industrial and cluster zones to better meet investor demands, while also enhancing administrative reforms to create favorable conditions for business investments.

The Industrial Zone Management Board considers the development of high-quality human resources a key solution to driving industrial production in the province. Supporting the sustainable growth of industrial zones and clusters acts as a catalyst for economic development, creating more jobs, and contributing positively to Thai Nguyen's overall progress. Investments in workforce education and training to improve

professional qualifications, along with synchronized technical infrastructure, ensure that these industrial zones meet the requirements and standards of modern, sustainable industrial zones, giving investors confidence in their choices.

The workforce in Diem Thuy, Song Cong 1, and Song Cong 2 industrial zones has improved in both ethical qualities and professional competencies. Workers strive to overcome challenges, fulfill assigned tasks effectively, and contribute to the business success of enterprises. Their educational and professional skills have also been significantly enhanced, further supporting the sustainable development of the province.

4.2. Limitations and Causes

Although the industrial zones have focused on building a high-quality workforce, there are still limitations and challenges in meeting the demands of production and business activities under the socialist-oriented market economy and international integration. Specifically, the workforce in enterprises faces the following issues:

Workers' ability to quickly adapt to modern machinery and equipment in enterprises remains limited. This is primarily because technology constantly evolves to meet market demands, improve product quality, and enhance business efficiency. However, the quality and quantity of high-quality human resources are still insufficient and lack sustainability.

The proportion of workers with professional qualifications and technical skills remains relatively low within the workforce of industrial zones. This is due to high recruitment demands for specialized knowledge and technical skills, while the supply of high-quality human resources from Thai Nguyen and neighboring provinces remains limited. Additionally, employment service centers have not yet achieved high levels of effectiveness.

The number of workers sent for advanced training to improve their professional skills, as well as the effectiveness of evaluating job performance post-training, has not shown significant improvement. This stems from limited time and funding allocated for training and research, as well as insufficient attention to the evaluation, monitoring, and supervision of job performance after training.

5. Solutions for Developing High-Quality Human Resources in Industrial Zones in Thai Nguyen Province

Firstly, to develop high-quality human resources in industrial zones, it is crucial to focus on integrating three key aspects: training, utilization, and remuneration. Training should be aligned with the trends and developmental needs of Vietnam's economy, tailored to the specific requirements of the job, and incorporate best practices from around the world. Attracting talent must become the top priority for every organization. To address challenges such as workforce fluctuations, capital instability, and knowledge changes, proactive and adaptive measures are essential.

Secondly, to enhance human resource management in industrial zones, appropriate management methods must be implemented. Special attention should be given to two key factors: human resource factors, which include alignment between individuals and the organization, competitive salaries and benefits, training and career development, and opportunities for challenging tasks; and organizational factors, such as leadership behavior, relationships within the organization, organizational culture and policies, and the working environment. Establishing a workplace that prioritizes fairness, discipline, ethics, and adherence to the rule of law should be a standard. Furthermore, fostering a cultural environment that drives and supports human resource development is crucial.

Thirdly, Thai Nguyen Province should continue reviewing and adjusting industrial and cluster zone planning to align with investment needs, enhance administrative reforms, and create favorable conditions for businesses to invest. Policies should be implemented to support the supply and demand of high-quality human resources between enterprises and employment service centers. Industrial zones should also organize discussions with employment service centers to establish a unified approach to recruitment, including professional requirements, quantity, and quality of human resources within Thai Nguyen and from other provinces.

Fourthly, it is essential to innovate training programs, content, and methods for developing workers, beyond traditional education system programs (such as vocational, undergraduate, and postgraduate training). Emphasis should be placed on training and enhancing professional and technical expertise in the key areas relevant to businesses, ensuring practical benefits. In addition to sending workers for professional development, it is important to consider each worker's desire to improve their skills and abilities, aligning these aspirations with the requirements and responsibilities of their specific roles.

Fifthly, managing training costs and rewarding high-performing workers in industrial zones who achieve excellent academic results is essential. Effective workforce management will maximize its impact and contribute to the overall success of training and development programs for human resources.

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THE IMPACT OF CASH HOLDINGS ON FIRM VALUE IN LISTED ELECTRICAL INDUSTRY COMPANIES ON THE VIETNAMESE STOCK MARKET

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Abstract: This study aims to analyze the impact of cash holdings on the financial factors of listed *electrical industry companies in Vietnam, comparing seperate financial statements with consolidated financial statements. Data is collected from 52 listed electrical industry companies on the Vietnamese stock market, based on audited financial statements during the 2018-2023 period. The objective of the study is to clarify the differences in the effects of cash holdings on financial indicators such as profitability, return ratios (ROA, ROE), and firm value when comparing the two types of financial statements. Descriptive statistics and regression methods will be used to analyze the relationship between cash holdings and financial factors. The expected findings suggest that cash holdings may positively impact firm value. The differences between seperate and consolidated financial statements will reflect how enterprises assess and utilize this financial resource in different contexts. This research hopes to provide useful insights for corporate managers, investors, and regulatory bodies in evaluating the financial performance of listed electrical industry companies.*

Keywords: *cash holdings, seperated/standalone financial statements, consolidated financial statements, listed electrical industry companies*

JEL classification: M40, M41, F65

1. Introduction

Cash holdings are a critical component of corporate financial strategy, enabling companies to maintain financial flexibility and cope with unforeseen uncertainties and risks. However, excessive cash holdings may reduce capital efficiency and create opportunity costs, as companies might miss out on investment or profitability opportunities by holding idle funds. Evaluating the impact of cash holdings on a firm's financial performance is a crucial issue in corporate finance research. In Vietnam, electric industry companies listed on the stock market are required to prepare both seperate financial statements and consolidated financial statements. Seperate financial statements reflect the financial position of the parent company, while consolidated financial statements represent the financial position of the entire group, including subsidiaries. Although both types of reports provide valuable insights into a firm's financial health, differences in data recognition and processing can lead to variations in assessing the impact of cash holdings on financial indicators. This study focuses on comparing the

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impact of cash holdings on financial factors such as profitability, return ratios, and firm value between seperate and consolidated financial statements. The research data was collected from 52 listed electrical industry companies on the Vietnamese stock market during the period 2018-2023. The study aims to clarify the differences in how cash holdings influence financial performance under different financial contexts.

2. Literature review

According to Myers (S. C. Myers, 1984) and Fama & French (Fama & French, 1998) corporate financial decisions not only impact firm value but also determine the success or failure of a company. One critical factor in these financial decisions is the amount of cash held by the firm. When transaction costs, issuance costs, and income taxes are high, companies tend to rely on internal funding rather than issuing new shares. However, excessive cash holdings can lead to financial inefficiencies, as firms may lack control over investment decisions. Research by Myers and Majluf (S. Myers, 1984) indicates that when firms face difficulties in raising capital, holding cash can help maintain investment opportunities. However, firms with weak governance mechanisms may overuse cash reserves for non-profitable projects, negatively affecting firm value. Additionally, studies by Harford (Harford, 1999), Faulkender (Faulkender & Petersen, 2006) and Martínez-Sola (Martínez-Sola et al., 2013) have also confirmed that excessive cash accumulation can lead to agency costs and missed investment opportunities, adversely impacting the firm's financial structure and operational performance. This study aims to explore the impact of cash holdings on financial decisions in the context of Vietnam, providing additional evidence for researchers and practitioners to consider appropriate financial policies.

In Vietnam, many studies have focused on exploring the relationship between cash holdings and firm value, reflecting the importance of this financial policy in enhancing business performance. Research by Hoa, Trang, and Vy (Trang et al.) indicates that cash holdings significantly affect firm value, as evidenced by an improvement in the Tobin’s Q ratio when companies maintain optimal cash levels. When cash holdings exceed the optimal threshold, firm value decreases due to increased opportunity costs and poor governance risks.

According to Nguyen et al. (Nguyen & Nguyen, 2020) in the context of Vietnam's highly volatile economy, holding cash helps firms reduce financial risks and ensure liquidity to seize unexpected investment opportunities. However, the study also emphasizes that excessive cash accumulation can lead to agency costs, diminishing firm value, particularly in companies with weak governance structures. Le and Pham (Pham et al., 2018) found that in listed electrical industry companies on the Vietnamese stock market, the relationship between cash holdings and firm value depends on factors such as company size and access to external capital. Larger companies tend to accumulate more cash to minimize financial risks, thereby increasing firm value. In contrast, smaller companies may face challenges in effectively managing cash, leading to negative effects on firm value. These studies highlight that managing the appropriate level of cash not only helps firms enhance their value but also contributes to optimizing financial structure, reducing agency costs, and improving operational efficiency within the context of the Vietnamese economy.

3. Research methodology

3.1. Research sample

The research sample consists of 52 listed electrical industry companies on the Vietnamese stock market, selected randomly from various sectors to ensure representativeness and diversity. These companies vary in size and operate in fields ranging from manufacturing to services, which helps clarify the relationship between cash holdings and financial factors in the context of the Vietnamese market.

Financial data was collected from the audited financial statements of these companies for the period from 2018 to 2023. The use of audited financial statements ensures the accuracy and reliability of the data while minimizing any discrepancies that may arise from unverified financial information.

3.2. Research variables

The study focuses on the following key variables to analyze the impact of cash holdings on firm value:

- Cash holdings: cash holdings are measured in two ways: the ratio of cash to total assets represents the liquidity position of the company and its ability to manage cash assets efficiently. Free cash flow is used as an alternative measure, reflecting the amount of cash available after the company has invested in capital expenditures. This method helps assess the flexibility of the firm in utilizing cash for potential growth opportunities.

- These factors are used to measure the company's financial performance and provide insight into how cash holdings influence firm value, including 3 factors:

+ Net profit is used to measure the company's profitability and its ability to generate earnings from its operations after all expenses have been deducted.

+ ROA is used to evaluate how effectively the company utilizes its assets to generate profit. It is calculated by dividing net profit by total assets/ ROE measures the profitability relative to the company's equity. It reflects how efficiently a company uses its shareholders' equity to generate profit.

+ Firm value is measured by the Tobin's Q ratio, which compares the market value of the firm to the replacement cost of its assets. Tobin's Q is an indicator of how the market perceives the firm's growth prospects relative to the costs of replacing its assets.

3.3. Analysis method

- Regression analysis method

To assess the impact of cash holdings on firm value, this study uses linear regression methods to identify the relationship between cash holdings and important financial factors. Specifically, the study will apply a multiple regression model to evaluate the effect of factors such as return on assets (ROA), return on equity (ROE), net profit, and firm value (typically measured by Tobin's Q) on the level of cash that firms retain.

Multiple regression model:

$$Cashi=\alpha+\beta 1ROAi+\beta 2ROEi+\beta 3Profiti+\beta 4Tobin's\ Qi+\epsilon i$$

Whereas:

- Cashi: is the ratio of cash to total assets of the company i,
- ROAi: is the return on assets and equity of the company i,
- Profiti: is the net profit of company i,
- Tobin's Qi: is the Tobin's Q ratio of company i,
- ϵi is the random error term.

Through this model, the study will examine the impact of financial factors on a company's decision to hold cash, thereby clarifying the relationship between cash holdings and firm value in the context of the Vietnamese stock market. The paper will

conduct this analysis for both seperate and consolidated financial statements to check whether the relationship between cash holdings and financial factors changes when considering different aspects of the company.

3.4. Checking the validity of the model

After the regression analysis, the study will assess the model's validity through statistical tests, including the goodness-of-fit test (to evaluate the significance of the regression coefficients) and the multicollinearity test (to avoid excessively high correlations among independent variables). Additionally, a homoscedasticity test will be conducted to ensure there is no variance inconsistency in the predicted values.

3.5. Expected results

The expected results of the study are anticipated to reveal the relationship between cash holdings and financial factors in the context of listed electrical industry companies in Vietnam. These findings aim to provide financial policy recommendations for companies to optimize cash management, thereby enhancing firm value.

4. Results analysis

4.1. Descriptive statistics

The dataset was collected from 52 listed electrical industry enterprises on the Vietnamese stock market. The data were obtained from the audited financial statements of these enterprises over six years, from 2018 to 2023, resulting in 312 observations with the following characteristics:

Table 1: Description of variables in the research sample

Indicators	ROA	ROE	DER	CL
	The companies use separate financial statements(n=155)			
Min	-0.344	-0.777	0.032	0.001
Mean	0.471	0.644	14.947	0.394
Sd	0.040	0.080	2.389	0.077
Max	0.078	0.137	2.429	0.086
	The companies use consolidated financial statements(n=157)			
Min	-0.315	-1.097	0.056	0.001
Mean	0.211	0.484	8.577	0.468
Sd	0.036	0.074	1.846	0.068
Max	0.056	0.145	1.696	0.063
	Related companies (N=312)			
Min	-0.344	-1.097	0.032	0.001
Mean	0.471	0.644	14.947	0.468
Sd	0.038	0.076	2.055	0.071
Max	0.065	0.142	2.025	0.073

Source: Authors compiled from STATA 14

Comments:

- The ROA ratio has a high average value (0.471 for companies using individual reports and 0.211 for companies using consolidated reports). This indicates that companies are relatively efficient at generating profits from their assets. However, the variation in ROA is quite large, with a standard deviation of 0.040 (for individual reports) and 0.036 (for consolidated reports), showing significant volatility in the profitability of companies, particularly in the group using individual reports (Huang et al., 2013;

Kaufmann et al., 2014).

- The ROE ratio has a high average value (0.644 for individual reports and 0.484 for consolidated reports), indicating that these companies are relatively efficient in using shareholders' equity to generate profits. The standard deviation of ROE is fairly consistent between the two groups (0.080 for individual reports and 0.074 for consolidated reports), indicating stability in profitability on equity across the companies. This may reflect the stability in their financial strategies and the ability to manage capital (Fama & French, 1998) (S. Myers, 1984)

- DER shows the level of debt usage in the companies. This ratio has a relatively high average value (14.947 for individual reports and 8.577 for consolidated reports), indicating that companies in the sample tend to use significant amounts of debt in their financial structure. The variability of DER is quite large, especially for companies using individual reports, highlighting a clear difference in financial strategies among companies. This could also reflect the diversity in how companies raise capital and manage debt within the context of Vietnam (Hoang et al., 2022); (Meckling & Jensen, 1976).

- CL indicates the level of cash retention by companies. The average cash ratio for seperated and consolidated reports is relatively high (0.394 and 0.468, respectively), showing that companies tend to maintain a significant amount of cash. The standard deviation of the cash ratio is 0.077 for standalone reports and 0.068 for consolidated reports, indicating a relatively high level of stability in cash retention by the companies. This may reflect the companies' cautious financial strategy, aimed at maintaining financial flexibility and coping with market risks (Harford, 1999); (Faulkender & Petersen, 2006).

4.2. Correlation analysis

The correlation matrix reflects the relationship between independent variables and the dependent variable, as well as between independent variables themselves. In this study, we use covariance to measure the relationship between the independent variable CL, the control variable DER, and ROA and ROE. The analysis results (Table 2) show that CL has a statistically significant positive correlation (P.value < 0.05) with both ROA and ROE. The control variable DER has a statistically significant negative correlation (P.value < 0.05) with ROA but does not have a statistically significant correlation (P.value > 0.05) with ROE (S. Myers, 1984); (Faulkender & Petersen, 2006). Additionally, the results in the table show that the correlation coefficient between CL and DER is 0.163 (a small correlation), suggesting that these variables are unlikely to exhibit multicollinearity. However, to confirm whether multicollinearity occurs, the study will use the VIF to measure it during regression analysis (Gujarati, 2009).

Table 2: Correlation analysis results

	ROA	ROE	DER	CL
ROA	1			
ROE	0.801***	1		
DER	-0.294***	-0.094	1	
CL	0.266***	0.208***	-0.163***	1

Source: Authors compiled from STATA 14

Note:

** significance at the level <0.05;*

*** significance at the level<0.01;*

**** significance at the level <0.001.*

4.3. Measuring the impact of cash holdings on firm value

To measure the impact of cash holdings on firm value, the study employs three regression methods: Ordinary Least Squares (OLS) regression and two panel data analysis models - Fixed Effects Model (FEM) and Random Effects Model (REM). Additionally, diagnostic tests for model imperfections, such as autocorrelation tests and tests for heteroscedasticity, are also applied to assess the robustness of the model. In case the aforementioned models exhibit any deficiencies, the study uses the Generalized Least Squares (GLS) regression model to estimate and address these imperfections.

- Regression analysis results using OLS model

The results of measuring the impact of cash holdings on firm value using the OLS method (Table 4) show that the P-value (F) for both models is less than 0.001, indicating that the models are valid (Wooldridge, 2016). The multicollinearity test using the VIF shows that VIF ≤ 2, which indicates that the independent and control variables in both models do not suffer from multicollinearity (Gujarati, 2009). The heteroscedasticity test shows that the P-value (chi2) for both models is less than 0.05 (5% significance level), indicating the presence of heteroscedasticity (Breusch & Pagan, 1979; White, 1980). Therefore, the estimation results using this model are no longer reliable and will not be used for further estimation.

Table 3: Summary of regression results using the OLS model

Independent variables	ROA		ROE	
	Coefficient	**P.value**	**Coefficient**	**P.value**
DER	-0.0083	<0.001	-0.0043	0.215
CL	0.2004	<0.001	0.3864	<0.001
Cons	0.0403	<0.001	0.0573	<0.001
N	403		403	
R2	0.135		0.047	
Adj R2	0.131		0.042	
F (p)	31.19	<0.001	9.88	<0.001
Multicollinearity (VIF)	1.03		1.03	
Heteroscedasticity *Breusch-Pagan: Chi2/P*	67.19	<0.001	25.50	<0.001

Source: Authors compiled from STATA 14

- Results of estimating the impact of cash holdings (CL) on ROA and ROE

To measure the impact of cash holdings on ROA and ROE, the study used the GLS method to address the issue of heteroscedasticity encountered in the REM model. In addition, to compare the impact of the financial reporting type on the effect of variables in the model, the study also performed estimations on two samples: one sample consisting of companies using standalone financial statements (sample a) and another sample of companies using consolidated financial statements (sample b).

+ Impact of CL on ROA

In model (1), which measures the effect of CL on ROA (Table 4), all variables included in the model have a statistically significant impact (P.value < 0.05) on ROA. Specifically: CL has a positive impact with a coefficient of 0.166, meaning that for every 1-unit increase in CL, ROA increases by 0.166 units. DER has a negative impact with a

coefficient of -0.006, meaning that for every 1-unit increase in DER, ROA decreases by 0.006 units.

Additionally, the estimation results for groups of companies using standalone financial statements (1a) and those using consolidated financial statements (1b) show that the impact of CL on ROA in both samples is positive and statistically significant. However, the magnitude of the impact of CL on ROA in model (1b) is 0.194, which is larger than the impact in model (1a) at 0.130. This suggests that the type of financial reporting (consolidated vs. standalone) may not significantly affect the magnitude of the impact of CL on ROA.

Table 4: Estimated results using the GLS model with ROA

Independent variables	ROA (1)		ROA(1a)		ROA(1b)	
	Coefficient β	P.value	Coefficient β	P.value	Coefficient β	P.value
DER	-0.006	<0.001	-0.007	<0.001	-0.006	<0.001
CL	0.166	<0.001	0.130	<0.001	0.194	<0.001
cons	0.036	<0.001	0.043	<0.001	0.033	<0.001
N	402		155		247	
Wald test (chi2/p)	248.09	<0.001	129.87	<0.001	163.36	<0.001

Source: Authors compiled from STATA 14

Note: *a represents the sample of companies using standalone financial statements; b represents the sample of companies using consolidated financial statements.*

- Impact of CL on ROE

In model (2), which measures the impact of cash holdings (CL) on ROE (Table 5), all independent variables included in the model are statistically significant at the 5% level (P.value < 0.05), except for the DER variable in model 2a (P.value = 0.849). CL positively affects ROE with a coefficient of 0.307 in the combined model (2). This means that when CL increases by one unit, ROE increases by 0.307 units. This result aligns with the study by Kim et al. (2018), which demonstrated the positive impact of cash holdings on a firm's profitability. DER negatively affects ROE with a coefficient of -0.003 in the combined model (2), indicating that a one-unit increase in DER reduces ROE by 0.003 units. Estimates for the groups of enterprises using standalone financial statements (2a) and consolidated financial statements (2b) also show a statistically significant positive effect of CL on ROE. However, the magnitude of the impact differs:

- In the group of companies using seperated financial statements (2a), the coefficient for CL is 0.269.

- In the group of companies using consolidated financial statements (2b), the coefficient for CL is 0.407, which is higher than in the standalone group.

This indicates that the type of financial statement (consolidated or seperated) may influence the magnitude of the impact between CL and ROE. The results from the GLS model for both sample groups reinforce the positive role of CL in increasing ROE. The Wald test (chi2/p) across all models shows P.value < 0.001, indicating high statistical significance and suitability of the models in explaining the relationships between variables (White, 1980).

Table 5: Estimation results using the GLS model with ROE

Independent variables	ROE(2)		ROE(2a)		ROE(2b)	
	Coefficient β	**P.value**	**Coefficient β**	**P.value**	**Coefficient β**	**P.value**
DER	-0.003	0.01	0.0003	0.849	-0.005	0.002
CL	0.307	<0.001	0.2689	<0.001	0.407	<0.001
cons	0.057	<0.001	0.0472	<0.001	0.056	<0.001
N	402		155		247	
Wald test (chi2/p)	72.37	<0.001	23.58	<0.001	62.47	<0.001

Source: Authors compiled from STATA 14

Note: *a represents the sample of companies using standalone financial statements; b represents the sample of companies using consolidated financial statements.*

5. Conclusion

The study analyzed the relationship between cash holdings and firm value through financial performance indicators such as ROA and ROE. The results from the regression models indicate that cash holdings have a positive and statistically significant impact on firm value in both cases of standalone and consolidated financial statements. Specifically, the results from the GLS model show that CL positively affects both ROA and ROE with coefficients of 0.166 and 0.307, respectively, in the combined model. This suggests that as firms increase their cash holdings, their financial performance and firm value also increase. Similarly, the results for the group of companies using consolidated financial statements show a stronger impact of CL compared to the group using standalone reports. This may be because consolidated financial statements better reflect the actual financial situation, including subsidiaries and associates, thereby enhancing firm value. Additionally, the results also show that the DER negatively impacts financial performance. The negative coefficients of DER with ROA and ROE in the models suggest that increasing debt ratios reduces financial performance and firm value. This aligns with capital structure theory, where excessive debt can increase financial risk and cost of capital. The findings of this study contribute to corporate finance theory by affirming the important role of cash holdings in enhancing firm value. From a practical perspective, managers need to consider maintaining an appropriate level of cash to ensure liquidity while also leveraging potential investment opportunities. At the same time, excessive use of debt should be avoided to minimize financial risk.

Although the study provides empirical evidence on the impact of cash holdings on firm value, there are some limitations. First, the study focuses only on data from listed electrical industrial companies in Vietnam, so the results may not fully reflect the situation of private companies or small and medium-sized enterprises. Second, the study period from 2018 to 2023 may have been influenced by macroeconomic factors, such as the COVID-19 pandemic, which altered the financial behavior of firms. Future studies could expand the sample to include companies from various industries and sectors to increase generalizability. Additionally, incorporating corporate governance factors such as management quality and board structure may help provide a deeper understanding of the relationship between cash holdings and firm value. The study emphasizes that effective cash management not only helps firms enhance their value but also minimizes financial risks, contributing to sustainable development.

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DOES ENTREPRENEURSHIP EDUCATION PROMOTE STUDENTS' ENTREPRENEURIAL INTENTIONS? AN EXPLORATORY STUDY IN VIETNAMESE AND INTERNATIONAL CONTEXTS.

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Abstract: Entrepreneurship education (EE) plays a crucial role in equipping individuals with the necessary knowledge, skills, and competencies for successful business initiation and management. This study delves into the impact of entrepreneurship education on students' entrepreneurial intentions through studies in the context of Vietnam and other countries, aiming to understand how educational interventions can foster entrepreneurial thinking and behavior essential for economic growth and innovation. The study has shown similarities in the impact of entrepreneurship education on the entrepreneurial intentions of Vietnamese students and students in some other countries while also pointing out differences. By examining the influence of entrepreneurship education on students' entrepreneurial intentions, this study seeks to shed light on the global significance of fostering entrepreneurial aspirations through tailored educational programs.

INTRODUCTION

The curriculum of entrepreneurship education equips participants with the essential knowledge, skills, and competences required for the successful initiation and management of a business [1]. EE denotes the many courses and curricula that training providers, including universities, must offer to equip participants with pertinent information, skills, and competencies in entrepreneurship. These competencies may encompass opportunity identification, resource integration, and venture development [2]. The writers stress how important EE is for developing self-esteem and critical thinking [3]. They also say that it helps develop entrepreneurial thinking and skills that can be used in many areas ([2], [3]. The primary objective of EE is to ascertain an enhancement in participants' propensity to partake in entrepreneurial activities [4].

Research on the impact of entrepreneurship education on students' entrepreneurial intentions is important because it provides insights into how educational interventions can promote entrepreneurial thinking and behavior, which are critical for economic growth and innovation [5]. Understanding how this education can translate into entrepreneurial intentions or enhance the conversion from intentions to entrepreneurial behavior is the focus of research on entrepreneurship education [5], [6].

Firstly, studies have shown that entrepreneurship education significantly influences students' entrepreneurial intentions by equipping them with essential knowledge and skills necessary for starting and managing a busines [7], [8]. This suggests that entrepreneurship education plays a foundational role in fostering an entrepreneurial mindset among students. Furthermore, effective entrepreneurship education cultivates

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essential competencies that enable students to manage the intricacies of initiating a business [9]. Consequently, the development of entrepreneurial abilities via education equips students to confront the challenges of business while enhancing their confidence in their potential for success. Additionally, the significance of personality traits and external influences, including familial economic position, must not be disregarded [10]. This underscores the necessity for customized entrepreneurship education programs that account for the varied backgrounds of students to enhance their efficacy. Finally, the extensive economic ramifications of cultivating entrepreneurial impulses via schooling are substantial. Entrepreneurship serves as a fundamental catalyst for economic expansion and innovation; by fostering entrepreneurial aspirations in students, educational institutions can facilitate the establishment of new enterprises and employment prospects [11], [12].

Examining the influence of entrepreneurship education on students' entrepreneurial intentions is essential for comprehending how educational interventions might successfully foster the forthcoming generation of entrepreneurs. Entrepreneurship education is essential for equipping students with entrepreneurial competencies, cultivating positive attitudes, and boosting self-efficacy, so facilitating successful business careers and contributing to overall economic development.

The objectives of this study are to answer the following questions:

RQ1: How does entrepreneurship education impact students' entrepreneurial intentions?

RQ2: Does Vietnam's entrepreneurship education have a positive impact on Vietnamese students' entrepreneurial intentions?

RQ3: Does research on the impact of entrepreneurship education on students' entrepreneurial intentions in Vietnam reflect the global context?

RESEARCH METHOD

The documentary research method is a qualitative research approach that involves the systematic analysis of documents to understand and explain social phenomena [13]-[15]. It is an important tool in collecting and analyzing information from documents to support research and draw conclusions [15], [16]. This study will apply the document research method to investigate the influence of entrepreneurship education on students' entrepreneurial intentions in Vietnam. Below are the specific steps of the document research method used in this study:

[17] established standards for quality control in the management of documentary materials. These encompass authenticity, credibility, representativeness, and meaning. Authenticity pertains to the genuineness of evidence and its origin from an unimpeachable source; credibility concerns the typicality of the evidence within its category; representativeness addresses whether the consulted documents reflect the entirety of pertinent documents, and meaning relates to the clarity and comprehensibility of the evidence.

RESULT AND DISCCUSSION

The influence of entrepreneurship education on students' desire to start their own business is significant.

Researchers have extensively studied the potential of entrepreneurship education to influence students' entrepreneurial intentions. Research indicates that EE can significantly impact students’ intentions to pursue entrepreneurial activities, although the

mechanisms and effects may vary based on a number of factors.

Entrepreneurship education primarily influences students' entrepreneurial goals by augmenting their entrepreneurial skills and orientation. Participation in entrepreneurship education programs markedly enhances students' entrepreneurial skills, subsequently fostering their entrepreneurial intentions [18]-[20]. Students participating in practical activities like business idea competitions or workshops are more inclined to cultivate a proactive disposition toward entrepreneurship. This practical experience enables individuals to implement theoretical information in real-world situations, enhancing their confidence and motivation to engage in business.

Furthermore, Putri underscores the vital importance of entrepreneurship education in influencing students' perspectives on entrepreneurship. Education can cultivate an entrepreneurial attitude and impart pertinent knowledge, hence guiding students to adopt entrepreneurial behaviors and enhancing their desire to participate in entrepreneurial activities [20]. A university that incorporates entrepreneurship education into its curriculum may observe a rise in students demonstrating interest in establishing their own firms post-graduation. An increased propensity to embrace risks and pursue creative concepts frequently accompanies this change in attitude.

Entrepreneurship education not only enhances skills and attitudes but also fosters self-efficacy in students, a crucial factor influencing entrepreneurial intention. Supardi et al. emphasize that successful entrepreneurship education can substantially impact students' self-efficacy, thereby augmenting their entrepreneurial goals [9], [21]. Students who obtain mentorship and assistance from seasoned entrepreneurs during their studies are more likely to feel equipped to initiate their companies. Enhanced self-efficacy may result in a greater propensity for students to consider entrepreneurship as a feasible career path.

Moreover, Wei et al. emphasize the significance of innovation in entrepreneurship education, asserting that it acts as a catalyst for entrepreneurial initiatives [22]. Emphasizing action-oriented learning through collaborative projects and innovation challenges fosters students' creative thinking and problem-solving abilities for real-world issues. This experiential learning not only augments their entrepreneurial talents but also fortifies their purpose to create and establish new enterprises. Students engaged in innovation laboratories or incubators may be more predisposed to transform their entrepreneurial concepts into tangible company enterprises.

The impact of familial background and previous exposure to business significantly shapes students' entrepreneurial inclinations. Sahputri et al. discovered that students from entrepreneurial households are more inclined to get advantages from entrepreneurship education since their familial experiences bolster the lessons acquired in academic environments [23]. This suggests that the integration of entrepreneurial education with nurturing home contexts can augment its efficacy. A student with entrepreneurial parents may be more inspired to pursue their own entrepreneurial aspirations following formal education in the discipline.

However, empirical evidence suggests that the impact of entrepreneurship education on entrepreneurial intention is not unidirectional. Although numerous research studies support the advantages of entrepreneurship education, there are significant instances where the results do not correspond with the anticipated positive impact. Hou et al. demonstrate that certain empirical studies show notable disparities in entrepreneurial

intents between students who receive entrepreneurship education and those who do not, implying that the effect may not be consistently beneficial [24]. This suggests that in specific situations, entrepreneurship education may not improve or may even reduce students' entrepreneurial inclinations. Voléry et al. similarly discovered no significant impact of entrepreneurship education on the entrepreneurial personality traits and objectives of upper-secondary students [25]. Their findings contradict previous research that suggested a positive impact, implying that the effectiveness of entrepreneurship education may vary significantly based on the educational setting and demographic factors. This prompts inquiries about the generalizability of the favorable effects sometimes linked to entrepreneurial education.

Furthermore, Hidayatulloh and Ashoumi emphasize that the efficacy of entrepreneurship education programs may be contingent upon students' past business experience or the elective nature of the program as opposed to it being mandatory. This indicates that the delivery setting of entrepreneurship education substantially affects students' intentions [26]. Education may fail to enhance entrepreneurial goals if pupils lack sufficient preparation or drive. Sánchez notes that whereas numerous studies indicate a positive correlation between entrepreneurship education and entrepreneurial inclinations, there are also substantial studies that have demonstrated negative outcomes. The variability in the results indicates that other mediating factors, including the caliber of the educational program, the students' backgrounds, and their prior experiences with entrepreneurship, may affect the intricate relationship [27].

In conclusion, entrepreneurship education profoundly influences students' entrepreneurial intents through multiple processes, including skill development, attitude cultivation, self-efficacy increase, and the encouragement of inventive thinking. By equipping students with essential resources and assistance, educational institutions can foster a new generation of entrepreneurs ready to confront the difficulties of the business landscape. However, despite the general view of entrepreneurship education as a positive influence on students' entrepreneurial intentions, evidence suggests that it can also have neutral or negative effects in certain contexts. Therefore, more research is necessary to comprehend the circumstances in which entrepreneurship education effectively fosters entrepreneurial intentions.

The current state of entrepreneurship education in Vietnam

The present condition of entrepreneurship education in Vietnam illustrates a burgeoning landscape that has accelerated since the early 2010s. The educational sector increasingly acknowledges the need to cultivate entrepreneurship skills in students; however, it continues to encounter obstacles in execution and efficacy. In contrast to Western nations that have implemented such programs for decades, Vietnam's entrepreneurship education is rather rudimentary. Nguyen and Diep assert that the educational landscape in Vietnam is deficient in predominant student-centered learning and experiential teaching methodologies, which are essential for effective entrepreneurial education [28]. This disparity indicates that conventional teaching approaches remain dominant, thereby constraining student involvement and the practical application of entrepreneurial concepts. Hoang et al. demonstrate that entrepreneurship education positively affects students' entrepreneurial inclinations, mediated by self-efficacy and learning orientation characteristics [21]. This discovery highlights the capacity of entrepreneurship education to foster a more entrepreneurial mindset among university

students. Moreover, research indicates that extracurricular activities associated with entrepreneurship markedly improve students' ambitions to establish their own enterprises, underscoring the significance of practical involvement in education [29]. Nonetheless, obstacles persist. The efficacy of entrepreneurship education may differ depending on the academic discipline and the particular curriculum employed. Duong's research underscores the necessity for customized strategies that take into account the varied backgrounds and ambitions of students [8]. The incorporation of contemporary pedagogical techniques and the encouragement of entrepreneurial innovation are vital for enhancing the overall effectiveness of entrepreneurship education in Vietnam [30]. In conclusion, although entrepreneurship education in Vietnam is progressing and demonstrates potential in augmenting students' entrepreneurial ambitions, it necessitates additional advancement in pedagogical methodologies and curriculum design to fully actualize its potential. The focus on experiential learning, innovative pedagogical approaches, and nurturing educational settings will be essential for cultivating a strong entrepreneurial culture among Vietnamese students.

Evidence indicates that entrepreneurship education in Vietnam positively influences students' entrepreneurial intentions. Multiple studies have emphasized the crucial impact of entrepreneurship education on influencing students' attitudes and intentions about entrepreneurship. Hoang et al. conducted a study with 1,021 university students in Vietnam, revealing that entrepreneurship education favorably influences students' entrepreneurial inclinations. Self-efficacy and learning orientation serve as mediating factors in this association, indicating that students who perceive themselves as more capable and actively involved in their learning are more inclined to indicate aspirations to initiate their own enterprises [21]. This discovery highlights the significance of proficient entrepreneurship education in cultivating a conducive atmosphere for prospective entrepreneurs. Nguyễn et al. investigated the influence of entrepreneurship-related extracurricular activities and determined that these activities markedly improve students' entrepreneurial inclinations. Their study encompassed 640 students across 11 colleges and revealed that both entrepreneurship-related extracurricular activities and inspiration are positively correlated with students' entrepreneurial goals, with self-efficacy acting as a partial mediator in this association [29]. This indicates that active participation in entrepreneurial endeavors is essential for strengthening students' intentions to engage in entrepreneurship. Furthermore, Tran's research emphasizes the direct and moderating functions of entrepreneurship education in connecting entrepreneurial attitudes with intentions. The research reinforces the idea that education can significantly impact students' entrepreneurial ambitions by revealing a robust link between perceived behavioral control and entrepreneurial inclinations [31]. A study by Dieu et al. highlights the influence of familial background and entrepreneurship education on students' entrepreneurial inclinations. The findings indicate that these factors substantially influence the formation of entrepreneurial inclinations among Vietnamese students, underscoring the necessity of a supportive educational and family environment for promoting entrepreneurship [32].

The current evidence regarding the impact of entrepreneurship education on Vietnamese students' entrepreneurial intentions suggests that while the overall trend is positive, there are instances where the effects may not be as beneficial or could even be negative. For example, Duong discusses the potential "dark side" of entrepreneurship

education, indicating that while it is generally aimed at fostering entrepreneurial intentions, there are biases and methodological issues that can obscure its true effectiveness. This suggests that in some cases, entrepreneurship education may not lead to the expected increase in entrepreneurial intentions, particularly if the educational approach is not well-designed or tailored to the students' needs [44]. Moreover, Hoang et al. highlight that the effectiveness of entrepreneurship education can be inconsistent. They note that while many studies report positive outcomes, there are also significant studies that have shown negative or negligible impacts on students' entrepreneurial intentions. This inconsistency raises questions about the quality and delivery of entrepreneurship education in Vietnam, suggesting that not all programs are equally effective in fostering entrepreneurial aspirations [45]. Additionally, Tran's research indicates that while entrepreneurship education can enhance entrepreneurial attitudes and intentions, it may also inadvertently create pressure or unrealistic expectations among students, leading to anxiety or discouragement if they feel unprepared to meet those expectations. This psychological impact could potentially diminish students' entrepreneurial intentions rather than enhance them [44]. In conclusion, while there is substantial evidence supporting the positive impact of entrepreneurship education on students' entrepreneurial intentions in Vietnam, there are also indications that it can have negative effects under certain conditions. Factors such as the quality of the educational program, the teaching methods employed, and the psychological impact on students all play critical roles in determining the overall effectiveness of entrepreneurship education.

The current evidence reveals that while the overall trend is good, entrepreneurship education may have some detrimental consequences on Vietnamese students' entrepreneurial inclinations. Duong discusses the "evil side" of entrepreneurship education, arguing that biases and methodological difficulties can obscure its genuine value. If the educational approach is not well-designed or matched to students' requirements, entrepreneurship education may not enhance entrepreneurial ambitions [31]. Hoang et al. note that entrepreneurship education's efficacy varies. Many research show good results, but others reveal negative or negligible effects on students' entrepreneurial inclinations. This mismatch raises questions regarding the quality and implementation of entrepreneurship education in Vietnam, suggesting that not all programs inspire entrepreneurial aspirations [21]. Tran's research also suggests that while entrepreneurship education may improve entrepreneurial attitudes and intentions, it may also set unrealistic expectations or pressure students, causing anxiety or discouragement if they feel unprepared. This psychological effect may reduce students' entrepreneurial intentions [31]. Entrepreneurship education has a favorable influence on Vietnamese students' entrepreneurial inclinations, but it can also have detrimental impacts under specific settings. Entrepreneurship education's effectiveness depends on program quality, instructional methods, and student psychology.

Research has been conducted on the impact of entrepreneurship education on students' entrepreneurial intention in Vietnam and internationally, highlighting similarities and contrasts.

Numerous research studies, conducted in Vietnam and internationally, have examined the correlation between entrepreneurship education and students' entrepreneurial inclinations. Although the findings exhibit similarities, they also reveal significant differences that underscore the distinct educational and cultural backgrounds

of each environment. The following examples illustrate both similarities and differences derived from the relevant references.

Positive Impact of Entrepreneurship Education: Vietnamese studies and international research regularly indicate that entrepreneurship education positively affects students' entrepreneurial inclinations. For instance, Hoang et al. discovered that entrepreneurship education substantially influences the entrepreneurial ambitions of Vietnamese university students, with self-efficacy and learning orientation serving as mediators [21]. Tran's study similarly demonstrates that structured entrepreneurship programs augment students' intentions to establish their own enterprises, underscoring the pivotal importance of education in cultivating entrepreneurial aspirations [31]. Amuda et al. similarly observed that entrepreneurship education positively influences the entrepreneurial inclinations of Nigerian students, consistent with other previous studies [33]. This indicates a widespread acknowledgment of the significance of entrepreneurship education in cultivating entrepreneurial ambitions.

Role of Self-Efficacy: Both Vietnamese and international studies have identified self-efficacy as a common mediating factor. In Vietnam, Nguyễn et al. highlighted that self-efficacy mediates the relationship between extracurricular entrepreneurial activities and entrepreneurial intentions [29]. Findings in Western contexts frequently cite self-efficacy as a critical determinant of entrepreneurial intentions, indicating the universal importance of confidence in one's abilities in entrepreneurial education [31]. Similarly, Wu et al. found that self-efficacy significantly influences entrepreneurial intentions, particularly when moderated by entrepreneurial competition experience [34]. This indicates that confidence in one's abilities is a critical determinant of entrepreneurial intentions across different cultural contexts.

Cultural Context and Gender Differences: A significant disparity emerges in the analysis of gender variations in entrepreneurial inclinations. Le's research on green entrepreneurial aspirations in Vietnam revealed that female students exhibited a greater propensity to participate in entrepreneurial endeavors owing to their empathic disposition toward environmental concerns [35]. Conversely, numerous studies in Western nations often minimize gender distinctions, focusing instead on the general effects of education rather than its gender-specific disparities. Research by Salam et al. demonstrates that female students frequently exhibit diminished entrepreneurial ambitions relative to male peers, implying that cultural influences may variably affect these results across different contexts [36].

Teaching Methods and Educational Environment: Vietnamese studies frequently emphasize the prevalence of conventional teaching methods, such as lecturing, which contrasts with the more varied and experiential learning strategies typically observed in Western entrepreneurship education [37]. Nguyen and Diep found that active learning and work-integrated learning are not commonly used in Vietnam's higher education institutions. This could make entrepreneurship education less effective compared to countries where these methods are common [37]. The disparity in educational methods can result in differing outcomes regarding students' entrepreneurial inclinations.

In conclusion, although there are considerable similarities in the beneficial effects of entrepreneurship education on students' entrepreneurial intentions across various contexts, significant differences are evident in cultural influences, pedagogical approaches, and the focus on particular factors, such as gender and extracurricular

activities. These disparities underscore the necessity of contextualizing entrepreneurship education to properly cultivate entrepreneurial intentions in pupils.

CONCLUSION

In summary, entrepreneurship education significantly influences students' entrepreneurial ambitions through processes such as skill acquisition, attitude formation, self-efficacy improvement, and the encouragement of inventive thought. By providing students with vital tools and support, educational institutions can cultivate a new generation of entrepreneurs ready to confront the difficulties of the business environment. Entrepreneurship education acts as a catalyst for fostering entrepreneurial ambitions in students; yet, its efficacy depends on customized strategies, creative pedagogical techniques, and a conducive educational atmosphere. Comprehending the intricate aspects of entrepreneurship education is crucial for cultivating an entrepreneurial culture and enabling students to initiate successful companies. However, despite the widespread belief that entrepreneurship education shapes students' entrepreneurial inclinations, evidence suggests that it can also have neutral or adverse effects in specific contexts. Consequently, additional research is essential to understand the conditions under which entrepreneurship education successfully cultivates entrepreneurial intentions.

For the first research question, entrepreneurship education profoundly impacts students' entrepreneurial aspirations by augmenting their abilities, attitudes, and self-efficacy. Experiential opportunities such as company idea competitions and workshops cultivate a proactive entrepreneurial mindset, allowing students to implement academic knowledge in practical contexts. The development of an entrepreneurial mindset and the provision of pertinent knowledge direct students to embrace entrepreneurial behaviors and engage in entrepreneurial endeavors.

For the second research question, the present condition of entrepreneurship education in Vietnam demonstrates advancement in cultivating entrepreneurial aspirations among students. Despite the clear beneficial effects, problems remain in the implementation of student-centered learning and experiential teaching techniques. Tailored tactics aligned with students' backgrounds and aspirations, coupled with novel teaching methods, are crucial for improving the efficacy of entrepreneurship education in Vietnam.

For the final research question, Research findings about entrepreneurship education in Vietnam correspond with international studies, emphasizing the beneficial effect of such education on students' entrepreneurial intentions. Cultural influences, pedagogical approaches, and gender discrepancies may result in divergent outcomes. Adapting entrepreneurship education to various school contexts is essential for efficiently fostering entrepreneurial goals.

Future Research Directions

The exploration of studies on the impact of entrepreneurship education on Vietnamese students' entrepreneurial intentions also suggests a number of future research directions, including:

To provide a broader understanding of the factors influencing entrepreneurial intentions, we need to analyze the comprehensive impact of the macro environment on entrepreneurship ([38]

The impact of entrepreneurship education on students' entrepreneurial intentions also

needs to consider additional factors such as government support policies, infrastructure conditions, and family support [35]; students' abilities, personality traits, and passion to better understand their motivational role in entrepreneurship [21].

For entrepreneurship education, it is necessary to investigate teaching methods that incorporate best practices in entrepreneurship education or to use objective measures such as pre- and post-training assessments [39].

Research limitations

Despite its advantages, the documentary research method also presents several common limitations. One significant constraint is the potential for bias in the selection and interpretation of literature on the impact of entrepreneurship education on students' entrepreneurial intentions, which can impact the validity and reliability of the research findings. Additionally, the availability and accessibility of relevant documents may pose challenges, especially when dealing with sensitive or confidential information. Another limitation is the emphasis on existing data, which may limit the scope and depth of the research.

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THE INFLUENCE OF THE CARBON BORDER ADJUSTMENT MECHANISM (CBAM) ON CEMENT EXPORTER'S PRODUCTION STRATEGIES: THE MODERATING ROLE OF TECHNOLOGICAL INNOVATION CAPABILITIES

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Abstract: The Carbon Border Adjustment Mechanism (CBAM), introduced by the European Union (EU), imposes carbon taxes on imported goods from countries with lower emission standards, posing significant challenges for Vietnam's cement industry - a sector with high CO_2 emissions. This study examines the impact of CBAM on the production strategies of cement enterprises, including process innovation and green transition, while investigating the moderating role of technological innovation capability. The analysis focuses on two key components of CBAM: "Emission Trading System" and "Carbon Tax" identified as critical factors driving changes in production strategies. The study emphasizes the need for cement enterprises to prioritize investments in technological innovation and collaborate with stakeholders to enhance compliance capabilities. Furthermore, government support policies are crucial to ensuring sustainable development and enabling the sector to adapt to evolving international trade regulations

Keywords: *Carbon Border Adjustment Mechanism (CBAM), Carbon Tax, Cement Industry, Production Strategy, Technological Innovation Capability.*

1. Introduction

In the context of increasingly severe climate change, countries and economic blocs are striving to reduce greenhouse gas emissions to achieve sustainable development goals. The Carbon Border Adjustment Mechanism (CBAM) has been proposed by the European Union (EU) as an important tool to regulate and limit unfair competition between domestic products and imported products with high emissions. CBAM not only requires businesses to purchase emission trading systems for their exported products but also creates a legal framework for monitoring and assessing the impact of climate policies on international trade (Böhringer et al., 2020) [03]. The goal is to level the playing field for EU producers and incentivize exporters to adopt greener production methods.

The cement export sector in Vietnam plays a significant role in the economy, with export revenue reaching approximately $2.5 billion in 2022, accounting for about 7% of the total export value of the construction industry (Vietnam General Statistics Office, 2023). However, this sector is also one of the largest sources of CO_2 emissions, making it crucial for the application of CBAM to significantly affect the production strategies and competitiveness of Vietnamese cement enterprises. According to data, emissions from cement production account for about 8% of global greenhouse gas emissions (IEA, 2022).

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Therefore, researching the impact of CBAM on the production strategies of cement-exporting enterprises is essential.

The introduction of CBAM brings about increased production costs, reduced profit margins, and additional administrative burdens for exporters. However, it also offers an opportunity for Vietnamese cement enterprises to adopt sustainable production practices, such as green process innovations and low-carbon technologies, to enhance their competitiveness. Understanding how CBAM influences production strategies and identifying pathways for adaptation is critical for ensuring the industry's long-term sustainability and resilience. Despite the importance of this issue, limited research exists on CBAM's sector-specific impact in developing countries like Vietnam, especially in the cement industry. Furthermore, the role of "Emission Trading System", "EU Import Policy", and "Carbon Tax", will be analyzed in this context. Specifically, emission trading system is a decisive factor in shaping production costs and competitiveness for businesses (Kühn et al., 2019) [12]. The EU's import policy, with stringent regulations on environmental protection, may reduce access to the market for Vietnamese cement products (Baker, 2022) [02]. Carbon tax will also influence investment decisions and production strategies of enterprises, requiring them to enhance their technological innovation capabilities to meet new demands (Pérez et al., 2021) [19].

According to CEMBUREAU (2021) [05], the Carbon Border Adjustment Mechanism (CBAM) not only imposes financial pressure through the application of carbon taxes on imported products but also incentivizes manufacturers to adopt advanced technologies to reduce CO_2 emissions in production processes. This necessitates enterprises to restructure their production strategies to ensure compliance with EU carbon standards. At the same time, Jacob Winskell (2022) [24] demonstrates that minimizing the costs of purchasing carbon certificates directly impacts cement exporters by increasing product prices, potentially diminishing their competitiveness in international markets. However, this mechanism also encourages manufacturers to invest in green technologies, such as low-emission kilns or alternative fuels, to improve environmental and economic performance.

Elisabetta Cornago and Aslak Berg (2024) [15] analyzed the initial impacts of CBAM during its transitional phase, highlighting that exporters from various nations are increasingly shifting toward low-carbon products to sustain access to the EU market. Technological innovation, such as utilizing renewable energy in cement production, is identified as a core strategy for adapting to this mechanism. The Development and Policies Research Center DEPOCEN (2024) [20] further emphasizes that cement exporters need to implement precise measurement, reporting, and verification (MRV) systems to comply with CBAM requirements. Simultaneously, the ability to innovate technologically plays a critical moderating role, enabling firms to meet stringent environmental standards while maintaining competitive advantages by reducing production costs.

Overall, the studies reveal that CBAM exerts multidimensional impacts on the production strategies of cement exporters. On one hand, the mechanism establishes trade barriers through carbon pricing. On the other hand, it motivates enterprises to invest in green technologies, which not only lower emissions but also enhance economic efficiency. Technological innovation capabilities are emphasized as a pivotal moderating factor, allowing firms to adapt to CBAM's stringent requirements and realign their

production strategies toward sustainable practices in the international market.

2. Research Methodology

The study employed two approaches. The authors used two types of research methods: qualitative research and quantitative research. For the qualitative research method, based on known theoretical models and prior studies on the influence of the Carbon Border Adjustment Mechanism (CBAM), the authors conducted a synthesis, analysis, and comparison to build a new research model (with modifications and additions) to research hypotheses. Then, for the quantitative method, the authors did the data collection: data used for this study will be collected through online and offline surveys conducted in Vietnam. Data will be collected through questionnaires on Google Forms and printed on paper. The authors aim to collect and evaluate primary data from managers and decision-makers in cement-exporting enterprises. For data processing, the authors will use SPSS and AMOS software to analyze the data and assess the research hypotheses that have been developed. Participants from various cement-exporting companies across different regions in Vietnam will be surveyed for this field of research.

3. Conceptual Framework

3.1. Carbon Border Adjustment Mechanism (CBAM)

The Carbon Border Adjustment Mechanism (CBAM) implemented by the European Commission [10], which imposes a carbon tax on imported goods from countries with lower emission standards, has posed a significant challenge for Vietnamese cement companies—a sector with high CO_2 emissions. This study analyzes the impact of CBAM on the financial performance (profit, cost, revenue) and production strategies (process innovation, green transition) of cement companies, while also examining the moderating role of technological innovation capacity. The research results are expected to show that CBAM exerts considerable pressure on company costs and profits, while also promoting sustainable production strategies. However, technological innovation capacity plays a role in mitigating the negative impacts of CBAM, helping companies better adapt to carbon emission requirements. The study provides specific recommendations for companies to enhance their technological innovation capabilities and suggests government support policies to help the Vietnamese cement industry develop sustainably in the context of international integration.

3.2. Production Strategy

In recent years, sustainable production and consumption have become an urgent need and an inevitable trend in the development process of most countries worldwide, including Vietnam. Sustainable production and consumption are considered an effective and comprehensive approach to achieving economic development goals and environmental protection. As a developing country, Vietnam faces significant challenges related to environmental pollution during its industrialization and modernization process. Globally, sustainable production and consumption are growing strongly, and Vietnam needs specific and effective solutions to minimize the use of natural resources, waste emissions, and pollutants to ensure sustainable development goals are met. This requires close cooperation between government agencies, businesses, and the community to promote initiatives and support policies for sustainable production and consumption, while also raising awareness and responsibility for environmental and natural resource protection.

The effectiveness of strategic production improvements is measured by three main

factors: green production process transformation, supply chain management innovation, and renewable energy application. According to VOIT, green transformation involves building an economy with low to very low emissions based on green development standards, efficiently and economically using natural resources, and preventing biodiversity loss. A green economy is characterized by factories and enterprises with minimal pollution, using clean and renewable energy sources. Specifically, businesses following the green transformation trend will operate in an environmentally friendly manner that promotes human health (*SCP, 2024, March 4)* [22].

Supply chain innovation is defined as the implementation of new and improved strategies, technologies, processes, and practices within the supply chain to enhance efficiency, reduce costs, minimize risks, and improve overall performance. Renewable energy is clean, naturally available, and inexhaustible. The most specific examples of renewable energy are sunlight and wind, which are continuously produced by nature and never run out. Due to their excellent benefits, these perpetual energy sources are being widely applied in daily life.

3.3. Technological Innovation Capability

In recent years, the concept of technological innovation capability (TIC) has become a central theme within both theoretical models and empirical examinations. Organizations are progressively aware of its indispensable function in augmenting competitive advantage and fostering sustainable development. The capacity for innovation and the proficient application of technology have fundamentally transformed organizational strategies in confronting market adversities, enhancing operational efficiency, and responding to the ever-evolving requirements of consumers (Du et al., 2021) [09].

As articulated by Rajapathirana and Hui (2018) [21], TIC specifies a corporation's capability in obtaining, integrating, and applying technological resources to enhance innovation. This capability encompasses not only the creation of novel technologies but also the strategic integration of such technologies with corporate aims to ensure sustained success.

Building upon established frameworks, TIC may be construed as the capacity of organizations to exploit internal resources in conjunction with external expertise, thereby facilitating innovation across various dimensions such as products, processes, and business models. It encompasses numerous facets, including research and development (R&D), absorptive capacity, collaboration with external partners, organizational agility, and the commercialization of innovations. Collectively, these facets empower enterprises to skillfully maneuver through technological and competitive landscapes, thereby generating sustainable value.

4. The Current Status of CO2 Emissions in The Cement Industry

4.1. The current status of Vietnam's cement exports (2020-2023)

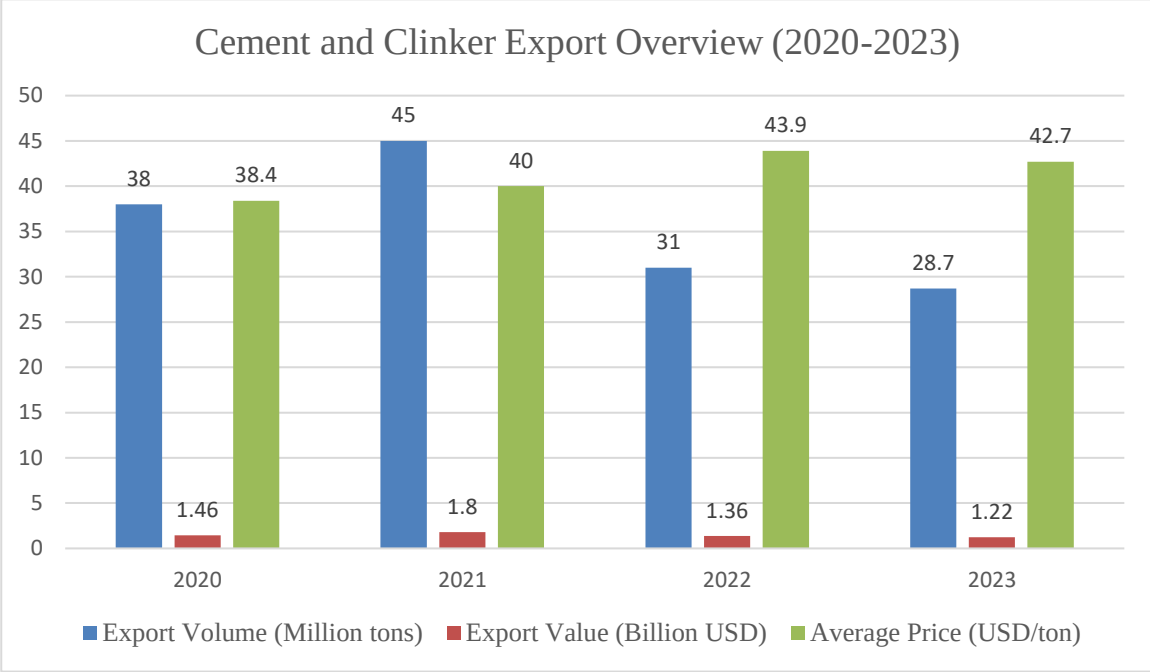


Figure 1. Cement and Clinker Export Overview in Vietnam (2020-2023)

(Source: Author's calculation)

From 2020 to 2023, Vietnam's cement industry underwent significant transformations in response to increasingly stringent environmental requirements, particularly with the introduction of the European Union's (EU) Carbon Border Adjustment Mechanism (CBAM). CBAM is a policy tool designed to impose carbon taxes on imported goods from countries with lower emissions standards, directly affecting Vietnam's cement industry, a sector known for its high CO_2 emissions. Consequently, Vietnamese cement enterprises have been compelled to tackle environmental challenges and adjust their production strategies to remain competitive in international markets.

Despite being impacted by the COVID-19 pandemic and global economic fluctuations, the cement industry managed to maintain a certain level of export stability during this period. In 2020, Vietnam exported approximately 38 million tons of cement and clinker, generating USD 1.46 billion in export value, with an average export price of USD 38.4 per ton. By 2021, export volumes surged to 45 million tons, with a total export value of USD 1.8 billion, while the average price increased to USD 40 per ton. However, in 2022, the industry faced a decline in export volumes, reaching only 31 million tons with a total value of USD 1.36 billion. Despite this, the average export price rose to USD 43.9 per ton, reflecting external factors such as the Russia-Ukraine conflict, which disrupted global supply chains and demand. In 2023, export volumes further decreased to 28.7 million tons, with a total value of USD 1.22 billion. Nonetheless, the average export price remained stable at USD 42.7 per ton, indicating that while volumes have declined, export value has been relatively unaffected due to higher product prices and stricter environmental quality requirements.

The introduction of CBAM has brought about tangible impacts on Vietnam's cement exporters. Under this mechanism, enterprises face stringent requirements regarding CO_2 emissions of cement products exported to EU countries. This not only presents challenges related to production costs but also necessitates improvements in production technologies

and the adoption of green solutions to reduce emissions and sustain competitiveness. As a result, Vietnamese cement enterprises are required to adjust their production strategies, transition to low-emission production technologies, and enhance their technological innovation capabilities to meet international standards. In summary, the 2020-2023 period marked a pivotal shift in Vietnam's cement export strategies due to rising environmental and carbon emission requirements. To maintain competitiveness in the global market, especially under mechanisms like CBAM, Vietnamese cement enterprises must adapt quickly and invest in technological innovation to align with the evolving demands of international trade.

4.2. CO2 Emissions from the Cement Industry of leading countries exporting

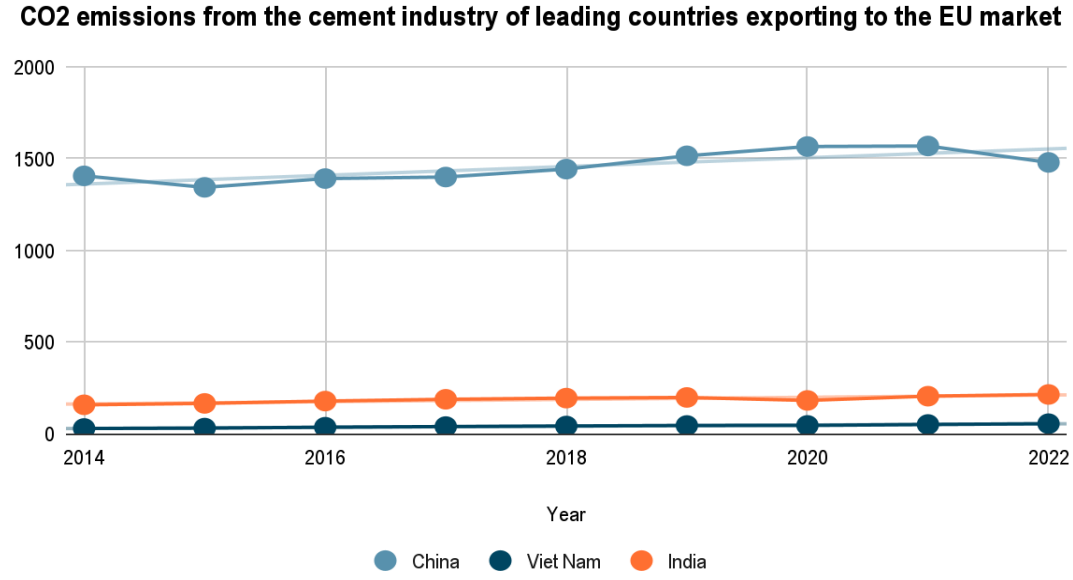


Figure 2. ***CO2 Emissions from the Cement Industry of leading countries exporting to the EU market***

(Source: Author's calculation)

The cement industry, a significant contributor to global CO_2 emissions, faces increasing scrutiny under the European Union's Carbon Border Adjustment Mechanism (CBAM). This policy aims to mitigate carbon leakage by imposing carbon tariffs on imports with high emissions, compelling major exporters to the EU—such as China, India, and Vietnam—to reassess their production strategies.

From 2020 to 2023, China, the largest emitter, recorded CO_2 emissions in its cement industry ranging from 1,500 to 1,600 million tons annually. Despite substantial investments in technological innovations like carbon capture and alternative fuels, China's vast production scale poses challenges in achieving proportional emission reductions. India, with emissions rising from 181.3 million tons in 2020 to 213.9 million tons in 2022, has focused on energy efficiency and blended cement, though its fragmented industry limits widespread adoption. Vietnam, while having lower absolute emissions, saw a significant rise in CO_2 output from 45.2 million tons in 2020 to 54.6 million tons in 2022. This growth highlights Vietnam's increasing cement production to meet export demands, particularly to the EU market. Unlike its larger counterparts, Vietnam's smaller scale and resource constraints make it particularly vulnerable to CBAM policies. However, this also positions Vietnam as a potential leader in rapid technological adaptation, driven by government

support and a strategic focus on aligning with EU carbon standards.

This research explores how CBAM influences production strategies in these countries, with a particular emphasis on Vietnam's unique challenges and opportunities in leveraging technological innovation capabilities. By investing in green innovations and aligning with EU carbon standards, Vietnam has the potential to emerge not only as a competitive exporter but also as a model for sustainable practices in the global cement industry.

4.3. The Current Price of EU ETS from 2020 to 2024

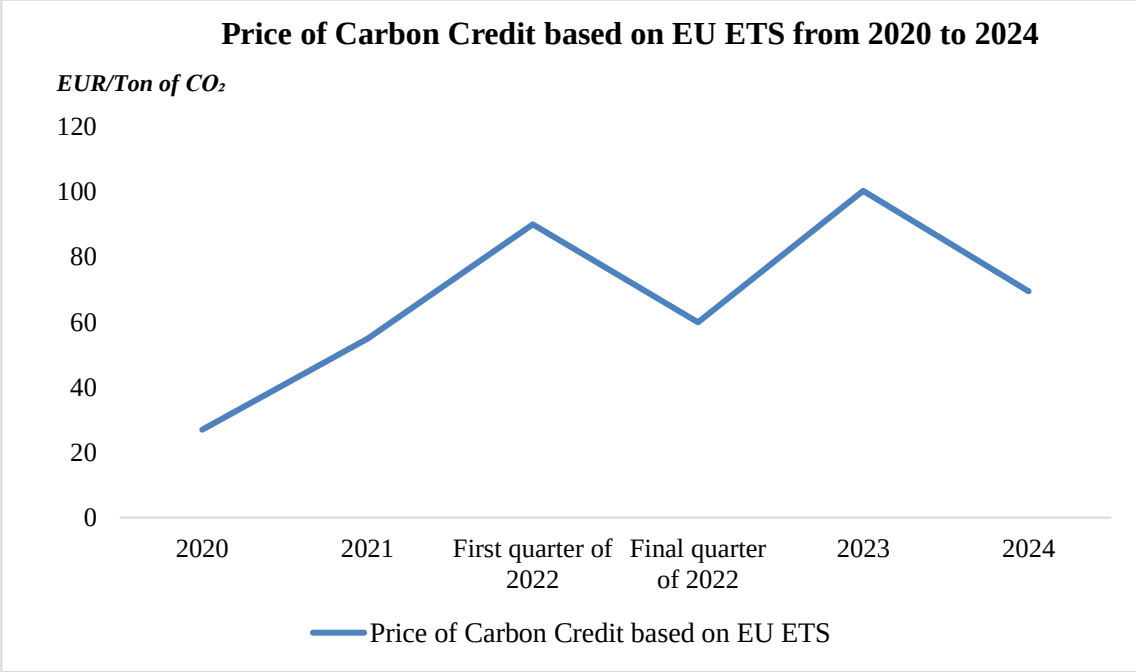


Figure 3. The Current Price of Carbon Credit based on EU ETS (2020-2023)

(Source: Author's calculation)

The price of carbon credit is determined based on the supply and demand for CO_2 emissions, leading to continuous fluctuations in carbon certificate prices each year in the EU from 2020 to 2024, as illustrated by the line chart depicting the global situation at that time. In 2020, prices began at around €30 per ton of CO_2 during the recovery phase following the COVID-19 pandemic, when energy demand and emissions started to rise again. By 2021, prices doubled to approximately €60 per ton of CO_2, primarily due to stricter environmental policies in the EU and a robust economic recovery post-COVID-19. In 2022, prices continued to surge, peaking at around €90 per ton of CO_2 early in the year. However, the Russia-Ukraine war caused significant volatility, dropping prices to about €60 per ton of CO_2 by the end of the year. In 2023, prices reached a record high of €100.34 per ton of CO_2 in February due to increased demand for emission rights and more stringent emission reduction measures. By 2024, prices fell to about €69.47 per ton of CO_2 by year-end, mainly due to an oversupply of emission rights in the market and decreased demand driven by energy-saving measures and increased use of renewable energy.

The main causes of price fluctuations include environmental policies, economic and political conditions, energy demand, and surplus emission rights. The EU has implemented stronger measures to reduce CO_2 emissions, increasing the demand for

emission rights. The Russia-Ukraine conflict and other economic factors have caused significant price volatility. The economic recovery after the COVID-19 pandemic and weather factors have also impacted energy demand and emissions. The surplus of emission rights in the market contributed to lower prices in 2024.

5. Model and hypotheses

5.1. Carbon Border Adjustment Mechanism

(1) Emission Trading System

A carbon credit or carbon allowance is considered a type of permit that allows the holder to emit a certain amount of CO2 or other greenhouse gases (CH4, NO2). If the actual emissions exceed the credits, additional credits must be purchased to meet the quota without penalty. Conversely, if emissions are lower, the surplus credits can be sold to others. By limiting the number of carbon credits on the market, the EU has implemented the Emission Trading System (ETS) since 2005 to address climate change and serve as a primary tool for reducing greenhouse gas emissions. According to a study by the Vietnam Institute of Strategy and Policy on Natural Resources and Environment (2024), the application of ETS or carbon credit trading has improved production strategies towards greater environmental friendliness through innovations in production inputs, such as switching from coal to renewable energy sources and natural gas, and adopting lower-carbon processes. The IEA (2020) shares a similar view, stating that ETS is a driving force for improving sustainable production processes.

(2) Carbon Tax

The carbon tax functions as a financial tool intended to reduce greenhouse gas emissions through the establishment of a duty on the carbon concentration present in fossil fuels, which has far-reaching consequences for corporate manufacturing practices, especially in high-emission industries such as cement production. Huiqin Zhang et al. (2021) [27] clarify that increased carbon tax rates motivate businesses to implement production techniques that emphasize the minimization of net carbon emissions. Such methodologies frequently necessitate the allocation of resources toward low-carbon technologies and the re-engineering of production processes to comply with increasingly stringent environmental regulations.

In their analysis, Kaiying Cao, Ping He, and Zhixin Liu (2019) [04] examine the dynamics between carbon tax legislations and production determinations within supply chain frameworks. Their results reveal that carbon tax rates significantly affect the equilibrium between the manufacture of new products and the incorporation of recycled materials. Specifically, within sectors characterized by substantial carbon emissions, such as cement manufacturing, the imposition of a carbon tax propels firms to amalgamate sustainable practices, which may include the utilization of alternative raw materials and the optimization of energy efficiency.

Furthermore, Wanting Chen and Zhi-Hua Hu (2018) [06] investigate the interaction between carbon tax regulations and governmental subsidies, accentuating the pivotal role of taxation in fostering low-carbon production as opposed to dependency on subsidies. Their findings indicate that carbon taxes are more efficacious in motivating the cement sector to embrace innovative and sustainable practices, thereby facilitating long-term economic and environmental advantages. Therefore, the author group proposes the research hypothesis:

Hypothesis 1: The Emission Trading System (ETS) has a direct and positive impact

on production strategies.

The carbon tax exerts a direct and affirmative influence on the implementation of sustainable production strategies within the cement industry.

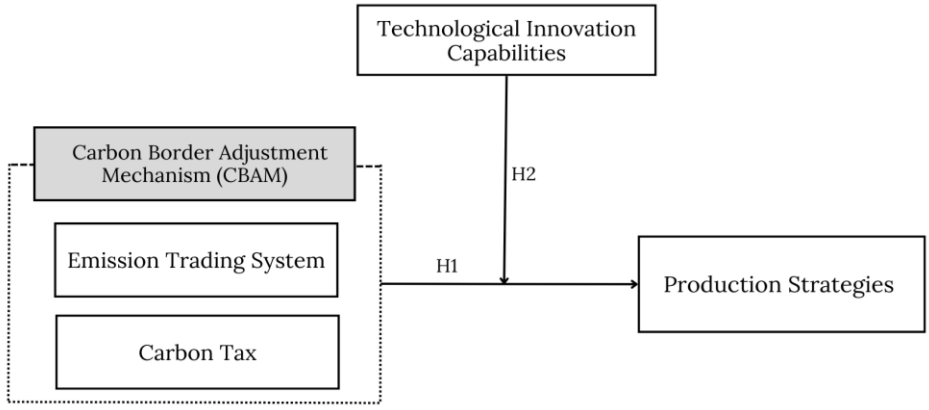
5.2. Technological Innovation Capability

According to socio-technical system theory, any change in an organization's technological system requires changes in the administrative system to adjust to the demands created by the technological system. In other words, organizational innovation is a necessary precondition for technological innovation to be fully implemented and exploited (Damanpour et al., 1989 [08]; Lam, 2005). Lam (2005) [14] states that developing effective production strategies within an organization is a prerequisite for the successful utilization of new technologies. Furthermore, Teece (2010) [23] argues that to profit from technological innovations, enterprises must adopt new organizational forms, new organizational methods, and new business models that are of equivalent importance to the enterprise. Damanpour and Evan (1984) [07] suggest that the creation of effective strategies leads to a high level of technological innovation. Companies that embrace organizational change as an ongoing effort and part of their organizational processes are therefore more likely to foster continuous improvements in the technological sphere, resulting in ongoing learning and continuous innovation (Golgeci and Ponomarov, 2013) [11]. Therefore, the author group proposes the research hypothesis:

Hypothesis 2: The regulatory role of technological innovation capabilities has a direct and positive impact on the relationship between carbon border adjustment mechanism and production strategies.

From these hypotheses, we suggest a research model:

Figure 1: Research mode



6. Discussion and Conclusion

The implementation of the Carbon Border Adjustment Mechanism (CBAM) has necessitated substantial adjustments in the production strategies of cement-exporting enterprises in Vietnam. As a regulatory framework targeting high-carbon industries, CBAM introduces significant challenges through its core mechanisms, including emission trading system and carbon taxes, both of which drive enterprises to adopt low-carbon production processes. These mechanisms have fundamentally reshaped the operational approaches of firms, forcing them to align with stringent global environmental standards while maintaining market competitiveness. CBAM imposes additional costs on carbon-intensive production by requiring enterprises to purchase

emission trading systems and comply with tax obligations tied to their carbon output. These financial pressures act as a catalyst for firms to transition toward sustainable practices. For Vietnamese cement exporters, this transition often involves adopting cleaner technologies, such as alternative clinker substitutes and waste heat recovery systems, which reduce emissions intensity. The shift to low-carbon production strategies is not only a compliance measure but also a strategic adaptation to meet the increasing environmental expectations of international markets.

The current state of the cement-exporting sector in Vietnam reflects varying levels of preparedness to adapt to CBAM's stringent requirements. Enterprises with strong technological innovation capabilities have made significant strides in adopting cleaner production technologies, such as waste heat recovery systems, alternative clinker materials, and optimized energy usage. These advancements reduce emissions intensity and mitigate the financial impact of CBAM. However, a large proportion of firms, particularly small and medium-sized enterprises (SMEs), face considerable challenges. Limited access to capital, insufficient technological infrastructure, and a lack of skilled labor impede their ability to transition toward low-carbon production processes. The disparity in readiness across the industry reveals an uneven landscape, where only a minority of enterprises are fully equipped to align with CBAM's requirements. Additionally, the absence of a standardized framework for emissions measurement, reporting, and verification (MRV) further exacerbates the challenges faced by Vietnamese cement exporters. Many firms lack the capacity to integrate robust MRV systems into their operations, which are critical for demonstrating compliance with CBAM and ensuring transparency in emissions reporting. Without these systems, enterprises risk losing access to international markets due to non-compliance, further highlighting the need for structural adjustments within the industry.

To enhance the role of technological innovation in mitigating the challenges posed by the Carbon Border Adjustment Mechanism (CBAM), a comprehensive set of solutions is proposed. First, addressing financial barriers is critical, and the government, alongside financial institutions, should establish robust incentive programs such as low-interest loans, tax credits, and direct subsidies. These mechanisms would enable enterprises to invest in vital technologies, including renewable energy-powered kilns, carbon capture and storage (CCS) systems, and advanced emissions monitoring tools. Furthermore, public funding initiatives should focus on supporting research and development (R&D) in low-carbon cement production, fostering sector-wide innovation. Second, capacity-building initiatives at the national level are essential to improve the technological and managerial capabilities of enterprises. These programs could include training workshops on advanced manufacturing processes, emissions management, and data integration systems. Collaboration with academic and research institutions can further facilitate knowledge transfer, enabling enterprises to adopt innovative low-carbon production practices effectively. Third, public-private partnerships (PPPs) should play a central role in driving technological advancements in the cement sector. Such partnerships can prioritize R&D efforts in alternative materials like geopolymer cement, which significantly reduces emissions compared to traditional clinker-based production. Additionally, these collaborations can focus on developing AI-driven resource optimization systems to enhance production efficiency and reduce carbon output. Fourth, policy reforms are required to establish a robust framework for emissions measurement,

reporting, and verification (MRV) specifically tailored to the cement sector. This standardized framework, supported by clear guidelines, would ensure uniform adoption across enterprises of varying sizes and allow firms to integrate MRV systems into their production processes seamlessly. By doing so, enterprises can meet CBAM compliance requirements while leveraging emissions data for strategic decision-making and supply chain optimization. Finally, fostering international technological collaboration and transfer is essential. Incentivizing multinational firms to share cutting-edge solutions for emissions reduction with local enterprises can accelerate the adoption of advanced technologies. These collaborations should include provisions for training and ongoing technical support, ensuring long-term benefits for domestic firms and enabling them to meet global environmental standards effectively. These integrated solutions highlight the importance of aligning financial, institutional, and technological strategies to enable the cement sector to adapt to CBAM's challenges while leveraging opportunities for sustainable growth.

Technological innovation serves as a critical moderating factor in mitigating the challenges posed by CBAM. Enterprises equipped with advanced production technologies and sustainable practices are better positioned to navigate the financial and operational complexities introduced by carbon pricing. For example, the integration of digital tools for emissions tracking and AI-driven production optimization allows firms to reduce compliance burdens while achieving operational efficiencies. Moreover, technological advancements facilitate the traceability and transparency of supply chains, a requirement increasingly emphasized by international markets. By enhancing their technological innovation capabilities, Vietnamese cement exporters can transform CBAM from a constraint into a strategic advantage. Firms that successfully adopt low-carbon technologies not only comply with regulatory demands but also position themselves as leaders in sustainable production, gaining access to premium markets that prioritize environmental responsibility. This dual benefit—compliance and competitive differentiation—underscores the transformative potential of integrating innovation into production strategies.

The CBAM represents a pivotal moment for Vietnam's cement industry, demanding both structural and strategic transformations. While current realities highlight significant challenges, particularly for SMEs, they also reveal opportunities for systemic improvements through technological innovation and policy support. By investing in sustainable technologies, fostering skill development, and strengthening institutional frameworks, the industry can achieve compliance with CBAM while enhancing long-term resilience and competitiveness. Future research should explore the socioeconomic impacts of CBAM on SMEs, investigate the scalability of low-carbon production technologies, and evaluate cross-sectoral collaborations to accelerate the green transition. By leveraging innovation and adopting inclusive policies, Vietnam's cement sector can align its production strategies with global decarbonization goals and secure its position in an environmentally conscious global markets.

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THE INFLUENCE OF ETHICAL LEADERSHIP ON EMPLOYEE OUTSPEAK AT VIETNAMESE BUSINESSES IN THE NEW CONTEXT

Na Lê Thi Tran[1], Anh Thi Dieu Ho[2], Van Thị Thuy Hoang[3], Thuong Thị Cam Hoang[4], Hoai Thị Thanh Nguyen[5]

Summary: This article carries out a study of the impact of ethical leadership on the outspeak of the employees in Vietnamese businesses in the new setting, in order to help leaders in businesses gain a better insight of the impact of ethical leadership, and how it affects the voice of the employees, which will help leaders truly grasp the existing problems of the organization to have solutions to make some enhancements, thereby businesses can achieve better results in the future. Employee outspeak depends on the employee's level of trust in the leader (Rousseau et al., 1998). The authors have used qualitative research methods through consulting experts and in-depth interviews, as well as quantitative methods through testing survey samples of 325 questionnaires of employees at businesses within 6 years, from May 2024 to November 2024. From these quantitative research results, it has been shown that ethical leadership positively affects the voice of employees in Vietnamese businesses, in which employers treating people fairly (DXCB) has a strong impact. ($\beta = 0.358$) on employee voice, followed by employers proactively managing ethics (QLDD) has the second impact with $\beta = 0.277$, and ultimately employers become role models for morality (HMĐD) with $\beta = 0.132$.

Key Words: Ethical leadership, employee outspeak.

1.Introduction

Leadership theories have contributed to gradually solving two big questions in leadership: Who is a leader? And how effective is leadership? A clear trend is to shift the focus of research and expand the scope of leadership research from individual leaders to the relationship between them and employees and the contextual and situational factors that make an impact on the leader's effectiveness. The role of leaders is extremely important in organizations, a decisive factor in the success, survival and development of an organization or a business (Olesia, Namusonge, & Iravo, 2014; Staats, 2015).

In Vietnamese enterprises, the silence and indifference of employees at work is still a difficult problem that needs to be solved by their managers. The survey results in Alphabe's Best Workplaces 2023 report (Alphabe, 2024) show that out of 32,000 people working in Vietnam, only 13.8% of employees are truly committed to the company; 46.9% of employees are committed to the company, 36.8% are indifferent and 2.5% are very disengaged. Notably, out of the 39.3% of employees who are silent and indifferent to the company, up to 67% of employees still stay with the company. They are the ones who still go to work every day but are indifferent and silent about the problems of the business. They may still recognize problems that need to be changed in the business (waste, abuse, embezzlement, bribery, mistreatment, etc.) or the employees themselves have initiatives and solutions to the problems of the business but they choose to remain

[1,2,3,4,5] Vinh University

silent because they are afraid of losing their job position, being negatively evaluated, being assigned with inappropriate work, affecting their promotion opportunities, or they feel they have no responsibility to speak up.

In the new context of development, there will be problems occurring in the enterprise that affect the long-term development, so how to make employees realize that they have the responsibility to speak up to improve the unsatisfactory problems in the enterprise. To answer this question, leaders need to clearly understand their roles and responsibilities in the enterprise. Leaders with appropriate leadership behavior will create trust for employees, from which they will boldly speak up about the existing problems of the enterprise

Currently, there have been many studies in the world researching on the impact of Ethical Leadership on the performance of organizations and employees. Research by (Potipiroon, W., & Fearman, S., 2016; Wright, B.E., Hassan, S., & Park, J., 2016, Hassan, S., 2015; Hassan, S., Wright, B.E., & Yukl, G, 2014; Thaler, J., & Helmig, B., 2016). However, there has been no specific study analyzing the impact of ethical leadership on employee voice for the business. Voice is a special form of employee extra-role behavior, bringing many important contributions to the business, because employee suggestions can make business decisions better (Detert, Burris, Harrison and Martin, 2013). Conversely, employee silence can lead to business inertia and resistance to change (Morrison, 2014)..

As a result, it is necessary to deepen the research and analyze the influence of ethical leadership on employee voice in Vietnamese enterprises, contributing to boosting leadership effectiveness and employees trust in their leaders, therefore assisting enterprises to grow more and more.

2. Theoretical basis and research model

2.1. Research concepts

2.1.1. Ethical leadership

Brown, Trevino, and Harrison (2005) were the first to study ethical leadership, implying that ethical leaders are those who engage in beneficial behaviors while avoiding behaviors that may harm others. Khuntia and Suar (2004) also suggested that ethical leaders are those who incorporate ethical principles into their values, beliefs, and actions. According to these authors, ethical leadership is defined as the demonstration of appropriate normative behaviors through personal actions and interpersonal relationships that promote such behaviors through two-way communication.

According to Brown, Trevino and Harrison (2005), there are three basic attributes of ethical leaders:

- Leaders become ethical role models for employees.
- Leaders treat everyone fairly.
- Leaders actively manage ethics in the organization.

Ethical leadership emphasizes leadership with respect for the rights and dignity of others (Ciulla, 2004), when referring to an ethical leader, it is referring to an ethical person and an ethical manager (Trevino, Hartman and Brown, 2000). With ethical leadership, the leader will apply ethics to the activities of the organization and is also an essential feature of the organization's ethical culture.

2.2.1. Employee’s voice.

The employee’s outspeak is an effort to change the practices, policies, and outcomes of the unit in which one belongs or the organization of which one is a member (Hirschman, 1970). In this view, speaking out their opinions is an employee’s

constructive effort to enhance those unsatisfactory conditions. Boldly giving out suggestions is an extra-role behavior because it is often not required in the employee's job description (Van Dyne and LePine, 1998). The content of voice can be to provide information about aspects of the job (improvement-focused voice) or to address important organizational issues (problem-focused voice) (Mirrison, 2014). Researching factors that may encourage employees to speak up about organizational problems (such as abuse, embezzlement, bribery, or mistreatment) is important both for employee confidence in doing the ethical right thing and to prevent similar problems in the future.

Speaking up, whether problem-focused or improvement-focused, carries risks for the implementor. When employees point out shortcomings, offer a different opinion than others, or make a suggestion that goes against existing norms, they may lose their job, receive a negative evaluation, be assigned inappropriate work, or even have their chances of promotion affected (Detert and Trevino, 2010, Grant, 2013). These safety concerns may be heightened, especially when employees speak directly to their leaders, due to the difference in status between employees and leaders (Edmondson, 2003). Morrison 2014 suggests that even when leaders are receptive to employee suggestions, power differentials between the parties can still impede honest and open communication. Therefore, employee's trust in the leader is crucial in whether employees will speak up or remain silent (Rousseau et al., 1998).

2.2. Foundational Theories

2.2.1. Social Exchange Theory (Exchange and power in social life)

Social exchange theory views social life as a series of transactions between two or more parties (Michell, Cropanzano, and Quisenberry, 2012). Resources are exchanged through a reciprocal process, in which one party will tend to reciprocate the good (or bad) deeds of the other (Gergen, 1969, Gouldner, 1960). The social exchange process begins when ethical leaders demonstrate fairness and concern for their subordinates. In turn, subordinates feel obligated to reciprocate and act according to the ethical leader's expectations (Brown et al., 2005; Brown & Trevino, 2006). Conversely, when subordinates are treated poorly, they will have little or no interest in forming this relationship. Based on the above idea, social exchange theory has become a widely used theoretical framework (Cropanzano and Mitchell, 2005).

In modern management research, one of the aspects of social exchange theory that has attracted much attention is the concept of relationships in the workplace. Social relationships develop when leaders care about employees, and smooth, fair exchanges between relationships will create effective work behavior and positive attitudes of employees.

2.2.2 Social Learning Theory

Social learning theory (Bandura, 1963, 1978) is the combination of both behavioral and cognitive theories of learning to provide a model that can explain many learning experiences. In addition to direct experience, individuals can learn by observing the others and thereby building the formation of how new behaviors are performed.

Applying social learning theory to organizations, the role model of the leader is the central process by which social influence occurs in the workplace due to the leader's position and power over followers. Followers will learn the leader's behavior when they perceive the leader as competent and trustworthy.

2.3. Related studies and proposed research model

2.3.1. Related studies

Up to now, there have been many studies in the world on the influence of Ethical Leadership on the performance of organizations and employees. The study of (Potipiroon, W., & Fearman, S., 2016) used employee data to examine how and when ethical leadership affects employee's performances. The research results showed that ethical leadership is positively correlated with job performance, employee behavior towards the organization and employee behavior toward the individual.

Wright, B.E., Hassan, S., & Park, J., (2016) also conducted a survey on the relationship between public service motivation and ethical behaviors by testing the extent to which public service motivation can predict employees' ethical behavior or behavioral intentions. The results of the study showed that leaders who demonstrate high ethical leadership will have employees with high service motivation and employees with high service motivation will show a willingness to report ethical violations in the organization.

Research by Hassan, S., Wright, B.E., & Yukl, G, (2014) shows that ethical leadership escalates employees' willingness to report ethical issues to management, which also means escalates employees' organizational commitment, and reduces employee absenteeism.

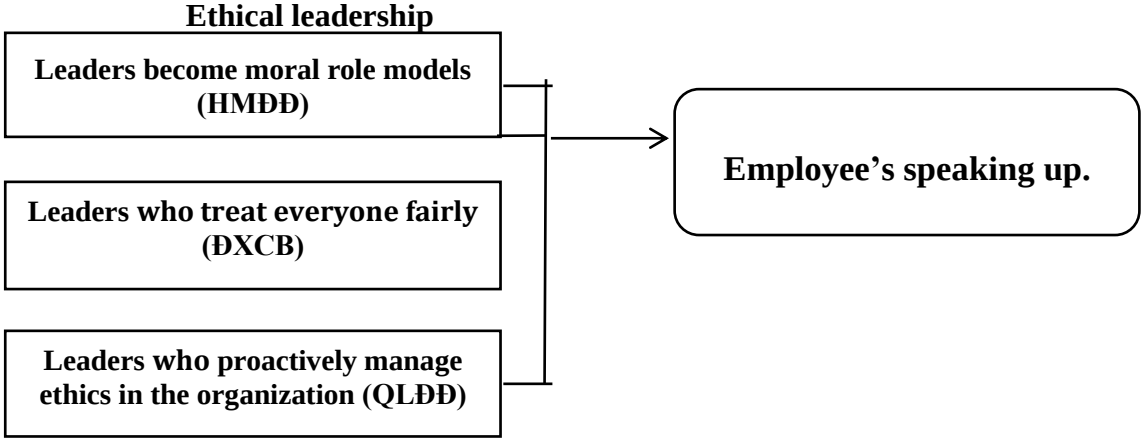
The study by Theler, J., & Helmig, B. (2016) also shows that at the organizational level, ethical management is vital due to the fact that ethical leadership and codes of conduct are constantly promoted. The research results also show that ethical leadership has a positive impact on ethical attitudes and behavioral intentions, on organizational-related attitudes and behavioral intentions.

Thus, many studies have shown the relationship between ethical leadership and employees, but the studies have not yet specified the level of influence of each element of ethical leadership on employees speaking up, besides, the studies are mainly focused on public organizations. Through this study, the author wishes to analyze the level of impact of each element of ethical leadership on employee speaking up in enterprises in Vietnam. Analyzing each element of ethical leadership on employee speaking up gives leaders a clearer perspective, providing specific and most effective directions and solutions for leaders to increase leadership effectiveness and employee speaking up, which will help enterprises in Vietnam thrive more and more steadily.

2.3.2. Proposed research model and hypothesis

After establishing the theoretical basis and synthesizing previous studies, the author proposes a research model based on the original research of author Hassan, S. (2015) as follows:

Figure 1: Proposed research model:



Source: Proposed by the author group.

Based on the theoretical foundation and previous studies presented above, the authors propose the following research hypotheses:

Hypothesis H1: Employers who become ethical role models (HMĐĐ) have a positive influence on employees speaking up (LTNV)

Hypothesis H2: Employers who treat everyone fairly (ĐXCB) have a positive influence on employees speaking up (LTNV)

Hypothesis H3: Employers who proactively manage ethics (QLĐĐ) in the organization have a positive influence on employees speaking up (LTNV)

3. Research method

3.1. Research scale

Based on the results of summarizing previous theories on ethical leadership, the author inherited from the scale of Brown, Trevino and Harrison (2005), Hassan, S., Wright, B.E., & Yukl, G, (2014) with 16 observed variables and conducted group discussions with 5 experts in management and long-term work interested in ethical leadership and employees with seniority working at enterprises to adjust and build an official scale to suit the research context in Vietnam. A 5-point Likert scale was used for the concepts in the study. The employee voice scale was inherited by the author from the scale of Van Dyne and LePine (1998) with 4 observed variables, the author eliminated 1 observed variable and adjusted the language of 5 observed variables to be clearer and easier to comprehend after conducting the qualitative research step.

3.2. Research sample

The study used non-probability sampling and convenience sampling. Regarding the survey form: the author simultaneously used the form of distributing survey forms directly to the survey subjects focusing on employees with long-term working experience at enterprises and surveying on the internet through the Google form tool via the link. Of the 335 returned forms, 10 were invalid, 325 qualified forms were included in the quantitative analysis by the author.

4. Results and discussion

4.1. Research results

4.1.1. Description of the research sample

The statistical analysis results showed that: the number of respondents was female with a rate of 53.85%, compared to male at 46.15%; The age range was mainly from 25 to 40 years old, accounting for 90%; In terms of education level, respondents mainly have university degrees or higher, accounting for 95%, and have 5 years or more of working experience, accounting for 96%. Detailed results are as follows:

Table 2: Research sample statistics

Number	Survey form information		Frequency	Ratio (%)
1	Genders	Male	150	46,15
		Female	175	53,85
2	Age	Under 25	10	3,07
		From 25-40	218	67,08
		Over 45	97	29,85
3	Trình độ học vấn	Pre-college	0	0
		College	30	9,24
		University	212	65,23
		Post-graduate	83	25,53

4	Experience	Under 5 years	20	6,16
		From 5 - 15 years	200	61,54
		Over 15 years	105	32,30

Source: SPSS analysis provided by the author team

4.1.2. *Cronbach's Alpha Reliability Test*

The results of the reliability test for the scales of ethical leadership and employee voice show that:

Ethical leadership consists of three latent variables with 16 observations. The Cronbach's Alpha coefficients for these latent variables range from 0.827 to 0.894, meeting the requirements. No observed variable was excluded, as all variables have an Item-Total Correlation greater than 0.4.

Table 3: Preliminary Results of the Ethical Leadership Scale Reliability Test

No.	Code	Variable Name	Corrected Item-Total Correlation
		1. Leaders as Ethical Symbols (HMĐĐ) α =.0.827	
1	HMĐĐ1	Leader establishes ethical behavioral models in decisions/actions	.853
2	HMĐĐ2	Leader values honesty and integrity as key personal values	.775
3	HMĐĐ3	Leader demonstrates trustworthiness and truthfulness	.706
4	HMĐĐ4	Leader manages personal life with high standards	.814
5	HMĐĐ5	Leader's actions align with stated values	.854
		2. Fair Treatment of Employees (ĐXCB) α =0.894	
6	ĐXCB1	Leader actively listens to employees	.772
7	ĐXCB2	Leader prioritizes employee interests	.851
8	ĐXCB3	Leader considers ethical implications in decision-making	.726
9	ĐXCB4	Leader makes fair and equitable decisions	.769
10	ĐXCB5	Leader maintains employee trust	.857
		3. Proactive Ethics Management (QLĐĐ) α =.0.843	
11	QLĐĐ1	Leader demonstrates strong commitment to ethical values	.818
12	QLĐĐ2	Leader clearly communicates ethical standards	.796
13	QLĐĐ3	Leader regularly discusses workplace ethics	.785
14	QLĐĐ4	Leader emphasizes ethical conduct despite challenges	.782
15	QLĐĐ5	Leader opposes unethical performance enhancement	.854
16	QLĐĐ6	Leader holds employees accountable for ethical conduct	.843

Source: Research data from the group of authors

Table 4: Preliminary Scale Testing Results for Employee Voice

No	Code	Variable Name	Corrected

			Item-Total Correlation
		1. Employee Voice Measures **(LTNV)** α =0. 857	
1	LTNV1	Proactive voices and encourages others' participation in organizational issues	.809
2	LTNV2	Expresses opinions even without peer support	.798
3	LTNV3	Generates and promotes suggestions for organizational improvement	.884
4	LTNV4	Engages in workplace quality improvement initiatives	.876

Source: Research data from the group of authors

Employee voice consists of 4 observed variables. The analysis yielded a Cronbach's Alpha coefficient of 0.857, which exceeds the threshold requirement of 0.7. All four observed variables demonstrated Item-Total Correlation coefficients greater than 0.4; therefore, the authors retained all four observed variables in their original form

4.1.3. ***Exploratory Factor Analysis (EFA)***

The EFA (Exploratory Factor Analysis) was conducted on 3 independent variables with 16 observable scales. The EFA results revealed: The Bartlett's test was significant (Sig = 0.000 < 0.05), while the KMO coefficient = 0.815 > 0.5, ensuring reliability. The Eigenvalue of the three factor equals 1.005, confirming that three factors were extracted from the analysis. The total variance explained by these three factors equals 78.779, indicating that the variation of the factors derived from the analysis can explain 78.78% of the variation in the initial survey data. All observed variables demonstrated factor loadings > 0.5, therefore no variables needed to be eliminated from the analysis. We identified three factor groups to be used in the analytical model, including: Leaders becoming ethical symbols (HMĐĐ), Leaders treating everyone fairly (ĐXCB), and Leaders play proactive ethics management (QLĐĐ)

Table 5: KMO Analysis Results for Ethical Leadership

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.815
Bartlett's Test of Sphericity	Approx. Chi-Square	9054.623
	df	300
	Sig.	.000

Source: Compilation of the author's survey and research results

Table 6: Rotated Component Matrix - Ethical Leadership

	Component		
	1	2	3
HMĐĐ1	.823		
HMĐĐ2	.745		
HMĐĐ3	.826		
HMĐĐ4	.787		
HMĐĐ5	.833		
ĐXCB1		.878	
ĐXCB2		.793	
ĐXCB3		.787	

ĐXCB4		.812	
ĐXCB5		.848	
QLĐĐ1			.767
QLĐĐ2			.784
QLĐĐ3			.792
QLĐĐ4			.783
QLĐĐ5			.683
QLĐĐ6	.		.759
	Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.[a]		
	a. Rotation converged in 3 iterations		

Source: Compilation of the author's survey and research results

Similarly, EFA was conducted for the dependent variable using four observable scales. After a single round of testing, the results indicated the following: Bartlett's Test of Sphericity yielded a significance level of 0.000 (Sig = 0.000 < 0.05), and the Kaiser-Meyer-Olkin (KMO) measure was 0.832 (> 0.5), ensuring reliability. All observed variables had factor loadings greater than 0.5, so no variables were excluded from the analysis.

5.1.4. Regression Analysis

The authors examined the relationship between independent variables and dependent variables through a linear regression model, focusing on the impact of ethical leadership on employee voice. Based on the authors' calculations, the adjusted R^2 coefficient = 0.659 indicates that the linear regression model fits the dataset at a level of 65.9%. The ANOVA analysis of the regression model produced an F-value of 78.457 and a significance level (Sig) of 0.000 < 0.05, demonstrating the overall suitability of the regression model.

The results are presented in Table 7.

Table 7: The results of the linear regression model analysis.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Multicollinearity	
		B	Standard Error	Beta			Tolerance	VIF
1	(Constant)	.815	.176		4.754	.000		
	HMĐĐ	.109	.067	.132	3.706	.050	.545	2.392
	ĐXCB	.236	.043	.358	3.586	.000	.687	2.523
	QLĐĐ	.213	.045	.277	3.793	.000	.705	2.176
Dependent Variable: LTNV								

Source: Compilation of the author's survey and research results

5.2. Discussion of Research Findings

The regression analysis revealed significant positive correlations between all three ethical leadership dimensions and employee voice behaviors. Based on standardized Beta coefficients:

4. Fair Treatment of Employees showed strongest impact (β = 0.358)
5. Proactive Ethics Management demonstrated second-strongest influence (β = 0.277)
6. Leaders as Ethical Role Models exhibited meaningful impact (β = 0.132)

These findings align with previous research as Hassan (2015), confirming that ethical leadership positively influences employee voice through multiple mechanisms including fair treatment, ethical decision-making, and consistent modeling of ethical behavior. This behavior will make a positive impact to employees and promote the voice of employees in the organisation.

Additionally, the study identifies the extent of the influence of each factor within ethical leadership, providing management implications for leaders. However, the research does not analyze or test the effects of control variables such as age, gender, and work experience. Therefore, future studies should examine and clarify the role of these factors. Furthermore, as the analysis focuses on Vietnamese businesses with a relatively broad sample scope, it would be beneficial to divide the sample into different industries and regions to better highlight the characteristics of various types of businesses.

6. Management Implications

The research highlights how important ethical leadership is for encouraging employees to voice up. It's crucial for managers to enhance their ethical leadership skills so that employees recognize and feel this commitment within the organization. When employees perceive strong ethical leadership, they are more likely to feel safe and confident in sharing their concerns about any issues.

A key factor influencing employee voice is how fairly leaders treat everyone. Leaders should actively listen to their team and maintain open lines of communication. However, not all leaders find this easy. The most effective leaders consistently listen, engage, and build positive relationships with their employees, creating an environment where feedback flows freely. Regular conversations can break down barriers between managers and staff, allowing employees to express their views, ideas, and suggestions.

Leaders need to be fair, but fairness shouldn't be mistaken for treating everyone the same. Rather, it means that systems for rewards and consequences should be clear, specific, and impartial. When leaders act fairly, employees will see them as trustworthy, which encourages them to speak up about issues that could lead to positive changes in the organization.

Furthermore, leaders must actively uphold ethical standards by creating a clear framework that guides all employees in aligning their actions with the organization's values and legal obligations. It's important to communicate these ethical standards clearly, highlighting their significance. Leaders should hold employees accountable for acting ethically, especially in tasks that carry ethical weight, even when those tasks are challenging. They should also promote responsibility toward stakeholders and the community while opposing unethical practices.

Leaders need to keep employees informed about changes in policies and objectives, involve them in decision-making, seek their input on important matters, listen to their perspectives, and empower competent individuals. By doing so, employees will understand their role and influence within the organization, making them more responsible and willing to voice concerns, thus reducing silence around organizational issues.

Finally, leaders should act as ethical role models. This means maintaining a consistent ethical approach in their decisions and actions across all situations. Ethical leaders are characterized by their honesty and trustworthiness, as well as their efforts to promote ethical behavior among employees. They do this by clearly communicating

ethical standards, setting expectations, offering guidance, and fostering a sense of responsibility regarding ethical conduct. When issues arise that could harm the organization, employees will feel encouraged to speak up, motivated by the ethical values their leaders uphold.

While this study contributes valuable insights to both theory and practice, it has some limitations. First, the sample size was relatively small. Although we surveyed employees from various businesses in major cities in Vietnam, including a range of ages, business types, and work experiences, resource constraints limited the survey's reach to other areas. This may affect how representative and generalizable the findings are across Vietnam. Second, the measurement scale used to evaluate the research variables relied on subjective perceptions, which could influence the results.

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SUSTAINABLE TEXTILE AND GARMENT EXPORTS OF VIETNAM: CURRENT SITUATION AND SOLUTIONS

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Abstract: Vietnam's textile and garment industry, as a key export industry, makes an important contribution to economic growth and solves social security issues through job creation. However, towards the goal of sustainable development, Vietnam's textile and garment industry needs a strong transformation. This article focuses on analyzing key solutions to promote sustainable textile and garment exports, with a special emphasis on the main foundations of trade policy, environmental policy and labor policy in the context of international economic integration.

Keywords: policy, sustainable export, textile, Vietnam

INTRODUCTION

As a pillar in the export sector, Vietnam's textile industry has made significant contributions to GDP and social stability. However, the growing trend towards sustainable consumption and international integration demands an urgent shift toward a sustainable development model. This paper analyzes policies to promote sustainable export development of Vietnam's textile industry, evaluates the current situation, and proposes solutions. The introduction presents the theoretical foundation of sustainable development and the role of policies. Next, the paper examines the textile export situation from 2020 to 2023. Based on this, it highlights the challenges in achieving sustainable exports. The following important section evaluates the current policies, focusing on trade and environmental policies. Finally, the paper proposes solutions to improve policies, contributing to the sustainable export development of Vietnam's textile industry, enhancing its value and position in the international market.

1. Theoretical Foundation

1.1. Concepts of Sustainable Development, Sustainable Export Development, and Sustainable Textile Export Development

Sustainable development is a broad concept, defined in various ways, but the most common and widely accepted definition is from the World Commission on Environment and Development (WCED) of the United Nations: "Sustainable development is development that meets the needs of the present without compromising the ability of

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future generations to meet their own needs" (WCED, 1987, p. 41). Additionally, in Vietnam's Sustainable Development Strategy for the period 2011-2020 (Decision No. 432/QĐ-TTg, dated April 12, 2012, by the Government), it is defined as: "Sustainable development is development that meets the needs of the present, without hindering the ability of future generations to meet their needs, based on the close and harmonious combination of economic growth, social progress, and environmental protection."

The Institute of Strategy and Policy on Industry and Trade (2018) defines "Sustainable export development as the process of increasing exports based on enhancing the competitiveness of enterprises and products, deepening integration into the global value chain, while ensuring social responsibility and environmental protection according to international commitments and best practices."

According to Do Duc Binh, Tran Thuy Linh (2024), sustainable textile export development is defined as: "Developing textile exports to achieve goals of high and stable export growth in terms of speed and quality, while harmonizing export growth with social progress and environmental protection."

1.2. Criteria for Evaluating Sustainable Exports

The criteria for evaluating sustainable exports are based on the three main pillars of sustainable development: economic, social, and environmental. Specifically:

Economic Criteria are evaluated through indicators such as: Export Growth; Value-added in; Competitiveness; Market Diversification; Product Diversification; Investment Efficiency; Contribution to Economic Growth and Job Creation

Social Criteria include: Labor Conditions; Labor Rights; Human Resource Development; Corporate Social Responsibility; Impact on Local Communities.

Environmental Criteria include: Resource Efficiency; Pollution Reduction; Biodiversity Protection; Environmental Management; Environmentally Friendly Products.

1.3. Types of Policies in Sustainable Export Development

- **Tariff Policies**

Export Tariffs: The imposition of export tariffs on raw materials can limit the export of unprocessed materials, encouraging domestic processing and increasing the added value of export products. This contributes to sustainable development in terms of economics (increasing added value) and the environment (reducing resource extraction). However, excessively high export tariffs may reduce the competitiveness of domestic raw materials and affect industries that rely on these materials.

Import Tariffs on Raw Materials and Components: Reducing or exempting import duties on raw materials, machinery, and equipment for producing export goods—especially environmentally friendly materials—can lower production costs and enhance the competitiveness of export businesses. This also encourages businesses to use green materials and technologies (environmental aspect). For example, exempting import duties on recycled fibers and eco-friendly dyes.

Tax Incentives for High-Value, Environmentally Friendly Export Products: Encouraging businesses to invest in research and development (R&D), technological innovation, and the production of high-tech products that meet sustainability standards. This positively impacts all three aspects: economic, social, and environmental. For example, reducing corporate income tax for textile export companies using organic fibers that meet green product certification.

- **Non-Tariff Policies**

Export Quotas: Export quotas control the volume of exports to prevent over-exploitation of resources (environmental aspect) and stabilize domestic prices (economic aspect). However, they should be applied flexibly to avoid reducing exporters' incentives. **Export Licenses**: These help manage and closely control export activities, particularly for sensitive goods that may affect national security or the environment, ensuring responsible and sustainable exports. **Technical Standards and Food Safety Regulations**: These encourage businesses to improve product quality, ensure consumer safety, and build the reputation of export goods. Complying with these standards also means that businesses must pay more attention to environmental and social issues during production. **Trade Defense Measures**: These protect domestic industries from unfair competition practices such as dumping or subsidies, creating a level playing field for domestic industries to grow, which in turn indirectly promotes sustainable exports. For example, in 2003, the U.S. applied anti-dumping duties on t-shirt imports from Vietnam; Vietnam has also applied safeguard measures on imported yarn products to protect its domestic yarn industry.

- **Negotiation, Signing, and Implementation of Free Trade Agreements (FTAs)**: These help expand export markets, attract investment, promote institutional reforms, and raise labor and environmental standards. For example, under the EVFTA, many Vietnamese textile products enjoy preferential tariffs when exported to the EU, but must also comply with the EU's rules of origin, labor standards, and environmental requirements.
- **Trade Promotion**: This helps expand markets, build brands, and promote the export of sustainable products. For example, organizing trade fairs and exhibitions specializing in organic products and green, clean products.

2. Current Situation and Challenges of Sustainable Textile Export from Vietnam in 2020-2023

2.1. Current Situation of Vietnam's Textile Exports from 2020 to 2023

In 2020, the total export value of Vietnam's textile industry was approximately 35 billion USD, a decrease of 9.8% compared to 2019. Of this, textile exports reached 29.8 billion USD, down by 9.2%. In 2021, the export value of the entire textile industry reached 40.3 billion USD, an increase of 15.2% compared to 2020. For garments, the export value was 32.8 billion USD, up by 9.9% compared to 2020. Exports to the U.S. and ASEAN markets became the key drivers for the growth of this sector.

In 2022, the export value of the entire textile industry reached 42.3 billion USD, with garment exports accounting for 37.6 billion USD, a 14.7% increase compared to 2021. Essentially, Vietnam's garment exports continued to rise compared to 2021, driven by strong growth in key markets such as the U.S., EU, Japan, and South Korea.

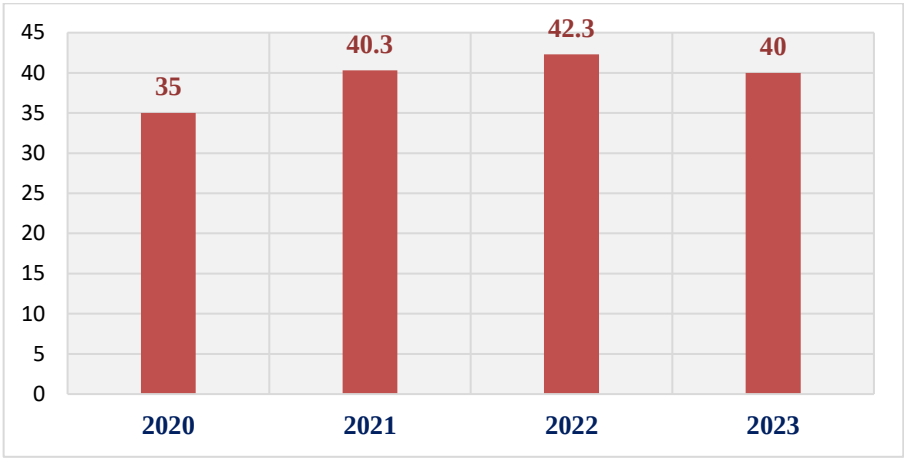

Figure 2.1. Total textile and garment export turnover of Vietnam

Unit: Billion USD

Source: Import and Export Report - Ministry of Industry and Trade

In 2023, the textile industry faced a challenging period due to significant impacts from geopolitical instability, rising inflation, which led to tighter consumer spending on non-essential goods, and high inventory levels, resulting in a sharp decline in both textile orders and unit prices. By the end of 2023, the total export value of the entire textile industry reached 40 billion USD, while global textile demand dropped by 8% (700 billion USD). In Vietnam, the textile industry also recorded negative growth, with textile exports in 2023 decreasing by 11.4%, reaching 33.3 billion USD. The three main export markets for Vietnam in 2023 accounted for the following proportions: 43% to the U.S., 12% to Japan, and 11% to other regions.

2.2. Challenges to Sustainable Textile Export Development

Vietnam's textile industry is facing fierce competition from other countries in the international market.

- **Competition from Other Countries:**

Competition from China: China holds a dominant market share globally due to its advantages of large-scale production, a complete supply chain, and relatively competitive labor costs, despite the increase in costs, particularly in the mid-segment production capacity. According to the WTO, China accounted for approximately 31.7% of the global textile export market share in 2022. According to the Vietnam Textile and Apparel Association, in the first half of 2023, Vietnam's textile exports to China were only 1.8 billion USD, while imports from China amounted to 6.3 billion USD. **Competition from Bangladesh:** Bangladesh benefits from low labor costs, favorable policies for the textile industry, and particularly enjoys GSP (Generalized System of Preferences) benefits when exporting to the EU. Bangladesh is a direct competitor to Vietnam in the low-cost garment segment. In 2022, Bangladesh exported approximately 45 billion USD worth of garments, surpassing Vietnam (around 44 billion USD) to become the second-largest garment exporter in the world after China. The average minimum wage for garment workers in Bangladesh is about 95 USD/month (2023), while in Vietnam it ranges from 150 to 200 USD/month. **Competition from India:** India has a long-established textile industry, with abundant cotton supplies, competitive labor costs, and increasing investments in technology and automation. Furthermore, there is competition from other ASEAN countries like Cambodia, Myanmar, and Indonesia; Competition from Turkey and

African Countries.

- **Increasing Demands for Social and Environmental Responsibility from Import Markets:**

Developed markets like the EU, the U.S., and Japan are setting high standards for the sustainable development of Vietnam's textile exports. Specifically, these challenges include: (i) Increased Costs: Investment in cleaner production technologies, waste treatment, sustainable raw materials, and certification costs; (ii) Transparency and Traceability Requirements: (iii) Changes in Supply Chains: (iv) Competitiveness and Awareness of Enterprises:

- **Dependence on Imported Raw Materials:**

This is a major challenge for the sustainable development of Vietnam's textile exports, especially amid fierce competition and rising demands for social and environmental responsibility. According to the Vietnam Textile and Apparel Association, around 60% to 70% of raw materials for the textile industry are imported, including cotton, fibers, yarns, fabrics, chemicals, dyes, and other apparel accessories. Additionally, China is the largest supplier of textile raw materials to Vietnam, accounting for a significant share of total imports.

- **Low Labor Productivity:**

According to the General Statistics Office of Vietnam, in 2022, the average labor productivity in Vietnam was estimated at 188.1 million VND per worker (approximately 8,083 USD per worker). Meanwhile, labor productivity in the manufacturing and processing industry (including textiles) was 273.9 million VND per worker (around 11,740 USD). While this is higher than the national average, it is still much lower than other countries in the region. According to the World Bank, the labor productivity of Vietnam's textile sector is only about 1/5 of that in China and 1/3 of that in Malaysia.

- **Impact of Climate Change:**

Climate change will directly affect the textile industry (e.g., water shortages, impact on raw material supply, production disruptions due to natural disasters, increased energy costs) and indirectly (e.g., reduced labor productivity, changing market demand, pressure from environmental regulations, and competition for resources). Climate change poses significant challenges for Vietnam's textile industry in securing raw materials, maintaining production, meeting environmental requirements, and competing in the global market. However, it also presents an opportunity for the industry to transition to a greener, more sustainable production model, applying energy-saving technologies, conserving resources, reducing emissions, and enhancing competitiveness.

3. The Current Situation of Sustainable Export Development Policies for Vietnam's Textile Industry

3.1. Trade Policies

- **Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP):**

The CPTPP has positively impacted Vietnam's textile industry by expanding markets, providing tariff preferences, promoting investment, and raising labor and environmental standards. The "yarn-forward" origin rule, although challenging, also acts as a driving force for the development of an internal supply chain within the agreement's member countries.

Table 3.1: Textile Export Value to Some CPTPP Markets

Unit: Billion USD

Year	Japan	Canada	Australia	Mexico	Total CPTPP
2018	3.8	0.8	0.5	0.2	5.3
2019	4.2	1.1	0.6	0.3	6.2
2020	3.9	1.0	0.5	0.3	5.7
2021	4.0	1.3	0.7	0.4	6.4
2022	4.5	1.5	0.8	0.5	7.3

Source: Ministry of Industry and Trade

After the CPTPP agreement came into effect (2019), Vietnam's textile export value to CPTPP markets, particularly Canada and Australia, has increased. However, the utilization rate of tariff preferences remains limited due to challenges in meeting the origin rule. According to the Ministry of Industry and Trade, the utilization rate of the Certificate of Origin (C/O) under the CPTPP for textile exports was only around 25-30% in 2022. This is because Vietnamese enterprises are still heavily reliant on imported raw materials, particularly from China, a non-member of the CPTPP.

- **Vietnam-European Union Free Trade Agreement (EVFTA):**

The EVFTA has eliminated most tariffs for Vietnamese textile exports to the EU, providing a significant competitive advantage. The agreement also includes provisions regarding labor and environmental standards, encouraging sustainable development in the textile sector.

Table 3.2: Textile Export Value to the EU

Unit: Billion USD

Year	Export Value	Growth Compared to the Same Period (%)
2019	4.3	-2.5
2020	3.8	-11.6
2021	4.0	5.3
2022	4.9	22.5

Source: Ministry of Industry and Trade

After the Vietnam-EU Free Trade Agreement (EVFTA) came into effect in August 2020, the textile export value to the EU recovered and experienced strong growth in 2022. The utilization rate of the Certificate of Origin (C/O) under the EVFTA for textile exports was approximately 40% in 2022. However, to benefit from tariff preferences, businesses need to meet labor and environmental standards and use materials sourced from member countries or those recognized under the agreement.

- **Regional Comprehensive Economic Partnership (RCEP):**

The RCEP, which came into effect on January 1, 2022, has had an unclear impact so far. However, it is expected to help Vietnam diversify its supply of raw materials, reduce logistics costs, and boost exports to markets such as China, Japan, and South Korea.

3.2. Tax Policies

Export Tax:

Most textile products enjoy a 0% export tax rate, which facilitates export activities.

However, to maximize the effectiveness of this policy, it is essential to further refine related policies, such as import tax policies for raw materials, trade promotion policies, human resource development policies, and especially policies to develop the supporting industries.

Import Tax on Raw Materials:

It can be seen that some raw materials that are not produced domestically or are insufficient to meet demand still face import taxes, which increases production costs and reduces competitiveness. The import tax rates on certain types of fabric and materials remain relatively high.

Regulations on Emissions:

Regulations concerning pollutant concentrations in emissions from boilers, generators, dryers, and other equipment in textile factories are set out in the National Technical Regulation on Industrial Emissions (QCVN 19: 2009/BTNMT). Before these regulations were implemented, dust concentrations in textile production areas often exceeded the permissible limits by 1 to 3 times. After 10 years of enforcement, the levels of dust and gases such as SO2 and NOx in industrial zones, including those involved in textile activities, have significantly decreased. However, further efforts are still required for control in some areas. In 2020, over 70% of large textile enterprises had invested in exhaust gas treatment systems. Common technologies include electrostatic dust filtration, fabric bag dust filtration, and activated carbon absorption for gas treatment.

Regulations on Solid Waste: Solid waste classification, collection, and disposal are regulated under Decree No. 40/2019/ND-CP. The policy encourages the recycling and reuse of solid waste, such as fabric scraps and fiber waste. It also mandates proper management of sludge from wastewater treatment systems, ensuring it is treated according to regulations and not directly discharged into the environment.

Regulations on Chemical Usage: Vietnam has established a list of chemicals restricted or banned in the textile industry, in line with the EU's REACH standards and the United States. This is outlined in Circular No. 21/2017/TT-BCT, issued on October 23, 2017, which sets the allowable levels of formaldehyde and aromatic amines that may be released from azo dyes on textile products. Additionally, regulations on chemical usage, environmental impact assessments, and eco-labeling standards are also in place to ensure environmentally responsible production.

Policies Promoting Cleaner Production and Circular Economy: Vietnam has adopted several policies promoting cleaner production and circular economy practices. This is reflected in the Cleaner Production Strategy for Industry until 2020 (Decision No. 1419/QĐ-TTg, September 7, 2009), the National Target Program for Energy Efficiency and Conservation (2019-2030), the Environmental Protection Law 2020, and Decision No. 687/QĐ-TTg (June 7, 2022), which approved the Circular Economy Development Plan in Vietnam.

In collaboration with the UNIDO, the Ministry of Industry and Trade has implemented the "Cleaner Production Strategy" project, helping textile companies reduce energy and material costs by an average of 10-20% while decreasing waste by 20-30%. Thanks to these policies, the textile industry has significantly reduced wastewater and air emissions, minimized environmental pollution, and improved economic efficiency. The industry has also achieved value-added benefits from waste, raised awareness and capacity, and enhanced the industry's reputation.

These measures have contributed to a more sustainable and environmentally friendly textile sector, with a focus on energy efficiency, reduced emissions, and the promotion of circular economy practices.

4. Some Solutions to Promote Sustainable Development of Vietnam's Textile and Garment Export Sector

The textile and garment industry plays a key role in Vietnam's export turnover, job creation, and economic growth. However, the industry faces numerous challenges in the context of deep international integration and the global trend toward green transformation. To achieve sustainable development in this sector, Vietnam needs to implement comprehensive policy solutions to enhance competitiveness, meet international standards, and protect the environment.

Firstly, effectively exploiting incentives from FTAs. Vietnam has signed many important FTAs such as CPTPP, EVFTA, UKVFTA, RCEP, bringing many tariff incentives for textile and garment products. However, the level of utilization of incentives is still low due to many reasons such as lack of information, difficulties in meeting rules of origin, and limited competitiveness. Therefore, (i) strengthen propaganda and dissemination of information about FTAs such as organizing seminars, training, providing detailed information about incentives and regulations of each FTA for textile and garment enterprises. Build a specialized electronic information portal on FTAs, easy to look up and update; (ii) Support enterprises to meet rules of origin including simplifying procedures for granting certificates of origin of goods (C/O); Support training and consulting for businesses on rules of origin, especially complex rules of origin such as "trade union code conversion" (CTC) or "value percentage" (LVC); Build a database of input materials, support businesses in tracing origins; Promote the development of the textile and garment support industry to increase the localization rate, easily meet the rules of origin, (iii) Improve competitiveness for businesses: Implement programs to support businesses in improving management capacity, applying technology, innovation, improving product quality, building brands,... to take advantage of incentives from FTAs more effectively; (iv) Establish a specialized focal point for FTAs in the Textile and Garment Association: Help businesses update information, answer questions, and support in resolving problems related to FTAs.

Second, Negotiating and signing new trade agreements: Although Vietnam has participated in current and potential agreements such as CPTPP and EVFTA, UKVFTA and RCEP. However, to develop sustainable exports, Vietnam can consider negotiating and signing new trade agreements or expanding existing agreements. Specifically, (i) Vietnam can negotiate a Vietnam-US Free Trade Agreement (Bilateral FTA). The United States is currently Vietnam's largest textile and garment export market, but the two countries do not have a bilateral FTA. A bilateral FTA will help reduce tariffs, further facilitate textile and garment exports to the US market, and create a framework for closer cooperation in areas such as labor, environment and intellectual property. However, Vietnam-US trade relations still have some potential problems such as trade deficit, currency and labor issues. Negotiating a bilateral FTA will require great efforts from both sides; (ii) Free trade agreements with Latin American countries. Latin American countries such as Brazil, Argentina, Chile, etc. are potential markets for Vietnamese textiles. Signing FTAs with these countries will help diversify export markets, reducing dependence on some traditional markets. However, the challenges with this agreement

are geographical distance, differences in business culture and legal systems; (iii) Free trade agreements with Middle Eastern and African countries: in terms of potential, these are regions with large populations and increasing demand for textiles. Countries such as the United Arab Emirates (UAE), Saudi Arabia, Egypt, South Africa, etc. can be important trade partners of Vietnam, however, the challenges are political risks, security instability in some countries, differences in business culture, lack of market information; (iv) Participate in new economic cooperation initiatives such as the Indo-Pacific Economic Framework for Prosperity (IPEF): IPEF is led by the United States, focusing on areas such as digital trade, supply chains, clean energy, and anti-corruption. Participation in IPEF can open up cooperation opportunities for Vietnam's textile and garment industry, especially in the fields of digital transformation and sustainable development; (v) Expand and upgrade existing FTAs, such as CPTPP, which will promote membership expansion, especially the accession of the United States, to increase benefits from the agreement; RCEP: Actively participate in cooperation activities within the RCEP framework, taking advantage of opportunities from the regional supply chain; EVFTA: Consider negotiating to expand the scope of EVFTA commitments, including new areas such as financial services, etc.

Third, (i) perfecting environmental policies, specifically building a roadmap and supporting businesses to transition to a circular economy model. The Government and relevant authorities need to develop and promulgate standards and guidelines on circular design, recycling, reuse, and selection of sustainable materials; Establishing a circular conversion support fund to support businesses in investing in technology, equipment, research and development of circular solutions; Creating a market for recycled and reusable products by encouraging the use of recycled materials in textile production, developing a market for second-hand textile products; Promoting public-private partnership by encouraging cooperation between research institutes, universities, businesses and the state in developing and applying circular economy solutions; (ii) Strengthen inspection and supervision of the implementation of environmental protection regulations, specifically applying information technology in environmental monitoring by using automatic monitoring systems, surveillance cameras, and environmental data management software; Establishing an independent monitoring mechanism with community participation by encouraging the participation of people and social organizations in monitoring environmental protection activities of enterprises; Strictly handling violations with strong enough sanctions, with deterrent effects, including suspension of operations and revocation of licenses for enterprises with serious violations; (iii) Applying economic tools to encourage enterprises to reduce pollution, specifically applying the principle of "polluters must pay", enterprises that cause pollution must bear the costs of handling the pollution they cause; Carbon tax: Applying carbon tax to enterprises that emit a lot of greenhouse gases; Emission trading system by setting emission quotas for businesses and allowing them to trade quotas with each other; Tax incentives for businesses investing in clean, environmentally friendly technology and interest rate support for loans invested in environmental protection projects; (iv) Building concentrated textile and garment industrial parks with modern, specific wastewater treatment systems; planning textile and garment industrial parks in suitable locations, away from residential areas, domestic water sources, and environmentally sensitive areas; Applying advanced wastewater treatment technologies by using combined biological,

physical and chemical technologies to improve treatment efficiency; Reusing treated wastewater such as irrigation and industrial cleaning; Requiring businesses in industrial parks to connect to a centralized wastewater treatment system and closely monitoring the operation of the centralized wastewater treatment system.

Finally, the solutions for sustainable development of Vietnam's textile exports related to labor training include several important aspects. First, training specialized skills for workers, such as textile technology, production management, and new technologies, helps improve their expertise, increase labor productivity, and enhance product quality. In addition, soft skills training such as communication and teamwork is essential to improve work efficiency and the working environment. Textile enterprises can collaborate with vocational schools and international organizations to provide high-quality training programs on international production standards and sustainability requirements. Moreover, training in new technologies, particularly smart textiles and eco-friendly production, also contributes to improving competitiveness and reducing production costs. Training in sustainability, environmental standards, and social responsibility is crucial to raise awareness among workers and managers about environmental protection and improving working conditions. Lastly, leadership training for managers helps create a positive working environment and promotes sustainable development throughout the textile industry. These solutions not only foster sustainable export growth but also bring long-term benefits to both businesses and workers.

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RESEARCH ON FACTORS AFFECTING CORPORATE INCOME TAX EVASION BEHAVIOR IN LISTED ENTERPRISES IN VIETNAM

Tran Thi Thuy Trang[1], Nguyen Thi Chinh[2]

Summary: This study aims to investigate and measure the impact of business characteristics on tax avoidance behavior for enterprises in Vietnam listed on the stock exchange from 2015 to 2023. The sample used in the study includes 4,875 observations from a sample of 542 enterprises over a period of 9 years. The analytical techniques used are linear regression analysis, OLS, FEM-REM and GLS estimation models. The results of this study show that factors such as business size, business age, financial leverage, and profit margin all have an impact on tax avoidance. In which, financial leverage has an inverse impact on tax avoidance behavior while the remaining factors have a positive impact on tax avoidance of enterprises.

Keywords : tax avoidance behavior, business size, business age, financial leverage, profit margin...

Abstract: This study aims to investigate and measure the impact of firm characteristics on tax avoidance behavior for enterprises in Vietnam listed on the stock exchange from 2015 to 2023. The sample used in the study includes 4,875 observations from a sample of 542 enterprises over an 9 year period. The analytical techniques used are linear regression analysis, OLS, FEM-REM and GLS estimation models. The results of this study show that the factors of firm size, firm age, financial leverage, and profit margin all have an impact on tax avoidance. In which, financial leverage has a negative impact on tax avoidance behavior while the remaining factors have a positive impact on tax avoidance of enterprises.

Keywords : tax avoidance behavior, firm size, firm age, financial leverage, profit margin…

1. INTRODUCE

Tax payment is a manifestation of state obligations and taxpayers' participation to directly and jointly fulfill tax obligations for state finances and national development. Many efforts have been made to optimize tax revenue, but the government has encountered obstacles in optimizing tax revenue. There are several obstacles that make tax collection in Indonesia ineffective, one of which is that taxpayers seek to manage their tax liabilities through both tax evasion and tax avoidance (Hidayat & Kadarisman, 2023).

Tax avoidance is a form of tax management that a company can legally perform. With tax planning activities, the structured action on the tax burden is made to the lowest possible level by using the existing rules to increase the after-tax profit, which has the effect of increasing the value of the company (Ichsani & Susanti, 2019). From the government's point of view, if the amount of tax paid by the taxpayer is less than the amount they have to pay, the state's revenue from the tax sector will decrease, while from the company's point of view, tax is one of the cost components that reduces the company's

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profit (Sarra, 2017). This difference in interests can cause obstacles in tax revenue, so there are always efforts to reduce the amount of tax paid by the taxpayer.

In Vietnam, the stock market is growing and the number of listed enterprises is increasing significantly. However, there have not been many in-depth studies on tax avoidance behavior in this group of enterprises, especially in the context of many shortcomings in tax regulations. The research results are the basis for other studies or policy proposals to improve the transparency and efficiency of the tax system. (Nguyen Thi Minh Hue and Dang Tung Lam, 2017).

The objective of this study is to identify factors affecting corporate income tax avoidance behavior. From there, some solutions are proposed to improve the ability to avoid corporate income tax in the stock market in Vietnam. At the same time, it also helps businesses and management agencies to make more informed decisions and policies and understand the benefits and harms of tax avoidance based on the knowledge provided in the study. The structure of the article includes 5 main contents: introduction, theoretical basis and research overview, research methods, research results and discussion, conclusions and recommendations.

2. THEORETICAL BASIS AND RESEARCH OVERVIEW

2.1. Theoretical basis.

Allingham and Sandmo (1972) tax evasion deterrence model describes that individual taxpayers attempt to maximize the utility of tax evasion by considering three main factors: the probability of being caught, the penalty, and their degree of risk aversion. Tax evasion is a risky choice. Therefore, individuals should favor tax evasion as long as the potential gains are expected to be greater than the potential losses, but their choice of tax evasion will be adjusted according to their degree of risk aversion. As pointed out in prospect theory, individuals may value incremental losses more than incremental gains. The asymmetry between utility costs and benefits may limit individual taxpayers from achieving optimal tax evasion.

The research is based on the theoretical thesis on factors affecting corporate income tax avoidance (Nguyen Diem Thi, 2018). Tax avoidance is the act of taking advantage of legal methods through which individuals and businesses can exploit loopholes in tax regulations with the goal of minimizing the amount of tax payable by an individual or any business. It is done by making the most of reasonable expenses, restructuring transactions in the direction of reducing tax obligations, such as buying local bonds, using tax deductions and taking advantage of tax incentives (Desai & Dharmapala, 2009).

Deterrence theory may not be applicable to corporate taxpayers, especially large public companies that are owned by shareholders but run by managers (Slemrod 2004; Slemrod 2007). In the context of tax evasion, risk-averse managers may be assumed to execute elaborate plans on behalf of risk-neutral owners (Chen and Chu 2005). Given the complexity arising from the multiple stakeholders involved in corporate tax evasion, deterrence theory for individual taxpayers may not be transferable to corporate taxpayers. Several studies provide analytical insights into corporate tax evasion based on agency theory (Chen and Chu 2005; Crocker and Slemrod 2005; Desai and Dharmapala 2006; Desai et al. 2007).

Chen and Chu (2005) focus on how influential or dominant shareholders can induce managers to engage in tax evasion, which may be illegal. In the optimal contract, managers' compensation is linked to positive business outcomes including reduced tax

liability. Managers may exploit such opaque internal control systems to extract rents. Accordingly, according to deterrence theory, individual taxpayers will choose to evade taxes as long as the expected marginal benefit of tax evasion is greater than the expected marginal benefit of punishment if caught. On the other hand, corporate shareholders need to have expected marginal benefits from tax evasion large enough to offset both the expected marginal utility of punishment and the loss of efficiency in the internal control system.

Desai and Dharmapala (2006), Desai et al. (2007) analyzed the role of corporate governance in corporate taxation. Desai and Dharmapala (2006) proposed a link between tax avoidance and corporate governance. Managers' attempts to reduce tax liability through tax avoidance will result in an opaque internal control system that does not disclose illegal transactions used. Accordingly, shareholders will not consider tax avoidance as the best option to improve firm value unless there is strong corporate governance. Desai et al. (2007) extended Desai and Dharmapala (2006) by analyzing the interaction between corporate taxation and corporate governance using three stakeholders: tax authorities, insiders, and shareholders. The impact of increasing tax rates on government tax revenue will vary depending on the strength of corporate governance.

2.2. Research Overview

Tax avoidance means reducing tax liability and that increases the profit level for the business. Businesses can save a significant amount of money through tax avoidance to use them for investment, development, and expansion of production and business.

Tax evasion can cause legal risks. When these acts are investigated by tax authorities and found to have serious errors, the enterprise will be punished according to the provisions of the law, typically by fines, tax collection or even criminal prosecution. For society, tax evasion reduces state budget revenue, causes imbalance between revenue and expenditure, and causes loss of national resources. From there, it causes economic recession due to insufficient revenue to cover expenditure, limiting aspects of social development such as infrastructure, transportation, bridges, health and public services (Christensen and Murphy, 2004).

We develop and describe a new measure of long-term corporate tax avoidance based on the ability to pay a low cash tax per dollar of pretax income over the long term. In a sample of 2,077 firms, we find significant cross-sectional variation in tax avoidance. We also find that the annual effective cash tax rate is not a good predictor of the long-term effective cash tax rate and, therefore, is not an accurate proxy for long-term tax avoidance (Dyreng, Hanlon, & Maydew, 2008).

Results from qualitative research through case study method, the study discovered new factors that directly and indirectly affect the application of VAS 17, which are accounting psychology and accounting software quality. Factors inherited from previous studies such as enterprise size, independent audit, accounting staff capacity, professional organization consulting support, tax pressure. From the results of qualitative research, the author analyzed by quantitative method and the results are presented in the next section (Nguyen Thi Thu Hoan, 2020).

By using the survey method, descriptive statistics and exploratory factor analysis (EFA), the research results show that there are 8 groups of factors related to tax management and business characteristics that affect tax compliance of enterprises at

different levels of importance, including: (1) Quality of public tax services, (2) Psychological characteristics of enterprises, (3) Handling of tax violations, (4) Characteristics of business operations, (5) Tax inspection and audit, (6) Application of information technology in tax management, (7) Propaganda and support and (8) Management of tax registration, termination, collection and settlement of tax complaints and denunciations (Ms. Bui Thi Thu Thao, 2019).

This study critically reviews the accounting literature on tax evasion, focusing on theories of corporate tax evasion as well as empirical proxies for tax evasion. Some empirical proxies for corporate tax evasion are calculated using financial reporting variables, but their relevance is limited to firms engaging in compliant tax evasion that reduces both book and taxable income. In addition, tax evasion and uncertain tax benefits can be used as reasons for active tax evasion.

3. RESEARCH METHODS

3.1. Research model

Based on the fundamental theory and results of studies related to factors affecting corporate income tax avoidance, a research model is proposed with the following 7 factors:

The "Return on Equity (ROE)" factor

Profit was chosen as the intervention variable because, in general, when a company's profit increases, the amount of tax payable also increases, leading to a tendency for the company to engage in tax avoidance behavior. Dewinta & Setiawan's (2016) study found that profit has a positive impact on tax avoidance behavior. However, some other studies, such as Irianto, Sudibyo & Wafirki (2017), found that return on equity (ROE) has no significant effect on tax avoidance behavior.

Therefore, the author proposed the research hypothesis H1 as follows:

H1: Return on equity has a positive impact on income tax avoidance behavior in listed enterprises on the Vietnamese stock market.

Factor "Return on Assets (ROA)"

Previous studies, such as Aminah, Chairina & Sari (2018), Rego (2003), and Jihene & Moez (2019), have shown that return on assets (ROA) has a positive impact on tax avoidance behavior. Similarly, Dewinta & Setiawan (2016) also argued that when ROA increases, corporate profits increase, leading to an increase in total income tax payable, thereby encouraging businesses to engage in tax avoidance behavior. However, contrary to the above conclusions, studies by Putri & Suryarini (2017) and Sunarsih, Haryono & Yahya (2019) showed that ROA has a negative correlation with tax avoidance behavior, based on the analysis results from multiple linear regression models.

Therefore, the author proposed the research hypothesis H2 as follows:

H2: Return on total assets has a positive impact on income tax avoidance behavior at listed enterprises on the Vietnamese stock market.

The factor "Company's Age (AGE)"

Mahanani & Titisari (2016), Dewinta & Setiawan (2016), and Le Khac Hoan (2023), Asalam, Ardan Gani,Tazkiyaturohmah, Devy, 2016-2020), Farizky, Aisyah Chairunnisa Fatihah Setiawati, Erma (2023) used the variable AGE, representing the age of the enterprise, calculated in years from its establishment to the time of the study, for analysis. The results showed that the age of the enterprise has an impact on tax avoidance behavior and there is a proportional relationship, that is, the older the enterprise, the more tax

avoidance behavior increases.

Nguyen Tan Tien 's (2017) study shows that the age of a business is inversely correlated with tax avoidance behavior. Accordingly, long-standing businesses are often not willing to trade reputation and brand to avoid taxes, especially when this behavior is at risk of being detected by authorities or the public. Similarly, Nguyen Tan Luong (2017) also asserts that tax avoidance behavior decreases as businesses age, because these businesses often perform less tax avoidance behavior than newly established businesses.

Therefore, the author proposed the research hypothesis H3 as follows:

H3: Enterprise age has a positive impact on income tax avoidance behavior in enterprises listed on the Vietnamese stock market.

*Factor "*Enterprise size (According to revenue) *(Ln)"*

The larger the scale of the enterprise, the easier it will be to attract capital from outside, helping the enterprise expand its scale of operations and increase profits. Expanding the scale not only creates advantages in reducing input costs in production and business activities, reducing information asymmetry and agency costs, but also brings opportunities to increase profits. Moreover, large scale helps enterprises affirm their position in the market, thereby expanding the ability to consume products, increasing revenue and continuing to increase profits (Le Hoang Vinh & Nguyen Ngoc Son, 2017; Nguyen Hoang Anh & Vu Hoang Phuc, 2021; Dwi Kartikasari & Marisa Merianti, 2016; Nguyen Tan Tien, 2017).

Therefore, the author proposed the research hypothesis H4 as follows:

H4: Enterprise size on net revenue has an inverse impact on income tax avoidance behavior in enterprises listed on the Vietnamese stock market.

*Factor "*Enterprise size (According to assets) *(LnTA)"*

The larger the scale of the enterprise, the easier it is to attract attention and investment from domestic and foreign partners through joint ventures and partnerships. These activities help enterprises supplement assets, especially fixed assets with modern technology, thereby improving production and business efficiency. At the same time, enterprises can take advantage of the management level, asset resources and market of partners to increase value. These factors play an important role in increasing the overall value of the enterprise (Dwi Kartikasari & Marisa Merianti, 2016; Vo Minh Long, 2017; Nguyen Hoang Anh & Vu Hoang Phuc, 2021; Cahyono, Andini & Raharjo, 2016).

Therefore, the author proposed the research hypothesis H5 as follows:

H5: Enterprise size in total assets has a positive impact on income tax avoidance behavior in enterprises listed on the Vietnamese stock market.

Factor "Return on Sales (ROS)"

According to the research of Alfina, Nurlael & Wijayanti (2018) and Sunarsih, Haryono & Yahya (2019), financial leverage has a positive impact on tax avoidance behavior. Similarly, the research of Nguyen Hoang Anh & Vu Hoang Phu (2021) also shows that ROS is in the same direction as tax avoidance behavior at enterprises on the UPCOM floor. In addition, Quyen Phan (2017) pointed out that ROA has a positive relationship with tax avoidance behavior of enterprises. Thereby, affirming the positive relationship between profit factors and financial leverage with tax avoidance behavior of listed enterprises.

Therefore, the author proposed research hypothesis H6:

H6: Return on sales (ROS) has a positive impact on income tax avoidance behavior

in listed enterprises on the Vietnamese stock market.

The "Financial Leverage (Lv)" factor

According to the research of Tran Thi Tam Nguyen & Truong Dong Loc (2018) and Lang et al. (1996), financial leverage is negatively correlated with the level of investment and business activities of companies, especially in companies with low growth opportunities. The reason is that the pressure of high interest costs forces businesses to cut investment to minimize liquidity risk. Mariyani Putri Umar and co-authors (2020) also pointed out that high financial leverage (high debt ratio) has a negative impact on tax avoidance behavior, showing that the relationship between financial leverage and tax avoidance behavior is not positive.

Therefore, the author proposed research hypothesis H7:

H7: Financial leverage (Lv) has an inverse effect on income tax avoidance behavior at listed enterprises on the Vietnamese stock market.

Based on the theory, overview of research works, and proposed hypotheses, we have proposed the following research model:

$$CETR = \alpha + \beta_1 ROE + \beta_2 ROA + \beta_3 AGE + \beta_4 Ln + \beta_5 LnTA + \beta_6 ROS + \beta_7 Lv$$

Figure 1: Proposed research model

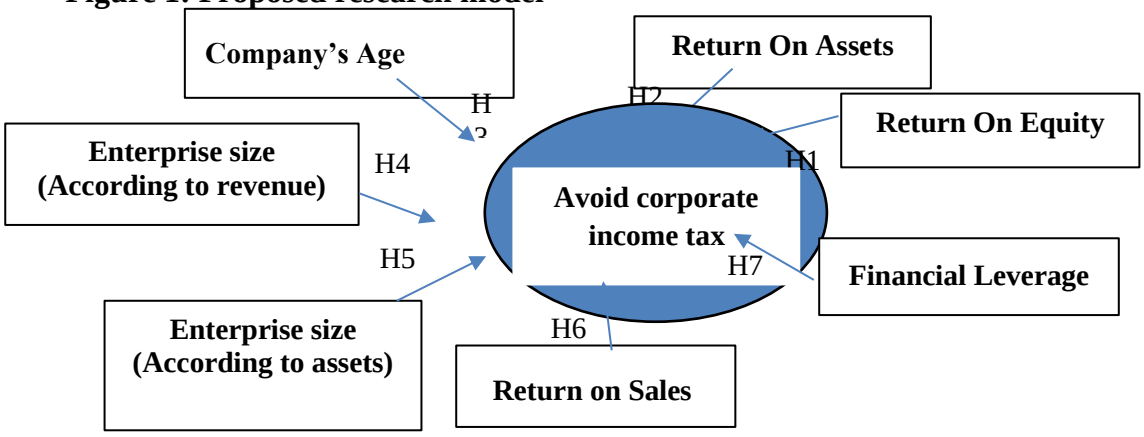

Table 1: Definition and measurement table of variables in the model

Variable	Define	Describe	Relationship	Source
CETR	Avoid corporate income tax	Pay Tax/ EBIT		Le Khac Hoan (2023), Asalam, Ardan Gani,Tazkiyaturohmah, Devy, 2016-2020), Farizky, Aisyah Chairunnisa Fatihah Setiawati, Erma (2023)
ROE	Return On Equity	Earnings/ Equity	+	(Dewinta & Setiawan, 2016), (Irianto, Sudibyo, & Wafirki, December 2017).
ROA	Return On Assets	Earnings/ Assets	+	Aminah, Chairina, & Sari (2018), Rego (2003) and Jihene & Moez (2019), Dewinta & Setiawan (2016), Putri & Suryarini (2017) and

				Sunarsih, Haryono & Yahya (2019).
AGE	Company's Age	Year of Analysis - Year of Establish	+	Mahanani & Titisari (2016), Dewinta & Setiawan (2016) and Le Khac Hoan (2023), Nguyen Tan Tien (2017), Nguyen Tan Luong (2017).
Ln	Enterprise size (According to revenue)	Log (Revenue)	+	(Dwi Kartikasari, Marisa Merianti (2016)), (Vo Minh Long, 2017), (Nguyen Hoang Anh, Vu Hoang Phuc, 2021), (Cahyono, Andini & Raharjo, 2016).
LnTA	Enterprise size (According to assets)	Log (Assets)	+	(Dwi Kartikasari, Marisa Merianti (2016)), (Vo Minh Long, 2017), (Nguyen Hoang Anh, Vu Hoang Phuc, 2021), (Cahyono, Andini & Raharjo, 2016).
ROS	Return On Sales	Operating Profit/ Net sales	+	Alfina, Nurlael & Wijayanti (2018) and Sunarsih, Haryono & Yahya (2019), Nguyen Hoang Anh & Vu Hoang Phu (2021), Quyen Phan (2017).
Lv	Financial Leverage	Liabilities/ Assets	-	Tran Thi Tam Nguyen & Truong Dong Loc (2018), Lang et al. (1996), Mariyani Putri Umar, Ratna Wijayanti Daniar Paramita, Muchamad Taufiq (2020).

Source: Author's synthesis

3.2. Data and data processing:

The study used secondary data sources collected on the Vietstock.vn website. The research data was processed and analyzed using Stata 17 software. The research team quantified panel data regression through the following models: Pooled least squares model (OLS), fixed effects model (FEM) and random effects model (REM). Then, the suitability between the models was compared and the most suitable model was selected. In addition, the research team also selected methods to test model defects, which were testing for heteroscedasticity, multicollinearity and autocorrelation of the selected model. These phenomena (if any) were corrected using the feasible generalized least squares method (FGLS).

4. RESEARCH RESULTS AND DISCUSSION

4.1. Descriptive statistical results

Table 2: Descriptive statistics table

Variable	Number of observations	Medium	Standard deviation	Minimum value	Maximum value
CETR	4,851	-0.2056576	0.5604083	-27.27054	7.318923

ROE	4,849	0.1547769	0.4724737	-30.5912	6.79
ROA	4,849	0.0813152	0.0720464	-0.6503	0.928
AGE	4,851	5	2.582255	1	9
Ln	4,851	11.84292	0.6831339	8.830379	14.48296
LnTA	4,851	11.87461	0.7284922	10.13727	14,648
ROS	4,851	3.326309	3.478626	0.7722066	61.26389
Lv	4,851	0.4526665	0.2147113	0.0163228	1.29499

Source: Data analysis results of the authors

For the CETR variable: Mean -0.2057, with a standard deviation of 0.5601, ranging from -27.2705 to 7.3189. This shows that some companies have very negative tax payments, but the mean is still negative, reflecting tax policy or tax incentives. ROE variable: Mean 0.1548 and standard deviation 0.4725, ranging from -30.5912 to 6.79. This index has a large dispersion, with many companies being inefficient, but the positive mean suggests that most companies are able to generate profits from their equity. ROA variable: Mean 0.0813, with a standard deviation of 0.0725, ranging from -0.6503 to 0.928. This shows that companies generate an average of 8.13% return on total assets. AGE variable: Average age is 5 years, standard deviation 2.5823, ranging from 1 to 9 years. This shows that companies in the market are quite young and have developed in the past 9 years. Ln variable: Average value is 11.8429, with standard deviation 0.6831, ranging from 8.8304 to 14.4830. The size of the business by revenue is large, showing the difference between companies. LnTA variable: Average 11.8746, standard deviation 0.7285, from 10.1373 to 14.6480, reflecting the size of the business by assets is quite large and has a certain dispersion. ROS variable: Average 3.3263, standard deviation 3.4786, ranging from 0.7722 to 61.2639. This ratio shows a large variation in the efficiency of revenue generation. Lv variable: Mean 0.4527, standard deviation 0.2147, ranging from 0.0163 to 1.2950. This indicates a moderate level of financial leverage, with some companies having very high debt-to-asset ratios. Overall, the data shows a clear differentiation among companies in terms of financial performance, size, and capital utilization strategy.

4.2. Correlation analysis results

Data table 3 describes the correlation between independent variables and dependent variables in the outlined research model including 7 independent variables and 1 dependent variable CETR. The author found that the correlation coefficient between pairs is not greater than 0.8, so it does not affect multicollinearity in the regression model. Therefore, in addition to correlation analysis, the author will analyze and test the variance inflation factor VIF.

Table 3: Correlation matrix results table

	CETR	**ROE**	**ROA**	**AGE**	**Ln**	**LnTA**	**ROS**	**Lv**
CETR	1,000							
ROE	0.010	1,000						
ROA	0.0535*	0.3672*	1,000					
AGE	-0.008	0.0362*	0.0539*	1,000				
Ln	-0.020	0.0343*	-0.0293*	-0.0742*	1,000			
LnTA	-0.0249*	0.009	-0.1154*	-0.0934*	0.8348*	1,000		
ROS	0.023	0.000	0.2579*	-0.0389*	-0.3217*	-0.2231*	1,000	
Lv	-0.0290*	-0.0425*	-0.4339*	0.0713*	0.3387*	0.2781*	-0.6712*	1,000

The correlation is statistically significant at the 10% level.

Source: Data analysis results of the authors

4.3. Regression analysis results:

The above regression table provides results from 4 models OLS, FEM, REM and FGLS, first,the author chooses the FEM model and the OLS model to test and uses the xtreg test (regression command on panel data), the regression result F=1.72, prob=0.000<1% so FEM is more suitable than OLS. Second, testing between REM and OLS, the author used the xttest0 model to test and gave the result p-value = 0.0000, which is less than 1%. Therefore, in this case, the REM model is more effective than the OLS model. Finally, comparing between FEM and PEM, the test showed that the statistical level is greater than 10%, so we will choose the REM model as more optimal through the Hausman test. However, the REM model is still not reliable because it can violate assumptions, defects such as heteroscedasticity or correlation,.... so we need to change to get the final result. To overcome this, the author uses the FGLS panel data model. After getting the results, the author will rely on this to comment as well as explain, compare with other studies. The above table also shows that the variables have high statistical significance, the ROA variable has high statistical significance in all models, especially in the FGLS model, $p < 0.01$, coefficient = 0.246, showing a large positive relationship with the dependent variable, ROE is only significant in the FGLS model, $p < 0.05$, coefficient = 0.022. The AGE variable also shows a small, but effective negative relationship, $p < 0.01$, coefficient = -0.002. The two variables Ln and LnTA are also only significant in FGLS. With Ln having a negative sign ($p < 0.01$, coefficient −0.017) and LnTA having a positive sign ($p < 0.01$, coefficient 0.013), ROS and Lv are not statistically significant in any model.

Table 4: Regression analysis results table

	OLS	**FEM**	**REM**	**FGLS**
ROE	-0.012	-0.013	-0.013	0.022 **
	(0.018)	(0.019)	(0.018)	(0.011)
ROA	0.459 ***	0.389 *	0.454 ***	0.246 ***
	(0.138)	(0.212)	(0.153)	(0.025)
AGE	-0.003	-0.004	-0.003	-0.002 ***
	(0.003)	(0.004)	(0.003)	(0.000)
Ln	-0.013	0.074	-0.006	-0.017 ***
	(0.023)	(0.063)	(0.028)	(0.003)
LnTA	-0.005	-0.095	-0.011	0.013 ***
	(0.021)	(0.087)	(0.025)	(0.002)
ROS	0.001	0.003	0.001	-0.000
	(0.003)	(0.004)	(0.003)	(0.000)
Lv	0.024	0.042	0.024	0.002
	(0.056)	(0.119)	(0.064)	(0.007)

_cons	-0.025 (0.155)	0.003 (0.914)	-0.043 (0.191)	-0.173 *** (0.018)
Observations	4849	4849	4849	4849
Adjusted R^2	0.002	-0.125		
Breusch Pagan			0.000	
Hausman		0.923		

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: Data analysis results of the authors

Through the model table showing the relationship between factors and corporate income tax avoidance behavior at listed enterprises in Vietnam is shown as follows:

CETR =0.018 + 0.011* ROE + 0.025*ROA + 0.003*Ln + 0.002LnTA + 0.007Lv

The return on equity (ROE) has a regression coefficient of 0.022 and is statistically significant at a relatively high level of 1%, so the return on equity has a positive impact on the factors affecting tax avoidance in the Vietnamese stock market. This result is consistent with the hypothesis set by a research group and similar to the study of Dewinta & Setiawan (2016), but contrary to the study of Irianto et al. (2017), which found that ROE does not significantly affect tax avoidance behavior.

The regression coefficient of return on assets (ROA) is 0.246 and has a positive result, so the return on assets has a positive impact on tax avoidance behavior of the factors affecting tax avoidance in the Vietnamese stock market. This result is consistent with the hypothesis set by the two research groups and is similar to the research of Dewinta & Setiawan (2016) and Rego (2003), which suggests that higher profits lead to increased tax avoidance motivation. However, this is contrary to some other studies such as Putri & Suryarini (2017), which suggests that ROA has a negative impact.

The age of the company (AGE) has a negative regression coefficient (-0.002) and is highly statistically significant ($p < 0.01$), showing that the age of the company has a negative impact on tax avoidance behavior. The results are consistent with studies such as Nguyen Tan Tien (2017) and Nguyen Tan Luong (2017), when long-standing businesses often focus on protecting their reputation and brand, thereby reducing tax avoidance behavior. The above results have rejected hypothesis 3 that the research team put forward.

Enterprise size by revenue (Ln) has a regression coefficient of -0.017 and a relatively high statistical significance of 1%, so enterprise size has a negative impact on the value of CETR. It shows that the larger the enterprise size by revenue, the lower the tax avoidance of enterprises listed on the stock market. This result is consistent with the hypothesis set by the 4 research groups and similar to the research of Le Hoang Vinh, Nguyen Ngoc Son (2017) and Nguyen Hoang Anh, Vu Hoang Phuc (2021), when large scale helps reduce agency costs and enhance the position of enterprises, thereby reducing the motivation to avoid taxes.

Enterprise size by assets (LnTA) has a regression coefficient of 0.013 and a relatively high statistical significance of 1%, so a 1% increase in LnTA (equivalent to a small increase in LnTA), the value of CETR will increase by about 1.3%, if other factors remain unchanged. Showing that large total assets are often associated with economies of scale. The positive regression coefficient shows that larger asset size can improve operating

efficiency. This result is consistent with the hypothesis set by the 5 research groups and is similar to the research of Dwi Kartikasari, Marisa Merianti (2016) and Nguyen Hoang Anh, Vu Hoang Phuc (2021), arguing that large enterprises are able to take advantage of asset and management advantages to optimize tax costs.

The return on sales (ROS) ratio showed statistically insignificant results and no clear impact on tax avoidance behavior. This result is contrary to studies such as Alfina et al. (2018) and Nguyen Hoang Anh, Vu Hoang Phuc (2021), which found that ROS has a positive impact on tax avoidance behavior. The above results rejected hypothesis 6 that the research team put forward.

Financial leverage (Lv) has a regression coefficient of 0.002, which shows that for every unit increase (for example, an increase in the debt/total assets ratio by 1%), the dependent variable CETR will increase by an average of 0.002 units, if other factors remain constant. It is concluded that financial leverage (Lv) has a positive impact on the dependent factor of tax avoidance. If the leverage is high but the regression coefficient is small, this shows that increasing debt does not create significant value for the business, or the business is close to the optimal threshold of leverage. This is contrary to studies such as Mariyani Putri Umar et al. (2020) and the authors' group, which suggest that financial leverage has a negative impact on tax avoidance behavior. The above results reject hypothesis 7 that the research group put forward.

4.4. DISCUSSION

From the above studies on corporate income tax avoidance, the group has made some recommendations for businesses that are businesses on the Vietnamese stock market need to implement and comply with corporate income tax regulations. Perfecting the law, strict tax policies with a public and transparent nature to be suitable and favorable not only for domestic enterprises but also for foreign enterprises to create a healthy business environment, fair competition to help the country's economy grow and develop strongly and introduce many tax incentives, tax exemptions, and tax reductions to attract foreign investment but at the same time must ensure compliance with Vietnamese law. On the international level, participating in double taxation avoidance agreements and cooperating in exchanging tax information between countries will contribute to effectively preventing cross-border tax avoidance. These solutions not only help increase budget revenue but also create a transparent, fair and sustainable business environment.

5. CONCLUSION

After the process of studying and researching corporate income tax avoidance behavior, the study took data from companies listed on the stock market in the period from 2015 to 2023. The research team found a research gap and recognized some advantages and disadvantages of previous research works. Thus, this study contributes a small part to the topic of corporate income tax avoidance behavior in the Vietnamese stock market. Tax avoidance is a complex issue and requires coordination between the government, the business community and international organizations. Building a strict and transparent legal system along with raising social awareness is the key to minimizing the negative impacts of this behavior, contributing to ensuring fairness and sustainable development.

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RESEARCH ON THE IMPACT OF ECONOMIC GROWTH ON INFLATION IN SOME DEVELOPING COUNTRIES AND PROPOSE SOLUTIONS TO CONTROL INFLATION AND PROMOTE ECONOMIC GROWTH IN VIETNAM

Dr. Nguyen Thi Bich Lien[1]

Abstract: This study measures the impact of five independent variables: national income per capita (gni), the proportion of high-tech product export value in total export value of goods (extech), unemployment rate (unemploy), human capital index (hci), trade openness (iegdp) on the dependent variable of inflation rate (infrate) in some developing countries in the period 2015 - 2022, thereby proposing recommendations and solutions to control inflation and promote economic growth in Vietnam.

Keywords: Economic growth, inflation, Vietnam

1. Problem statement

Economic growth is one of the top important goals of countries in the world. However, along with the growth target, countries face many difficulties, one of the difficulties of countries in the growth stage is controlling inflation. Balancing economic growth and inflation is always a difficult problem for every country, especially developing economies or emerging economies that tend to prioritize pursuing economic growth targets.

2. Theoretical basis and research model

2.1. Theoretical basis

Some concepts

Concept of economic growth.

According to the definition of Samuelson and Nordhaus in the Economics textbook (1948), economic growth is the increase in GDP or potential output of a country. Economic growth occurs when the production frontier (PPF - Production possibility frontier) of a country moves outward.

In the Basic Macroeconomics textbook (Hoang Xuan Binh, 2015), economic growth is strictly defined as an increase or expansion in the scale of the potential output of a country's economy. Potential output is the output that an economy can achieve when it is in a state of full resource utilization or can be understood at that time, all workers can find jobs with a given real wage.

Concept of inflation

According to the Basic Macroeconomics textbook (Hoang Xuan Binh, 2015), inflation is an increase in the general price level in a country's economy over a certain period of time. Inflation is also defined as a monetary phenomenon (M. Friedman, 1963) or a price increase phenomenon (H. E. Johnson, 1970).

The difference in inflation rates between countries is believed to be based on the credibility of the Government, the quality of institutions, the monetary policy of the Central Bank and the technical aspects of inflation indicators (IMF, 2016)

Theory on the impact of economic growth on inflation

**** Demand-pull inflation***

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According to the Basic Macroeconomics textbook (Hoang Xuan Binh, 2015), demand-pull inflation occurs when aggregate demand increases strongly at the level of output that has reached or exceeded the potential output level.

The causes of demand-pull inflation can come from the following factors:

- High economic growth: When the economy grows and unemployment decreases, consumers have better income and increase spending, pushing up the aggregate demand of the economy, leading to inflation.

- Sudden increase in money supply: One of the jobs of the Central Bank is to control and influence the money supply, so when there is too much supply in the market, especially during difficult economic times, a sudden increase in liquidity will push up the demand for goods and services. Demand-pull inflation occurs when businesses do not increase supply enough to meet demand.

- Expected inflation: Expected inflation is the rate of inflation that economic actors expect prices to rise in the future. If consumers expect inflation to increase in the near future, they will tend to increase their spending on current goods to avoid paying higher prices for goods in the future. This phenomenon will affect the scarcity of supply, leading to higher market prices due to demand-pull.

- Government policy: Fiscal policy is used in accordance with the economic situation such as providing incentives during economic recession or tax reductions for certain items, which will affect the amount of money that consumers need to spend on goods and services.

This theory is based on the model of aggregate demand and equilibrium output:

$$AD = C + I + G + X - IM$$

In which:

AD: is aggregate demand

C: is household consumption

G: is government spending

X: is the value of exported goods

IM: is the value of imported goods

Therefore, an increase in AD aggregate demand can be due to increased household consumption, government spending or increased net export value. During the period of economic growth, when the gross domestic product (GDP) or gross national product (GNP) of the economy increases, consumers will have the motivation to consume more, thereby increasing household consumption and leading to an increase in aggregate demand of the economy. In addition, economic growth in the period of international integration and globalization means promoting trade activities, increasing the value of net exports and leading to an increase in the economy's aggregate demand.

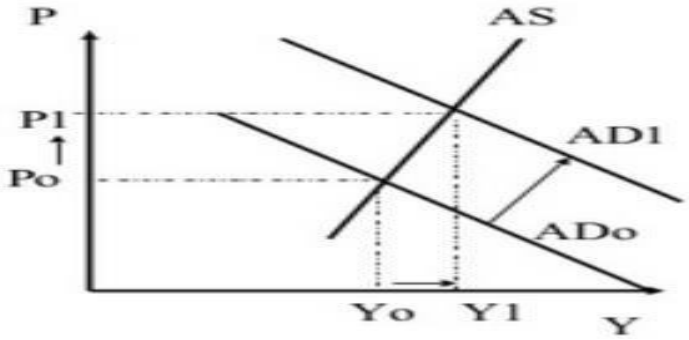

Figure 1. Diagram describing demand-pull inflation

Source: Basic macroeconomics textbook

The essence of this theory is that spending too much money on goods with a limited supply of goods that can be produced under conditions where the labor market has reached equilibrium. At that time, the components of aggregate demand (according to the model) compete with each other before the limited aggregate supply of goods and push the general price of goods in the market up. At the same time, when the labor market is in equilibrium and the unemployment rate decreases, labor becomes scarce, so labor wages will increase and the inflation process continues.

Phillips Curve

The Phillips curve theory originated from the article "The Relationship Between Unemployment and the Rate of Change in Nominal Wages in the UK from 1861 to 1957", which pointed out the inverse relationship between the unemployment rate and the inflation rate in the economy.

The short-run Phillips curve shows the combinations of inflation and unemployment in the short run when the aggregate demand curve (AD) shifts, the economy will move along the short-run aggregate supply curve. In addition, the aggregate demand curve shifts to the right, meaning it increases, which will cause the economy's output and the general price level to increase, while the unemployment rate will decrease. Thus, the shift of the aggregate demand curve causes inflation and unemployment to be inversely correlated in the short run, which is clearly described by the Phillips curve below.

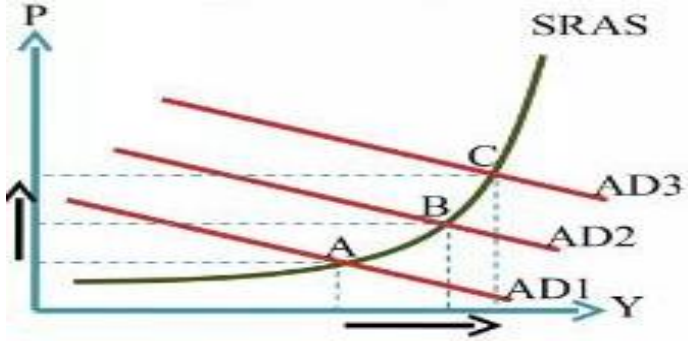

Figure 2. Short-run Phillips curve

Source: Basic macroeconomics textbook

Based on the classical principles of macroeconomics, Friedman and Phelps made the following observations about the long-run Phillips curve: there is no relationship between the inflation rate and the unemployment rate in the long run.

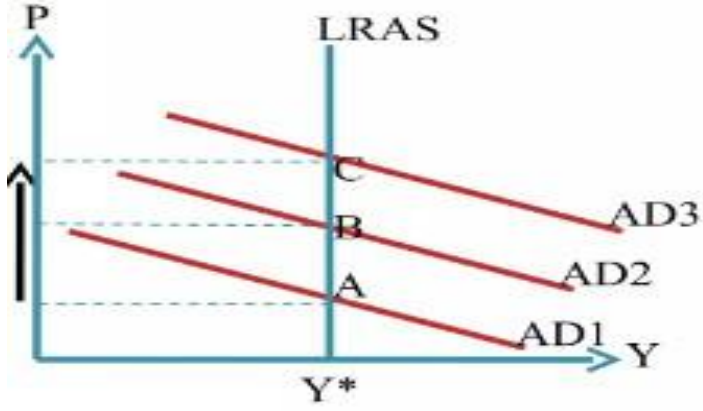

Figure 3. Long-run Phillips curve

Source: Basic macroeconomics textbook

The explanation for this phenomenon is that, before any demand shock to the economy, which can come from the impact of monetary policy or other external factors, in the long run, the economy will also adjust itself to the potential output level, the output level corresponding to the natural unemployment rate. Therefore, the long-run Phillips curve implies that the unemployment rate tends to move towards the natural level or the natural unemployment rate. The vertical long-run Phillips curve does not show the correlation between the inflation rate and the unemployment rate, similar to inflation and aggregate demand or the state of inflation and economic growth.

Research Overview

In the study *"An examination on the determinants of inflation"* (2015), authors Yen Chee Lim and Siok Kun Sek found factors affecting inflation in 2 groups of countries: high inflation countries and low inflation countries. The model used in the study is ARDL (Autoregressive Distributed Lag) with a large amount of data from 1970 to 2011 to measure the impact of variables on inflation in the short and long run. According to the quantitative results of the study, in the long run, GDP growth and the amount of exported goods and services have a profound impact on the inflation of low inflation countries while high inflation countries are affected by factors including money supply, total national expenditure and GDP growth.

The study *"Inflation and economic growth: Evidence from four South Asian countries"* (2001) by Girja Shankar Mallik and Anis Chowdhury investigated the relationship between GDP growth and inflation in four South Asian countries including Bangladesh, India, Pakistan and Sri Lanka. The authors used cointegration model and error correction model with annual data series collected from IMF to study the short-run and long-run relationship between the two subjects. The research results gave two main conclusions: first, inflation and economic growth are positively correlated in the long run; second, the impact of inflation on growth rate is greater than the impact of economic growth on inflation.

In the study *"Technological upgrading in China and India: What do we know?"* (2014), author Jaejoon Woo analyzed an aspect through which the proportion of high-tech export value to total export value can affect the inflation rate. That is, the production structure has become too complex and the high-tech sectors of the economy - the sectors that facilitate the growth rate of demand and low unemployment - are kept in a stable and low inflation environment. This makes China, a typical country in the process of transition from an economy based on commodity exports to the largest exporter of high-tech goods in the world.

The cause-effect relationship between inflation and unemployment is reflected in the study *"The causal relationship between unemployment and inflation in G6 countries"* (2020) by Suna Korkmaz and Muzhgan Abdullazade. This study uses a data set from 2009 to 2017 to analyze the relationship between inflation and unemployment in 9 economies in the G6 group of countries: Australia, Brazil, Canada, France, Germany, Italy, Russia, Turkey and the UK. Using the Granger causality analysis model, the study makes an assessment of the one-way relationship between the two research objects. The inflation rate affects unemployment because the governments of countries implement tight fiscal and monetary policies to control inflation. When inflation increases, the purchasing power of goods and the value of domestic currency decreases, leading to a decrease in aggregate demand for goods and services, so tight fiscal policies are applied, specifically limiting public spending.

2.2. Research model

From the theoretical basis, we propose factors affecting the inflation rate including: (i) Average national income per capita (gni), (ii) Proportion of high-tech product export value in total export value of goods (extech), (iii) Unemployment rate (unemploy), (iv) Human capital index (hci), (v) Trade openness (iegdp).

Research model:

$$infrate = \beta 0 + \beta 1 * lngni + \beta 2 * extech + \beta 3 * unemploy + \beta 4 * hci + \beta 5 * iegdp + uit$$

In which:

- $\beta 0$: intercept coefficient
- βj (j = 1, 2, 3, 4, 5, 6): slope coefficient
- uit: random error
- i: developing countries selected for research
- t: research year in the period 2015 - 2022

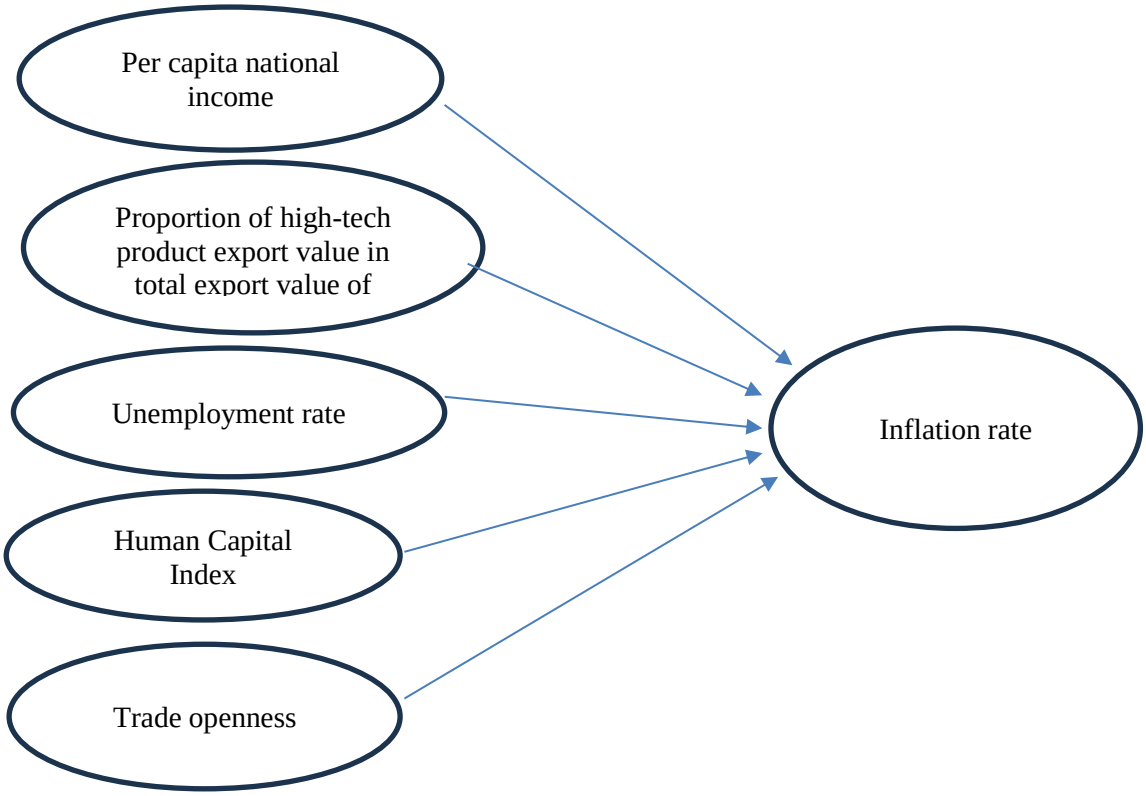

Figure 1. Proposed research model

3. Research method

In order to estimate the impact of economic growth on inflation in some developing countries in the period 2015 - 2019, the author uses 3 panel data estimation methods in the research including: the least squares method (POLS - Pooled Ordinary Least Squares), the fixed effect model (FEM - Fixed Effect Model) and the random effect model (REM - Random Effect Model).

The data set collected for the study is secondary data, in the form of table data with the following characteristics:

- Spatial dimension: some developing countries in the world. After filtering the data

and selecting countries based on some criteria to support the process of proposing solutions for Vietnam, the author built a data set with 67 developing countries.

- Time dimension: the data set is observed and collected continuously in the period from 2015 to 2022.

Below is the description of variables and sources of variable collection in the model:

Table 1. Table of variable description in the research model

Variables	Variable characteristics	Variable explanation	Unit	Source
Infrate	Infrate Dependent variable	Inflation rate	%	World Bank
Gni	Independent variable	Average national income per capita	USD	World Bank
Extech	Independent variable	High-tech export rate	%	World Bank
Unemploy	Independent variable	Unemployment rate	%	World Bank
Hci	Independent variable	Human capital index (based on years of schooling and returning to school)	Number of years	Penn World Table
Iegdp	Independent variable	Trade openness	%	World Bank

Source: Author's own synthesis

4. Results and discussion

4.1. Results

a. Descriptive statistical analysis

** Descriptive statistical data*

The study uses the summarize command to describe the overview of the data of the variables in the model, thereby determining the number of observations (Obs), the average value (Mean), the standard deviation (Std. Dev.), the smallest value (Min), the largest value (Max).

The statistical results from STATA 14 software are shown in the following table:

Table 2. Descriptive statistics of variables in the model

Variable name	Number of observations	Mean value	Standard deviation	Minimum value	Maximum value
Infrate	327	4,766376	6,60618	-25,9584	43,06866
Gni	327	5384,44	6608,269	271,0356	32562,77
Extech	327	8,287161	10,72045	0,001261	62,24658
Unemploy	327	6,280492	4,903949	0,14	25,54
Hci	327	2,356206	0,6318395	1,199025	3,580603
Iegdp	327	0,7248716	0,327645	0,213	1,72

Source: Synthesis of results from Stata 14 analysis

Through the statistical table, the author makes some observations:

Inflation rate:

The average inflation rate of developing countries in this period is 4.766376%,

insignificantly different from the global inflation rate controlled at around 4% and 5%. The standard deviation is 6.60618.

The lowest inflation rate was -25.9584%, recorded in Kuwait in 2015. The reason may stem from the problem of oil prices continuously hitting rock bottom this year while Kuwait is a country with strong oil exports with the 6th largest recorded oil reserves in the world at this stage.

Meanwhile, the Democratic Republic of Congo has the highest inflation rate of more than 43%, stemming from the reason that this country has not well controlled the relationship between economic growth rate and inflation when it was recorded as one of the three countries with the fastest GDP growth in the period 2014 - 2017 (according to the Global Economic Prospects report, World Bank).

Average national income per capita (gni):

The average value is 5384.44 USD with a standard deviation of 6608.269. The highest GNI per capita was $32,562.77 in Kuwait in 2015. The country's thriving oil-based economy provides 90% of its income.

The lowest figure was 271.0356 USD in Burundi in 2019, a country with a poor and backward economy mainly focused on agriculture while at this time, the world fertilizer industry is showing signs of saturation and slowing growth due to the trend of more environmentally friendly organic fertilizers (According to the Fertilizer Industry Report T9/2019).

Proportion of export value of high-tech products (extech):

The average ratio is at 8.287161%, much lower than the proportion of high-tech products exported by the world, fluctuating between 20% and 30% at this stage, demonstrating the difficulty in keeping up with the pace of global technology development. This is most clearly shown by the figure of 0.001261% of Sierra Leone, a country exporting mainly agricultural products.

In contrast, the Philippines had a share of 62.24658% in 2019 as electronic products became one of the country's main export items.

Unemployment rate (unemploy):

The average unemployment rate was 6.280492% with a standard deviation of 4.903949. Cambodia maintained the lowest unemployment rate at 0.14% due to the growth of garment and footwear exports, the number of companies and businesses registering to enter the market helped the country create more than 12,000 jobs in 2017.

Meanwhile, the country that is constantly facing high unemployment is South Africa with a rate of 25.54%. The main reasons are low economic growth, inappropriate labor market policies that limit businesses from recruiting unskilled workers while the people in this country lack formal training, and face the Apartheid regime.

Human capital index per capita (hci):

This index is based on the number of years of schooling and the number of times they returned to school. The average index is 2.356206, with a standard deviation of 0.6318395. Niger is the country with the lowest human capital index at 1.199025 in 2015 while in 2019, Moldova has the highest index at 3.580603, clearly demonstrating the more productive capacity of workers in this country.

Export-import ratio to GDP (iegdp):

The average ratio is recorded at 0.7248716%, standard deviation 0.327645. The country with the lowest ratio is Nigeria with 0.213% in 2015, due to strict barriers in

requirements and procedures for exporting goods to this potential market. In addition, being a member of OPEC facing the bottom of oil prices also significantly affects Nigeria's export situation.

Vietnam is the country with the highest export-import ratio to GDP in the research group, 1.72% in 2018. During this period, Vietnam welcomed many foreign direct investment (FDI) projects, contributing to promoting the country's export-import activities when in 2019, the export turnover of FDI enterprises contributed more than 70% of the total export turnover of the country.

** Correlation description*

The results of the correlation description are shown in the following table:

Table 3. Correlation description between variables in the model

Variable	**Infrate**	**Gni**	**extech**	**unemploy**	**Hci**	**iegdp**
Infrate	1,0000					
Gni	- 0,2391	1,0000				
Extech	-0,0489	0,1161	1,0000			
Unemploy	0,0996	-0,0006	-0,1082	1,0000		
Hci	-0,0331	0,4000	0,2980	0,1456	1,0000	
Iegdp	-0,0953	0,2303	0,1509	0,0955	0,2713	1,0000

Source: Summary of results from Stata analysis 14

** Correlation between dependent variable and independent variables*

The correlation between dependent variable infrate and independent variables gni, extech, hci, iegdp is positive while only unemployment rate (unemploy) is negatively correlated with inflation rate (infrate).

Among the independent variables, national income per capita (gni) has the highest correlation with inflation rate (infrate) at 0.2391. The remaining variables have quite low correlation with the dependent variable.

** Correlation between independent variables*

The independent variables are not strongly correlated with each other because the correlation level is generally below 70%, which will limit the possibility of multicollinearity and autocorrelation in the regression model.

b. Regression analysis

The study used 3 models for the regression process including: Pooled Ordinary Least Squares (POLS), Fixed Effect Model (FEM) and Random Effect Model (REM) and was conducted in the following order: POLS model, FEM model, REM model. The regression results are shown in the following table:

Table 4. Regression results using POLS, FEM, REM models

Independent variables	**POLS**	**FEM**	**REM**
	Infrate	**Infrate**	**Infrate**
Lngni	-1,789758*** (0,000)	-30,16658*** (0,000)	-1,919565** (0,002)
Extech	- 0,0060929 (0,863)	- 0,0355616 (0,693)	- 0,0180371 (0,694)
Unemploy	0,1729518** (0,021)	0,0937196 (0,839)	0,1740189 (0,107)
Hci	1,92272**(0,016)	18,03027* (0,059)	2,072608* (0,075)
Iegdp	- 1,557779 (0,172)	11,39231* (0,093)	- 1,032949 (0,530)
_cons	14,58679*** (0,000)	194,0395*** (0,000)	14,96628*** (0,000)
Number of	327	327	327

observations			
Prob>F	0,0002	0,0000	0,0273
*Chú thích: * (p<0,1); ** (p<0,05); *** (p<0,01)*			

Source: Summary of results from Stata 14 analysis

Variable estimates with p-value < 10% indicate that the variable is statistically significant in the research model. For the POLS model, except for the variable representing the proportion of high-tech exports (extech), the remaining variables are statistically significant at the 10% significance level. In the FEM model, the variable representing national income per capita (lngni) is statistically significant with a negative regression coefficient, the variable representing the human capital index (hci) is statistically significant with a positive regression coefficient, and the variable representing the ratio of imports and exports to GDP (iegdp) is statistically significant with a positive regression coefficient. Thus, the human capital index and the ratio of imports and exports to GDP have a positive impact on the inflation rate while national income per capita has an inverse effect, a positive impact on inflation as well as economic growth.

In general:

The POLS pooled regression model has Prob > F = 0.0002 < 5%, so the H0 hypothesis is rejected, which means that the F-test or White test is suitable for the overall model. The variables lngni, unemploy, hci are statistically significant at the 5% significance level.

The FEM fixed effects model has Prob > F = 0.0000 < 10%, so the H0 hypothesis is rejected, which means that the F-test is suitable for the overall model. The variables lngni, hci, iegdp are statistically significant at the 10% significance level.

The random effects model REM has Prob > F = 0.0273 < 10%, so the hypothesis H0 is rejected, which means that the F-test is suitable for the overall model. The variables lngni and hci are statistically significant at the 10% significance level.

Model testing

Model selection testing

Of the 3 models used for regression analysis, the author conducted testing to select the most suitable model to obtain objective and accurate results. Using STATA 14 software, the author performed the following tests:

LM test - Breusch and pagan Lagrangian Multiplier: choose between POLS model and REM model

F-test: choose between POLS model and FEM model

Hausman test: choose between REM model and FEM model

Specific test steps:

• Breusch and pagan Lagrangian Multiplier test:

Test to check whether POLS model or REM model is suitable for the pair of hypotheses based on the variance of error.

Hypothesis H0: Constant error variance (choose POLS model) Hypothesis H1: Variable error variance (choose REM model)

To perform the test, the author uses the xttest0 command in STATA 14. If the result is p-value < 0.1, which means rejecting hypothesis H0, then the appropriate model chosen at this time is the REM model and vice versa when there is not enough basis to reject hypothesis H0.

• Hausman test:

The test checks whether the random effects of the model are correlated with the independent variable or not based on the following pair of hypotheses:

Hypothesis H0: There is no correlation between the random effects and the independent variable in the model (choose the REM model)

Hypothesis H1: There is a correlation between the random effects and the independent variable in the model (choose the FEM model)

To perform the test, the author uses the hausman command in STATA 14. If the result is p-value < 0.1, which means rejecting the H0 hypothesis, then the appropriate model selected at this time is the FEM model and vice versa when there is not enough basis to reject the H0 hypothesis.

Test results:

Table 5. Test results for model selection

	LM test - Breusch and pagan Lagrangian Multiplier	**Hausman test**
p-value	0,0000	0,0039

Source: Summary of results from Stata 14 analysis

Result comments:

- LM test - Breusch and pagan Lagrangian Multiplier

The result obtained is p-value = 0.0000 < 0.1, allowing to reject the hypothesis H0, accepting the hypothesis H1. Therefore, the more suitable model selected is the REM model at the 10% significance level.

- Hausman test:

The result obtained is p-value = 0.0039 < 0.1, allowing to reject the hypothesis H0, accepting the hypothesis H1. Therefore, the suitable model selected is the FEM model at the 10% significance level.

After performing model selection testing with panel data, the FEM fixed effects model was selected as the most suitable model. FEM model results:

Table 6. FEM fixed effects model results table

Infrate	**Regression coefficient**	**Standard error**	**t**	**p- value**	**Confidence interval (95%)**	
Lngni	-30,16658	7,45466	-4,05	0,000	-44,84712	-15,48604
Extech	-0,0355616	0,0900731	-0,39	0,693	-0,2129435	0,1418202
Unemploy	0,0937196	0,4615775	0,20	0,839	-0,81527	1,002709
Hci	18,03027	9,521732	1,89	0,059	-0,7209814	36,78152
Iegdp	11,39231	6,761706	1,68	0,093	-1,923586	24,70821
_cons	194,0395	52,53997	3,69	0,000	90,572	297,507
Prob>F	0,0000					

Source: Summary of results from Stata 14 analysis

Comments:

- Prob > F = 0.0000 is less than 0.1 (10% significance level), so there will be at least one independent variable that can explain the dependent variable.

- Considering the expected signs of the coefficients of the independent variables:

Of the 5 independent variables, 4 variables have coefficient signs as expected, including: lngni has a negative sign (-), extech has a negative sign (-), hci has a positive sign (+), and iegdp has a positive sign (+). Only the coefficient of the variable unemploy has a positive sign (+), contrary to the author's expected sign.

- In terms of statistical significance of the independent variables:

The independent variables lngni, hci and iegdp all have p-values less than 01 (10% significance level), showing that these independent variables are statistically significant and have an explanatory role for the inflation rate.

The independent variables extech and unemploy are not significant at all three levels of 1%, 5% and 10%, indicating that these variables have no explanatory role for the inflation rate.

The intercept coefficient $\beta 0$ = 194.0395 has a positive sign. The quantitative results imply that: in the case where the remaining variables of the model are 0, the inflation rate is 194.0395%.

The intercept coefficient has a p-value = 0.0000 < 1% so the variable is statistically significant.

Testing model defects

The final suitable model is the FEM fixed-effects model, so the author conducts a test of the model defects including: heteroskedasticity and autocorrelation.

- Testing heteroskedasticity Pair of hypotheses:

H0: Constant heteroskedasticity

H1: Variable heteroskedasticity

The author uses the xttest3 command for this test.

- Testing autocorrelation Pair of hypotheses:

H0: The model does not have autocorrelation

H1: The model has autocorrelation

The author uses the xtserial command for this test.

The test results are as follows:

Table 7. Model defect testing

	Changed PSSS test	**Autocorrelation test**
p-value	0,0000	0,0000

Source: Summary of results from Stata 14 analysis

Conclusion:

- The test for the variance of the error variable obtained p-value = 0.0000 < = 0.1. At the 10% significance level, reject H0 and accept H1. Thus, the model suffers from the defect of the variance of the error variable.

- The test for the autocorrelation obtained p-value = 0.0000 < = 0.1. At the 10% significance level, reject H0 and accept H1. Thus, the model suffers from the defect of autocorrelation.

The general conclusion is that the model suffers from 2 defects including the variance of the error variable and autocorrelation. The above defects can be overcome by cluster model regression.

The defect correction results are as follows:

Table 8. Model defect correction results

Infrate	**Regression coefficient**	**Standard error**	**t**	**p- value**	**Confidence interval (95%)**	
Lngni	-30,16658	11,53048	-2,62	0,011	-53,18792	-7,145238
Extech	- 0,0355616	0,0767977	-0,46	0,645	- 0,1888933	0,11777
unemploy	0,0937196	0,3964367	0,24	0,814	- 0,6977919	0,885231

Hci	18,03027	11,63632	1,55	0,126	-5,202387	41,26292
Iegdp	11,39231	9,973572	1,14	0,257	-8,520566	31,30519
_cons	194,0395	72,24131	2,69	0,009	49,80508	338,2739
Prob>F	0,0656					

Source: Synthesis of results from Stata 14 analysis

4.2. Discussion of research results

The regression results of the model show that: Of the 5 variables included in the model, with a significance level of 10%, the 3 variables lngni, hci, iegdp are statistically significant and have an explanatory role for the dependent variable inflation rate.

Based on the model estimation results, the factors representing economic growth that affect the inflation rate in some developing countries are shown in the equation below:

Infrate = 194.0395 - 30.16658*lngni - 0.0355616*extech + 0.0937196*unemploy + 18.03027*hci + 11.39231*iegdp

From this, some conclusions can be drawn as follows:

First, the regression coefficient of the lngni variable is - 30.16658, which means that under the condition that other factors remain constant, when the average national income per capita of the country increases by 1%, the inflation rate decreases by 30.16658%. This is consistent with expectations and previous studies that suggest that per capita national income has an inverse relationship with inflation.

In many cases, a GNI increases steadily with economic expansion and increased economic activity. When an economy is growing, the demand for goods and services typically increases. If the increase in demand is not met by a corresponding increase in the supply of goods and services, inflationary pressures may result. Prices may rise when demand exceeds supply. GNI can be affected by global economic conditions, trade, and commodity prices. Changes in these factors can impact a country's inflation, for example, global economic shocks or disruptions can affect a country's GNI and contribute to inflationary pressures.

Second, the regression coefficient of the extech variable is -0.0355616 and does not play an explanatory role for the dependent variable. This can be explained by the fact that in this period, the export of high-tech goods has not had many strong activities compared to the world, so the proportion of high-tech goods exports has an insignificant impact on the inflation of developing countries.

In 2021, the Technology and Innovation Report of the United Nations Conference on Trade and Development (UNCTAD) stated that the countries with the most suitable and best conditions to adapt and apply technology to trade products are mainly Europe and North America while developing countries tend to have difficulties in this regard.

A key issue for developing countries is the protection of technology from developed countries through intellectual property (IP) rights. This protection can take many forms, such as patents, trade secrets, trademarks, and copyrights. Therefore, without a system of patent protection, there is little incentive for companies to develop and commercialize innovations.

Third, the regression coefficient of the unemploy variable is 0.0937196, contrary to the initial expectation and does not play an explanatory role for the dependent variable.

Normally, based on the Phillips curve theory in the short run, the relationship between the inflation rate and the unemployment rate is inverse. When the economy witnesses the positive effect of these two factors, that is, inflation and unemployment

increase together, the phenomenon is called “stagflation”, which is considered a major challenge for policymakers globally. The causes of stagflation can come from factors such as supply shocks, reduced aggregate supply and ineffective economic management. This is a challenge for policymakers because traditional inflation control tools such as tightening monetary policy will affect unemployment while measures to reduce unemployment such as fiscal policy and loose monetary policy will affect inflation. In the period 2015 - 2022, the positive correlation between inflation and unemployment can be explained by the phenomenon of rising oil prices. In 2018, world crude oil prices increased by more than 10% according to VnEconomy newspaper. Oil prices were pushed up by two main reasons: first, speculative capital concentrated on oil futures contracts with the prediction that the oil market supply will be tightened until the end of 2018 due to the combined agreement to reduce production by OPEC and Russia; Second, the number of oil rigs in the US decreased, affecting the efficiency of oil drilling activities in this country, thereby affecting the world oil supply. This led to a sudden increase in global oil prices, causing an increase in the cost of goods and contributing to the increase in the unemployment rate. Due to the increase in transportation costs, the process of producing and bringing products to market became more expensive, causing prices to increase even when workers were laid off.

Fourth, the regression coefficient of the variable hci is 18.03027, which means that under the condition that other factors remain unchanged, when the human capital index increases by 1 unit, the inflation rate increases by 18.03027%. This is completely consistent with the expected sign and previous studies that the human capital index has a positive impact on inflation.

When the human capital index increases, it means that human resources are being invested in, especially in education when the index in the study has a representative variable of the number of years of schooling and returning to school. This proves that workers as well as future consumers have the ability to increase income and increase consumption in the future. However, when human resources invest in education, the labor force producing goods will decrease, the supply of goods in the market is not guaranteed, thereby pushing up domestic prices and increasing the inflation rate.

Fifth, the regression coefficient of the variable iegdp is 11.39231, which means that under the condition that other factors remain unchanged, when trade openness increases by 1%, the inflation rate increases by 11.39231%. This is completely consistent with the expected sign and previous studies that trade openness has a positive impact on inflation.

The reason is explained when countries are active in trade including import of goods and services, domestic inflation can be affected by the increase in imported goods prices, arising from changes in exchange rates or general commodity prices in the world.

4.3. Proposed solutions to help Vietnam control inflation and promote economic growth

Based on the estimated results from the model of the group of developing countries and analysis of the economic situation, inflation and economic growth in Vietnam, the author proposes a number of solutions for the Vietnamese economy.

First, control input material prices.

The basis of this solution is that the textile and garment industry - one of Vietnam's key export industries - is facing problems with increasing input material prices and is looking for ways to solve the problem of reducing dependence on input materials.

According to data from the Center for Industry and Trade Information (Ministry of Industry and Trade), in 2020, the total export turnover of Vietnam's textile and garment products reached 35.29 billion USD, but at the same time, the recorded figure of imported raw materials for the textile and garment production industry also reached 21.38 billion USD.

Solutions to this problem include:

- Solving the problem of dependence on input materials, aiming for self-sufficiency in input materials, focusing on developing supporting industries. This could be a long-term solution for Vietnam because Vietnam has good human resources for the textile industry, so if it can control its own input sources, export prices will be highly competitive in the international market. However, Vietnam is currently facing two problems: the requirements for fabrics and raw materials for the textile industry are extremely meticulous and complicated, so Vietnam still needs to depend on foreign markets to continue to develop; the policy to encourage the supporting industry is not strong enough, so very few domestic enterprises invest in this field because of the high risk.

According to data from the Department of Industry (Ministry of Industry and Trade) for Vietnam's input materials: 60% of raw fabrics are imported from China, more than 65% of auto parts and components are imported from China, Korea, Japan and 42% of electronic components are imported from Korea. Therefore, in general, this will be a long-term problem for Vietnam, while currently Vietnam is still relying on foreign markets.

- Implement active diplomatic measures to ensure raw material sources. This solution is more feasible in the short term for the current Vietnamese market situation. The government can invest in strategic, partnership activities through cooperation with resource-rich countries, introduce policies to support businesses in signing long-term raw material import contracts, ensure the supply of input materials to limit bottlenecks in the production supply chain, thereby helping to stabilize commodity prices.

Second, maintain the development of agriculture.

The basis of this solution comes from the fact that in the basket of goods used to calculate Vietnam's CPI, food accounts for up to 27%. Therefore, the implication for this figure is that stabilizing domestic food prices will contribute significantly to stabilizing the general price of goods in the market or is also a solution to control inflation and stimulate economic growth.

According to the General Statistics Office, the average CPI in Vietnam often increases due to 4 main reasons:

- Household electricity prices are adjusted up and electricity consumption demand increases
- Prices of medical services and medical examination and treatment services in localities are adjusted
- Maintaining the roadmap for increasing annual tuition fees and increasing textbook prices
- Prices of food, beverages, tobacco, ready-made clothing, public transport services, etc. increase

In the case of an increase in the general price of goods in the world, ensuring the domestic food supply will help limit the increase in domestic food prices. Therefore, stable food prices are a solution worth considering in national policies that significantly contribute to the process of controlling inflation in Vietnam during the economic growth

process.

Third, actively invest in research and development (R&D).

During the research period, the rate of high-tech exports did not affect the inflation rate, but the reason came from the fact that the application of technology to traded goods of developing countries had not been promoted. However, the process of international integration is inevitable for import and export activities. Investment in R&D activities plays a role as a solid foundational solution to the challenge of economic growth and inflation control in Vietnam. According to a report conducted by the Ministry of Science and Technology and SIRO's Data61 of Australia, although there has been an improvement in the allocation of resources for R&D in Vietnam in recent years, compared to the average investment level of countries in the region and the world, the investment level for R&D in Vietnam is still quite low. In 2019, the R&D budget in Vietnam accounted for 0.53% of total GDP, which is much lower than that of neighboring countries (only Indonesia and the Philippines have lower R&D levels).

Investing in R&D can bring long-term benefits to the operation of the domestic economic market and commercial activities in the international market:

R&D helps to increase the quality of domestic goods and services: This helps domestic goods to be competitive and stable with imported products, minimizing the impact of international market fluctuations on domestic goods prices as well as inflation.

Developing R&D helps to increase Vietnam's position and capacity in the global supply chain: Vietnam can improve its position in the R&D area of the supply chain, producing and exporting products with higher added value in the international market.

Policies to promote R&D activities in Vietnam can be considered in the following forms, with special attention to policies suitable for new enterprises because one of the barriers to R&D investment in recent years is the risk of market entry and development potential. The solutions proposed in the study include:

- Promoting enterprises to invest in technological innovation activities through preferential tax policies for additional costs for research in enterprises.

- Focusing on and supporting human resource training for the field of science and technology through opening training courses at universities, with the participation of leading experts in the industry.

- Creating many development funds for the field of science and technology, applying flexible lending policies to support Research and Development (R&D) activities in new and advanced technology fields, especially those with high risk levels.

5. Conclusion

With secondary data from reliable sources, the study measured the impact of five variables representing economic growth on inflation rates in a number of developing countries in the period 2015 - 2022. Based on the analysis of the current situation of the growth process coupled with the inflation problem, the author proposed a number of solutions based on the impact of the factors for the group of research countries and for Vietnam. For Vietnam, the author proposed 2 solutions related to external factors and internal factors, respectively: controlling input material prices (especially for key export industries such as textiles and garments), maintaining the development of the agricultural sector. Hopefully, the analysis, proposals, and solutions presented in the study will contribute to identifying the core issues and the next direction for Vietnam to solve the problem of balancing economic growth and inflation.

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INVESTMENT FOR THE SUSTAINABLE DEVELOPMENT OF VIETNAM'S ECONOMY IN THE NEW CONTEXT

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Abstract: This research paper aims to analyze investment strategies for the sustainable development of Vietnam's economy in the current context. The study focuses on five key areas: education and training of high-quality human resources, technology and innovation, green infrastructure, sustainable manufacturing, and protection of the environment and natural resources. The article points out that investment in education, especially in key technology industries, is critical to meeting the demand for high-quality labor in the digital economy. Investment in technology and innovation plays a key role in driving productivity and competitiveness. Along with that, developing green infrastructure and sustainable manufacturing industries helps minimize adverse impacts on the environment. Protecting natural resources is also an indispensable factor in Vietnam's sustainable development strategy. The study proposes synchronous solutions, including investment support policies, cooperation between the state and enterprises, and the application of advanced technology in the above fields, to achieve sustainable development goals in the future.

Keywords: Investment, sustainable development, education, technology, green infrastructure, environmental protection, Vietnam

1. Introduction

In recent years, Vietnam's economy has achieved many remarkable achievements, with impressive growth rates and a strong increase in the manufacturing, industry, and service sectors. However, this rapid development also brings with it many challenges, especially environmental pollution, climate change and social problems such as the gap between rich and poor. To ensure sustainable development, Vietnam needs to transform itself from a growth model based on cheap resources and labor to a development model based on productivity, technology and environmental protection.

In the context that the world is witnessing far-reaching changes in the economy, environment and society, Vietnam faces many new challenges and opportunities in the process of sustainable development. Factors such as globalization, rapid digital transformation, along with international commitments to reduce greenhouse gas emissions, especially the Paris Agreement and the goal of achieving Net Zero by 2050, have placed urgent requirements on Vietnam in its transition to a green and circular economy model.

In addition, increasing climate change, energy crises, and environmental pollution have become serious problems that threaten economic development and people's quality of life. These challenges require not only a change in development strategy, but also the strong involvement of investment resources to thoroughly solve environmental and social problems, and ensure the sustainability of the economy.

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In this context, investment has become a central factor, acting as a powerful driving force for economic transformation towards sustainability. Investment is not merely the mobilization of financial resources, but also includes technological innovation, the construction of modern infrastructure, and the development of sustainable business models, and a driving force to help form and consolidate key economic sectors in the future. However, to promote this role, investment flows need to be directed to strategic areas. First, investing in *high-quality education and training of human resources* is a prerequisite for creating a workforce that can meet the needs of the economy in the digital transformation period. In addition, *investing in technology and innovation* will help improve labor productivity, create environmentally friendly products and services, and meet the rapidly changing needs of the market. Digital technologies, renewable energy technologies and environmental protection solutions will not only help Vietnam grow but also minimize negative impacts on the environment. Moreover, investment in *the development of green infrastructure and sustainable manufacturing industries* are essential factors to reduce pollution, protect resources and enhance economic value. Green industries, organic agriculture and recycling technologies will create a solid foundation for the economy and help protect the environment for future generations.

In addition, *investing in programs to protect the environment and conserve natural resources* will contribute to maintaining biodiversity and mitigating the impacts of climate change. Along with that, financial policies to support sustainable investment, such as green bonds or investment funds with environmental protection criteria, will help mobilize capital for green projects, thereby promoting sustainable development. In conclusion, investing in strategic areas such as education, technology, green infrastructure and environmental protection will not only help Vietnam develop its economy in a sustainable way, but also protect resources and ensure the quality of life for people in the long term. This is an important path that Vietnam needs to follow to achieve prosperity in the new context, and at the same time meet the requirements of sustainable development in the 21st century.

2. Current status of investment for sustainable economic development of Vietnam

2.1. Investment in education and training of high-quality human resources

Investment in education and training of high-quality human resources in Vietnam has made significant strides over the years, especially in the context of the rapidly increasing demand for highly skilled workers. The Government has focused on improving the quality of education through higher education, vocational training programs and international cooperation programs. However, the quality of training still does not meet the requirements of the economy in the context of digital transformation and international integration.

The budget for education in Viet Nam has increased significantly, with the goal of improving the quality of education and training, especially for intensive disciplines such as information technology, engineering, and applied sciences. According to statistics from the Ministry of Education and Training, budget expenditure on education in 2023 will reach about VND 340,000 billion, accounting for about 6% of GDP, showing the Government's interest in this sector. However, the rate is still low compared to developed countries, where the share of budget spending on education typically ranges from 7% to 8% of GDP.

Table 1: Expenditure on investment from the budget for education

Year	Total budget expenditure for education (billion VND)	Percentage of budget expenditure on education/GDP
2020	289.500	5,6%
2021	305.600	5,7%
2022	321.700	5,8%
2023	340.000	6,0%

Source: General Statistics Office

Although the budget for education has increased, there are still many issues that need to be addressed to ensure the development of the education and training system, especially vocational and technical training programs. While high-value-added professions, such as information technology, industrial engineering, and data science, are increasingly attracting attention, training institutions are still not enough to meet the recruitment needs of businesses. The vocational training program still lacks flexibility, and lacks connection with the actual needs of businesses, leading to a situation of "excess teachers and lack of workers", making it difficult to meet the requirements of the labor market. Businesses in the high-tech, clean manufacturing, and innovation industries are struggling to find the right skilled and qualified workforce. This reflects the lack of connectivity between the education system and the development needs of the labor market. To improve this situation, it is necessary to increase investment in vocational education programs, high-quality universities, and especially in science and technology, digitalization and innovation.

2.2. Investment in technology and innovation

In recent years, Vietnam has witnessed a significant increase in investment in technology and innovation, especially in industries such as information technology, fintech, and automated manufacturing industries. The government has implemented programs to support innovation and research and development (R&D) enterprises, creating opportunities for domestic enterprises to develop high technology. One of the highlights of technology investment in Vietnam is the strong development of the information technology, telecommunications and software industries. Technology enterprises such as FPT, Vingroup, and Viettel have made important contributions in promoting the digital economy and developing advanced technology solutions. Vietnam is also currently in the process of developing and implementing national digital transformation strategies, in order to create a favorable environment for the application of new technologies in all sectors of the economy.

Despite developments in several technology industries, Vietnam still faces some major challenges in improving its innovation capacity. The first is the lack of financial resources for research and development (R&D). Many businesses, especially small and medium-sized enterprises, cannot afford to invest in innovation projects and technology research. The level of investment in research and development, as well as technology transfer, is still low compared to countries in the region and the world.

Table 2: Level of investment in research and development in Vietnam

Year	Total expenditure on R&D (Billion VND)	Ratio of expenditure on R&D/GDP (%)
2020	22.000	0,2%
2021	25.000	0,3%

2022	28.500	0,3%
2023	32.000	0,4%

Source: General Statistics Office

Despite some growth, Vietnam's R&D/GDP spending ratio is still low compared to developed countries in the region such as South Korea or Singapore, where the ratio typically ranges from 2% to 3%. This shows that Vietnam needs stronger incentive policies to attract businesses to invest in new technologies, especially in high-tech industries and scientific research.

In addition, technology investment in Vietnam also faces difficulties in creating a real innovation environment. Although the Government has introduced a number of supportive policies such as innovative startup programs and venture capital funds, the implementation and effectiveness of these policies are still limited. Domestic research and development facilities lack close connections with businesses and production practices. Moreover, the innovation ecosystem is not yet strong enough to support startups and innovative initiatives.

2.3. Investment in green infrastructure development

Green infrastructure, including buildings using renewable energy, wastewater treatment systems, and greenhouse gas emission reduction projects, has been identified as an important part of Vietnam's sustainable development strategy. Investing in green infrastructure is one of Vietnam's priorities, especially in big cities such as Hanoi, Ho Chi Minh City. HCM. The government has policies to encourage renewable energy projects such as solar and wind power, and improve public transportation to reduce environmental pollution. However, currently, green infrastructure projects still face difficulties in mobilizing capital and implementing in practice.

Despite support from international organizations and development partners, budgets for green infrastructure projects are still very limited compared to actual needs. Projects such as solar power, wind power, and construction works using environmentally friendly materials often require large investment capital and long payback periods, which limits the access to capital of many businesses and state agencies.

Table 3: Investment in green infrastructure in Vietnam

Year	Total investment in green infrastructure (VND billion)	% of investment in renewable energy
2020	55.000	20%
2021	60.000	25%
2022	70.000	30%
2023	85.000	35%

Source: Ministry of Planning and Investment

Green infrastructure projects, especially renewable energy, are still growing but not fast enough to meet the energy needs and sustainable development of the economy. Vietnam needs to continue to promote renewable energy and public transport projects to reduce pollution and protect the environment.

In addition to financial issues, another challenge is the lack of synchronization in green infrastructure development policies and plans. Although the Government of Vietnam has put in place many sustainable development strategies and plans, the implementation of these policies still faces a lack of coordination between ministries, sectors, and localities. This leads to the situation that green infrastructure projects are not

implemented synchronously and ineffectively in meeting actual needs.

Besides, institutional problems are also a factor hindering the development of green infrastructure. Environmental and construction regulations are sometimes not clear enough or strictly enforced, making it difficult to implement environmentally friendly projects. Complicated administrative procedures and long licensing times are also a major barrier for investors in implementing green projects.

2.4. Investment in the development of sustainable manufacturing industries

Investment in sustainable manufacturing is an important factor in helping Vietnam implement its sustainable development strategy, especially in the processing industries, organic agricultural production, and clean production. Sustainable manufacturing industries are not only aimed at optimizing economic efficiency, but also protecting the environment and using natural resources rationally. Over the years, Vietnam has made certain strides in encouraging manufacturing industries to adopt clean technology and environmentally friendly production. Industries such as electricity generation from renewable energy (wind, solar), agricultural product processing industry, and green building material production are gradually developing. In particular, renewable energy production has attracted great attention from domestic and foreign investors, with solar and wind power projects being implemented in many localities. Vietnam has also introduced many policies to support green projects, such as policies to encourage investment in renewable energy, tax and fee reductions for companies that produce environmentally friendly products.

However, the reality of investment in sustainable manufacturing industries in Vietnam still faces some difficulties. One of the major problems is the limited technological capacity of domestic enterprises, especially in heavy industries and consumer goods manufacturing. Vietnamese companies also lack access to advanced technologies, which makes their products often have high production costs and are not competitive enough in the international market. In addition, investment in sustainable manufacturing industries also faces capital problems. Sustainable manufacturing projects, especially in the field of green industry and renewable energy production, require large investment capital but long payback periods. This makes many businesses afraid to invest in these fields. Although the Vietnamese government has issued a number of financial support policies, such as concessional loans and investment support funds for green enterprises, the level of support is still limited and not strong enough to attract large investors.

Table 4: Investment in sustainable manufacturing industries in Vietnam

Year	Investment in organic agriculture and processing industry (Billion VND)	Percentage of clean industrial products
2020	18.500	15%
2021	20.000	17%
2022	22.500	19%
2023	25.000	20%

Source: General Statistics Office

Moreover, administrative process and procedural issues are also a hindrance to investment in sustainable manufacturing industries. Although there have been some reforms in simplifying the licensing procedure for manufacturing projects, there are still

many difficulties related to construction licensing, the deployment of new technologies, and environmental inspections. Environmental regulations and sustainable development in production are not synchronized, making it difficult for businesses to make changes quickly and effectively.

2.5. Investment in environmental and natural resource protection programs

Protecting the environment and natural resources is a key factor in Vietnam's sustainable development strategy. One of the notable results is the fact that the Government has developed and implemented many national environmental protection programs. For example, the National Target Program on Environmental Protection for the period 2016-2020 has achieved a number of achievements in improving air and water quality, waste treatment, and biodiversity protection. At the same time, Vietnam has participated in international commitments such as the Paris Agreement on climate change, with the goal of reducing greenhouse gas emissions and strengthening environmental protection efforts. Programs such as Forest Management and Protection, Restoration and Conservation of Marine Ecosystems, and Water Resources Protection have been implemented in many localities.

Despite this, environmental and natural resource protection programs still face some problems in implementation. The government has implemented many programs, including waste management, forest protection and biodiversity conservation, but implementation is still difficult. One of the major difficulties is the lack of financial resources for these programs. Environmental protection projects often require large capital sources, while the state budget for the environment is limited. Despite support from international organizations and development partners, these resources are not enough to meet the real needs of large-scale environmental protection programs.

Table 5: Investment in environmental protection programs in Vietnam

Year	Total investment in environmental protection programs (Billion VND)	Percentage of budget expenditure for the environment/GDP
2020	15.000	0,3%
2021	18.000	0,4%
2022	20.000	0,5%
2023	22.000	0,6%

Source: General Statistics Office

Despite the growth in environmental protection investments, resources are still limited and not strong enough to address pressing environmental issues. Therefore, it is necessary to increase investment in waste treatment technology and natural resource protection projects to reduce pollution and improve the quality of life.

In addition to financial problems, the implementation of environmental protection policies still faces many difficulties. Some areas have not had effective coordination between state agencies in monitoring and managing environmental protection programs. Legal and policy corridors are sometimes inconsistent and inadequate, leading to stagnation in the implementation of environmental protection programs. Along with that, raising public awareness of environmental protection and natural resources is still limited. A large part of people still lack awareness of environmental and resource protection, leading to indiscriminate exploitation of resources, environmental pollution and degradation of natural resources. Businesses, especially heavy industries, still do not

really pay attention to environmental protection, leading to serious pollution in many industrial parks and big cities.

3. Solutions to increase investment for sustainable economic development of Vietnam in the coming time

In order to achieve sustainable development goals in the new context, Vietnam needs to implement synchronous solutions to optimize investment in important areas such as education and training, technology and innovation, green infrastructure, sustainable manufacturing industries, etc and environmental protection. Below are specific solutions for each field.

Investing in high-quality human resource education and training

Investing in education and training of high-quality human resources is a key factor to promote sustainable development. To achieve this goal, the Government needs to increase the budget for education, especially in key areas such as information technology, data science and engineering. At the same time, it is necessary to innovate teaching methods and develop training programs associated with the actual needs of the labor market. Training programs need to be flexibly adjusted to suit the trend of Industry 4.0, especially in industries such as information technology, data science, artificial intelligence and clean manufacturing industries. Universities and training institutions should work closely with businesses to build flexible training programs, making it easier for students to find jobs after graduation. In addition, the Government also needs to have vocational training and retraining programs for the workforce in traditional industries, helping them change careers and adapt to the requirements of the digital economy.

Investing in technology and innovation

Technology and innovation play an important role in promoting the sustainable development of Vietnam's economy. The government needs to develop strong preferential policies and support for technology businesses and start-ups, especially in high-tech and creative fields. Investment funds and financial support programs for research and development (R&D) need to be expanded to encourage businesses to invest in new technologies. Vietnam also needs to build research and innovation centers, and create favorable mechanisms for technology transfer from developed countries. Strengthening cooperation between research institutes, universities and businesses is necessary to put research results into practical application, thereby improving labor productivity and promoting the creative economy.

In addition, Vietnam also needs to strengthen international cooperation in the field of technology, especially in high-tech fields such as artificial intelligence (AI), blockchain, and biotechnology. Attracting investment from the world's major technology corporations and international research cooperation will help Vietnam quickly access advanced technologies, and at the same time create opportunities for domestic businesses to improve their competitiveness.

In the coming time, to promote technology investment and innovation, Vietnam needs to improve the investment environment, especially institutional reforms and create stronger support policies for start-ups and technology research. At the same time, it is necessary to focus on improving the capacity of human resources through training and development of collaborative research programs between universities, research institutes and enterprises.

Investment in green infrastructure development

Investment in green infrastructure is an important factor for Vietnam to achieve its sustainable development goals, especially in the context of climate change and increasingly serious environmental pollution. To achieve this goal, the government needs to promote renewable energy projects, such as wind power, solar power, and biomass energy, to reduce dependence on fossil energy. At the same time, it is necessary to improve the public transportation system to reduce pollution and traffic congestion, including metro and electric bus projects. Urban areas need to be planned and developed according to green standards, with energy-efficient buildings and green spaces. In addition, governments at all levels need to encourage businesses to invest in green technology and develop sustainable urban models.

To promote investment in green infrastructure in the coming time, Vietnam needs stronger solutions to improve the investment environment. Financial support policies, such as funds to support renewable energy projects, tax breaks for businesses investing in green technologies, and institutional reforms in the construction and environment sectors will help reduce barriers to green infrastructure development. At the same time, raising public awareness and encouraging the participation of organizations and businesses in developing green projects is also an important factor in this process.

Investment in the development of sustainable manufacturing industries

For sustainable development, Vietnam needs to focus on manufacturing industries that are highly sustainable, minimize adverse impacts on the environment and use resources efficiently. The government needs to implement policies to encourage the use of green technology in production, and at the same time create tax and financial incentives for businesses to invest in clean and energy-saving technology. Organic food processing and clean manufacturing industries need to be promoted to not only grow economically but also protect public health and the environment. Vietnam also needs to build sustainable supply chains, from the production of input materials to the consumption of final products, helping to reduce waste and optimize the use of resources.

In order to promote investment in these industries in the coming time, Vietnam needs to implement synchronous solutions, including creating stronger financial policies for green production projects, reforming administrative procedures to create favorable conditions for businesses to invest in clean technology, and building supporting infrastructure systems for sustainable industries. In addition, raising awareness of businesses and the community about the importance of sustainable production and environmental protection is also an important factor to help promote the development of these industries.

Investment in environmental and natural resource protection programs

Protecting the environment and natural resources is an important factor in Vietnam's sustainable development strategy. The Government needs to step up programs to protect forest and marine resources, combat illegal deforestation and protect marine ecosystems. These programs not only help protect biodiversity but also create a healthy living environment for people. In addition, it is necessary to have effective waste management strategies and policies, encouraging recycling and industrial waste treatment. Biodiversity conservation projects, especially the protection of rare and precious species of flora and fauna, should be prioritized. The Government should also continue to cooperate with international organizations to implement programs to protect the environment and natural resources, contributing to promoting sustainable economic development.

In order to improve the effectiveness of these programs in the coming time, Vietnam needs to have more specific and synchronous solutions, including increasing financial resources for environmental protection projects through national environmental protection funds, developing public-private cooperation mechanisms in environmental protection, etc and reform policies on natural resource management. At the same time, raising public awareness and the responsibility of businesses in protecting the environment also plays an important role in the successful implementation of natural resource protection programs.

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DIGITAL TRANSFORMATION IN FINANCIAL MANAGEMENT FOR SMALL AND MEDIUM ENTERPRISES IN VIETNAM

Dr. Nguyen Thi Anh Giang[1]

Abstract: Digital transformation in financial management is an urgent requirement for companies to achieve business success in the digital era. This study aims to examine the role of digital transformation in financial management in small and medium-sized enterprises such as risk management, strengthening relationships with external partners, and making financial decisions. Research shows that digital transformation in financial management helps increase operational efficiency through financial process automation. SMEs can make financial decisions more quickly and accurately thanks to updating their financial processes. Update financial data instantly, while improving relationships with external partners through increased access and quality of financial services. In addition, digital transformation in financial management activities also has certain challenges such as security and privacy of financial data, cultural changes and choosing appropriate technology solutions. The case also needs to be considered carefully.

Keywords: *Digital Transformation, Financial Management, Technology, Business*.

A. INTRODUCTION

Currently, small and medium enterprises (SMEs) account for over 95% of the total number of businesses and play a very important role in the country's economic growth and development process. In Vietnam, in the period 2018-2023, the average contribution of the business sector to the state budget (state budget) increased to 12.4%/year. In particular, SMEs account for 98.1% of the total number of operating enterprises, contributing about 45% of GDP and 31% of total state budget revenue. On average, during the period 2018 - 2023, the number of SMEs increased by 8.8%, higher than the average increase of large enterprises of 5.4%. SMEs develop in all industries, sectors of the economy, and localities. To achieve that result, financial management in businesses plays a significant role for businesses to develop sustainably. Corporate financial management is rapidly transitioning from an administrative role to a consulting role, helping to guide the organization's strategy. Digital transformation and data orientation will help further enhance the role and potential of corporate finance in planning and implementing successful long-term plans. Digital Transformation (abbreviated as DX) is the process of applying digital technology to make comprehensive and comprehensive changes in the way we operate and interact in all areas of society, from government, businesses to people's lives. The goal of digital transformation is to take advantage of the potential of digital technology to improve work performance, add value and create a digital economy, improve quality of life and promote sustainable development. Digital transformation is no longer a vision or a distant goal in the future, but has become an essential process, forcing every organization and business to participate in order to survive and not be left behind. in today's fiercely competitive and rapidly changing market. Digital

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transformation in businesses is taking place strongly, but in financial management activities, many businesses do not clearly understand, evaluate and apply the role of digital transformation for effective financial management. help businesses develop sustainably.

With technology increasingly developing today, digital financial technology is also an indispensable factor to achieve efficiency in financial management activities for SMEs. Financial technology or Fintech in English, is a combination of "finance" and "technology". Thanks to the application of advanced technology, financial services become more flexible, convenient and suitable for companies and individuals in fields such as banking, lending, payment, crowdfunding, and crowdfunding and investment.

In addition, Financial data analysis is also a content that digital transformation in financial management activities targets. Big data and financial analytics are essential in processing large volumes of financial data and generating insights for companies to make better decisions (Aftab et al., 2023). Financial data generated by companies can be a valuable source of information if managed and analyzed properly. This simplifies the coordination process, speeds up the financial cycle, and improves shared understanding of the company's financial condition (Chen et al., 2021).

Digital transformation in financial management also affects relationships with external partners such as banks, business partners and investors. Financial technologies such as online banking applications, e-commerce platforms and digital investor relations enable companies to build more efficient, transparent relationships with external partners. This can strengthen the company's reputation and build stakeholder trust (Klein & Todesco, 2021). However, during the digital transformation process, SMEs always face challenges such as security and privacy issues of financial data, and the risk of information leakage or misuse. In addition, other challenges are cultural change and understanding the importance of digital transformation among employees (Chang et al., 2020).

According to a survey by the Vietnam Association of Small and Medium Enterprises (SMEs), currently, SMEs are aware that applying digital transformation will optimize operations; business model; Increase experience and strengthen customer relationships. Survey results show that more than 80% of business leaders want to digitally transform and 65% of businesses are willing to invest heavily in digital transformation, showing a strong need for transformation and the spirit of transforming according to the industry's trends. The Report on the Status of Digital Business Transformation by IDG Group (USA) also shows that about 55% of start-up businesses in Vietnam have used digital technology to operate their businesses effectively, of which, the proportion of businesses Traditionally it is 38%. Within the scope of the article, the author delves into digital transformation in financial management activities to help small and medium-sized enterprises increase their financial management capacity to help businesses develop sustainably.

B. METHOD

The article used basic research methods in the field of economics such as: analysis and synthesis method, logical thinking method, comparison, deduction, induction, and inference methods. This research will be conducted using a qualitative method through literature. Data used in this study are taken from many relevant sources, including scientific journals, books, previous studies, and survey results from investment plans on

digital transformation in Ministry of Planning and Investment. Collected research data will be systematically and critically analyzed to identify findings related to the objectives of this study. This approach aims to more deeply analyze the impact of digital transformation in financial management and its significance for business development.

C. RESULT AND DISCUSSION

Effective financial management during digital transformation

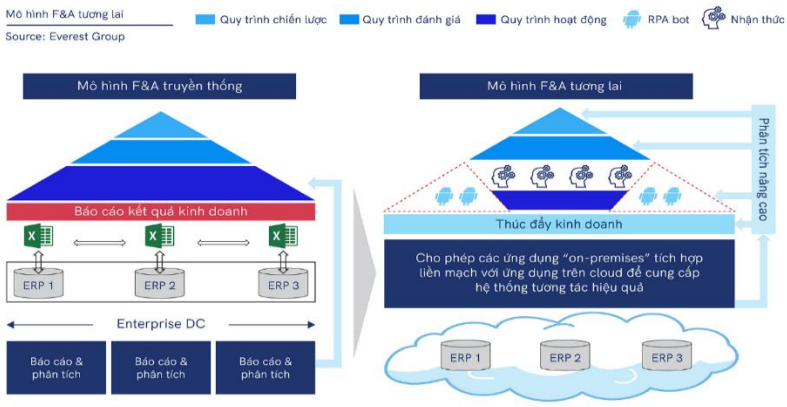
Digital transformation plays an important role in improving the efficiency of financial operations and processes within a company. Through automating various financial processes, such as cash management, invoicing and financial reporting, digital transformation enables reduced human error, increased accuracy and reduced time needed to complete these tasks.

Source: https://digital.fpt.com

In addition, digital transformation also brings benefits in the form of real-time access to financial data, which can be accessed directly and immediately. This instant access allows managers to Financial managers make more accurate decisions based on the latest information. This helps optimize the use of financial resources and better manage risks. Using complex financial analysis tools is also one of the positive impacts of digital transformation in financial management. With technology like big data analytics, companies can analyze financial data more deeply. These tools enable the identification of new trends, patterns and opportunities that may otherwise be overlooked when using only traditional analysis methods. Additionally, with the ability to more accurately predict capacity, companies can make better strategic decisions when faced with market changes.

The impact of digital transformation on financial risk management

Digital transformation has a significant impact on financial risk management within a company. Through sophisticated financial technology, companies can proactively identify and manage risks. In-depth data analytics enables companies to identify more financial risk quickly and accurately, helping them take the necessary actions on time. In this context, digital transformation enables companies to implement effective risk mitigation strategies. With a better understanding of risk, companies can plan proactive steps to reduce the impact and frequency of financial risks. This includes the use of predictive analytics tools that allow companies to predict possible losses and take appropriate preventive measures.



Source: https://digital.fpt.com

Additionally, digital transformation also improves a company's financial monitoring and control. Using technology such as blockchain, financial transactions can be recorded transparently and authenticity guaranteed. This helps reduce the risk of fraud and fraud. Artificial use of intelligence (AI) tools also allows companies to more quickly and accurately identify suspected forms of fraud or financial violations. Companies can perform faster and accurate risk assessments using sophisticated modeling and analysis tools. This allows the company to make more timely decisions, thereby minimizing the impact of financial risks that may arise.

Impact on SMEs' relationships with external partners thanks to digital transformation in financial management

Digital transformation significantly impacts a company's relationships with external partners, including financial institutions and business partners. One of the main impacts is increasing access and quality of financial services. Through financial technology, companies can increase the accessibility and convenience of banking transactions through digital banking applications. In addition to increasing accessibility, digital transformation allows companies to improve the quality of financial services they receive. For example, companies can adopt technology that enables real-time financial reporting to external parties. This increases the transparency and speed of information, which in turn can strengthen relationships with financial institutions and business partners. The obvious effect of digital transformation is expanding the customer base and market. Companies can reach and interact with potential customers globally using digital platforms.

Digital transformation and financial decision making

Digital transformation has brought significant benefits to financial decision-making. One of the key benefits is the ability to perform more accurate and in-depth analysis of financial data. Companies can collect, integrate and analyze financial data more effectively through financial technology. This allows financial managers to understand company performance more deeply, identify trends and comprehensively evaluate business performance. In this context, digital transformation enables complex data analysis tools such as big data analytics.With these tools, companies can analyze financial data with greater depth and complexity. For example, financial data analytics can assist in identifying cause-and-effect relationships between financial variables and business performance so that financial managers can make informed and evidence-based decisions. more scientific. Additionally, digital transformation enables predictive

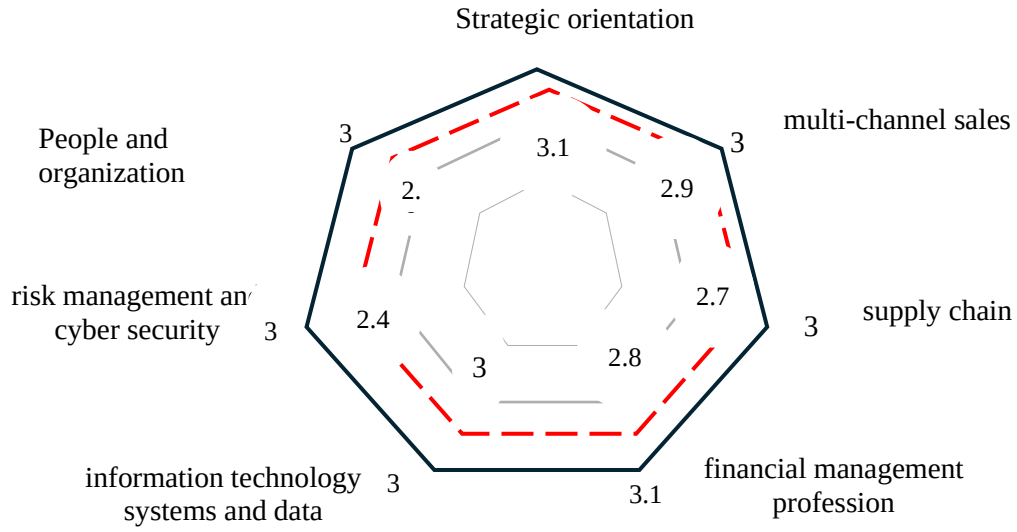
technology to support financial decision-making. By leveraging algorithms and predictive models, companies can accurately forecast financials and predict the outcomes of different business scenarios. This helps financial managers plan and make more informed decisions, considering various factors and possible future risks. Making effective financial decisions also involves optimizing the use of financial resources. Digital transformation allows companies to carry out complex financial operations scenario simulations and simulations to understand the impact of decisions on the company's operations and financial situation (Lee et al., 2021). Financial managers can use integrated finance simulation tools to determine the best options for allocating financial resources, optimizing investment portfolios, and managing financial risk. In this context, financial technology also offers the benefit of speed and efficiency in making financial decisions. Real-time access to financial data allows financial managers to make faster decisions. Up-to-date and accurate financial information helps financial managers better respond to market changes, optimize financial resources and take advantage of emerging business opportunities. In addition, digital transformation also allows companies to automate the process of making financial decisions. By implementing integrated financial systems and artificial intelligence (AI), companies can automatically make operational and tactical decisions based on defined rules and algorithms before. This reduces reliance on human decision-making, eliminates bias, and improves financial decision-making efficiency.

Current status of digital transformation in financial management in Vietnamese small and medium enterprises

According to survey results conducted by the Vietnam Chamber of Commerce and Industry (VCCI), surveying over 400 businesses, it shows that Vietnamese businesses have begun to perceive and apply digital technologies in all stages, such as internal administration, purchasing, logistics, production, marketing, sales and payment. As the COVID-19 pandemic spreads, leading to contact restrictions and the need to implement social distancing measures, forcing businesses to apply more digital technologies in their operations, especially in internal administration, electronic payment, online marketing. In a short period of time, the rate of businesses applying digital technologies has increased rapidly compared to before, specifically in remote personnel management, online conferencing, online learning, internal approvals... In the field of financial management, cloud computing is the technical tool used by the most Vietnamese businesses, with 60.6%, an increase of 19.5% compared to the time before the COVID-19 pandemic. Next are online conferencing systems, work and process management systems with approximately 30% of businesses having applied these tools before the COVID-19 pandemic and approximately 19% of businesses. has started using these tools since the epidemic. At the same time, the above survey shows the great expectations of the majority of Vietnamese businesses for the digital transformation process. Up to 98% of businesses expect a change in production and business activities when implementing digital transformation, of which the largest is the ability to help reduce costs (accounting for more than 71%), helping businesses industries that limit paperwork (61.4%) add added value to products and improve product and service quality (45.3%).

According to a survey by the Enterprise Development Department under the Ministry of Planning and Investment, conducted until the end of 2023 with the participation of 500 businesses nationwide from different industries including processing

and manufacturing industries. manufacturing, mining, wholesale and retail, education and training, real estate, etc. All businesses participating in the survey are small and medium-sized enterprises and do not belong to the group of businesses that conducted the survey in 2022.



Compared to the previous year, the level of readiness for digital transformation in the Transportation and Warehousing industry in Vietnam has changed significantly, increasing from an average of 2.6 to 3.5. Demand for goods transportation and logistics services continues to increase in the domestic market, along with the development of trade and international economic integration, promoting the need to improve digital technology to increase productivity. High quality of transportation and warehouse networks. At the same time, the explosion of e-commerce in recent years has led to increased demand for digital transformation in the transportation and warehousing industry in Vietnam. This explains the increase in the digital transformation readiness scores of the Strategic Orientation, People & Organization, and Financial and Accounting Management, Planning, Legal & Human Resources aspects. skyrocketed and reached 3.7, 3.5 and 3.6 respectively

Challenges when implementing digital transformation in financial management

Implementing digital transformation in financial management is not without challenges. One of the main challenges is the security and privacy of financial data. Companies face increasing security risks in the digital era, such as cyberattacks and data theft. Therefore, companies must protect their financial data with strong security measures, such as data encryption, multiple authentication systems, and protection against the ever-evolving networks of hackers. In addition, digital transformation also requires cultural changes within the company and adjustments to employee roles. When adopting new financial technologies, companies must change their current ways of working and face resistance to change. Managers and employees need to be actively engaged in the digital transformation process, receive appropriate training, and be supported to develop the new skills needed to work with new technologies. Another challenge is investing in technology and choosing the right solution. Digital transformation in financial management often requires significant investments in

technology infrastructure, software and highly skilled human resources. SMEs must carefully consider their business needs, evaluate the solutions available on the market and choose the solution that best suits their goals and budget.

E. DISCUSS

In the context of technical industrialization and digital transformation, in order to fully exploit the power of financial management in SMEs, the author proposes the following recommendations:

Firstly, it is necessary to change perceptions about the impact of digital technology on financial management in SMEs. It is necessary to proactively create a digital transformation environment for financial management.

Second, SMEs need to build a large database to meet transaction data; Applying Blockchain technology to analyze and process data, ensuring security and safety. In addition, it is necessary to develop online management software to fully meet financial information towards solving the problem of processing internal financial management data for businesses anytime, anywhere.

Third, it is necessary to focus on building corresponding technological infrastructure to keep up with new trends.

Fourth, it is necessary to focus on building a network security system, ensuring high security of financial management data information. Pay attention to safety and information security associated with network security against the threat of cybercriminal attacks to avoid the risk of information data theft. At the same time, it is necessary to be aware of and prepare for problems that may arise when applying new technologies.

Fifth, develop a workforce with high financial management qualifications to respond to changes in financial management under the impact of digital transformation. Along with that, business managers need to learn financial management experiences from businesses in developed countries through strengthening and expanding international cooperation activities.

F. CONCLUSION

Digital transformation, digital economic development, and digital society are inevitable trends that businesses need to implement to ensure sustainable development, especially in financial management activities, digital transformation is an urgent requirement. necessary to improve the efficiency of financial management operations of enterprises

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EMPIRICAL INSIGHTS INTO THE SUCCESS OF VIETNAM'S ELECTRONIC TAX SYSTEM: USERTRUST, SERVICE QUALITY, AND USER SATISFACTION

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Abstract: Reforming administrative procedures, particularly tax administration, is vital for fostering development and innovation. Electronic tax payment systems in Vietnam have simplified tax compliance for businesses by improving accessibility and convenience. This study evaluates the system's success using the DeLone and McLean Information System Success Model, analyzing responses from over 150 major taxpayers. Key constructs such as trustworthiness, security, service quality, and information quality are examined using PLS-SEM via SmartPLS4. Findings indicate that security and privacy are the most significant factors affecting user satisfaction, which is crucial for system acceptance and continued use. While information and service quality positively influence satisfaction, system quality does not show a significant impact. These insights provide guidance for policy and system improvements to enhance user satisfaction, strengthen trust, and ensure the system's long-term success.

Keywords: E-Tax System; User Trust; Service Quality; Security and Privacy; IS Success Model

1. Introduction

The adoption of online tax filing systems, or e-Filing, addresses the complexities of traditional manual tax filing by digitizing and automating the process. This innovation simplifies tax compliance, reduces administrative burdens, and enhances efficiency for taxpayers and tax authorities (Rahman & Mayasari, 2016). With secure transmission of Self-Assessment Tax Forms (SPT) via Application Service Providers (ASPs), e-Filing allows taxpayers to submit forms anytime, anywhere, offering a convenient alternative to manual systems (Yefni et al., 2018).

E-Filing's primary goals include creating a user-friendly interface that improves filing efficiency, reduces submission errors, and enhances reporting accuracy. It also lowers financial costs, minimizes administrative workloads, and promotes transparency in tax operations (Kotlyar & Pop, 2019). Moreover, public data disclosure through e-Filing fosters accountability, better governance, and reduced corruption (Schuppan, 2009).

Despite these advantages, concerns about security and privacy pose significant challenges to widespread adoption. Fear of data breaches and mishandling of sensitive information undermines trust in e-Government services. A study in Japan highlights how breaches can erode public trust in tax authorities and discourage e-Filing adoption (Chatfield, 2009).

For successful implementation, governments must meet user expectations for secure, efficient, and high-quality systems. Factors such as usability, feedback, information quality, accessibility, and transaction capabilities are critical for system success (Wang et

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al., 2005; Kent et al., 2003).

This study examines user feedback to evaluate the success of e-Filing systems, with a focus on satisfaction, trust, and system responsiveness. The research explores key factors influencing adoption, provides a framework for assessing e-Filing success, and offers recommendations for future improvements. The article reviews IS models, proposes a conceptual model, details the methodology, presents findings, and concludes with implications for policy and system refinement.

2. Literature Review

The success of information systems (IS) has been a central topic in academic and practical discussions, evaluated across technical, semantic, and effectiveness levels. According to Shannon and Weaver (1963), technical success ensures efficient and accurate information delivery, semantic success focuses on conveying meaning, and effectiveness addresses the system's impact on users. IS success metrics have evolved from developer-centered views—emphasizing timely, budget-conscious completion of projects—to user-focused measures like satisfaction and performance enhancement.

This study examines the success of electronic tax filing systems through user satisfaction, using influential models like DeLone and McLean (1992). Their framework links system quality, information quality, and user satisfaction, suggesting that these factors collectively drive individual and organizational outcomes. System quality includes attributes like accessibility, responsiveness, and flexibility, while information quality emphasizes accuracy, timeliness, and completeness. Seddon (1997) expanded this model by incorporating perceived usefulness and net benefits, providing a holistic perspective on IS success.

DeLone and McLean's updated 2003 model introduced six dimensions: system quality, information quality, service quality, usage, user satisfaction, and net benefits. Service quality, which includes system reliability and responsiveness, became critical for assessing e-Government services. Trust also emerged as a key determinant of user satisfaction and system adoption. Studies highlight that secure management of personal and financial information builds trust, while privacy concerns and data breaches can deter users.

Fedorowicz et al. (2010) stressed the importance of robust cybersecurity measures to foster user trust and adoption. Trust influences satisfaction by reinforcing confidence in system functionality and data protection, making it a pivotal factor for electronic tax systems. This study integrates trust, security, system quality, and service quality into the DeLone and McLean model, emphasizing these constructs to assess the success of Vietnam's e-filing system. By addressing trust and security concerns, the system can achieve widespread user acceptance and long-term success.

3. Conceptual Framework and Hypothesis Development

3.1 Information Quality and Trust

Information quality plays a pivotal role in user satisfaction and the success of government e-services, such as electronic tax systems. High-quality information—defined by its accuracy, reliability, and timeliness—builds trust by meeting user needs effectively (Lee & Levy, 2014). Trust ensures that users perceive the information as credible and relevant, while a lack of trust can lead to skepticism about the system's reliability, regardless of the factual accuracy of the information.

Hypothesis H1a: Information quality in the electronic tax system positively

influences users' trust in the system.

3.2 Service Quality and Trust

Service quality in e-government reflects the efficiency and effectiveness of citizen-government interactions. Key components include ease of use, security, trustworthiness, and citizen care (Pham et al., 2023; Gupta et al., 2024). High service quality enhances user satisfaction and fosters trust, while a lack of trust can negatively impact perceptions of service quality, regardless of actual performance. Building trust is essential for improving the perceived reliability of services.

Hypothesis H1b: Service quality of the electronic tax system positively influences users' trust in the system.

3.3 System Quality and Trust

System quality in e-government encompasses platform attributes like reliability, usability, and efficiency, which are vital for effective service delivery and user satisfaction. Research by Alzahrani et al. (2017) shows that system quality significantly impacts trust in e-government services. Trust enhances perceptions of system reliability and usability, while its absence can lead to negative assessments, even if performance is adequate. Building trust is crucial to improving perceived system quality.

Hypothesis H1c: System quality of the electronic tax system positively influences users' trust in the system.

3.4 Information Quality and User Satisfaction

Information quality is vital for user satisfaction in e-government services. Accurate, complete, and timely information boosts user confidence, enabling effective use of systems and improving satisfaction (Pham et al., 2023). In electronic tax systems, reliable and responsive information is essential for accurate tax filing and compliance, enhancing the overall user experience.

Hypothesis H2a: Information quality positively influences user satisfaction with the electronic tax system.

3.5 Service Quality and User Satisfaction

Service quality significantly affects user satisfaction in e-government platforms, with factors like efficiency, responsiveness, and reliability playing key roles (Chan et al., 2021). In electronic tax systems, timely and accurate responses to taxpayer inquiries, personalized support, and addressing individual concerns enhance the user experience and satisfaction by meeting their needs effectively.

Hypothesis H2b: Service quality positively influences user satisfaction with the electronic tax system.

3.6 System Quality and User Satisfaction

System quality in e-government platforms encompasses technical aspects like reliability, usability, and efficiency, which are vital for user satisfaction. Smooth navigation, quick response times, and secure operations build user confidence, while technical issues such as slow loading or poor usability can lead to dissatisfaction (Ilieva et al., 2024). In electronic tax systems, robust system quality ensures accessible, flexible, and user-friendly operations, enhancing satisfaction.

Hypothesis H2c: System quality positively influences user satisfaction with the electronic tax system.

3.7 Security and User Satisfaction

Security is crucial for user satisfaction in e-government services, as it ensures data

protection and minimizes risks during online interactions. Users are more likely to trust and use systems that safeguard their personal information (Gupta et al., 2024). In electronic tax systems, robust security measures that prevent fraud and unauthorized access enhance user confidence and satisfaction, while perceived vulnerabilities can discourage adoption.

Hypothesis H3: The security level of the electronic tax system positively influences user satisfaction.

3.8 Information Quality and Perceived Usefulness

Information quality, measured by accuracy, relevance, timeliness, and completeness, is key to meeting users' needs in electronic tax systems. High-quality information supports taxpayers in efficiently completing tax filings, enhancing their perception of the system's usefulness (Wirtz et al., 2016). Accurate and relevant information improves user performance, making the system more beneficial, especially for experienced users who rely on it for government service interactions.

Hypothesis H4a: Information quality positively influences the perceived usefulness of the electronic tax system.

3.9 Service Quality and Perceived Usefulness

Service quality measures how effectively a system meets users' needs through reliability, responsiveness, and support. In electronic tax systems, high service quality—offering accurate information and prompt assistance—enhances users' perception of the system's usefulness. Studies show that better service quality increases perceived usefulness and satisfaction, influencing user intentions to adopt e-filing systems (Mustapha, 2013).

Hypothesis H4b: Service quality positively influences the perceived usefulness of the electronic tax system.

3.10 System Quality and Perceived Usefulness

System quality reflects how well a platform meets user needs, emphasizing usability, reliability, and security. In electronic tax systems, robust system quality ensures efficient access to information and secure operations, aligning with user expectations and enhancing perceived usefulness. Studies confirm that high system quality positively impacts perceived usefulness, influencing satisfaction and compliance willingness by reducing perceived costs (Muslichah et al., 2023; Saptono et al., 2023).

Hypothesis H4c: System quality positively influences the perceived usefulness of the electronic tax system.

3.11 Perceived Usefulness and User Satisfaction

Perceived usefulness measures how effectively a system enhances user performance or meets needs. In electronic tax systems, perceived usefulness offers benefits like error reduction, time savings, and faster refunds, leading to higher satisfaction. Studies show that perceived usefulness significantly impacts user satisfaction and loyalty to e-government services, reinforcing its role in driving contentment (Pham et al., 2023; Muslichah et al., 2023).

Hypothesis H5: Perceived usefulness of the electronic tax system positively influences user satisfaction.

3.12 Proposed Research Model for E-Tax System Success

This study builds on existing frameworks to identify key factors influencing the success of electronic tax systems, including system quality, service quality, information

quality, security and privacy, trust, perceived usefulness, and user satisfaction. These elements, recognized as critical to e-tax system effectiveness (Alghamdi & Rahim, 2016), are integrated into a research model to analyze their interrelationships and collective impact. The model provides a comprehensive understanding of factors driving user satisfaction and system adoption.

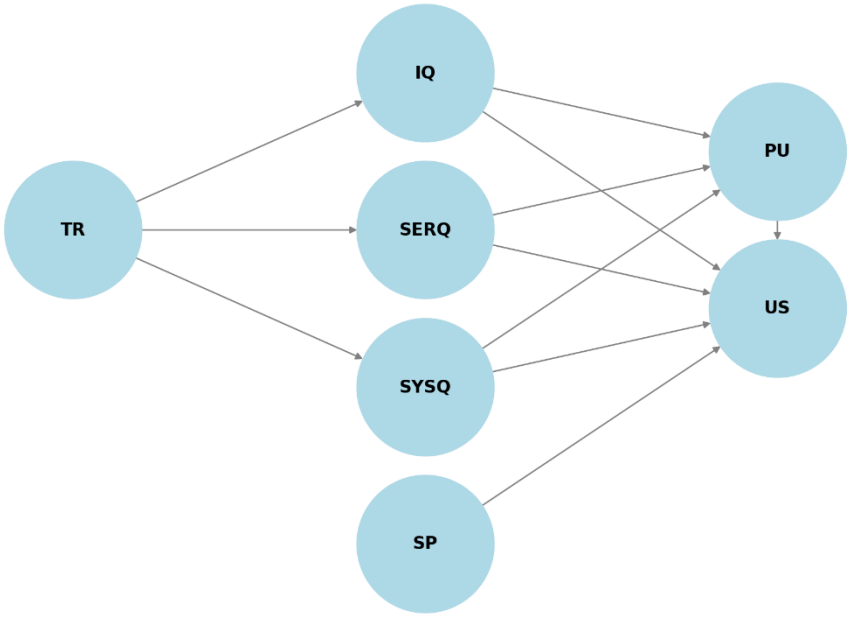


Figure 1: Proposed Research Model

This model forms the basis for developing hypotheses and guiding empirical studies on the success factors of electronic tax systems. It highlights the need for a comprehensive approach to evaluate and improve e-tax platforms, ensuring they align with user expectations and deliver intended outcomes.

4. Data Collection and Survey Design

4.1 Survey Design and Participants

This study employed a structured questionnaire to evaluate key factors affecting the success of the electronic tax system. Each factor was measured using multiple items on a five-point Likert scale, ranging from "Strongly Disagree" (1) to "Strongly Agree" (5). The survey assessed perceptions of information quality, system quality, service quality, security and privacy, perceived usefulness, trustworthiness, and user satisfaction. A summary of the factors and their measurement items is provided.

Table 1. Surveyed facotrs and Measurement Items

Factors		Degree				
Factor 1	Information Quality - IQ	1	2	3	4	5
IQ1	The accuracy of information provided by the e-tax system.					
IQ2	The frequency of information updates by the e-tax system.					
IQ3	The ease of understanding the content of information provided by the e-tax system.					
IQ4	The alignment between the information provided by the e-tax system and your tax declaration status.					
Factor 2	System Quality -SYQ	1	2	3	4	5

SYQ1	The frequency of encountering system errors while using the e-tax system					
SYQ2	The frequency of experiencing system delays when using the e-tax system.					
SYQ3	The frequency of encountering system malfunctions during use.					
SYQ4	The frequency of facing difficulties in accessing e-tax system platforms.					
Factor 3	Service Quality - SERQ					
SERQ1	The user-friendliness of the e-tax system's interface.					
SERQ2	The ease of using tools provided by the e-tax system's interface.					
SERQ3	The responsiveness of the e-tax system in addressing your tax declaration needs.					
Factor 4	Security & Privacy - SP	1	2	3	4	5
SP1	The level of safety for personal information when using the e-tax system.					
SP2	The frequency of notifications about security measures implemented by the e-tax system.					
SP3	The frequency of options provided to control the use of personal information by the e-tax system.					
Factor 5	Perceived Usefulness - PU					
PU1	The extent of time savings when using the e-tax system for tax returns.					
PU2	The degree of cost savings when using the e-tax system.					
PU3	The usefulness of streamlining tax filing procedures through the e-tax system.					
Factor 6	Perceived Trustworthiness - TR	1	2	3	4	5
TR1	The level of trust in the accuracy of penalty calculations by the e-tax system.					
TR2	The level of trust in the accuracy of stored information in the e-tax system.					
TR3	The level of trust in the protection of personal information from unauthorized access.					
Factor 7	User Satisfaction - US	1	2	3	4	5
US1	The extent to which your expectations are met when submitting tax declarations.					
US2	The extent to which your needs are fully met in interactions with the e-tax system.					
US3	The accuracy of data supporting effective tax compliance.					

An online survey was conducted with 120 professionals experienced in accounting and tax declaration within Vietnamese businesses. Participants were selected for their expertise and familiarity with the e-tax system, offering valuable insights into its functionality, trustworthiness, and impact on user satisfaction. This section connects the survey design to the study's objectives, emphasizing its alignment with the research focus.

4.2 Demographic Characteristics of Survey Respondents

The survey's descriptive statistics outline the demographic and professional characteristics of participants, including gender, age, education, industry, and duration of e-tax system usage. These details provide a clear profile of the respondents, offering context for their insights into the system.

Table 2. Sample Descriptive Statistics from the Survey

Factor	Characteristics	Frequency	Proportion (%)
Gender	Men	30	25,0
	Women	90	75,0
Total		120	100
Age	Under 30	65	54,2
	30 - 39	42	35,0
	40 - 49	12	10,0
	Over 49	1	0,8
Total		120	100
Education Level	Vocational School, College	8	6,7
	University	99	82,5
	Postgraduate	13	10,8
Total		120	100
Field	Agriculture, Forestry, and Aquatic Resources	4	3,3
	Industry	10	8,3
	Construction	2	1,7
	Commerce and Services	104	86,7
Total		120	100
Duration of use	Under 1 year	45	37,5
	1 - 3 years	26	21,7
	4 - 6 years	11	9,2
	over 6 years	38	31,7
		120	100

The survey revealed that 75.0% of respondents were women, while men accounted for 25.0%. The largest age group consisted of individuals under 30 years old (54.2%), followed by those aged 30-39 (35.0%). In terms of education, 82.5% of participants held university degrees, with an additional 10.8% possessing postgraduate qualifications. The majority of respondents worked in the commerce and services sector (86.7%), with 8.3% employed in industry. Regarding the duration of e-tax system usage, 37.5% had used the system for less than one year, while 31.7% reported over six years of experience.

This overview provides a clear understanding of the demographic characteristics, emphasizing the relevance of the sample to the study.

5. Results and Model Validation

5.1 Reliability Assessment of Measurement Scales

The measurement scales were evaluated for reliability using Cronbach's Alpha, with all constructs exceeding the 0.7 threshold, indicating strong reliability. Additionally, all

item-total correlations were above 0.3, confirming the robustness of the scales.

5.2 Validation of Research Model Using Structural Equation Modeling (SEM)

Structural Equation Modeling (SEM) using Smart PLS 4 validated the research model, which included seven constructs: Information Quality (IQ), System Quality (SYQ), Service Quality (SERQ), Security and Privacy (SP), Perceived Usefulness (PU), Trust (TR), and User Satisfaction (US). User Satisfaction acted as a mediating variable, critically influencing the success of the electronic tax filing system. The analysis was based on survey data from Vietnamese participants, ensuring contextual relevance.

5.3 Measurement Model Reliability and Validity

The reliability and validity of the measurement model were assessed using Composite Reliability (CR), Average Variance Extracted (AVE), and Factor Loading Coefficients. CR values above 0.7 confirmed internal consistency, AVE values over 0.5 established convergent validity, and loadings above 0.4 indicated acceptable item reliability. All constructs met these criteria, ensuring the model's robustness.

Table 3. Results of Reliability Assessment

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
IQ	0.801	0.813	0.869	0.625
PU	0.848	0.848	0.908	0.767
SERQ	0.861	0.871	0.915	0.782
SP	0.863	0.863	0.917	0.786
SYQ	0.921	1.063	0.942	0.803
TR	0.852	0.856	0.910	0.772
US	0.880	0.884	0.926	0.807

Discriminant Validity Assessment

Discriminant validity was assessed using the Heterotrait-Monotrait (HTMT) Ratio and the Fornell-Larcker Criterion. All HTMT values were below the 0.9 threshold, confirming strong discriminant validity for the constructs, as detailed in Table 4.

Table 4: Fornell-Larcker Discriminant Validity

	IQ	PU	SERQ	SP	SYQ	TR	US
IQ	0.790						
PU	0.612	0.876					
SERQ	0.708	0.556	0.885				
SP	0.473	0.524	0.545	0.887			
SYQ	0.091	0.023	0.193	0.249	0.896		
TR	0.661	0.575	0.597	0.762	0.154	0.879	
US	0.710	0.726	0.717	0.658	0.179	0.790	0.898

The reliability tests, SEM analysis, and validity assessments confirm the robustness and validity of the measurement scales. These results establish a strong foundation for evaluating the structural model and drawing empirical conclusions about the success of the electronic tax filing system.

5.4 Evaluation of Structural Model

Multicollinearity Testing

Variance Inflation Factor (VIF) results indicated no multicollinearity issues, with all values below the threshold of 5, confirming model validity.

Structural Model Evaluation and Predictive Power

Using PLS-SEM, the adjusted R^2 value was 0.722, showing that 72.2% of the variance in the success of the e-tax system was explained by the constructs. Q^2 values were all above 0, confirming strong predictive relevance. Effect sizes (f^2) ranged from 0.007 to 0.221, indicating moderate contributions from predictors.

Bootstrapping Analysis

Bootstrapping with 1,000 samples validated the significance of path coefficients, with T-values above 1.96 ($p < 0.05$).

Hypothesis Testing and Results

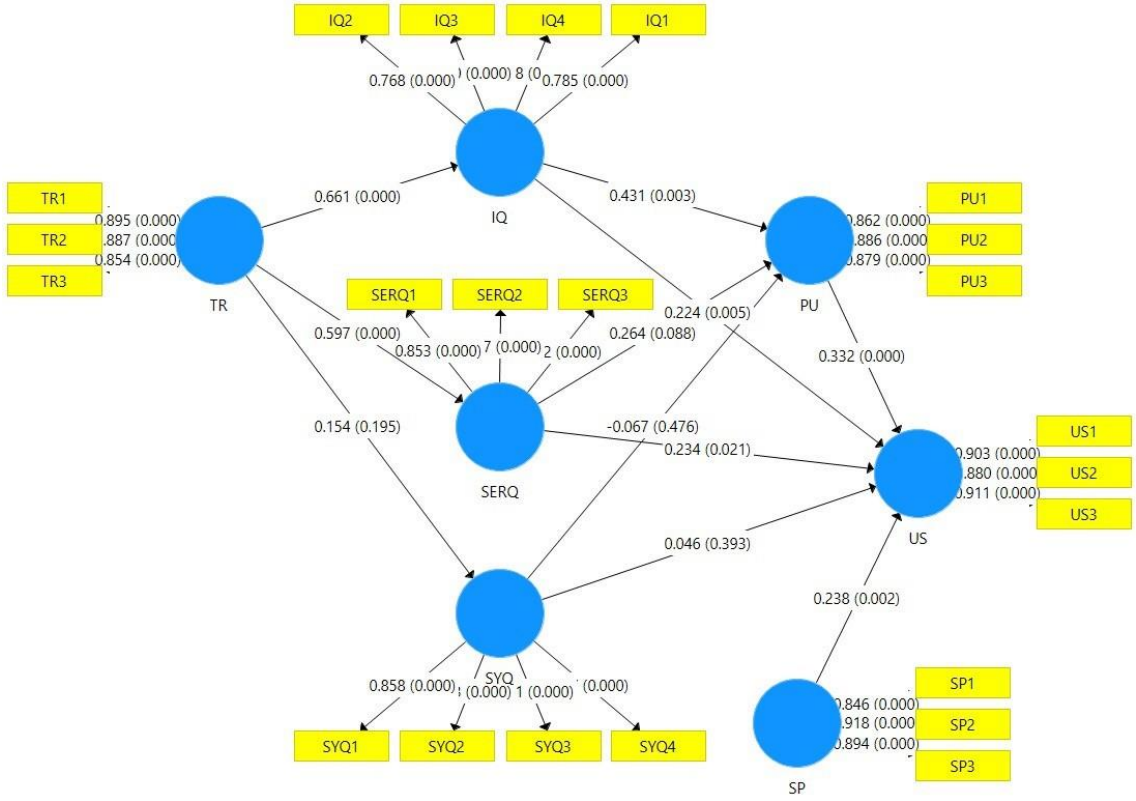
Trust (TR) had the strongest impact on intermediary constructs, affecting Information Quality ($\beta = 0.661$) and Service Quality ($\beta = 0.597$). User Satisfaction (US) was influenced by Perceived Usefulness ($\beta = 0.332$), Security and Privacy ($\beta = 0.238$), Service Quality ($\beta = 0.234$), and Information Quality ($\beta = 0.224$). System Quality (SYQ) showed insignificant effects on certain paths. Most hypotheses were supported at a 95% confidence level.

Table 5. Structural Model Bootstrapping Results

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
IQ -> PU	0.431	0.444	0.140	3.087	**0.002**
IQ -> US	0.224	0.220	0.077	2.895	**0.004**
PU -> US	0.332	0.331	0.082	4.039	**0.000**
SERQ -> PU	0.264	0.253	0.151	1.748	**0.081**
SERQ -> US	0.234	0.235	0.100	2.342	**0.019**
SP -> US	0.238	0.236	0.076	3.152	**0.002**
SYQ -> PU	-0.067	-0.068	0.091	0.739	**0.460**
SYQ -> US	0.046	0.049	0.057	0.820	**0.413**
TR -> IQ	0.661	0.663	0.057	11.642	**0.000**
TR -> SERQ	0.597	0.599	0.059	10.208	**0.000**
TR -> SYQ	0.154	0.157	0.125	1.232	**0.218**

Structural Model Interpretation

The structural model demonstrates that Trust, Perceived Usefulness, Service Quality, and Information Quality are critical factors influencing user satisfaction and the success of the e-tax system. Figure 2 illustrates the interactions among these constructs in the PLS-SEM model.



Figue 2: PLS-SEM model with interactions

The analysis confirms that the proposed model effectively explains the success of Vietnam's e-tax system, with significant relationships among key constructs. Bootstrapping results validate the model's reliability and predictive relevance.

6. Discussion of Findings

This study explores the factors driving the success of Vietnam's electronic tax system, applying the DeLone and McLean IS Success Model with constructs such as trust, security, service quality, and information quality. Key findings are contextualized within prior research.

6.1 The Role of Security and Privacy

Security and privacy emerged as the most critical factors influencing user satisfaction, aligning with prior studies (Chang et al., 2005; Chen, 2010). Tax authorities should prioritize advanced encryption, secure authentication, and system audits to build trust and mitigate risks.

6.2 The Importance of Trust

Trust significantly shapes perceptions of information and service quality, especially in systems handling sensitive data (Teo et al., 2008). Enhancing transparency and system performance can strengthen user confidence in Vietnam's e-tax platform.

6.3 The Divergent Impact of System Quality

System quality showed no direct impact on satisfaction, diverging from traditional models. Users prioritize service quality and accurate information over usability or system responsiveness, consistent with findings by Khayun and Ractham (2011).

6.4 The Interplay Between Service Quality and Perceived Usefulness

Service quality positively affects perceived usefulness, which drives satisfaction.

Improvements in responsiveness, reliability, and user support can enhance perceived value and system adoption (Parasuraman et al., 2005).

6.5 Information Quality as a Foundational Element

Accurate, complete, and timely information remains essential for user satisfaction and compliance (Economides & Terzis, 2008). Vietnam's e-tax platform must ensure reliable and relevant data to support taxpayer needs.

6.6 Policy and Practical Implications

Key strategies include enhancing security protocols, promoting trust through transparency, improving service responsiveness, and leveraging user feedback to refine the system.

6.7 Theoretical Contributions

This study extends the DeLone and McLean model by incorporating trust and security as essential elements for e-government adoption, particularly in developing countries.

6.8 Future Research Directions

Future work should explore the long-term effects of trust and security on user engagement and compare success factors across different countries to identify universal and context-specific drivers of e-tax system adoption.

7. Conclusion

This study examines the factors influencing the success of Vietnam's electronic tax system, integrating trust, security, service quality, and information quality into the DeLone and McLean IS Success Model. Findings highlight the critical role of trust and security in driving user satisfaction and adoption, particularly in systems managing sensitive data.

Key Insights and Implications:

- Security as a Priority: Security and privacy significantly impact satisfaction, requiring robust encryption, secure authentication, and regular audits to build confidence.
- Building Trust: Transparency, consistent performance, and clear communication foster trust in information and service quality.
- Service Over System Quality: Service quality directly influences satisfaction, emphasizing responsive support, user-friendly interfaces, and proactive assistance.
- High-Quality Information: Accurate and timely information is essential for compliance and satisfaction.

Theoretical Contributions:

By incorporating trust and security, this study enhances the IS Success Model's relevance to e-government adoption, particularly in developing countries.

Practical Recommendations:

Policymakers and system developers should prioritize security, promote transparency, enhance user support, and leverage feedback to refine systems.

Future Research Directions:

Further studies could explore the long-term effects of trust and security and compare success factors across regions to identify universal and context-specific drivers of e-government adoption.

Vietnam's electronic tax system illustrates technology's transformative potential in tax administration. Addressing identified challenges can enhance efficiency, compliance, and user satisfaction, fostering trust and collaboration between governments and citizens in the digital era.

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PROMOTING HIGH TECHNOLOGY APPLICATION FOR AGRICULTURAL COOPERATIVES IN NGHE AN PROVINCE

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Abstract: In the current context, the application of advanced technology in agriculture is an inevitable trend in the development process. Cooperatives play a vital role in connecting and driving development for small-scale households. Developing agricultural cooperatives with a focus on applying scientific and technical achievements to agricultural production aims to contribute to sustainable agricultural development. Therefore, the objective of this article is to evaluate the achievements and challenges faced, and from there, propose several solutions to promote the adoption of high-tech applications in agricultural cooperatives in Nghe An province.

Keywords: *high technology, high technology agriculture, Agricultural cooperatives,*

1. INTRODUCTION

Agricultural cooperatives play a significant role in driving socio-economic development nationwide and at the local level. Agriculture, in particular, is one of the key strengths of many regions, including Nghe An province. High-tech agricultural cooperative models have been established and implemented in various sectors, yielding positive outcomes in economic, social, and environmental aspects. These models have initially transformed production and business mindsets and are gradually being expanded on a larger scale. However, the adoption of high technology by agricultural cooperatives in Nghe An remains slow and faces numerous challenges and limitations. Therefore, researching solutions to promote high-tech applications in agricultural cooperatives is essential. This effort will act as a catalyst for advancing the province's agricultural development in the coming years.

2. RESEARCH METHODOLOGY

Data and statistical information on the current state of high-tech agricultural cooperatives in Nghe An province were collected, processed, and analyzed by the author from various sources, including the Nghe An Statistical Yearbook, reports from the Nghe An Cooperative Alliance, and the Department of Agriculture and Rural Development of Nghe An province.

In addition, the author conducted field surveys of agricultural cooperatives, including 38 high-tech agricultural cooperatives, and randomly interviewed 12 agricultural cooperatives that have not adopted high technology to identify the benefits of high-tech applications.

The collected data were compiled and analyzed using SPSS 20 software. The author employed descriptive and comparative statistical methods, utilizing frequencies and means, to analyze the current state and achievements of high-tech agricultural cooperatives in Nghe An province.

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3. RESULTS AND DISCUSSION

3.1. Current Status of High-Tech Applications in Agricultural Cooperatives in Nghe An Province

3.1.1. Operational Scale of High-Tech Agricultural Cooperatives

In recent years, despite challenges in both global and domestic economies, the collective economic sector, including cooperatives in Nghe An province, has maintained relatively stable operations. According to the 2023 Statistical Yearbook of Nghe An, as of December 31, 2023, the province had 899 cooperatives, an increase of 33 cooperatives compared to 2022. During the 2021-2023 period, the number of cooperatives grew by an average of 4.2% annually, accounting for approximately 3% of the national total and ranking second in the North Central region. Among these, cooperatives operating in agriculture, forestry, and fisheries dominate, with 690 cooperatives making up 76.75% of the province's total. Notably, the number of agricultural cooperatives applying high technology has increased in recent years but still remains low. There are 38 high-tech agricultural cooperatives, representing only 5.57% of all agricultural cooperatives. These cooperatives are distributed across the province's three regions: the plains, midlands, and mountainous areas.

Table 3.1. Number of High-Tech Agricultural Cooperatives in Nghe An Province
Unit: Cooperative

Indicator	2021	2022	2023
Total number of cooperatives	828	866	899
Agricultural cooperatives	627	648	690
High-tech agricultural cooperatives	19	25	38
Percentage of high-tech agricultural cooperatives (%)	303	3,86	5,51

Source: *Department of Agriculture and Rural Development of Nghe An Province*

In terms of operational types, among the 38 high-tech agricultural cooperatives, 60.53% are engaged in crop production, 31.58% in livestock farming, and 7.89% operate as integrated agricultural cooperatives.

Table 3.2: Distribution of High-Tech Agricultural Cooperatives by Operational Type in Nghe An Province

Operational Type	Number of Cooperatives (n=38)	Percentage (%)
1. Field		
Crop production	23	60,53
Livestock farming	12	31,58
Integrated operations	3	7,89
2. High-tech application stage		
Production	35	92,11
Storage and processing	11	28,95
Distribution	8	21,05

Source: Compiled from survey results by the author

In terms of operational types, among the 38 high-tech agricultural cooperatives, 60.53% operate in crop production, 31.58% in livestock farming, and 7.89% as integrated cooperatives. Regarding the application of high technology in production stages, 92.11%

of cooperatives implement high-tech solutions in production, the predominant area.

In crop production, most cooperatives utilize advanced techniques such as cultivating high-yield crop varieties, including rice, peanuts, passion fruit, and medicinal plants that are resilient to harsh weather conditions and diseases. Greenhouse and net-house technologies are employed by 28.95% of cooperatives, focusing on crops like melons, cantaloupes, and off-season vegetables. Automated irrigation systems are used by 47.37%, while technologies such as sensors for humidity, temperature, light, and automated fertilization are less common, applied by only 5.26%. In livestock farming, high-tech applications include automated and semi-automated systems for feeding, drinking, and cooling, as well as the use of biotechnology for waste treatment. For aquaculture, cooperatives adopt advanced systems such as closed housing and floating cages with covers to stabilize temperature, reduce disease spread, and improve growth conditions. Techniques like two-stage farming, Semi-Biofloc, and greenhouse aquaculture have enhanced shrimp farming efficiency, achieving yields of 15-20 tons per hectare and promoting sustainable and eco-friendly practices.

High-tech applications in storage and processing remain limited, accounting for only 28.95% of the total high-tech agricultural cooperatives. These applications primarily involve cold storage for preservation and the processing of products such as fish sauce and sausages.

In terms of distribution, high-tech applications mainly focus on IT solutions for management and business operations. Some cooperatives have implemented product traceability systems, with certain products like oranges, lemons, guavas, and seafood being assigned barcodes and QR codes. These codes help introduce, promote, and trace the origins of the cooperatives' products, representing approximately 13.16% of the total high-tech agricultural cooperatives.

3.1.2. Scale of Operations of High-Tech Agricultural Cooperatives

In terms of membership, high-tech agricultural cooperatives generally have significantly fewer members compared to those not adopting high technology. In 2023, the average number of members in agricultural cooperatives was 289 members per cooperative. However, for high-tech agricultural cooperatives, survey data indicate an average of 15.7 members in crop production cooperatives and 19.6 members in livestock farming cooperatives, with the smallest cooperative having only 7 members.

Regarding land size, survey results show that high-tech agricultural cooperatives operate on relatively small scales. On average, crop production cooperatives cover approximately **2,700 m²**, while livestock farming cooperatives span about **2,200 m²**. Most of the land utilized by these cooperatives comes from contributions made by their members.

Table 3.3: Average Scale of High-Tech Agricultural Cooperatives in Nghe An Province

Indicator	Unit	Crop Cooperative	Livestock Cooperative
Number of members per cooperative	Members	15,7	19,6
Charter capital per cooperative	Million VND	1,2	2
Investment contribution per member	Million VND	100	150
Area under high-tech application	m^2	2.700	2.200

Source: Compiled from the author's survey results

Survey data indicate variations in charter capital among high-tech agricultural cooperatives, depending on their operational field. Crop production cooperatives exhibit a lower average charter capital of 1.2 billion VND per cooperative, while livestock cooperatives have an average of 2 billion VND per cooperative. Regarding investment contributions by members, those involved in crop production contribute an average of 100 million VND per member, whereas members of livestock cooperatives contribute approximately 150 million VND per member. The primary source of capital comes from individual members, with contributions varying according to their financial capacity. Additionally, certain cooperatives benefit from funding support provided by provincial programs and projects. However, the overall scale of member contributions suggests that high-tech agricultural cooperatives in the province are still operating at a relatively small scale, indicating a need for increased capital mobilization to enhance their competitiveness and growth potential.

3.2. Results of High-Tech Application by Agricultural Cooperatives in Nghe An Province

3.2.1. Evaluation of the Benefits of High-Tech Application by Agricultural Cooperatives

According to a survey conducted among agricultural cooperatives in Nghe An province, the application of high technology has delivered substantial benefits. High-tech adoption has helped cooperatives reduce fertilizer and animal feed costs by **25.3%**, pesticide and veterinary medicine costs by **50.4%,** labor costs by **36.3%,** and water usage by **43.9%.** Meanwhile, crop and livestock productivity has increased by **39.8%** compared to previous practices.

Table 3.4 Summarizes the surveyed cooperatives' evaluations of the benefits of high-tech application

Indicator	Unit (%)	Result
% increased crop/livestock productivity	%	34,5
% reduced fertilizer and feed costs	%	24,17
% reduced pesticide and veterinary costs	%	53,87
% water savings	%	32,41
% reduced labor costs	%	37,58
Food safety levels:		
- Relatively safe	% of opinions	2,63
- Safe	% of opinions	26,32
- Very safe	% of opinions	71,05
Improvement in product quality:		
- Little to no change	% of opinions	7,89
- Moderately improved	% of opinions	36,84
- Outstanding quality	% of opinions	55,26
Improvement in product appearance:		
- Little to no change	% of opinions	10,53
- Moderately improved	% of opinions	42,11
- Outstanding appearance	% of opinions	47,37

Source: Compiled from survey results by the author.

In addition to reducing costs and increasing productivity, most cooperatives surveyed reported significant improvements in food safety, with **71.05%** considering

their products "very safe" and **26.32%** rating them as "safe." Regarding product quality, **55.26%** of cooperatives noted "exceptional quality improvement," while **42.11%** observed "significant improvements" in the appearance and packaging of their products.

3.2.2. Revenue, Costs, and Profit of High-Tech Agricultural Cooperatives

By applying high-tech methods to agricultural production, cooperatives in the province have been able to minimize resource waste, save on input costs such as water, fertilizers, and labor, and thereby improve both economic outcomes and efficiency. Specifically:

Table 3.5. Revenue, Expenses, and Profit of Agricultural Cooperatives in Nghe An Province in 2023

Unit: Million VND

Indicator	Crop Cooperatives		Livestock Cooperatives	
	With Technology	Without Technology	With Technology	Without Technology
Revenue/Cooperative	3.451	2.109	9.481	2.531
Expenses/Cooperative	2.563	1.815	5.845	1.776
Profit/Cooperative	888	294	3.636	755
Profit/Expense Ratio	34,65	16,20	62,21	42,51
Revenue/Member	219,81	105,45	483,72	140,61
Profit/Member	56,56	14,70	185,51	41,94

Source: Compiled from the author's survey results

In the crop cultivation sector, the revenue of agricultural cooperatives applying high technology reached about 3,451 million VND per cooperative, which was 1.64 times higher than that of cooperatives not applying high technology, at 2,109 million VND per cooperative. The profit for high-tech cooperatives was 2,563 million VND per cooperative, 1.41 times higher than the 1,815 million VND per cooperative for those not using high technology. The profit-to-cost ratio for high-tech agricultural cooperatives was 34.65%, while non-high-tech cooperatives only achieved 16.2%.

In the livestock sector, high-tech agricultural cooperatives also performed better, with revenues 3.74 times higher and profits 4.82 times higher compared to non-high-tech cooperatives. The profit-to-cost ratio for high-tech cooperatives was 62.21%, much higher than the 42.51% for those without high-tech investment.

Therefore, the application of high technology has helped agricultural cooperatives in Nghe An province reduce costs, increase crop and livestock productivity, lower product prices, and enhance overall economic efficiency.

3.3. The difficulties and limitations of high-tech agricultural cooperatives in Nghe An Province

First, the scale of high-tech agricultural cooperatives is generally small, both in terms of land area and capital. These cooperatives primarily rely on their own capital, while the initial investment required for high-tech adoption is substantial. Only a small number of cooperatives (18.72%) have been able to access loans from credit institutions. The reason for this is that these cooperatives do not meet the necessary criteria to qualify for government loans, especially large loans. Cooperatives must secure land and ensure that commercial banks recognize their high-tech agricultural projects, which involves a complex and lengthy appraisal process.

Second, high-tech agricultural cooperatives in the province mainly focus on applying technical advancements to individual stages of the production process. They have not yet

applied high-tech solutions to key areas such as post-harvest preservation and processing of agricultural products. Additionally, there are few products that integrate high-tech solutions across the value chain, resulting in limited effectiveness and sustainability. The use of information technology, production automation, biotechnology, and advanced farming practices is still minimal.

Third, the management capacity of cooperatives and the skill level of workers remain inadequate to fully implement high-tech applications. Most cooperative managers report challenges in their business operations due to a lack of market skills, the ability to develop business plans, negotiation skills, brand development, and access to policies. Furthermore, the workforce involved in the development of high-tech agriculture requires highly skilled labor to operate and apply modern processes and equipment. However, there is a shortage of skilled workers within cooperatives, making it difficult to access and operate new technologies. Training and professional development are essential to address this issue.

Fourth, the market access of high-tech agricultural cooperatives is still limited. With small production scales and insufficient output, these cooperatives have not been able to establish links with large enterprises for product distribution. Moreover, only a few cooperatives have websites or online sales channels, while most still rely on traditional methods to reach the market. As a result, the ability of these cooperatives to access markets outside the province and to export is significantly constrained.

3.4. Some solutions to promote high-tech agricultural cooperatives in Nghe An Province

First, to expand the scale of high-tech agricultural cooperatives, the province needs to accelerate the planning and approval of high-tech agricultural zone projects, thereby encouraging economic organizations to invest in high-tech agriculture, including agricultural cooperatives. To achieve this, the province needs to review the planning and implementation of high-tech agricultural production zones. Each region within the province should have a well-defined agricultural production area for large-scale, high-tech applications. Specifically, the mountain areas in the western part should be planned for industrial-scale livestock farming and fruit cultivation, while the central and coastal plain areas should focus on high-quality vegetable production, high-tech aquaculture, and centralized processing and preservation of agricultural and aquatic products.

Second, it is essential to establish partnerships and relationships with enterprises to mobilize and support funding. In particular, cooperatives should focus on linking with enterprises involved in production, processing, and consumption, as well as those that supply and advise on technology. This will help cooperatives address challenges related to inputs and outputs. Additionally, the government needs to issue guidelines to resolve issues related to access to capital for cooperatives and work closely with banks to implement preferential loan programs to promote high-tech agricultural cooperatives.

Third, enhancing the management capacity of cooperative leaders is crucial. In addition to management training programs covering key areas such as management skills and state policies on collective economy development, it is essential to incorporate training in high-tech agriculture, organic farming, and business and market analysis skills. Training in the transfer of high-tech agricultural production technologies will help cooperatives adopt and expand high-tech agricultural practices.

Fourth, there needs to be a stronger focus on training and development for the

workforce participating in high-tech agricultural cooperatives, ensuring a skilled workforce that meets the required knowledge, skills, and attitudes to apply high-tech methods in production.

Fifth, improving market access both within and outside the province, including international markets, for high-tech agricultural cooperatives through digital transformation and the application of information technology is vital. Digital transformation and the use of information technology are key trends being implemented worldwide. By applying these technologies, high-tech agricultural cooperatives can enhance their competitiveness, increase productivity, improve management and operational efficiency, and reduce costs and time. To implement digital transformation and the use of information technology, specific solutions include: (1) Using management software for tasks such as customer relationship management, financial transactions, and cooperative operations, thus improving the management and service for cooperative members; (2) Building a website and leveraging social media platforms to promote products and services, enhance customer engagement, and increase the cooperative's reputation. Additionally, integrating e-commerce platforms for online sales will expand market access for cooperative products. Cooperatives should also focus on providing product information through instructional videos, photos, and detailed descriptions to help customers understand the products they wish to purchase.

4. CONCLUSION

The application of high-tech in agricultural cooperatives has attracted significant attention and development efforts from localities across the country. In practice, high-tech agricultural cooperatives in Nghe An province have helped reduce input costs such as fertilizers, animal feed, plant protection products, veterinary medicines, labor costs, and water usage for crop cultivation and livestock farming compared to non-high-tech cooperatives. At the same time, the productivity, quality, and appearance of agricultural products have improved significantly. As a result, the revenue and profits of high-tech agricultural cooperatives have experienced remarkable growth. However, the scale of these cooperatives is still quite small in terms of both area and investment capital, and the use of technology is primarily limited to the production stage. This is due to barriers related to policies, planning, credit, science and technology, management and labor capacity, and market access. Therefore, it is necessary to implement comprehensive and feasible solutions to promote the development of high-tech agricultural cooperatives in the province in the near future, contributing to the development of the local rural economy.

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DIGITAL ECONOMIC DEVELOPMENT POLICY TOWARDS GREEN ECONOMY IN VIETNAM

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Abstract:

Purpose - This study analyzes and evaluates current policies on the digital economy and identifies *transformation opportunities to promote green growth, thereby proposing policies and solutions to increase efficiency and minimize negative impacts on the environment in Vietnam.*

Design/methodology/approach *- A mixed methods approach is used, starting with a qualitative assessment of Vietnam's digital economy policies and their alignment with green growth goals. Quantitative analyses, including statistical regression models, are used to assess the relationship between these two variables. The study also incorporates comparative policy analysis to draw lessons from international best practices.*

Findings *- The study highlights how digital policies drive economic growth and green innovation, with successes in smart grids, digital finance, and advanced technologies. Practical recommendations include improving policy enforcement, addressing regulatory gaps, and fostering workforce development to enhance sustainable development efforts.*

Research limitations/implications *- Data limitations and gaps in green growth metrics present challenges in assessing the full spectrum of impacts. Future studies are encouraged to develop a unified framework for evaluating digital policies and green growth across diverse economic sectors.*

Originality/value *- Vietnam's unique socio-economic and environmental context shapes the integration of the digital economy and green growth policies. These findings should be adapted to local conditions when applied to other regions.*

Keywords *Digital economy, Green growth, Policy*

Paper type Research paper

1. Introduction

In the face of climate change and resource depletion, green growth is considered an essential solution for sustainable development goals. To achieve these goals, the digital economy plays an indispensable role in supporting this process by applying technology to optimize production, manage data and reduce resource waste. At the end of 2008, the United Nations Environment Programme (UNEP) launched the "Green Economy Initiative" with the aim of strengthening international cooperation to respond to the financial crisis while addressing global issues towards sustainable development of the post-crisis world economy. In 2009, the United Nations Organization for Economic Cooperation and Development issued its first publication on green growth. In addition, to promote the development of the digital economy, in 2016, at the UNCTAD Ministerial Conference in Nairobi, they also decided to strengthen UNCTAD's work in enhancing

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the development benefits from the digital economy and e-commerce. Their wise actions laid the foundation for what has evolved into the Electronic Commerce and Digital Economy (ECDE) Programme.

In Vietnam, the issue of green growth and sustainable development has also received special attention from the Party and State in recent times. On October 1, 2021, the Prime Minister issued Decision No. 1658/QD-TTg approving the National Strategy on Green Growth for the 2021-2030 period, with a vision to 2050, which also sets the general goal of green growth contributing to promoting economic restructuring associated with growth model innovation to achieve economic prosperity, environmental sustainability and social equity; towards a green, carbon-neutral economy and contributing to the goal of limiting global temperature rise. In addition to green growth policies, the Government has also issued policies to develop the digital economy towards sustainable development. On June 3, 2020, the Prime Minister issued Decision 749/QD-TTg approving the "National Digital Transformation Program to 2025, with a vision to 2030", identifying digital transformation, digital economic development, and digital society as Vietnam's strategic focus in the coming period and setting specific goals by 2025.

The impact of digital economic development policies towards green economy has prompted many scholars and researchers around the world to focus on studying the impact of digital economic development policies on green economy in countries. Liao (2023) emphasized the need for policies that utilize digital tools such as IoT and data analytics to manage and reduce carbon emissions. In addition, Lin et al. (2024) emphasized the important role of creating policies that link the digital economy and green economy to address sustainability challenges and promote economic growth. In addition, Tan (2024) affirmed the important impact of the Big Data Comprehensive Zone (BDCZ) policy in China on the digital intelligent transformation (DIT) of manufacturing companies. Through advanced methods such as DID and PSM-DID, the study shows that BDCZ policies not only promote green innovation but also improve operational efficiency.

The impacts of the digital economy on the green economy are not only important but also have profound practical significance in the current context of sustainable development. However, the amount of research on the relationship between these two fields is still quite limited, creating gaps that researchers can continue to exploit. Therefore, to support developed and developing countries in comprehensively assessing the situation, the group of authors chose the topic: “The impact of digital economic policies on green growth in Vietnam.”

2. Literature review

2.1. Digital economy

The Organisation for Economic Co-operation and Development (OECD) defines the digital economy as "enabling and conducting the trade of goods and services through e-commerce on the Internet" (OECD, 2012). Its core content relates to competition and regulation in digital markets, with additional discussions on network effects, interoperability, and open or closed platforms. Building on this perspective, Deloitte states, "The digital economy encompasses economic activities generated by billions of daily online connections between people, businesses, devices, data, and processes. The backbone of the digital economy is hyperconnectivity, which refers to the increasing interconnection between people, organizations, and machines, driven by the Internet, mobile technology, and the Internet of Things (IoT)."

From a national policy perspective, as defined in the National Strategy for Digital Economy and Digital Society Development by 2025, with a vision to 2030 (Decision No. 411/QĐ-TTg dated March 31, 2022, by the Prime Minister): "The digital economy refers to economic activities that use digital technology and digital data as key inputs, operate primarily in digital environments, and leverage ICT to enhance labor productivity, innovate business models, and optimize economic structures."

In summary, the digital economy refers to the broad scope of economic activities relying on digital technology and data as core inputs. These activities primarily occur in digital environments and are supported by ICT systems such as the Internet, cloud computing, big data, and IoT. The digital economy spans all sectors - industry, agriculture, services, etc. - where digital platforms enhance productivity, foster innovation, and create new business models. At its core, the digital economy is characterized by hyperconnectivity, which entails continuous connections among people, businesses, and devices, facilitating seamless exchanges of information, goods, and services.

2.2. Green growth

The concept of green growth has been defined by the United Nations as follows: “Green growth is the promotion of economic growth and social development while ensuring the sustainable use of natural resources and minimizing environmental risks.” Similarly, the United Nations Environment Programme (UNEP) asserts that green growth is economic growth aimed at enhancing human well-being and social equity while significantly reducing environmental risks and the degradation of natural ecosystems.

This study adopts and applies the definition of green growth based on the principles and objectives of Vietnam’s current policies to ensure alignment and consistency with the country's sustainable economic development strategies. According to Decree No. 83/2015/NĐ-CP dated June 23, 2015, issued by the Government: “Green growth is the process of economic growth associated with environmental protection, the efficient use of natural resources, responding to climate change, ensuring sustainable development, and improving the quality of life.” Similarly, the National Green Growth Strategy for the 2021-2030 period defines green growth as “economic growth associated with environmental protection, the efficient use of natural resources, responding to climate change, and ensuring sustainable development.” The national green growth strategy also identifies three strategic tasks: (i) reducing greenhouse gas emissions intensity and promoting clean and renewable energy; (ii) greening production; and (iii) greening lifestyles and promoting sustainable consumption.

2.3. Digital economic policy towards green growth

The digital economy has become a transformative force, significantly influencing both economic growth and environmental sustainability. Studies highlight the complex relationship between digitization and CO2 emissions, showing both opportunities and challenges. Park et al. (2018) found that ICT adoption in the EU initially increased emissions due to heightened energy demand during early digital transformation; however, economic growth and trade liberalization helped mitigate these effects by promoting energy efficiency and technological progress. Similarly, Li et al. (2021) identified an inverted U-shaped relationship globally, where CO2 emissions rise during early digital development but eventually decline as energy efficiency improves and technological advancements take hold, particularly in high-income countries.

In China, the role of digitization in fostering green economic growth is particularly evident, as it has optimized production processes, enhanced resource efficiency, and reduced carbon emissions (Li et al., 2022). Additionally, Ren et al. (2022) showed that digital economic clusters have positively influenced green growth by driving technological progress and industrial transformation, though spillover effects also impacted neighboring regions. Jiang and Deng (2022) further explained the nonlinear dynamics of digitization, identifying factors like financial concentration and green innovation that shape its environmental impact. Gao and Li (2024) emphasized the importance of balanced regulatory frameworks, cautioning that overregulation could impose costs that undermine the benefits of digital technologies in reducing emissions.

Vietnam reflects these global trends, as Hoang and Ngo (2023) demonstrated that while ICT initially increased emissions due to higher energy consumption, it later reduced them through advancements in energy efficiency and renewable energy adoption. Similarly, Bui et al. (2023) observed that early-stage digitization in Asia drove emissions up because of energy-intensive activities, yet these emissions declined over time with the adoption of green technologies and more efficient energy use. However, challenges such as inefficient industrialization and rapid urbanization persisted, exacerbating emissions in some developing nations.

These findings collectively underscore the transformative potential of the digital economy in promoting sustainability while also revealing regional and developmental disparities. High-income countries have successfully leveraged digital innovations to reduce emissions, while developing nations face challenges related to energy demand and infrastructure limitations. Policymakers must prioritize renewable energy integration, incentivize green technological advancements, and promote equitable access to digital technologies. By adopting tailored strategies, it is possible to harmonize economic growth and environmental sustainability, ensuring the digital economy contributes meaningfully to global sustainability goals.

3. Methodology

3.1. Model Specification

To assess the impact of digital economy on green growth, the authors propose the following econometric model:

$$GG_{it} = \beta_0 + \beta_1 DE_{it} + \beta_2 GDP_{it} + \beta_3 FD_{it} + \beta_4 Trade_{it} + \beta_5 FDI_{it} + \beta_6 Gov_{it} + \beta_7 Urban_{it} + \beta_8 Reg_{it} + \beta_9 DE_{it} * Reg_{it}$$

where i denotes Asian countries; t denotes time (2010-2022); GG represents green growth, DE denotes digital economy; GDP is economic development; FD denotes financial development; Trade represents trade openness; FDI denotes foreign direct investment; Gov denotes government spending; Urban denotes urbanization; Reg denotes government regulations; Patent is patent index.

3.2. Data descriptions

The study uses secondary data from 39 Asian countries for the period 2010-2022 with 507 observations, collected from reliable sources. Some countries are not included due to data shortages. Vietnam is not analyzed separately due to limited data on green growth, for example, the newly released PGI from 2023 is not long enough for regression analysis. The Asian scope allows for comparison of differences between countries and provides useful policy implications for Vietnam.

Descriptions for the variables used in the research model are detailed in Table 1 below.

Table 1. Summary of variables in the research model

Variables	Abbreviation	Measurement	Expectation of sign	Source
Dependent variable				
Green growth	GGit	Green Growth index of country i year t		The Global Green Growth Institute (GGGI)
Independent variable				
Digital economy	LnDEit	Natural logarithm of international trade in ICT services, value, shares and growth, annual of country i year t	+	UNCTAD
Control variables				
Economic development	LnGDPit	Natural logarithm of gross domestic product of country i year t	+	World Bank
Financial development	FDit	Financial Development index of country i year t	+	World Bank
Trade openness	Tradeit	The sum of exports and imports of goods and services measured as a share of gross domestic product of country i year t (% of GDP)	+	World Bank
Foreign direct investment	FDIit	Total foreign direct investment, net flow of country i year t (% of GDP)	+	World Bank
Government Spending	Govit	Government Spending to GDP by country i year t (% of GDP)	+	Trading Economics
Urbanization	Urbanit	Urban population of country i year t (% of total	+	World Bank

		population)		
Regulation	Regit	Measured by the average of the six governance indexes for country i year t The six governance indexes of Kaufmann (2010) include Control of Corruption, Government Effectiveness, Political Stability and Absence of Violence/Terrorism, Regulatory Quality, Rule of Law, and Voice and Accountability.	+	World Bank
Patent	Patentit	Patent index of country i year t	+	OECD

Source: Author's compilation

Table 2 provides descriptive statistics for the main variables in this study. The average value for green growth level is 49.966; the maximum value is 31.87, and the minimum value is 64.19. This indicates a significant disparity in the levels of sustainable development. Similarly, the levels of the digital economy also demonstrate heterogeneity among countries.

Table 2. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
GGI	507	49.966	8.796	31.87	64.19
LnDE	507	5.827	2.429	0	11.502
LnGDP	507	8.477	1.289	5.865	11.39
Trade	507	4.323	.547	3.207	5.938
FD	507	.336	.199	.07	.93
FDI	507	3.732	6.325	-37.173	43.912
Gov	507	15.511	10.083	3.625	103.164
Urban	507	3.905	.481	2.819	4.605
Reg	507	-.37	.743	-2.022	1.623
Patent	507	4.518	2.321	0	9.061

Source: Author's calculation

3.3. Econometric methodologies

The study uses regression models for panel data, applying the methods of ordinary least squares estimation (POLS), fixed effects estimation (FE) and random effects estimation (RE) to assess the impact of other independent variables on the dependent variable. To select the most reliable estimation model, the author uses the Breusch-Pagan LM test to choose between the OLS and REM models, and the Hausman test to choose between the FEM and REM models.

4. Results

4.1. The policy situation of digital economic development towards green growth

According to Nguyen Thi Thanh Tam (2019), according to the assessment report of 5 years of implementing the Green Growth Strategy of the Ministry of Planning and Investment, there have been many positive results from the development of mechanisms and policies to public awareness of green growth:

First, the initial formation of a system of legal documents for the implementation of green growth.

On June 3, 2013, the Party Central Committee issued Resolution No. 24/NQ-TW on proactively responding to climate change, strengthening resource management and environmental protection, with the key task of promoting the transformation of the growth model associated with restructuring the economy towards green growth and sustainable development.

Along with that, the National Assembly has issued new, or supplemented, amended a number of laws related to green growth such as: Law on Economical and Efficient Use of Energy; Law on Natural Disaster Prevention; Amended Law on Environmental Protection; Law on Meteorology and Hydrology. A number of new legal documents have been developed to promote the implementation of activities related to green growth. Specifically:

In the industrial sector: Master plan for the Electricity sector, power plants; Master plan for industrial sectors and sub-sectors, especially those sub-sectors and facilities that have a strong impact on the environment, aiming at sustainable development of the sector, economical use of natural resources, pollution control and effective waste management. In particular, the Strategy for Renewable Energy Development in Vietnam to 2030 and vision to 2050 has been developed; a legal framework for economical and efficient use of energy in production and life; minimum energy efficiency standards and energy labeling for production materials and consumer equipment has been developed.

In the agricultural sector: The Law on Irrigation, the Law on Fisheries, the Law on Forestry have been issued and documents guiding, guiding and regulating "green" standards for agricultural, forestry and fishery production have been issued and applied, bringing practical results to production and business.

In the construction sector: The Construction Industry has issued an Action Plan to reduce greenhouse gas emissions in cement production to 2020 and orientation to 2030; National Urban Upgrading Program for the period 2009 - 2020; National Strategy on Integrated Solid Waste Management to 2025 with a vision to 2050; Vietnam Green Growth Urban Development Plan to 2030; Regulations on green growth urban construction indicators…

In the transport sector: Responding to the Green Growth Strategy, together with ministries and branches, the Ministry of Transport has issued an action plan to reduce CO2 emissions in Vietnam's civil aviation activities for the period 2016 - 2020.

Second, develop a green growth action plan. Institutional improvement activities and implementation of the Green Growth Strategy are carried out through the development and promulgation of green growth action plans in ministries and localities. Statistics show that by the end of 2018, 7 ministries had issued green growth action plans. To date, 34 provinces and centrally run cities nationwide have developed and implemented green growth action plans at the provincial and municipal levels.

Third, reduce greenhouse gas emissions and increase the rate of renewable energy use. To date, the implementation of solutions to reduce greenhouse gas emissions has been widely deployed in all sectors. According to the Institute of Energy (Ministry of Industry and Trade), in the period of 2011 - 2015, the energy saving rate of our country reached 5.65%, equivalent to a total energy saving of nearly 11.3 million tons of oil equivalent (TOE). In particular, the energy intensity of industrial production sectors that consume a lot of energy has gradually decreased, such as: Steel industry decreased by 8.09%; cement decreased by 6.33%; textile industry decreased by 7.32%.

Fourth, strengthening greening production activities. The content of greening production is to implement a "clean industrialization" strategy through reviewing and adjusting existing industry plans, using resources economically and effectively, encouraging the development of green industry and green agriculture with industry structures, technology, and equipment that ensure the principle of being environmentally friendly, investing in developing natural capital, actively preventing and treating pollution, etc.

According to Thu Huong (2021), after 8 years of implementing the Strategy, people's and communities' awareness of the role and significance of green growth has been significantly raised, gradually changing production and living behaviors and taking many practical actions to contribute to green growth; many models of production and consumption that are economical, safe, civilized, imbued with national identity, harmonious and friendly with nature have emerged; the landscape and living environment of people have increasingly changed in a more positive direction, especially in new rural communes.

The work of building and perfecting institutions to realize green growth goals has achieved many outstanding results: 8 Ministries and 34 provinces and centrally-run cities have issued Action Plans to implement the Strategy for the 2011-2020 period. From the directed Action Plans, green growth content has been studied and integrated into many Resolutions of the Party, the National Assembly, laws, decrees, and circulars in each specific field, creating a legal corridor to implement the tasks and solutions of the Strategy for the period 2011-2020.

In addition, according to Tran Thi Tuyet Lan (2023), Decision No. 749/QD-TTg dated June 3, 2020 approving the National Digital Transformation Program to 2025, with a vision to 2030, determined that by 2030, Vietnam will become a digital, stable and prosperous country; fundamentally and comprehensively innovate the management and operation activities of the Government, the production and business activities of enterprises, and the way people live and work. The program aims at the "dual goal" of both developing a digital government, digital economy, digital society, and forming digital technology enterprises with global capacity. In addition, the legal framework is increasingly being improved, creating favorable conditions for economic development, such as: the Law on Electronic Transactions 2005, the Law on Information Technology 2006, the Law on Cyber Security 2018, etc.

4.2. Assessing the current status of digital economic development policies towards green growth

a. Opportunities for Digital Economy Policies Development Toward Green Growth

Vietnam’s robust commitment to green growth and digital transformation has created

numerous opportunities for advancing a sustainable digital economy. First, the comprehensive legal framework supporting digital transformation provides a strong foundation for fostering innovation. Policies like the National Digital Transformation Program and the Renewable Energy Development Strategy establish clear pathways for integrating technology into critical sectors, enabling resource optimization, pollution reduction, and enhanced productivity. The focus on developing a digital government, economy, and society enhances transparency and efficiency, creating a conducive environment for sustainable growth.

Second, Vietnam's progress in renewable energy presents a significant opportunity to integrate digital technologies. The rapid expansion of wind and solar capacity, coupled with the adoption of smart grids and digital management systems, enables better resource allocation and energy efficiency. This progress positions Vietnam as a regional leader in renewable energy development, paving the way for further investment and innovation in the energy sector.

Third, advancements in green finance represent another avenue for growth. By mid-2023, Vietnam's green credit loans amounted to 528.3 trillion VND, supporting renewable energy and sustainable agriculture projects. The combination of digital financial tools and green finance mechanisms allows for more efficient resource allocation and enhances investor confidence. This synergy between finance and technology strengthens Vietnam's ability to fund sustainable projects and achieve long-term growth goals.

Additionally, Vietnam's increasing adoption of advanced digital technologies in manufacturing and agriculture highlights the potential for improving productivity and reducing emissions. Technologies such as AI, IoT, and blockchain have already demonstrated success in optimizing processes and minimizing waste. For example, smart factories have reported energy savings of 10-20%, while blockchain improves supply chain transparency. With continued investment, Vietnam can expand the application of these technologies to other sectors, amplifying their environmental and economic benefits.

Finally, public awareness and education provide a fertile ground for fostering a culture of sustainability. National campaigns and educational initiatives have not only increased understanding of green practices but also equipped younger generations with the skills needed to participate in a sustainable digital economy. This growing awareness ensures long-term support for green policies and technological advancements, fostering a societal commitment to sustainability.

With a strong legal foundation, technological progress, and increasing public awareness, Vietnam is well-positioned to accelerate its green growth ambitions. Strategic investments in digital technologies and green industries, supported by comprehensive policies, can enable Vietnam to lead in sustainable development and digital transformation.

b. Challenges in Developing a Digital Economy Policies Toward Green Growth

Despite significant progress, Vietnam faces several challenges in fully realizing the potential of its digital economy for green growth. One of the primary issues is regulatory inconsistency and overlap. While numerous policies have been enacted, the lack of coordination among government agencies and between national and local levels has

resulted in fragmented implementation. Overlapping regulations in fields like energy efficiency, urban development, and environmental protection hinder the effective deployment of green initiatives, delaying progress.

A second challenge is the shortage of skilled labor capable of advancing green and digital transformations. The adoption of advanced technologies, such as AI, IoT, and blockchain, requires a highly skilled workforce. However, Vietnam's current education and vocational training systems struggle to meet these demands, leaving a gap in expertise that slows innovation and the adoption of sustainable practices. This skills gap is particularly evident among small and medium-sized enterprises (SMEs), which lack the technical knowledge and resources to implement digital solutions effectively.

High costs associated with advanced technologies present another major barrier. While large corporations have begun integrating digital tools into their operations, many SMEs are constrained by financial limitations. For instance, only 46.9% of enterprises adopted cleaner production technologies by 2020, despite governmental support. Without targeted incentives or subsidies, SMEs will continue to face difficulties in adopting sustainable practices, limiting the overall impact of green policies.

Additionally, rural-urban disparities exacerbate challenges in technology adoption and policy implementation. Rural areas often lack access to digital infrastructure and resources, creating a significant gap in the adoption of green and digital practices. This divide hampers equitable development and limits the reach of green growth strategies, particularly in agricultural regions that play a vital role in Vietnam's economy.

Finally, technical challenges in integrating renewable energy into the national grid remain unresolved. While Vietnam has made remarkable progress in expanding its renewable energy capacity, outdated grid infrastructure struggles to accommodate fluctuating outputs from wind and solar power. This inefficiency not only limits the potential of renewable energy but also undermines the stability of the power system.

To address these challenges, Vietnam must focus on streamlining its regulatory framework, investing in workforce development, and providing financial support to SMEs. Public-private partnerships can also play a crucial role in mobilizing resources and fostering innovation. By overcoming these obstacles, Vietnam can fully harness the potential of its digital economy to achieve its green growth ambitions.

4.3. The impact of digital economy on green growth in Asian countries

To verify the reliability of the conclusions on the current status of digital economic development policies towards green economy, the authors assessed the interactive relationship between these two areas, specifically digital economy and green economy.

To select the model that gives the most suitable and reliable estimation results, this study conducts related tests. First, the Breusch-Pagan LM test result is 846.91, and the corresponding p-value is 0.0000. This shows that our model has heterogeneity in errors across all observations. To overcome this problem, we can use one of the models that can handle heterogeneity in errors such as the FE or RE model.

With the hypothesis of random differences between the FE model and the RE model, the Hausman test is used to decide whether to use the FE model or the RE model for data analysis. In this case, the p-value of the Hausman test is 0.2272, which is greater than the threshold of 0.05. Therefore, with the results of the Breusch-Pagan LM test and the Hausman test, the RE model gives more reliable results.

Table 3. Results of RE model estimation to assess the impact of digital

economy on green growth

Model	**(1)**	**(2)**
LnDE	.676***	.849***
	(.129)	(.214)
LnGDP		-1.158***
		(.409)
Trade		-1.841***
		(.609)
FD		3.567
		(3.098)
FDI		.042**
		(.021)
Gov		.022
		(.05)
Urban		3.889
		(2.804)
Reg		3.918***
		(.883)
Patent		-.012
		(.195)
Constant	46.083***	45.249***
	(1.61)	(11.296)
Observations	470	204

Standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

Source: Author's calculations

The estimation results from the RE model in Table 3 indicate that the variable LnDE is statistically significant at the 1% level in both models. This confirms that the digital economy has a significantly positive impact on green growth in Asian countries during 2010-2022. This finding aligns with the study by Xu et al. (2019), which highlights that digital technology acts as a driving force for the digital economy, creating opportunities to achieve green development through a harmonious balance between economic growth and environmental protection. The digital economy focuses on balancing economic growth with minimizing environmental impacts, while also maintaining close connections with other sectors. This facilitates the identification and mitigation of negative environmental effects, thereby contributing to comprehensive sustainable development (Gu et al., 2021; Zhang et al., 2022; Zhao et al., 2021).

As a result, policymakers have increasingly recognized the importance of prioritizing the development of the digital economy as a tool to achieve green growth objectives. They have also emphasized the necessity of global cooperation to address climate change challenges rather than focusing solely on economic growth strategies at the regional or local levels (Tran Tho Dat et al., 2023). Furthermore, the digital economy and green growth are increasingly asserting their critical roles in environmental policy and sustainable development. To achieve these goals, the digital economy needs to closely integrate with the concepts of green economy, circular economy, knowledge economy, and sharing economy to build an independent, self-reliant economy while fostering

substantive and effective international integration. Additionally, the digital economy introduces new frameworks to facilitate sustainable development and economic recovery, especially in the context of financial crises caused by the pandemic (Hosan et al., 2022; Usman et al., 2021; Zhong et al., 2022).

Regarding other control variables, the results show that while GDP and trade openness negatively influence green growth in Asian countries during 2010-2022, FDI and regulation exhibit positive effects. Conversely, financial development, governance spending, and patents do not demonstrate significant impacts.

5. International experience in digital economic development policies towards green growth and lessons for Vietnam

5.1. Experience from Korea

Global climate change and severe pollution, such as PM10 levels exceeding the OECD average, have negatively impacted public health and quality of life in South Korea. International commitments, including the Paris Agreement, compel South Korea to reduce greenhouse gas emissions and transition to a green economy. Additionally, South Korea's highly developed economy faces the need for restructuring, shifting from traditional industries to a high-tech and digitized economy to ensure sustainable growth.

In response, South Korea launched the National Green Growth Strategy with the Green Growth and Low-Carbon Act, committing to invest 2% of its GDP annually in green technologies and industries. Key sectors, such as renewable energy, green transportation, and recycling technology, have been prioritized, creating over 1 million new jobs and reducing dependence on fossil fuels.

Digital transformation is considered a central driver for green growth. Technologies like AI, big data, and IoT are being applied to optimize energy consumption, cut greenhouse gas emissions, and develop eco-friendly smart cities. The smart urban model integrates technology into traffic management, energy use, and waste processing, improving living standards and environmental protection.

South Korea also plays a leading role in international initiatives like the Green Climate Fund (GCF) and the Global Green Growth Institute (GGGI), supporting developing countries in addressing climate change. The country is committed to reducing greenhouse gas emissions, aiming for a 30% reduction by 2020 compared to the business-as-usual scenario and achieving net-zero emissions in the long term. Efforts focus on developing solar, wind, and hydrogen energy, alongside encouraging private sector investment in sustainable technologies. Green infrastructure has also been heavily invested in, with the National Green Technology Center and environmentally friendly urban areas being key components.

5.2. Experience from Singapore

Singapore has implemented comprehensive digital economy policies to promote green growth while addressing significant challenges such as climate change, resource scarcity, and the need to enhance national competitiveness in an increasingly digital world. The government has committed to achieving net-zero carbon emissions by 2050, reflecting its dedication to sustainable development amidst global climate concerns. As part of this commitment, Singapore has introduced numerous initiatives aimed at reducing greenhouse gas emissions, promoting renewable energy, and optimizing energy consumption across various sectors, including industries and transportation.

The government has launched the Green Data Center Innovation Program, focusing

on developing energy-efficient solutions that help minimize the carbon footprint of data centers. Data centers are among the largest consumers of energy, and optimizing their energy performance is critical in achieving the country's green growth objectives. In 2023, Singapore introduced energy-saving standards specifically designed for tropical data centers, which will further encourage the use of renewable energy and advanced technologies in the IT infrastructure sector.

In addition to national efforts, Singapore is also collaborating internationally to promote sustainable digital technologies. It has joined forces with organizations such as the Green Software Foundation and the European Green Digital Coalition to advance green software solutions and foster global cooperation in the digital sustainability space. Moreover, Singapore has partnered with companies like Dell Technologies, Equinix, and the Infocomm Media Development Authority (IMDA) to explore new ways to develop and implement sustainable digital infrastructure. These collaborations focus on optimizing the design and deployment of data centers, which are pivotal for supporting a digitally-driven, sustainable economy.

These combined efforts highlight Singapore's commitment to transitioning to a low-carbon, sustainable future by blending digital innovation with environmental responsibility. The country's proactive approach positions it as a global leader in integrating digital technologies into green economic strategies, offering valuable insights for other nations seeking to balance technological advancement with environmental preservation.

6. Conclusion and Recommendation

6.1. Conclusion

Vietnam has made significant strides in integrating digital economy policies with green growth objectives, supported by a robust legal framework, renewable energy advancements, and the adoption of digital technologies such as AI, IoT, and blockchain. These efforts have optimized resource use and reduced emissions across sectors like manufacturing and agriculture. However, challenges persist, including regulatory inconsistencies, a shortage of skilled labor, and financial barriers for SMEs, which hinder the full realization of green growth potential. Additionally, rural-urban disparities and technical challenges in integrating renewable energy into the national grid further complicate the transition.

Empirical results from this study, using the Random Effects (RE) model, demonstrate that the digital economy has a statistically significant positive impact on green growth in Asian countries during 2010-2022. These findings align with the broader literature, suggesting that digital technologies can drive economic growth while minimizing environmental impacts.

The findings highlight the increasing importance of digital transformation in achieving green growth. Digital technologies act as a catalyst for both economic development and environmental sustainability, helping address challenges and driving the transition to a more sustainable future.

6.2. Recommendation

Based on the current status of policies in Vietnam and lessons learned from other countries, we would like to make some recommendations to promote the development of digital economic policies towards green growth in Vietnam in the future.

First, the Government needs to issue guiding documents to integrate the development

trends of the digital economy towards the environment into the leadership levels of state management agencies, sectors, localities, and the business sector. Different parts of the digital economy will have environmental impacts at different levels, so in the development of a number of key telecommunications, information technology, and digital enterprises that play a leading role in digital infrastructure, as a foundation for the digital economy and digital society, it is necessary to ensure environmental requirements.

Second, perfecting the institutional framework suitable for the digital business environment is also a top priority to promote innovation and increase the proportion of the digital economy in national growth. This needs to be accompanied by perfecting green technical norms, standards, and guidelines, as well as early promulgation of a set of indicators to measure green growth at the national level. Along with that, sectors and localities need to integrate digital transformation projects and activities, digital economic development with solutions to promote the implementation of the Green Growth Strategy in Vietnam, continue to develop a specific roadmap for green growth activities and implement them.

Third, in the plan to increase investment, especially public investment to synchronously upgrade infrastructure and essential and widespread digital services, it is necessary to link it with the development of a plan to allocate and manage the national budget to serve the implementation of the green growth strategy. In addition, it is necessary to perfect financial policies to support digital transformation and green growth in a reasonable and consistent manner, including taxes, fees, subsidies, support funds, sanctions, green and digital criteria.

Fourth, the Government needs to focus on strengthening system reform, continuously improving the business environment, minimizing business legal risks, significantly reducing internal and external impacts that cause costs for enterprises, and fully exploiting the potential of the division of labor in the market.

Finally, training human resources with skills in digital technology and environmental protection is a top priority. The Government and relevant agencies need to develop specialized training programs focusing on renewable energy, clean production, and sustainable governance to ensure that the workforce meets the requirements of the digital economic transformation process. In addition, cooperation between enterprises, universities, and research institutions is encouraged to develop practical training programs.

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APPLYING BLOCKCHAIN TECHNOLOGY IN HIGH-TECH AGRICULTURE IN VIETNAM: CHALLENGES AND OPPORTUNITIES

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Abstract: In the current period, Vietnam is giving priority to digital transformation in general and IT application in particular to the fields of production and life, especially high-tech agriculture 4.0. Blockchain technology has emerged as a revolutionary tool in various sectors, including agriculture, by offering transparency, traceability, and efficiency (Bhadra, et al. 2022). In Vietnam, a rapidly developing economy with a strong agricultural foundation, the integration of blockchain into high-tech agriculture offers significant potential to address longstanding challenges such as supply chain inefficiencies, food safety concerns, and market access barriers (OECD, 2020). This paper explores the application of blockchain in Vietnam's high-tech agriculture sector, analyzing its benefits, potential challenges, and strategic opportunities for implementation. Through a review of existing literature, case studies, and an examination of the local agricultural landscape, this study proposes actionable insights for stakeholders looking to leverage blockchain technology for sustainable agricultural growth.

Keywords: *Blockchain, High-tech Agriculture, Vietnam, Supply Chain, Agricultural Innovation, Technology Adoption.*

1. Introduction

Vietnam is one of the world's largest agricultural producers, known for its rice, coffee, and seafood exports. However, the sector faces persistent challenges such as inefficiency in supply chains, poor traceability of products, a lack of transparency in transactions, and a growing need for technological modernization (OECD, 2020). As the country progresses towards high-tech agriculture, the introduction of advanced digital solutions such as blockchain holds significant promise for addressing these issues.

Blockchain, a decentralized digital ledger technology, has gained considerable attention due to its ability to create transparent, immutable, and traceable records of transactions (Shardeo, 2023). The application of blockchain in agriculture could streamline operations, reduce fraud, enhance food safety, and increase the trustworthiness of products in global markets. However, despite its potential, the adoption of blockchain in agriculture remains nascent, particularly in developing countries like Vietnam.

Application of the Internet of Things (IoT), data analytics, blockchain, artificial intelligence (AI), and other emerging technologies represent a seismic shift in how agricultural activities, ranging from planting to the end consumer, are managed and executed. This transformation involves the integration of advanced technological solutions into agricultural practices to improve efficiency, reduce waste, improve productivity, and ensure sustainability (Mattern, 2018). Blockchain is not only a testament to the power of technology, but also an answer to the growing global demand for food security in the face of climate change and an ever increasing population. As

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Vietnam progresses on its journey of digital transformation, technology implementation must be strategically aligned with the specific requirements for sustainable growth and robustness despite fluctuating market conditions and environmental challenges (Cameron, 2018).

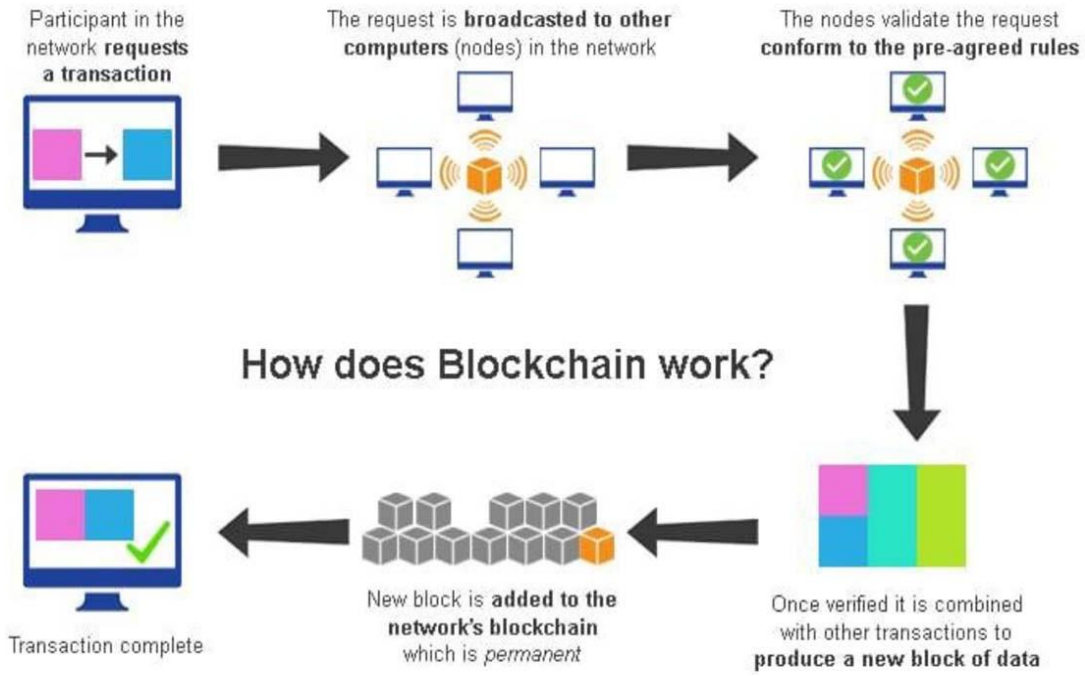
This paper investigates the potential of blockchain technology in transforming Vietnam's high-tech agricultural practices by exploring its applications, challenges, and prospects for sustainable agricultural development.

2. Literature review

2.1 Blockchain Technology Overview

Satoshi Nakamoto first introduced the concept of blockchain technology (Nakamoto, 2008). Fundamentally, blockchain is a decentralized database that uses distributed ledger technology (DLT) for data storage and management. It features a unique data structure that allows information to be stored in blocks, each containing a certain number of transaction records. These blocks are cryptographically linked to the preceding block, forming a continuous chain. The blockchain network operates on a distributed basis, without reliance on any central authority for management, and is characterized by immutability and transparency. Data within a blockchain cannot be arbitrarily altered or deleted, which ensures the authenticity and security of the information (Risius and spohrer, 2017). Blockchain technology underpins transactions in the cryptocurrency sector, with its initial applications primarily focused on data security, transaction security, and other aspects of the financial field. As the technology evolved from Blockchain 1.0 to Blockchain 3.0, its decentralized and distributed data storage structure, along with its transparent, secure, and traceable chain structure, has been widely implemented and applied (Swan, 2015). Its applications have gradually expanded from the initial focus on finance to include transportation, healthcare, trade, and agriculture (Casino et al., 2019; Shardeo, 2023).

Blockchain has become a disruptive technology. Technically, it is a decentralized ledger that stores the data of every transaction in the respective blocks along each step of the supply chain in chronological order by the specific stakeholder. Each transaction executed in the public ledger is shared among the involved parties on a peer-to-peer network (Figure 1). Each transaction is verified by the consensus of the involved parties in the supply chain. The distributed consensus and anonymity are the major characteristics of blockchain (Michael et al., 2016). The blockchain is seen as the main technological innovation because it stands as a "trustless" proof mechanism of all the transactions in the network (Swan, 2015). BCT does not involve any third parties or the intermediaries thereby reducing the processing cost while enhancing the security, efficiency of transactions, trustworthiness and traceability.



Source: Mohapatra *et al.* (2021).

Using algorithms, blockchain assists in digesting the data and making it more understandable for the farmers. Additionally, as the information is accessible to all market participants, it will increase production efficiency and promote the sustainability of the agri-food systems. In the event of any weather-related problems during the crop cycle, Blockchain is crucial in maximising the payments to the farmers. The application of blockchain technology to the safety and traceability of agricultural products can provide a transparent and traceable system that records detailed information about the production, processing, distribution, and retail of agricultural products (Risius and Spohrer, 2017). This allows every link from the field to the table to be monitored and recorded, enabling consumers to trace the origin of each product, thereby increasing confidence in food safety (Shardeo, 2023). Blockchain technology can offer a decentralized platform for data sharing, allowing large food companies and retailers to track the supply chain of their products to increase transparency and improve operational efficiency. In terms of agricultural financial services, blockchain technology, through smart contracts and its decentralized nature, can provide farmers with safer and more convenient financial services such as credit, insurance, and payment systems. This helps farmers improve production efficiency, better manage risks, and increase their income (Casino et al., 2019).

In agriculture, blockchain can be applied in various ways, such as:

- **Supply Chain Management**: Blockchain can enable end-to-end visibility and real-time tracking of agricultural products from farm to table, ensuring product integrity and reducing fraud.
- **Food Safety and Traceability**: Blockchain can track the journey of agricultural products, enabling quick identification of contamination sources in the event of food safety issues.
- **Smart Contracts**: These can automate and enforce agreements in agricultural

transactions, such as ensuring payment for delivered goods or compliance with agreed quality standards.

- **Certification and Provenance**: Blockchain can facilitate the certification of organic or high-quality products, improving consumer confidence in agricultural exports.

2.2 Significant Usage of Blockchain with Agriculture

The nation's growth, economic prosperity, nutrition, and health are closely tied to the agricultural sector, which increasingly relies on technology to enhance efficiency, profitability, and crop yields. However, agriculture in many developing and underdeveloped countries faces significant challenges, such as inconsistent crop pricing, excessive middlemen in the supply chain leading to fraud and farmer exploitation, crop wastage, and the exclusion of small-scale farmers from government subsidies. Blockchain technology, a key element in modern smart systems, has already transformed industries like cryptocurrency, insurance, healthcare, and the Internet of Things. Now, it is making its way into agriculture. Blockchain enables accurate and transparent tracking of products from production to delivery, providing reliable information to all participants in the supply chain (Bhadra et al., 2022).

2.2.1 Improving the efficiency of agricultural production

Blockchain technology, by enhancing the traceability of agricultural products and increasing the transparency of the supply chain, enables farmers to directly communicate their product information to consumers and retailers. This eliminates many intermediary layers within the traditional supply chain, allowing farmers better market access and higher product prices, reducing sales costs, and increasing profit margins (Mirabelli and Solina, 2020). Moreover, blockchain technology aids in precisely tracking crop growth and real- time monitoring of agricultural environments, enabling precise management of the agricultural production process, improving the quality and efficiency of agricultural production, and contributing to the modernization of agricultural production methods (Nguyen, 2021). Innovation in the management and operation of the industry chain promotes the overall upgrading of agricultural industry, enhancing its competitiveness and sustainable development capabilities. Futhermore, high-tech agriculture with applying blockchain allows farmers to recognize the conduct of the crop by applying sensors and mapping areas. Agricultural weather stations in farms may provide valuable information like soil temperature, air temperature, wetness in the leaves, rainfall, wind intensity, relative humidity temperature, atmospheric pressure, wind speed, and direction. All the above parameters are calculated, stored, and saved in the blockchain that helps the farmers and other authorized organizations to have transparent connections to it.

Blockchain's transparency also plays a vital role in combating food fraud, especially as consumer demand for organic, non-GMO, and antibiotic-free foods continues to rise. Fraudulent food labeling remains a significant concern, and blockchain systems can address this issue by providing reliable verification. When integrated with IoT technologies like sensors and RFID tags, blockchain can monitor and communicate minor transactions effectively across farms, warehouses, and factories (Bhat and Joudu, 2019). Major global companies highlight that blockchain applications can save billions annually by enhancing efficiency and reducing fraud and human error. For example, a report by the Food Marketing Institute and the Grocery Manufacturers Association found that the average cost of a food recall is approximately $10 million, excluding brand damage and lost revenue (Wu, et al., 2023). Additionally, blockchain can prevent price manipulation

and payment delays, reducing the need for intermediaries and lowering transaction fees. This leads to fairer pricing and empowers small farmers to capture a larger share of their crop's value. For instance, small coffee farmers in Kenya, who currently receive only a fraction of the final price of their coffee, could benefit significantly. Blockchain fosters transparency between farmers and markets, ensuring fairer practices and improved economic outcomes.

2.2.2. Traceability in Agricultural Products

By creating immutable records of every transaction and movement within the supply chain, the blockchain addresses the issues of fraud, counterfeiting, and inefficiency. Blockchain offers a permanent record of the lifecycle of agricultural products, detailing seed quality, farming methods, fertilizer and pesticide use, transportation, and storage conditions. In cases of contamination or food safety concerns, the blockchain can pinpoint the source quickly, enabling targeted recalls and minimizing harm to consumers. Blockchain can improve trust among consumers, producers, famers and retailers by offering verifiable histories of agricultural products from farm to fork (Titan, 2016).

For example, the technology is used by Walmart to supply livestock products from China and mangoes from Mexico to the United States. Walmart and IBM are currently working on a blockchain-based agricultural supply chain to apply transparency for retail customers. The system encourages all parts of the "food chain" (farmers, suppliers, businesses, etc.) to enter their data into a single database based on the blockchain network. The number of agricultural and food companies using the system is increasing daily (Pham, 2018). For example, IBM worked with ten of the world's largest consumer goods and food firms to integrate blockchain into their supply chains. Walmart, Nestle, Unilever, McCormick, Kroger, Driscoll's, Dole, and Golden State Foods are among the companies that collectively generate more than half a trillion dollars in yearly global sales, so IBM's blockchain platform will assist food industries in increasing supply chain visibility and traceability as a result of the agreement (Wang, 2019).

Smart Contracts for Fair Trade: Blockchain-powered smart contracts can automate and enforce agreements between farmers and buyers. These contracts can specify terms for pricing, delivery, quality standards, and payment, ensuring fairness and efficiency in trade. can receive fair prices for their produce while buyers can have con□idence in the

quality and authenticity of the products.

2.2.3. Financing and Supply Chain Management

Blockchain was originally proposed to improve the financial efficiency, and reduce transaction cost by removing intermediaries and audit cost via improved accountability in trading business process (Casey et al., 2018). This feature is powerful to support small scale farmers who are suffering from high cost of trade transactions and accidental losses caused by environmental disasters or other uncertainties (Manski, 2017). Therefore, the straightforward use cases of blockchain in agriculture is to explore its financial functions to make these agricultural producers profitable. Many agriculture related companies are developing blockchain systems to support trading parties in supply chain management. In (Mao et al., 2018), an integrated food trading systems with consortium blockchain, called FTSCON, was built to facilitate costly and easy trading of agricultural products in Shandong province, China. Based on the trial between 2014 and 2017, it was found that the total profit of different enterprises in the region increased significantly. In (Salah et

al., 2019), a detailed solution of implementing a trading system in soybean supply chain was presented. It emphasized that this system could provide proof of delivery, automated payments and dispute handling.

Blockchain technology is being developed by various financial institutions and commercial banks to support agricultural financing. Chang et al., (2019) highlights case studies of blockchain systems collaboratively developed by banks and IT companies, showcasing how these systems efficiently issue letters of credit to accelerate trading processes significantly. State Farm and USAA collaborated to create a system that streamlines automatic insurance claims for farmers, reducing fraud risks and enhancing claim efficiency. These advancements have incentivized farmers to increase production by improving their profit margins.

3. Methodology

This research section employs a qualitative approach to explore the application of Blockchain technology in Vietnam's high-tech agricultural sector. By synthesizing and analyzing data from diverse sources such as recent case studies, articles, and published reports, this method provides a comprehensive understanding of the topic.

Criteria for Case Studies

- Modernity and Relevance: Case studies are selected based on their currency and relevance to Blockchain applications in Vietnam's agricultural sector, ensuring the information is up-to-date and practical.
- Diversity: To offer a broad perspective, the selection includes a variety of sources showcasing different Blockchain uses in agriculture, such as supply chain management, origin tracing, and food safety.
- Feasibility and Impact: Priority is given to case studies that demonstrate high feasibility and significant positive impacts or potential impacts on Vietnam's agricultural industry.

Analytical Methods

- Content Analysis: Information from selected case studies is evaluated and synthesized to identify key themes, patterns, and trends in Blockchain applications within agriculture.
- Comparison and Contrast: Case studies are compared to highlight similarities and differences, enabling the extraction of valuable lessons and insights regarding the opportunities and challenges of Blockchain implementation.
- Evidence-Based Evaluation: Each case study is assessed based on empirical evidence and its proven or potential effectiveness, ensuring practical insights into Blockchain's applicability in Vietnam's agricultural context.

This qualitative methodology enables an in-depth exploration of Blockchain technology's role in Vietnam's agricultural sector, offering actionable insights and strategic recommendations for stakeholders moving forward.

4. High-Tech Agriculture development in Vietnam

Vietnam’s agriculture has traditionally been characterized by smallholder farming, with limited access to advanced technologies. However, the country has recently seen a growing trend towards high-tech agriculture, especially in areas like aquaculture, horticulture, and precision farming. High-tech agriculture mainly refers to agricultural operations involving the latest and advance technologies such as cultivation technology, automation, IT application, biotechnology. High-tech agriculture has recently emerged as

an important tool to increase yields, ensure high quality and increase the market value of agricultural products (the National Assembly of Vietnam, 2008).

Agriculture is still a key pillar of the country' economy. The agriculture sector contributes 14% to the annual GDP, employing 40% of the total workforce, and generating US$50 billion in exports in 2023. However, both numbers are predicted to decline in the near future. To ensure a sustainable growth going forward, the industry needs to move towards high-tech farming and value chain development to reduce costs, increase production, and achieve better product quality. For this purpose, the Vietnamese government has introduced a number of policies and incentive schemes to attract enterprises and encourage producers to shift towards hightech agriculture applications.

Vietnam has huge potentials for developing high-tech agriculture. By 2022, 34 high-tech agricultural zones were planned based on the decision of the Prime Minister; 35 high-tech agricultural enterprises were approved by the Ministry of Agriculture and Rural Development; and 51 high-tech agricultural areas have been approved by provinces and cities in the whole country. Support policies on science and technology are essential motivators to foster agricultural growth, and technological advances contribute about 30-40 percent to agricultural growth. The number of firms operating in the agriculture, forestry, and fishery industry increased from 3,517 enterprises in 2012 to 4,500 enterprises in 2016 and 7,471 in 2019. In addition, the expansion of start-up enterprises in agriculture is attractive to young laborers and corporations in recent years. For example, some corporations are investing in high-tech agriculture such as VinEco Agricultural Investment, Development and Productions, LLC. (a member of Vingroup), TH Group, Vinamik, Hoa Phat and Viet UC Seafood Corporation, etc. This is an important element to establish high-tech agricultural system in Vietnam.

The Vietnamese government has set ambitious goals to modernize agriculture through the promotion of smart farming, the use of Internet of Things (IoT) devices, drones, artificial intelligence (AI), and blockchain.

In recent years, Vietnam, with the advantage of being an agricultural country, has increasingly promoted its role in promoting innovation in the economy, contributing to national GDP growth, ensuring food safety and positioning Vietnam in the global supply chain. In fact, in recent times, the Party and State have had many policies to promote and improve high-tech agricultural.

Vietnam government proactively has paid atten-tion to high-tech applications and digitalization ofeconomy. As a matter of fact, some crucial policy doc-uments have been released to build the digital econ-omy. For example, Decision No. 392/QĐ-TTg (2015)set targets on information technology developmentthrough to 2020 with a vision toward 2025; Decision16/CT-TTg approved by the Prime Minister to for-tify the progress towards Industry 4.0 (Cameron, 2018). Specifically,the Prime Minister issued the Decree 100/QĐ-TTG,which implements the initiatives in regards to estab-lishing systems for product traceability and prove-nance in Vietnam since January 2019. Till 2025, at least 30 percent total products would be tracedby disruptive technology such as RFID, QR codes, NFC matching with international trading standardsin terms of data transactions. These policy documentsaccordingly prove that the Vietnamese governmenthas devoted a great deal of effort to digitalize the econ-omy in the wake of Industry 4.0 movement (Vu and Trinh, 2021).

Cameron A, Pham T, Atherton J. Vietnam Today - □rst report

of the Vietnam's Future Digital Economy Project. CSIRO: Brisbane. 2018.;

Cameron A, Pham T, Atherton J. Vietnam Today - □rst report of the Vietnam's Future Digital Economy Project. CSIRO: Brisbane. 2018.;

Several pilot projects have been initiated by government agencies and private firms to incorporate blockchain into the agricultural supply chain. One example is the use of blockchain in tracing the origin of Vietnam's famous "Vietnamese Coffee," aimed at enhancing export credibility and transparency in global markets.

Advancements in technology have significantly benefited the agricultural sector, driving higher productivity and growth. Blockchain technology, when integrated with the Internet of Things (IoT), sensors, and mobile network infrastructure, has the potential to enhance agricultural productivity and optimize agri-food supply chains. This reflects a growing convergence between agriculture and Information and Communication Technology (ICT) in today's world. In Vietnam, ICT enterprises have had the proof of concept in blockchain plat-forms since mid-2018 and some initiatives in relevantto tracing agri-foods have implemented blockchainin reality such as wowtrace, fruitchain, agriden-tial mostly appearing in the South of Vietnam for examples Mekong Delta, Central Highland (Wowtrace, 2020).

5. Blockchain Applications in High-Tech Agriculture in Vietnam

The potential applications of blockchain in high-tech agriculture in Vietnam can be categorized as follows:

5.1 Agricultural Transparency and Efficiency

Blockchain technology improves the traceability of agricultural products and enhances supply chain transparency, allowing farmers to share product information directly with consumers and retailers. By removing numerous intermediaries in the traditional supply chain, it provides farmers with better market access, higher product prices, lower sales costs, and increased profit margins (Nguyen, 2021). Additionally, blockchain supports detailed tracking of crop growth and real-time monitoring of agricultural environments. This facilitates precise management of production processes, boosts the quality and efficiency of agricultural output, and promotes the modernization of agricultural practices (OECD,2020). In Vietnam, the fragmented nature of agricultural production makes it difficult to track products reliably.

Forexample, wowtrace initiative provides the solution of blockchain enabled traceability in food chains withthe notable features of ensuring transparency, enhancing the competitive advantage, gaining the quality of products, and reducing risk (Wowtrace, 2020). Furthermore, Vietnam Blockchain Corporation, exposing the lead-ing of blockchain technology not only in Vietnam but also in Asia, has offered blockchain related platform for manufacturing, logistics, finance, agriculture, smart city, and public service provisions. Additionally, TE-Food.vn, a farm-to-table fresh foodtraceability solution over the globe, did business inusing blockchain for food traceability since 2018.

5.2 Food Safety and Quality Control

Blockchain can significantly improve food safety by offering a secure, transparent system to trace the origins of food products. In Vietnam, where concerns about pesticide use, food contamination, and adulteration are common, blockchain can enhance consumer trust by allowing for complete traceability. If an outbreak of foodborne illness occurs,

blockchain can quickly identify the source of contamination, enabling faster responses.

The mango industry has been one of the five key industries in the Dong Thap province's Agriculture Restructuring Scheme. In fact, DongThap province has 9,200 hectares of mango with ap-proximate 100,000 tons annual output; and also ex-ports 93, 000 tons of mangoes to "demanding mar-kets" such as Japan, Australia, South Korea and Rus-sia yearly. However, it remains dificulties to enter theUS market. Afer 10 years of negotiations with Viet-Gap and GlobalGap standards, with blockchain-basedtraceability technology, Vietnam's first eight tons ofmangoes collected from My Xuong Mango Cooper-ative in Cao Lanh, Dong Thap have reached the USmarket on April 18, 2020. My Xuong Mango Coop-erative cooperated with the VBC to store all essentialinformation involving its fruits on the blockchain toensure traceability and fight against copycats (Vu & Trinh, 2021). Hence,this facilitate the local economy. Furthermore, as anagricultural hub of the whole country, currently, LamDong province has 21 enterprises that have appliedblockchain technology to control the supply, food hy-giene and traceability for fruit and vegetable such asstrawberry, carrot, potato.

5.3 Smart Contracts for Agricultural Transactions

Blockchain-based smart contracts can facilitate seamless transactions between farmers, suppliers, distributors, and consumers. These contracts can automate payment and enforcement of terms, reducing the need for intermediaries and ensuring fair pricing. For example, a farmer could receive payment upon confirmation of delivery, without relying on bank intermediaries.

In Vietnam, special agricultural products like Xa Doai orange and Cat Chu mango, are renowned for their exceptional quality, which is uniquely influenced by the local soil and climate. Blockchain technology offers significant advantages in managing the origin and ensuring transparency for these specialties. To maximize the benefits of this technology, it is crucial to focus initially on high-value agricultural products with export potential. Once established, its application can be expanded to other types of agricultural goods based on their characteristics and requirements.

The adoption of Blockchain, particularly through smart contracts, paves the way for a transformative future in the import and export of agricultural products. By enabling trust in transactions between unfamiliar parties, Blockchain reduces the need for intermediaries and simplifies complex procedures, saving time, effort, and costs. Transactions become faster, more efficient, and highly accurate. Furthermore, Blockchain systems ensure secure payments with minimal risk of contract breaches or unauthorized third-party interference (Tran & Trinh, 2021)

5.4 Certification and Provenance

For high-value agricultural products, such as organic produce, blockchain can serve as a verification tool for certification and provenance. In Vietnam, where authenticity is sometimes questioned, blockchain can provide an immutable record of a product's origin and processing history. This will not only ensure the quality of local products but also enhance their competitiveness in the global market.

An example of using blockchain to ensure the origin of Vietnam's famous agricultural product is "Vietnamese Coffee- Buon Me Thuat", promoting enhanced export credibility and transparency in the global market by the authenticity and quality of its coffee products. A Blockchain project could involve tracking the journey of coffee beans from farms through processing, export, and retail. This system will ensure that consumers

worldwide can verify the origin of their Viet- namese coffee, potentially commanding higher prices for sustainably or organically certified beans. This not only enhances consumer trust but also supports fair compen- sation for farmers.

These examples and projects above demonstrate the potential of Block- chain technology to highlight the necessity of applying this technology in high-tech agriculture. For Vietnam, further exploration and deployment of this tech- nology will not only enhance the position of agricultural products in the international market but also establish strong consumer trust, thereby supporting the sustainable development of the domestic agricultural sector.

In the current period, Vietnam is giving priority to digital transformation in general and IT application in particular to the fields of production and life, especially high-tech agriculture 4.0; Blockchain technology is increasingly focused and developed in both the state and business

aspects. For businesses and individuals, this is considered an opportunity to apply this new technology with new creative and competitive opportunities, enough to reach out to the region and internationally.

6. Opportunities and challenges

6.1. Opportunities

The blockchain is a new emerging technology, and it will take some time to get full set of applications to be develop in agriculture sector. However, it is surely clearing that agriculture blockchain is having good opportunities. Vietnam has many advantages when it comes to emerging as a dynamic country, with many opportunities to apply blockchain to promote high-tech agriculture.

- Biotechnology systems supported by the Government: opportunities abound for Vietnam to be onward to a place of reckoning in blockchain technology-based agriculture. These opportunities include growing numbers of high-tech enterprises starting up with the support of government's policies, the IoT devices for blockchain technology with the support of Vietnam 5G service, ICT initiatives with the financial support of foreign investors (Dharmaraj, 2020).

- Expansion of international markets: Blockchain's ability to ensure traceability and quality assurance can help Vietnamese agricultural products gain a competitive edge in global markets. By ensuring transparency and reducing risks, blockchain could increase the demand for Vietnamese products, particularly in premium segments like organic foods and specialty crops. In order to export the agri-food products to important markets like the EU, Japan, and the US with the highest quality and food safety requirements, food traceability is obligated (Mania et al., 2016; Sue, 2016). The application of Blockchain in the agricul- ture industry helps Vietnamese products meet international standards for transpar- ency and quality, thereby expanding opportunities to access global markets and in- creasing export revenue.

- Efficiency and cost savings: Streamlining supply chain processes through Block- chain can lead to increased efficiency and cost savings by reducing paperwork, transaction costs, and intermediary fees, benefiting both producers and consumers (Tse et al., 2017). Besides, smart contracts in blockchain incentivize the sharing economy, particularly agriculture cooperatives, enhancing overall economic efficiency.

- Increasing product value: Products of high-tech agriculture managed with blockchain technology, with clear traceability, can attract a market segment willing to

pay higher prices for guaranteed quality and food safety (Kshetri, 2018).

6.2 Challenges

While the potential for blockchain in high-tech agriculture is significant, there are several challenges to its widespread adoption in Vietnam:

- Lack of Technical Infrastructure:

One of the primary barriers to blockchain adoption in agriculture is the lack of technological infrastructure, particularly in rural areas where most of Vietnam's agricultural activity takes place. Blockchain applications require robust internet connectivity, reliable hardware, and a skilled workforce, all of which are in short supply in many regions (Nguyen, 2020).

- Legal and Regulatory Challenges:

Vietnam's legal and regulatory framework may not yet be equipped to accommodate blockchain technologies, particularly with regard to data privacy, smart contracts, and digital currencies. Arcording to European Parliament (2020), regulatory clarity will be needed to ensure that blockchain implementations comply with existing laws and are aligned with international standards. To overcome this, collaboration with regulatory agencies to develop a blockchain-friendly legal framework is necessary. This not only ensures compliance with regulations but also encourages innovation and technology adoption in the industry.

- High Initial Costs:

The initial cost of implementing blockchain solutions, including technology development and integration, may be prohibitively high for many stakeholders in Vietnam's agricultural sector. Collaboration between government, private sector players, and international organizations will be necessary to share the financial burden and incentivize investment.

7. Conclusion

Summing up, blockchain is a promising technology towards a transparent effective agriculture sector, but many barriers and challenges still exist, however, there are still many barriersand challenges to hinder its wider popularity amongfarmers and systems in Vietnam. It is very interest to see how blockchain will be combined with other emerging technologies (big data, robotics, IoT, RFID, NFC, hyperspectral imaging, 5G, edge computing etc.). Hence, it is impor-tant to prescribe some policies for blockchain application in the context of Vietnam agriculture sec-tor. It is necessary to develop more qualified IT de-velopers in blockchain technology in the same man-ners as Artificial Intelligence, Big Data, and IoT; con-sequently, developing an ecosystem of blockchaintechnology surrounds advanced technology in Viet-namese agriculture.We conclude in this review that the blockchain is revolutionary technology which is imparting different techniques in agriculture sector and it will be going to improve agriculture productivity and sustainability in near future.

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FISHING CAPACITY ANALYSIS FOR AN OPEN-ACCESS OFFSHORE FISHERIES: THE CASE OF THE KHANH HOA'S OFFSHORE HANDLINE FISHERY IN EAST VIETNAM SEA

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Abstract: This study analyzes the fishing capacity for the multi-species Khanh Hoa's hand-line fleet. The sample of 45 fishing vessels (occupied 15% of the total population) is used in this analysis. The result shows that based on the ray capacity measure, the fleet's excess capacity is quite moderate with the range of 10.77% to 24.62% for the yellow fin tuna and of 15.72% to 28.28% for the big eye tuna compared to their current catches if technical efficiency of fishing vessels can be improved. In the case of multi-species fisheries, however, fishermen might concentrate their efforts on the high value species or the target species. Hence, the partial capacity measure that indicates how much the production of one output can be increased keeping the other outputs fixed is also important to investigate. The partial excess capacity in this fishing fleet is significantly considerable. It is up to 47.83% for the yellow fin tuna and 80.62% for the big eye tuna compared to their current catches if technical efficiency of fishing vessels can be improved.

KEYWORDS: DEA, fishing capacity, capacity utilization, Vietnam

Introduction

Since the mid-1990s, the government of Vietnam has made strenuous efforts to develop its offshore fisheries. The subsidy programmes such as the investment programme for offshore vessels (in 1997 and 2014) and fuel cost compensation subsidies (in 2008 and 2011), etc. were introduced (see Duy et al. 2015 & Pham et al. 2021). These subsidies have encouraged the growth of underdeveloped offshore fisheries with the expansion of the fleets and an increase in production. The reasons for the introduction of the offshore fisheries development programme in Vietnam as follows. The first is to reduce the pressure on coastal fisheries resources and enhance income, create new jobs and improve the living standards of fishing communities (Long, 2008). Second, the Vietnamese Exclusive Economic Zone (EEZ), which is part of the East Vietnam Sea was considered to be abundant in marine resources yet under-exploited, with its maximum sustainable yield estimated at about 1.1 million tonnes (see e.g. Long, 2009b; Duy et al., 2015). Moreover, with some international fishing disputes in the East Vietnam Sea and the lack of an internationally recognized delineation of the sea, the government wanted to encourage the presence of its country's own vessels in these areas (see e.g. Long, 2009b).

The East Vietnam Sea fisheries are still open-access resources for offshore fishing vessels from more than ten countries, including Vietnam. These Vietnamese policies expanding fishing capacity may lead to excess fishing capacity in offshore fishing fleets.

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Sustainable development in renewable natural resource industries, such as fisheries, is necessarily built upon sustainable resource exploitation at a target catch level, in which productive capacity matches the target sustainable yields from the resource stock. In practice, however, policies expanding fishing capacity in the sea area with the lack of an internationally recognized delineation of the sea may overlooked, or were unaware of, the target yields, allowing excess fishing capacity to form in open-access fisheries. Hence, assessing fishing capacity of this open-access offshore fishing fleet in the East Vietnam Sea is important, especially in the context of World Trade Organization disciplines on fisheries subsidies (IISD, 2021).

Khanh Hoa lies on the coast of Southern Central Vietnam in the East Vietnam Sea region. It covers an area of 5197.5 km2 with a coastline of 520km and over 200 islands. In 2016, Khanh Hoa had 303 offshore hand-line vessels (Duc, 2021). Most fishermen have good fishing experience and often come from traditional fishing households. The fishing grounds for tuna hand-line are partly in the EEZ of Vietnam and partly in the disputed areas in the East Vietnam Sea. The fishing takes place all year round, from October to September of the following year and is divided into two fishing seasons: the north east monsoon (from October to March) and the southwest monsoon (from April to September). Offshore vessels often stay onshore for repairs and maintenance from either August to September or September to October. For the hand-line fishery, yellow fin tuna (Thunnus albacares) and bigeye tuna (Thunnus obesus) are the main target species caught, while a small amount of other species is referred to as by-catch (Duc, 2021).

Fishing capacity is the maximum amount of fish that a fishing fleet could have reasonably expected to catch or land during the year under the normal and realistic operating conditions of each vessel, fully utilizing the machinery and equipment in place, and given the technology, the availability and skill of skippers and crew, the abundance of the stocks of fish, some or all fishery regulations, and other relevant constraints (Terry et al. 2008). Fishing vessel capacity based on this physical output notion has primarily been estimated with data envelopment analysis (DEA), a method using linear programming techniques. Most papers adopted the DEA method for capacity analysis considered the ray capacity measure (i.e., all outputs are allowed to increase by the same proportion). In the case of multiple species or multiple products, however, fishermen might concentrate their efforts on the high value species or the target species. Since the precautionary approach is important to sustainable fisheries management (FAO, 1995), the partial capacity measure that indicates how much the production of one output can be increased keeping the other outputs fixed is also important to investigate the reference points for fisheries management. These will help reducing the risk to the fish resources. This paper adopts DEA method to present an analysis of fishing capacity in the multi-species Khanh Hoa hand-line fishery. Specifically, the species-specific capacity measures for yellow fin tuna and big eye tuna of this fishing fleet will be calculated and analyzed in both ray and partial capacity measures.

Backgrounds for fishing capacity analysis

Fishing capacity (so-called capacity output) is defined as the maximum amount of fish that can be produced over a period of time by a vessel or a fleet given the set of fixed inputs (capital utilized), existing fish biomass, and applicable fishing regulations but in the absence of variable input constraints. This is a short-term concept, as fishing capacity could vary with stock fluctuations in a stock-flow production technology system (FAO,

1999). The capacity of a vessel can be also defined as the maximum level of output that it could be expected to produce under normal working conditions (Pascoe et al. 2003). Hence, capacity output takes into account periods of maintenance, poor weather, seasonal factors and other normal breaks in activity.

The capacity utilisation (CU) of a fishing vessel is the degree to which the vessel is achieving its capacity output given its physical characteristics (i.e., fixed inputs such as hull length and/or engine power of the vessel). CU reflects the proportion of available fishing capacity that is utilized, thereby providing an indicator of the extent to which excess capacity occurs at individual-fisher level (Tingley & Pascoe, 2005). CU is computed as the ratio of observed output (y) to capacity output (y_C). That is, CU = y/y_C (Morrison, 1985).

Next, the unused capacity output of a fishing vessel is (1 - CU) * YC or the unused capacity is 1 - CU. There are two sources of the unused capacity output of a fishing vessel such as: (i) the first is that a fisher might fail to produce the technically efficient level of output for a given set of inputs (both fixed and variable inputs); and (ii) the second is underutilization of fixed input (fishing capacity underutilization) due to variable input limitations.

Methodology

We denote the output vector of the i^{th} fishing vessel (i = 1,…, 45) by $y_i = (y_{i1}, \dots, y_{is}) \in R^s$ and its fixed and variable input factors by $x_i^f = \left(x_{i1}^f, \dots, x_{il}^f\right) \in R^l$ and $x_i^v = (x_{i1}^v, \dots, x_{ik}^v) \in R^m$, respectively. The output-oriented radial model to estimate the ray capacity output level of the i^{th} fishing vessel is presented as follows (see e.g. Pascoe & Tingley, 2007).

$$\underset{\emptyset_i^1, z_i}{Max}\ \emptyset_i^1$$

such that:

$$\begin{aligned}
\emptyset_i^1 y_{im} &\le \sum_{i=1}^{45} z_i y_{im}, \qquad m = 1,2,\dots,s; \\
x_{in}^f &\ge \textstyle\sum_{i=1}^{45} z_i x_{in}^f, \ n = 1,2,\dots,l; \qquad (1) \\
\lambda_{in} x_{in}^v &= \sum_{i=1}^{45} z_i x_{in}^v, \qquad n = 1,2,\dots,k; \\
\lambda_{in} &\ge 0, \qquad n = 1,2,\dots,k; \\
z_i &\ge 0; \\
\textstyle\sum_{i=1}^{45} z_i &= 1.
\end{aligned}$$

where z_i is the intensity variable for the i^{th} fishing vessel; λ_{in} is the ratio of optimum input level to observed variable input use of x_{in}^v. Next, $\emptyset_i^1$ is the proportion by which outputs of the i^{th} fishing vessel may be expanded when production is at full capacity. Capacity output of the i^{th} fishing vessel is then determined by $\emptyset_i^1$ multiplying by actual production ($y_i^C = \emptyset_i^1\ y_i$). Hence, capacity utilization which is the ratio of observed over capacity output is:

$$CU_i = \frac{y_i}{y_i^C} = 1/\emptyset_i^1.$$

This measure provides a ray measure of capacity output and CU in which the multiple outputs are expanded in fixed proportions relative to their observed values

(Segerson and Squires, 1990). The ray measure converts the multiple-output problem to a single-product problem by keeping all outputs in fixed proportions. The unused capacity (1- CU) can be the indicator of excess capacity if the actual catch is chosen as a proxy of fishing target (excess capacity = y_i^C - y_i). Hence, the excess capacity can be decomposed into two parts as (i) excess capacity due to technical inefficiency and (ii) excess capacity due to underutilization of fixed inputs. The model for estimating excess capacity due to technical inefficiency as follows (see Zhu, 2009):

$$\underset{\emptyset_i^2, z_i}{Max}\ \emptyset_i^2$$

such that:

$$\begin{aligned} \emptyset_i^2 y_{im} &\le \sum_{i=1}^{45} z_i y_{im}, \qquad m = 1,2,\dots,s; \\ x_{in}^f &\ge \textstyle\sum_{i=1}^{45} z_i x_{in}^f, \ n = 1,2,\dots,l; \qquad (2) \\ x_{in}^v &\ge \sum_{i=1}^{45} z_i x_{in}^v, \qquad n = 1,2,\dots,k; \\ z_i &\ge 0; \\ \textstyle\sum_{i=1}^{45} z_i &= 1. \end{aligned}$$

The technically efficient output vector is calculated by multiplying $\emptyset_i^2$ by observed production for each output (y_i^{TE} =$\emptyset_i^2$ y_i). The excess capacity due to technical inefficiency is therefore the difference between technically efficient output and actual output (y_i^{TE}- y_i). Next, excess capacity due to underutilization of fixed inputs is y_i^C - y_i^{TE}. Hence, the capacity utilization purging the effects of technical efficiency is:

$$CU_i^* = \frac{y_i^C - (y_i^C - y_i^{TE})}{y_i^C} = \frac{y_i^{TE}}{y_i^C} = \frac{y_i^{TE}/y_i}{y_i^C/y_i} = \frac{\emptyset_i^2}{\emptyset_i^1}$$

Study sites and data for analysis

The survey of offshore hand-line vessels was administered to collect data for the fishing year-seasons 2015/2016. Following Long et al. (2008) and Duy et al. (2015), the questionnaire was adjusted to obtain data on the hand-line vessels in the Khanh Hoa province. Vessel owners and/or their wives were interviewed face-to-face. Two main types of information were collected from the surveys: a description of the vessel's technical and operational characteristics, and costs and earnings data with and without the subsidies (Duc, 2021). Data were obtained from 15% (45 vessels) of the Khanh Hoa offshore hand-line vessels operating in 2016. The Horsepower and hull length were the physical characteristics used to test the samples' representativeness. A t-test was conducted to compare the engine power and hull length between sample and population (See *Long & Duc, 2018))*

There are three outputs for this hand-line fishery. They are yellow fine tuna (y_1), big eye tuna (y_2), and others (y_3); and measured in tons in the operating year of 2015/2016. The production function consists of three fixed and three variable inputs. The fixed inputs were the length of the hull (x_1^f), the engine power (x_2^f) and the gross tonnage (x_3^f) of the vessels. The variable inputs were total quantity of fuel used of the fishing vessel per year (x_4^v), the average crew size of the fishing vessel (x_5^v) and total fishing days of the fishing

vessel in the operating year (x_6^v).

Summary statistics of input and output levels for Khanh Hoa's hand-line vessels for the operating year of 2015/2016 are presented in Table 1.

Table 1: Summary statistics of variables used in the capacity analysis

Variable	Unit	Mean	SD	Min	Max
Output (*y*)					
Yellow fin tuna (y_1)	Ton	9.46	3.51	3.60	17.16
Big eye tuna (y_2)	Ton	2.80	1.50	0.90	7.80
Other species (y_3)	Ton	4.67	2.51	0.80	11.00
Fixed Input (*x*)					
Hull length (x_1)	M	15.97	1.13	13.80	18.95
Engine power (x_2)	Hp	401.78	110.60	165.00	720.00
Gross tonnage (x_3)	Ton	33.13	8.04	20.00	60.00
Variable Input (*x*)					
Fuel (x_4)	Liter	43,555.56	9,083.52	24,000.00	60,500.00
Labour (x_5)	Person	6.27	0.94	5.00	10.00
Fishing day (x_6)	Day	223.60	37.18	140.00	300.00

Result and discussion

Capacity estimation and analysis

Capacity utilization was calculated as the ratio of observed catch to capacity output including the effects of both technical inefficiency (fishing skill) and low levels of variable input usage. Table 2 shows that, on average, the CU for a fishing vessel is 0.815; the unused capacity is, thus, 18.5%. On other hand, estimated capacity score of a fishing vessel is, on average, 1.302 (see Table 2). Since capacity scores are calculated as an output-oriented measure, it suggests that vessels could increase the observed catches by about 30.2% on average if they were operating at full capacity.

Table 2: Average capacity, technical efficiency scores and capacity utilization at the vessel level

Criteria	Capacity score	Technical efficiency score	Capacity utilization	
			CU	CU*
Mean	1.302	1.155	0.815	0.910
Standard deviation	0.354	0.278	0.184	0.144
Min	1.000	1.000	0.422	0.422
Max	2.368	2.315	1.000	1.000

This unused capacity comes from two sources: (i) the shortage of variable inputs and (ii) technical inefficiency (fishing skill). On average, capacity utilization of a fishing vessel after purging the effect of technical inefficiency (CU*) is 0.910. This implies that the shortage of variable inputs used is, therefore, the reason for 9% of unused capacity. Hence, fishermen could increase catches without investing new capital or increasing the capacities of their vessels if they can use the variable inputs at their optimal levels. Next, technical inefficiency leads to (18.5% - 9%) or 9.5% of unused capacity. On the other hand, Table 2 also shows that the estimated technical efficiency score is 1.155, which indicates that fishermen could increase the observed catches by 15.5% at the present state of technology by using their disposable variable and fixed inputs more efficiently. Thus, improving technical efficiency would significantly increase the percentage of utilized

capacity.

To measure excess capacity of this fishing fleet, fleet measure of capacity output is first obtained by summing over all vessels of this sample for each species. The fleet measure of CU is obtained by the fleet observed output over capacity output for each fishing species. The excess capacity for each species was then calculated as the difference between capacity output and observed catch for the fishing fleet. Similarly, the fleet's technical efficiency output levels are also calculated for each species and then provide an estimate of excess capacity after purging the effect of TE. Table 3 provides an analysis of ray measures of capacity for this fishing fleet as follows.

Table 3: Analyzing ray measures of capacity for this fishing fleet

Criteria		**Unit**	**Yellow fin tuna**	**Big eye tuna**
Observed catch		Kg	425.760	125.810
Technical efficiency output		Kg	484.704	141.623
TE		-	0.88	0.89
Capacity output		Kg	530.569	161.394
CU		-	0.80	0.78
Total excess capacity	Value	Kg	104.809	35.584
	Percentage	%	24.62	28.28
Capacity output after purging effects of TE		Tons	471.625	145.581
CU*		-	0.91	0.88
Excess capacity after purging effects of TE	Value	Tons	45.865	19.771
	Percentage	%	10.77	15.72

Table 3 illustrates that the total fleet production of yellow fin tuna could at full capacity have been 104,809 kg higher compared to the observed catch, which corresponds to the total excess capacity for yellow fin tuna of 24.62%. Moreover, the excess capacity after purging the effects of TE of this fleet is only 10.77% for yellow fin tuna. Similarly, the total excess capacity for big eye tuna is 28.28%. The excess capacity after purging the effects of TE of this fleet is 15.72% for big eye tuna. It means that the excess capacity in this fishery is significant but only moderate. If technical inefficiency is expected to remain constant and hence latent, then the excess capacity of this fishing fleet is 10.77% and 15.72% for yellow fin tuna and big eye tuna, respectively. If technical inefficiency can be reduced, i.e. fishing skill improved, through improved fishing practices, fishery development programs, or other means (which could be concomitant to, but not part of the vessel decommissioning) then this 'latent capacity' due to technical inefficiency is meaningful and then the excess capacity is 24.62% and 28.28% for yellow fin tuna and big eye tuna, respectively.

On the other hand, fishermen might concentrate their efforts on the high value species or the target species. Since the precautionary approach is important to sustainable fisheries management (FAO, 1995), the partial capacity measures that indicate how much the production of one output can be increased keeping the other outputs fixed (along with the fixed factors and resource stock fixed) is also calculated to provide the reference points for fisheries management. These will help reducing the risk to the fish resources. The partial CU was less than the ray CU for both species, which showed that the potential

outputs for both yellow fin and big eye tuna were higher than their capacity outputs.

Table 4: The analysis of partial measures of capacity for this fishing fleet

Criteria		**Unit**	**Yellow fin tuna**	**Big eye tuna**
Observed catch		Kg	425.760	125.810
Potential output		Kg	629.401	227.237
PCU		-	0.68	0.55
Partial excess capacity	Value	Kg	203.641	101.427
	Percentage	%	47.83	80.62

Table 4 also illustrates that the partial excess capacity for both species in this fishing fleet is significantly considerable. Specifically, if the production of big eye tuna fixed (along with the fixed factors and resource stock fixed), the total fleet production of yellow fin tuna could have been 203,641 kg higher compared to its observed catch. This corresponds to the partial excess capacity of this fishing fleet for yellow fin tuna of 47.83%. Moreover, the partial excess capacity for big eye tuna reaches 80.62% compared to its observed catch. This result suggests that if fishermen only target on one species and the other outputs keeping unchanged, the excess capacity of this fleet become significantly substantial, especially for big eye tuna.

Conclusions

The Khanh Hoa's hand-line fleet exhibits moderate symptoms of excess capacity. First, the radial CU measure is adopted. The average CU for the Khanh Hoa's hand-line fleet was estimated to be the ranges of 0.80 and 0.91 for yellow fin tuna and 0.78 and 0.88 for big eye tuna. Hence, the excess capacity can increase from 10.77% and 15.72% to 24.62% and 28.28%, respectively, for the yellow fin tuna the big eye tuna compared to their current catches if technical efficiency can be improved.

In the case of multi-species fisheries, however, fishermen might concentrate their efforts on the high value species or the target species. Thus, the partial capacity measures indicate how much the production of one output can be increased keeping the other outputs (along with the fixed factors and resource stock) fixed. The result suggests that if fishermen only target on one species and the other outputs keeping unchanged, the excess capacity of this fleet become significantly substantial, especially it can reach to 80.62% for big eye tuna.

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HIGH-TECH APPLIED AGRICULTURE: THEORY AND PRACTICE IN NGHI LOC DISTRICT, NGHE AN PROVINCE

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Abtract:

High-tech agriculture is an agriculture that appropriately applies new and advanced technologies to production to improve efficiency and create breakthroughs in productivity and quality of agricultural products. The article will clarify theoretical issues about high-tech agriculture. From there, analyze the current situation of high-tech agricultural application in Nghi Loc District, Nghe An province, pointing out the achievements, limitations and causes of limitations in high-tech application in Nghi Loc District. On that basis, the authors have suggested a number of policies to promote the development of high-tech applications in Nghi Loc District in the coming time.

Keywords: agriculture, high technology, high technology applications, Nghi Loc district

1. Introduction

Nghi Loc is a district neighboring Vinh city and Cua Lo town, located in the key industrial, commercial and service development area of the province. Therefore, agricultural land is increasingly shrinking, requiring the promotion of production structural transformation towards the application of high technology associated with linkages to improve productivity, production value, and income per unit. area, improve land use efficiency and fully exploit the land fund to create jobs and generate income for workers. The district has advantages in the agricultural product consumption market, especially high quality and safe agricultural products. Therefore, it is necessary to transform production towards applying high technology to produce high quality, clean, safe agricultural products, meeting the increasing demands of markets inside and outside the district.

Recently, Nghi Loc district has paid attention to leading, directing, and implementing mechanisms and policies to support and encourage the construction of high-tech agricultural models. High-tech agricultural models have been built and put into operation in a number of fields and have been effective in economic, social and environmental aspects; It has initially changed the way farmers think about production and business and is gradually being replicated on a large scale. However, the implementation of building high-quality agricultural models in the area still has shortcomings and limitations such as: production models are still small and fragmented, and have not applied many high and advanced technologies. progressive, modern; The link between production and product consumption has not been implemented much and is not sustainable; Building and promoting product brands, digital transformation and putting products on e-commerce channels have not received adequate attention; Support mechanisms and policies still have shortcomings and do not fully meet the practical production requirements and desires of production subjects; especially support for land allocation, land lease, and land use conversion.

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Therefore, assessing the current status of high-tech application development in Nghi Loc District to propose solutions to promote the development of high-tech applications in Nghi Loc District in the coming time is a necessary task.

2. Theoretical basis

The term high-tech agriculture appeared in February 1999 in India with the concept: High-tech agriculture includes all modern, advanced agricultural techniques, less dependent on the environment, highly capital-intensive and has ability to increase productivity and quality of agricultural products (Hoang Anh, 2011). [1]

According to Nguyen Tho (2013), High-tech agriculture is agriculture with a high content of scientific research and technological development, integrated from modern scientific and technological achievements, such as biotechnology. science, new materials technology, information technology, automation technology... In addition, it is also shown in management and human resources. [5]

In Decision No. 176/QD-TTg, dated January 29, 2010, approving the Project to develop high-tech agriculture until 2020, high-tech agriculture: is agriculture that uses technology. high in the production of quality agricultural products, outstanding productivity, high added value and environmental friendliness. [8]

According to Nguyen Anh Tuan (2023), High-tech agriculture is agriculture that integrates and applies advanced and modern science and technology, suitable for environmental conditions and climate change, for use. effectively use available resources, and innovate production organization, to create high productivity and quality with products of high class and added value, internationally competitive and developed. sustainable. [7]

In agriculture, the concept of "high technology" was formed and widely used as the combination and application of the above technologies to improve efficiency in agricultural production to create a breakthrough in productivity and quality. quantity of goods, satisfying the increasing needs of people, especially ensuring sustainable agricultural development.

Thus, it can be understood that high-tech agriculture is an agriculture that appropriately applies new and advanced technologies to production to improve efficiency and create breakthroughs in productivity and agricultural quality. products, satisfying the increasing needs of society and ensuring sustainable agricultural development

3. Current status of high-tech agriculture in Nghi Loc District

3.1. Number of models and fields of operation of high-tech agriculture

The number of agricultural cooperatives, businesses and households in Nghi Loc District applying high technology has increased in recent years. If in 2018, the whole district had only 31 agricultural cooperatives, businesses and households participating, then by 2024 there will be 107 agricultural cooperatives, businesses and households applying high-tech models. High-tech application models are scattered throughout the district. Communes with many high-tech application models in the agricultural sector are Nghi Trung and Nghi Van, and in the livestock sector are Nghi Van, Nghi Truong, Nghi Kieu. Among high-tech application models, 22.4% of high-tech application models are in the field of cultivation, 72.0% in the field of animal husbandry, and 5.6% in the field of fisheries.

Table 1. High-tech agricultural models in the district

Application type	Number of models	Percentage (%)
1. According to field:		
- Crop	24	22,4
- Livestock	77	72
- Seafood	6	5,6
2. According to application stage:	71	66,4
- Manufacture		
- Preservation and processing	36	33,6

Source: Nghi Loc district people's committee

Table 2. High technology is applied in the models

High-tech type	Number of models	Percentage (%)	
1. Crop:			
- Greenhouse, automatic watering		22	91,7
- Drip irrigation, save water		02	8,3
2. Livestock:	-		
Semi-automatic livestock farming		09	11,7
- Livestock farming on an industrial scale		63	81,8
- Biological bedding technology in livestock farming		01	1,3
- Closed barns, cooling, automatic feeding troughs	04	5,2	
3. Aquaculture			
- Shrimp farming technology in many stages	05	83,3	
- Raising mud crabs in plastic boxes	01	16,7	

Source: Nghi Loc district people's committee

In terms of applying high technology in the farming industry, the whole district has 24 agricultural models applying high technology, with a total area of 159,300 m2. Among them, there are 22 production models of melons, grapes, vegetables, tubers, and fruits grown on substrates in greenhouses, using drip and automatic irrigation technology, with an area of more than 50,300 m2; There are 2 orange and grapefruit growing models using drip irrigation technology, saving water with an area of 109,000 m2.

In the livestock sector, there are 77 livestock farms applying high technology on an industrial scale, implementing automation and semi-automation of the stages of feeding, drinking, cooling barns and applying biotechnology. (biological bedding, biological products) to treat manure and other types of livestock waste.

The aquaculture sector is concentrated in Nghi Quang and Nghi Tien communes with 6 white-legged shrimp farming models, using multi-stage shrimp farming technology and the mud crab farming model in plastic boxes, bringing high economic efficiency. for households.

3.2. Scale of agricultural models applying high technology

Nghi Loc district currently has over 350 household economic development models in the field of farming, with average revenue from the models reaching from 200 to 1

billion VND/year, including 24 applied agricultural models. High technology, annual total output of 403.8 tons (138 tons of oranges, grapefruits; 265.8 tons of melons, fruits and vegetables of all kinds); Annual revenue (GTSX) reached 14,539,000,000 VND, income (net profit) reached 7,763,000,000 VND. Of which, revenue from greenhouses, growing melons, vegetables and fruits reached 10,250,000,000 VND, an average of 2,037,773,000 VND/ha/year, income reached 4,805,400,000 VND, an average of 955,347,912 VND/ha /year (nearly 10 times higher than normal agricultural production). Revenue from the orange and grapefruit growing model reached 4,289,000,000 VND, an average of 393,486,000 VND/ha/year (nearly 4 times higher than normal agricultural production); Income reached 2,957,600,000 VND, an average of 271,339,449 VND/ha/year. Cultivation models applying high technology annually create jobs for 99 workers, with a stable income reaching an average of 78,416,161 VND/person/year.

The livestock sector brings total revenue of 259,259,800,000 VND/year, income of 90,740,930,000 VND/year; creating stable jobs for 190 workers with an average income of 84 million VND/worker/year.

Aquaculture sector with a total farming area of 94,000 m2, accounting for 6.76% of the entire district's brackish aquaculture area; output reached 209 tons/year, accounting for 19.62% of brackish aquaculture output; Production value reached 43,550,000,000 VND/year, accounting for 39.69% of production value of brackish saline farming; Income reached 20,580,000,000 VND/year, accounting for 49.06% of income from brackish saline farming. High-tech shrimp farming models bring much higher output, production value and income per unit area than mass aquaculture. Specifically: The average output reached 22.23 tons/ha/year, 2.9 times higher than the average aquaculture output of the entire district; Production value reached 4,632,980,000 VND/ha/year, 5.87 times higher than the average production value of aquaculture in the entire district; Income reached 2,189,400,000 VND/ha/year, 7.26 times higher than the average income of aquaculture in the entire district.

The development of economic models not only creates jobs for many local workers, contributes to hunger eradication and poverty reduction, but also promotes sustainable development of production in the district, contributing to reducing the rate of production in the district. The district's poverty rate dropped to 1.82%. The average income per capita reached nearly 54 million VND/person/year.

3.3. Linking production and product promotion, trade promotion

Nghi Loc district has recently implemented diverse links and cooperation with various types of economic organizations inside and outside the province in the field of high-tech applied agriculture. Specifically, cooperatives representing households link some stages of production with Nghe An Agricultural Materials Company, Vietnam Seed Group Joint Stock Company, and Orion Vietnam Company Limited.,... Linking with major livestock corporations such as: JAPFA COMFEED Vietnam Co., Ltd., CP Vietnam Livestock Joint Stock Company, GOLDEN STAR Animal Feed Co., Ltd... all all stages from providing breeds, food, and veterinary medicine ideas, farming techniques to the consumption of all products in industrial-scale pig and chicken farming.

High-tech agricultural production is always associated with safe production processes such as VietGap, Global Gap, organic agriculture, IPM integrated pest management... Recently, the district has allocated budget support cooperatives and people 50% of the cost of implementing the VietGap production process for fruit and vegetable

production in Nghi Long, Nghi Trung, Khanh Hop, grapefruit production, raising evil chickens in Nghi Van, pest management model synthesis and VietGap in vegetable growing in Nghi Thuan, orange growing model according to the GlobalGap Nghi Dien process,... The district has also supported part of the funding to support seeds, materials as well as support in connecting and implementing product linkages. production associated with product consumption between cooperatives, production households in the district with agricultural product purchasing units, businesses, supermarkets,... inside and outside the province.

To support the promotion of agricultural products, trade promotion, and connect supply and demand of local products to markets inside and outside the province; Every year, the district has supported promoting local agricultural products, connecting supply and demand through channels: fairs, product displays organized inside and outside the province; Support for OCOP store construction; posting information about introduced products on electronic information pages of provinces, districts and communes; Use specialties as gifts during festivals;... Through promotion channels, product introduction, and connection between supply and demand, some of Nghi Loc's specialties have been widely introduced and become quite famous brands in markets inside and outside the province such as: Xa Doai Orange., Xa Doai Orange wine, Cua Hoi salted eggplant, Nghi Van grapefruit, Nghi Lam wooden spoon, Nghi Loc melon, Tay Lan cardamom, Dong Thuan green rice cake...

From 2021, the district has implemented and included in the budget plan about 300 million VND to support cooperatives, craft villages, and production and business households with 50% of the cost of stamping product traceability. Coordinate with VNPT to support and guide manufacturers to introduce and sell products through the Postmart e-commerce channel.

Therefore, in the district, models linking production and product consumption have been formed and expanded, creating peace of mind for producers about a stable and sustainable product consumption market. Farmers gradually become familiar with good agricultural production processes, creating clean, safe and reliable products for consumers.

4. General assessment

4.1. Results achieved

In the fields of agricultural production, high-tech models have been applied, creating products with high productivity, quality, economic value, and income. Contribute to the overall growth of the agricultural sector and contribute to improving the production value per unit area of Nghi Loc agriculture. A number of high-tech agricultural production models have proven effective and are gradually being replicated; A number of high quality products have initially affirmed their brands in the market inside and outside the province.

Awareness and thinking of commodity agricultural production applying high technology and large scale associated with digital transformation have initially formed and there have been many changes among Nghi Loc farmers. Linkages in agricultural production are increasingly expanding, becoming closer and more sustainable, helping the agricultural product consumption market become more stable and sustainable.

4.2. Limitations

High technology application in agricultural production is not much, the scale is still small and fragmented. It has not attracted many large investors to invest in production and business in the agricultural sector and apply high technology. High technology has

not been applied to important areas of agricultural production such as forestry, preservation and processing of agricultural products.

The agricultural product consumption market is not really stable; Linkages in agricultural production in general and high-tech agricultural production are not really tight and sustainable.

Support mechanisms and policies are limited in quantity and inadequate in support content; has not really had much impact on promoting, supporting, or encouraging producers.

Land for construction of industrial-scale livestock farms does not have complete procedures and many documents; difficulties in state management and have not created peace of mind for people in investing in production and business.

4.3. Cause of limitations

The district's socio-economic situation is still difficult: the scale, production and business capacity, and economic potential of businesses, cooperatives, and people are still limited, making it difficult to mobilize resources for development investment. large-scale production, building agricultural models applying high technology. Infrastructure for production is lacking and weak, especially irrigation and drainage systems for agricultural production.

The land is uneven, has low fertility, small and fragmented areas, making it difficult to invest in large-scale production. Climate, harsh weather, and natural disasters occur frequently and abnormally, greatly affecting the results of investment, production and business.

Support mechanisms and policies are still small, fragmented, and do not meet the needs and desires of producers; has not created a strong driving force to promote the development of high-tech agriculture. The direction and orientation of state management agencies is still passive, allowing people to do it spontaneously, leading to the construction of livestock farms without complete documentation procedures; The implementation of investment procedures for agricultural projects is not synchronized with procedures for land allocation, land lease, and land use change according to regulations.

A part of the people still has the mindset of small-scale, backward, small and fragmented production; Slow to innovate, not bold enough to mobilize investment resources to build high-tech agricultural models; Afraid to apply new technologies, new production processes, and new seedlings into production.

5. Conclusion and some policy implications

From documentary sources and secondary data, the study has clearly shown some achieved results, as well as limitations in the process of applying high technology in agriculture in Nghi Loc District, Nghe An province. To overcome some of the above limitations to promote the development of high-tech agriculture in Nghi Loc District, Nghe An province, the authors propose the following solutions:

Firstly, Promote propaganda and orient the thinking of large-scale agricultural commodity production, high technology application, associated with digital transformation for people to build a modern, large-scale agriculture, High technology application, safe and sustainable production.

Second, perform well the planning and implementation of land use planning and plans.

Develop, supplement and adjust land planning and plans from time to time to suit socio-economic development conditions. In particular, districts and communes must plan and identify areas for large-scale agricultural production, applying high technology. Orient the western mountainous communes to plan concentrated livestock farming areas on an industrial

scale and fruit growing areas. Communes in the central plain and coastal plain plan high-quality fruit and vegetable production areas, high-tech aquaculture areas, and concentrated agricultural, forestry, and fishery product processing and preservation areas.

Third, continue to well implement mechanisms and policies to support the development of high-tech agriculture: Support the construction of facilities, purchase machinery and equipment to apply advanced technologies., modern in agricultural production; Support in land allocation, land lease, and encouragement of land accumulation; Support and encourage the application of safe production processes; Support for investment loans to build agricultural models applying high technology; Integrate funding sources from programs to support the development of high-tech agriculture

Fourth, perform well the work of site clearance, attract a variety of businesses, organizations and individuals with financial potential to invest in production and business in agricultural industries applying high technology. In particular, priority is given to production fields that use new, advanced, safe and environmentally friendly technologies; Enterprises that preserve and process agricultural products whose raw materials are key products of the district such as peanuts, corn, sesame, seafood,...

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FACTORS INFLUENCING GENERATION Z EMPLOYEES' TURNOVER INTENTION: A STUDY IN SMALL AND MEDIUM-SIZED ENTERPRISES IN NGHE AN PROVINCE

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Abstract: In recent years, turnover intention has become a significant issue in both academia and industry, particularly among Generation Z employees. This study aims to identify the factors influencing turnover intention among Generation Z employees in small and medium-sized enterprises (SMEs) in Nghe An Province. A combination of qualitative and descriptive statistical analyses was employed to analyze the collected data. The findings reveal four primary factors affecting turnover intention among Generation Z employees in SMEs in Nghe An Province: work environment, compensation and benefits, workplace relationships, and career development opportunities. Based on these findings, the study proposes several solutions to mitigate turnover intention among Generation Z employees and improve the work environment of SMEs in the future.

Keywords: *Labor, Gen Z, Small and Medium Enterprises, Nghe An*

1. Introduction

Generation Z, born between approximately 1997 and 2012, is the demographic cohort that bridges Millennials and Generation Alpha. This generation has entered the workforce in the last decade and is projected to account for nearly 30% of Vietnam's working-age population by 2025, according to the General Statistics Office of Vietnam.

Characterized by a strong sense of individuality, a preference for independent and multitasking work environments, and a desire for career advancement, Gen Z employees bring a unique set of skills and perspectives to the workplace. However, they also face challenges such as intense competition for jobs, unemployment, and intergenerational conflicts. These challenges are particularly pronounced in small and medium-sized enterprises (SMEs) due to limited resources and less formal organizational structures compared to larger corporations. Consequently, a significant portion of Gen Z employees have expressed dissatisfaction with their current jobs and have exhibited turnover intentions.

This study focuses on Generation Z employees in small and medium-sized enterprises (SMEs) in Nghe An Province, Vietnam, where they represent a growing proportion of the workforce. Given the high turnover rates observed among this generation, this research aims to identify the key factors influencing their intention to leave their current employment. By understanding these factors, this study seeks to contribute to the development of effective strategies to retain Generation Z employees and improve the overall work environment in SMEs.

2. Factors affecting Gen Z workers' intention to quit their job

Turnover intention refers to an individual's voluntary and permanent desire to leave

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an organization (Hom & Griffeth, 1991). Tett and Meyer (1993) further define it as an employee's expressed intent to leave an organization and seek employment elsewhere. While there are various conceptualizations of turnover intention, this study defines it as a premeditated plan to voluntarily quit a job. To mitigate turnover, organizations must address the underlying factors that contribute to employees' intentions to leave. These are the following basic factors:

2.1. Working environment

The work environment is primarily characterized by working conditions, including the use of tools, equipment, skills, and technology, as well as factors that influence employees' ability to perform their jobs. A positive, clean, and comfortable work environment can enhance employee productivity and creativity. Conversely, a cramped, poorly equipped, or lacking in essential amenities workspace can lead to employee fatigue and demotivation.

The work environment has a direct impact on turnover intention among Generation Z employees in small and medium-sized enterprises. Having grown up in a technologically advanced world, Gen Z employees expect to work with modern tools to optimize their performance. Adequate facilities and modern equipment are considered essential elements of a conducive work environment. According to Cheng & Chew (2004), working conditions serve as the primary work environment, providing constant interaction and support for employees. Individuals are more likely to stay with a company when they perceive a genuine concern for their well-being, health, and the company's location relative to their family and other personal needs. Sarros et al. (2002) demonstrated that working conditions influence employees' attitudes toward work and increase their motivation, thereby reducing turnover intention. Poor working conditions, as noted by Milmann (2002), can lead to increased turnover. Conversely, a positive and supportive work environment can enhance employee satisfaction and reduce turnover intention.

Therefore, creating a comfortable work environment can reduce turnover intention. Underinvestment in technology or substandard equipment can decrease work efficiency and make employees feel undervalued. Conversely, by focusing on improving the work environment, providing flexible arrangements, investing in facilities, and fostering an open communication culture, organizations can enhance employee satisfaction, foster growth, and promote long-term commitment.

2.2. Salary and benefits policies

Compensation and benefits packages, encompassing salary, bonuses, and perks, are organizational policies designed to reward and retain employees. These packages include not only base salary but also a variety of other financial incentives such as performance-based bonuses, health insurance, paid time off, training programs, and other benefits. A study by Feldman & Ng. (2007) found that employees in companies without comprehensive benefits packages had higher turnover rates. Lee et al. (2022) demonstrated that competitive salaries and comprehensive benefits packages contributed to higher job satisfaction and lower turnover intentions among foreign workers. Additionally, Shaw et al. (1998) emphasized the strong link between perceived fairness in compensation and job satisfaction. When employees feel underpaid or unfairly treated, they are more likely to seek employment elsewhere.

Generation Z employees often seek career development opportunities and learning experiences. They value clear career paths and opportunities for growth. Small and

medium-sized enterprises (SMEs) need to provide training programs, mentorship, and other development opportunities to retain Generation Z employees. The lack of such opportunities can lead to boredom and turnover. Moreover, Generation Z employees often have high expectations regarding compensation and frequently compare salaries across different companies. If SMEs fail to offer competitive salaries, Generation Z employees may seek employment elsewhere. Benefits packages should not be limited to health insurance but should also include other perks such as paid time off, tuition reimbursement, and mental health support. SMEs often struggle to provide the same level of benefits as larger organizations, which can lead to lower employee satisfaction and higher turnover rates. SMEs need to tailor their compensation and benefits packages to meet the specific needs and expectations of Generation Z employees. This includes offering competitive salaries, comprehensive benefits, and opportunities for professional growth.

2.3. Workplace relationships

Interpersonal relationships, particularly those with supervisors and colleagues, play a significant role in shaping employees' turnover intentions. These relationships directly influence employees' ability and motivation to succeed within an organization. Such relationships can be both positive and negative, both within and outside the organization. The absence of workplace relationships can lead to feelings of isolation (Du plooy & Roodt, 2010). Conversely, positive relationships with colleagues and supervisors can enhance job satisfaction and reduce turnover intentions. On the other hand, conflicts and interpersonal tensions can negatively impact job performance and increase the likelihood of turnover (Lee, Huang, & Zhao, 2012).

A study by Gallup (2019) found that the quality of the relationship between employees and their managers is a significant predictor of employee turnover. Employees who have strong, collaborative relationships with their managers tend to have higher job performance and lower turnover rates.

For Generation Z employees, interpersonal relationships are particularly important. Given the generational differences in the workplace, it is essential for organizations to foster positive relationships between employees of different ages. Gentry et al. (2006) found that supervisors who are open, communicative, and supportive of their employees are more likely to retain their employees.

2.4. Opportunities for advancement and career development

Generation Z places a high emphasis on career advancement and development opportunities, as well as acquiring new skills. Consequently, they actively seek out diverse experiences to objectively evaluate their job opportunities and desire clear career paths and opportunities for skill enhancement. If organizations fail to provide clear development opportunities, Generation Z employees may perceive a lack of future prospects and seek employment elsewhere.

Sission's research (1993) suggests that promotions serve as an indicator of organizational commitment. The more opportunities for advancement, the greater the employee's commitment to the organization, as they perceive long-term career development prospects. Promotions offer opportunities for personal growth, increased responsibilities, and enhanced status within the organization. Career advancement is associated with employees' perceptions of opportunities to assume higher-level positions and achieve greater professional development. Similarly, Koh and Goh (1995) demonstrated that career advancement is a significant predictor of turnover intentions. Their research confirmed a

negative correlation between career advancement opportunities and turnover intentions. These findings align with the conclusions of Frazis et al. (1998) and Wetland (2003), who also found that promotions can reduce turnover intentions.

3. Analysis of factors affecting the intention to quit of Gen Z employees in small and medium enterprises in Nghe An province

3.1. Overview of small and medium enterprises in Nghe An

Nghe An is a province with a large population and diverse consumer demands, particularly for agricultural products and local handicrafts. Its strategic geographic location, serving as a trading hub between the Central Region and Laos, provides opportunities for market expansion. The provincial government has implemented various incentives and support programs for SMEs, including tax reductions, financial support, access to information, and workforce training, while actively reforming administrative procedures to create a favorable business environment.

Nghe An businesses have made significant strides in recent years, playing a pivotal role in the province's socio-economic development. The province's economic growth rate is currently ranked 26th nationally and 3rd in the North Central Coast region. It is also among the top 10 FDI destinations in Vietnam. Positive developments have been observed in education, healthcare, culture, and society, while security and social order have been maintained.

Nghe An is home to approximately 29,000 registered businesses with a combined registered capital of around 194 trillion VND. However, only about 14,000 businesses are currently operational, employing around 310,000 workers. While the number of businesses is relatively high, nearly 98% of them are micro and small enterprises with limited scale. The absence of large enterprises and major brands is a notable characteristic of the province's business landscape.

SMEs typically employ 50-60% of the total workforce in the non-state sector. Specifically, in Nghe An province in 2023, SMEs employed approximately 200,000 workers. According to the Nghe An Department of Labor, Invalids and Social Affairs, around 12-15% of workers in SMEs in the province experienced unemployment or reduced working hours due to disruptions in the supply chain and product market. The COVID-19 pandemic has further disrupted production and business operations of many SMEs. Some enterprises have had to scale down production or temporarily suspend operations, leading to temporary job losses or instability, thereby impacting the workforce in these enterprises.

As the pandemic situation has been brought under control, SMEs have begun to recover. However, they have faced challenges in recruiting skilled labor. Enterprises in the agriculture, forestry, fishery, and construction sectors require unskilled labor, while food processing and manufacturing industries need skilled workers. The proportion of skilled workers in SMEs is only about 30-35%, with the remaining being unskilled labor. This proportion varies across industries, with industries such as manufacturing and construction requiring higher levels of skilled labor. Large industrial zones such as Nam Cam Industrial Zone and VSIP Nghe An Industrial Park have attracted a significant number of skilled workers, making it difficult for SMEs to recruit and retain talent. SMEs are unable to compete with the attractive salaries and benefits offered by large industrial zones, leading to a shortage of high-quality labor, especially in the processing and manufacturing industries.

3.2. Factors affecting the intention to quit of Gen Z employees in small and medium enterprises in Nghe An province

The authors surveyed Generation Z workers at small and medium-sized enterprises in Nghe An. The purpose of the survey was to help correctly assess the factors affecting the intention to quit of Gen Z workers. This is also the basis for proposing solutions for small and medium-sized enterprises in Nghe An province. After the survey, the group obtained 350 results from Gen Z workers, specifically as follows:

Of the 350 people surveyed, 36.3% were workers aged 26-35, equivalent to 127 workers. The number of workers with the highest proportion was between the ages of 18-25 with 46.9%, equivalent to 164 workers participating in the survey. In addition, workers aged 36-46 and >46 were 16.6% and 0.2%, respectively.

The educational level of the workers is mainly at the university level, accounting for 47.7%, equivalent to 167 people, college level is 25.4%, equivalent to 89 workers, high school level is 25.4%, equivalent to 89 workers and intermediate level is 1.5%, equivalent to 5 workers. In addition, the survey subjects are divided by gender, mainly male with 68%, equivalent to 238 people, the remaining respondents are female.

From the survey results, it can be seen that the workers at the enterprises are mainly workers, accounting for 43.7% (equivalent to 153 people); students account for 24.9% (equivalent to 87 people); office workers account for 21.7% (equivalent to 76 people) and teachers account for 9.7% (equivalent to 34 people).

The impacts are specifically assessed as follows:

3.2.1. The influence of working environment

In the survey, the authors asked a number of questions to assess how the work environment affects the intention to quit of Generation Z. Specifically, with the question "I have the necessary equipment and tools to facilitate my work", there were 167 "Completely agree" responses, equivalent to 47.7%. This result proves that the equipment and tools used in the work process are very important and necessary for them.

In addition, the authors also included in the survey some questions to learn more about the provision and preparation of necessities for employees of the businesses (where the respondents are working) is really good or not? For example, "I am provided with necessities to facilitate the performance of my work" or "My business always prepares food and drinks for employees". Through these two questions, the authors have assessed that, currently, most businesses have also been more meticulous and prepared in providing necessities to serve their employees during the working process:

Through the survey, the group of authors found that in small and medium-sized enterprises in Nghe An province, the working environment is assessed as quite good, basically meeting the needs of Gen Z workers.

3.2.2. The influence of compensation and benefits

Generation Z, despite having high intangible values, still wants a salary commensurate with their efforts and abilities. Small and medium-sized enterprises in Nghe An may not have enough financial resources to provide competitive salaries and full benefits like large enterprises, leading to Generation Z workers looking for better opportunities. In some cases, small and medium-sized enterprises do not develop reasonable and fair compensation policies, leading to Generation Z workers feeling unmotivated and deciding to quit their jobs.

Table 1. Average income of workers in enterprises in Nghe An province

Unit: thousand VND.

Business Type	Year 2019	Year 2020	Year 2021
Micro-enterprise	4,656.3	3,277.2	5,085.9
Small enterprise	4,991.2	5,742.1	6,738.4
Medium enterprise	5,085.3	7,390.8	7,649.9
Large enterprise	6,971.4	7,873.0	8,589.2

Source: Nghe An Provincial Statistics Office

According to the Nghe An Provincial Statistics Office, the average income of workers in operating enterprises with production and business results in the area tends to increase over the years. The average monthly income of a worker in 2021 gradually increased according to the size of the enterprise from micro to large, specifically the micro enterprise sector had the lowest income at 5.1 million VND/month and a slight increase of 9.23% compared to 2019; the small enterprise sector had an income of 6.7 million VND, an increase of 35.01%; the medium enterprise sector had 7.6 million VND, an increase of 50.43%; the large enterprise sector had the highest income at 8.6 million VND, an increase of 25.68%.

In addition, according to the survey results of the authors, the majority of workers with salaries under 10 million VND accounted for 78.9%, reflecting a common reality that the majority of workers are still in the low-income group. The group of workers with incomes from 10-30 million VND accounted for only 18.7%. The group of workers with incomes over 30 million VND accounted for a very low proportion. The survey results show an imbalance in the income structure. Low salaries accounting for a large proportion can reduce the satisfaction and motivation of workers, especially young workers of Generation Z, who often have high expectations about income to ensure quality of life.

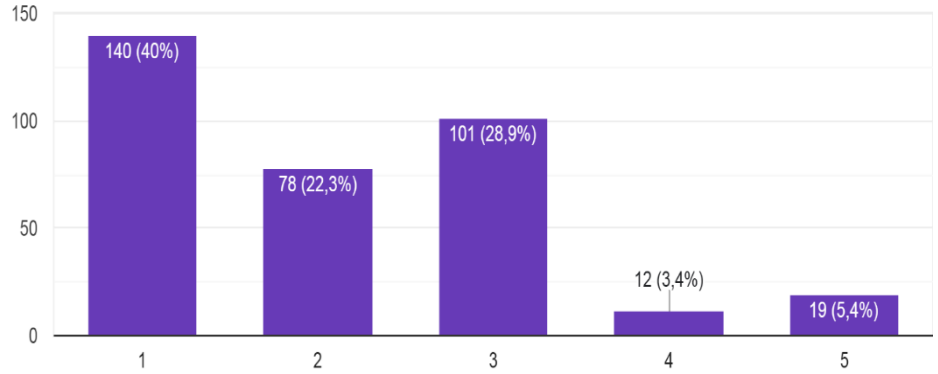

Figure 1. Survey results on Gen Z workers' perceptions of salary

Source: Compiled by the authors (2024)

Figure 1 shows that there is a significant difference in the perception of employees about their salary compared to the average. Of the 350 responses, the majority of employees (40%) said that their salary was lower than the average, corresponding to level 1 on the scale. Next, 22.3% of participants also agreed at level 2 that they were dissatisfied with their current salary. Meanwhile, only 3.4% and 5.4% of employees expressed satisfaction (levels 4 and 5), thinking that their salary was higher than the average. Notably, 28.9% of participants chose level 3 (neutral), expressing an unclear view on this issue.

Through the survey, the authors found that in small and medium-sized enterprises in Nghe An province, salary and benefits are important factors but have not really met the expectations of Generation Z workers. Although Generation Z has intangible values such as job satisfaction, career development opportunities and a positive working environment, they are also very interested in a salary that is commensurate with their efforts and abilities.

3.2.3. The influence of relationship at work

The authors surveyed 350 GenZ workers at small and medium-sized enterprises in Nghe An and found that nearly 40% of workers said that there was still no connection between superiors and subordinates, they did not see recognition and respect from their superiors (Figure 4). This is a worrying thing, because GenZ generation highly values recognition when they have achievements, in terms of thinking, GenZ generation is often sensitive to many issues, the lack of respect between leaders and employees makes them feel hurt, dissatisfied, which leads to them leaving the business. Therefore, to control this problem well, leaders who set an example must pay attention to changing their emotions as well as focusing on the issue of recognition and respect for their employees.

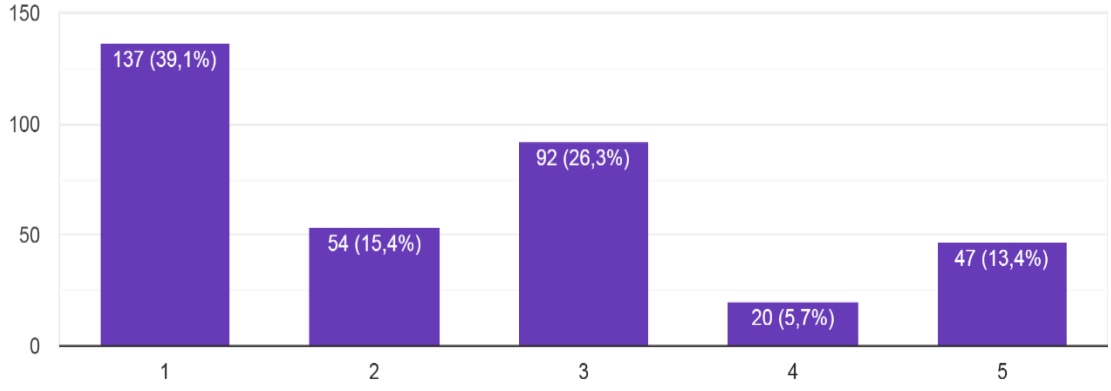

Figure 2. Survey results on workplace relationships

Source: Compiled by the authors (2024)

The survey results in Figure 2 show that, in small and medium-sized enterprises in Nghe An, although a few have tried to improve workplace relationships, most have not yet been able to create a strong culture that is consistent with the needs and expectations of the Generation Z workforce. Enterprises need to clearly recognize the importance of a positive working environment, where communication and information exchange between managers and employees are valued. Only then can enterprises attract and retain talent.

3.2.4. The influence of promotion and career development opportunities

Through the survey, the authors found that in small and medium enterprises in Nghe An province, career development opportunities are assessed as not favorable. In general, the number of employees in small and medium enterprises is on the decline. The promotion path in enterprises is assessed as not high, so employees are eager to try their hand in other fields. The specific results are as follows:

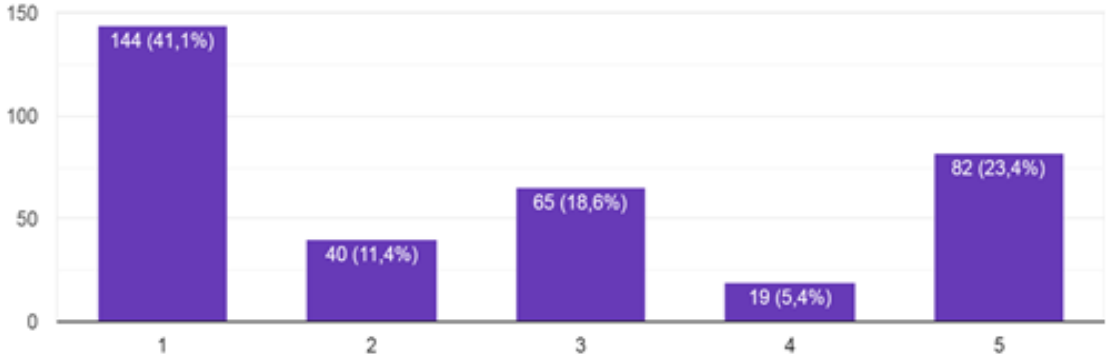

Figure 3. Survey results on the career path of Gen Z workers

Source: Compiled by the authors (2024)

With the survey results in Figure 3, the number of workers who completely disagree with the high evaluation of the career path at the enterprise accounts for 41.1%, equivalent to 144 people; the number of workers who completely agree with the high evaluation of the career path at the enterprise accounts for 23.4%, equivalent to 82 people.

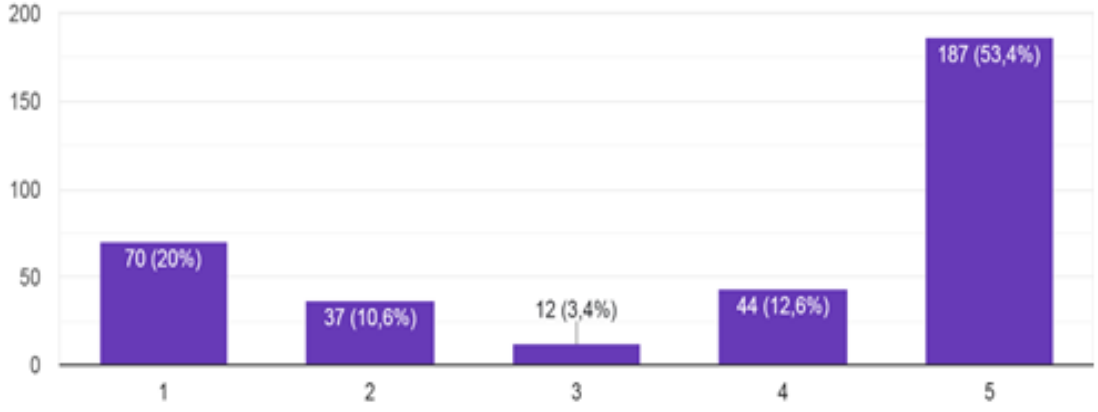

Figure 4: Survey on the intention to try other fields of Gen Z workers

Source: Compiled by the authors (2024)

Gen Z workers are mostly eager to try other fields, they strongly agree, accounting for 53.4%, equivalent to 187 people; at the average level, accounting for 3.4%, equivalent to 12 people, and completely disagreeing, accounting for 20%, equivalent to 70 people (Figure 4). Therefore, to retain Generation Z employees, organizations need to create a positive and supportive work environment where employees feel valued and respected. This includes providing opportunities for employees to build strong relationships with their colleagues and supervisors.

4. Recommending some solutions

Based on the analysis of factors affecting the intention to quit of Gen Z workers at small and medium enterprises in Nghe An province, the authors propose the following necessary solutions:

- Solutions to improve the working environment:

To reduce the intention to quit of Gen Z workers at small and medium enterprises in Nghe An, improving the working environment is an important solution. Gen Z tends to

appreciate modern working environments, with adequate facilities and advanced technological equipment. Investing in technology, comfortable workspaces, and work support tools is a key factor in retaining young employees.

In addition, flexible working policies, especially the ability to work remotely or adjust working hours, are one of the important factors that help them maintain a balance between work and life. Flexible leave policies can also help reduce stress and increase satisfaction.

Furthermore, an indispensable factor is building a harmonious and fair corporate culture where employees feel appreciated and have opportunities for career development. A work environment that lacks consensus or recognition of contributions will make employees feel unappreciated, leading to them looking for other opportunities.

Improving these factors will not only help create an attractive working environment but also reduce the turnover rate of Generation Z employees at small and medium enterprises in Nghe An.

- *Solutions to improve salary and other benefits policies*

SMEs should implement regular salary reviews (annually or quarterly) to ensure that employees' compensation aligns with their individual performance and development. While SMEs may not always be able to offer salaries as competitive as large corporations, fair and equitable compensation based on skills and performance can make employees feel valued.

Additionally, SMEs should establish comprehensive compensation and benefit packages. Flexible and diverse benefits such as social insurance, health insurance, bonuses, allowances, and transportation subsidies should be provided. Performance-based incentives, such as productivity bonuses, innovation awards, or team bonuses for project completion, can motivate employees. A fair compensation policy, ensuring equity in work allocation, promotion criteria, and reward systems, is crucial. When employees feel fairly treated, they are more likely to be satisfied with their jobs and less likely to leave.

Flexible work arrangements are another form of compensation that businesses should offer to meet the needs of their workforce, reducing stress and increasing job satisfaction. Key considerations include remote work options, flexible working hours to accommodate personal lives, and reasonable vacation policies to allow employees to rest and recharge. Providing healthcare programs, including medical services or regular health check-ups, and fostering a work-life balance by encouraging employees to spend time with their families and themselves are also essential. Offering regular breaks and organizing team-building activities, such as trips or recreational events, can enhance employee morale and foster a sense of camaraderie.

- *Solutions to improve workplace relationships*

Workplace relationships play a very important role in employee retention. When employees feel comfortable, respected and have good relationships with colleagues and superiors, they will be more motivated to work and less likely to look for other opportunities. Solutions for SMEs in Nghe An province to improve workplace relationships and build a positive corporate culture include: setting rules of conduct in the business for everyone to follow, creating a professional and respectful working environment; Organizing Team building activities to create opportunities for communication, helping employees understand and connect with each other better;

Respecting individual differences, creating a diverse working environment; Organizing group meetings, company-wide meetings to listen to information and opinions of employees; Encouraging employees to give feedback on work and colleagues; Training soft skills for employees such as: Communication skills, teamwork skills,...

- - *Solutions to create opportunities for promotion and career development*

SMEs in Nghe An province need to create a positive working environment with clear promotion opportunities, focusing on training the necessary skills for employees. Create promotion opportunities for employees based on their capacity and work efficiency. Support programs need to be regularly organized such as: mentoring programs to connect new workers with experienced people for support and guidance... Create peer support groups to share experiences, helping workers have favorable opportunities to improve their professional qualifications, while helping them relieve stress during work. Enterprises need to encourage workers to be creative, creating conditions for them to promote their capacity and ability through challenging jobs or in many different fields. At the same time, it is also necessary to consider developing online training so that Gen Z workers can easily arrange time to participate in online courses, and can study anywhere, anytime. Small and medium-sized enterprises can use online training tools to exploit internal courses, helping to save a lot of accommodation costs and travel time for employees, while promoting the strengths of information technology skills of Generation Z.

In conclusion, SMEs in Nghe An need to cultivate a positive work environment that fosters cooperation, mutual respect, and a pleasant atmosphere. Organizing events and extracurricular activities provides opportunities for employees to interact and build stronger relationships. Encouraging employee participation in decision-making processes and conducting regular, fair, and transparent performance evaluations with constructive feedback can enhance employee engagement. Recognizing and rewarding employee contributions through various programs can also boost morale. Ensuring competitive compensation, flexible work arrangements, and attractive benefits such as health insurance and social security can further improve employee satisfaction. By implementing these integrated solutions, SMEs in Nghe An can strengthen the commitment of Generation Z employees, thereby reducing turnover rates. Furthermore, these initiatives contribute to a more conducive work environment, fostering higher employee motivation, productivity, and retention.

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THE IMPACT OF PROFITABILITY ON SUSTAINABLE GROWTH OF LISTED COMPANIES IN VIETNAM

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Abstract: The objective of the study is to determine the impact of profitability on sustainable growth of listed companies in Vietnam in the period 2019-2023. The study collects reliable data from published financial statements of 355 enterprises, using Stata tool to analyze regression models. From there, consider the impact such as profitability (ROA) and some other factors (LEV: financial leverage, SIZE: company size, INF: inflation rate, and COVID: Covid-19) on sustainable growth rate (SGR). The research results show that profitability has a significant positive impact on the sustainable growth rate of enterprises. In addition, the results also found that SGR is also positively affected by SIZE and negatively by INF. The study has not confirmed the impact of financial leverage and Covid-19 on SGR. The findings from this paper are useful for academics and especially managers to understand the importance of profitability for sustainable growth. Future studies may consider expanding the survey's scope and time to include all businesses in similar regions to compare with the findings of this study.

Keywords: Profitability, sustainable growth, Covid-19, Vietnam

1 Introduction

Many studies are interested in and affirm the role of profitability in determining operational efficiency, creating core values for the development of the organization (Abbas et al., 2024; Dirman, 2020; Lee, 2014; Nguyen et al., 2023, Nguyen and Nguyen, 2024; …). The goal of enterprises is to reach maximum profits, which makes profitability not only a metric for measuring operational efficiency, but also a significant factor in evaluating their potential for growth.

A company can only exist at a sales growth rate that is consistent with its operations and finances at a certain level to develop sustainably without needing to raise external capital (Higgins, 1981). Sustainable growth (SGR) is a core factor in ensuring the prosperity of any organization. Thu (2024) shows that sustainable growth strategies will help businesses enhance their reputation, affirm their core values; increase trust with partners; reduce risks and reduce operating costs.

In order to achieve a long-term sustainable business, it is crucial to identify the factors that influence sustainable growth rates. (Mat Nor et al., 2020) shows that companies can achieve higher profits or will face financial difficulties when the crisis occurs. In the context of current economic instability, the production and business activities of companies are facing many challenges for their survival and development. Research on the impact of profitability on sustainable growth during Covid-19 is necessary to understand the current situation of businesses when facing fluctuations, thereby proposing strategic solutions to maintain and develop sustainably in the future. This study will provide a comprehensive view of how Covid-19 has affected growth rates,

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thus offering predictions and appropriate recovery strategies for businesses in Vietnam. This study is the first empirical research in Vietnam during the period 2019-2023 that uses the ROA criterion to reflect profitability and assess its impact on sustainable growth rate (SGR). The research results enrich the scientific knowledge, confirming the impact of profitability on the sustainable development of enterprises.

The remaining sections of the paper are organized as follows: Section 2 presents the theoretical foundations for the study; Section 3 provides an overview of studies on the same topic of the paper; Section 4 introduces the research methodology; Section 5 presents the results of the study; and Section 6 is the conclusion.

2 Theoretical Framework

2.1 Capital structure theory

Modigliani and Miller (1958) proposed the capital structure theory (M&M theory) and supplemented it in 1963, which is a fundamental study in financial research. M&M theory shows that, for imperfect financial markets, the benefits of borrowing and receiving tax shield benefits become more attractive for businesses. Therefore, a reasonable capital structure is a key factor to achieve the goal of sustainable growth. Profitability is an important factor for managers to decide on capital mobilization options. Companies with high profitability often limit the need for debt, businesses with low profitability tend to depend on external sources of finance such as debt, and this directly affects capital structure. From that, the author asserts that there is an impact of profitability on maintaining stable growth, therefore capital structure theory plays an important role in the research analyzing the relationship between profitability and sustainable growth of enterprises in this article.

2.2 Business life cycle theory

Vernon (1979) proposed the business life cycle theory by describes the stages of start-up, growth, maturity, and decline throughout the life of a business. This theory contributes to explaining the concept of sustainable growth cycle that changes with each stage of the business. Greiner (1972) developed a description of the development of an organization through stages of growth, each stage interrupted by a crisis, requiring changes in strategy and management. Under this theory, the author proposes studying the relationship between profitability and sustainable business growth in Vietnam during the Covid-19 crisis.

3 Literature review

3.1 Sustainable growth

Sustainable growth is defined by Higgins (1977) as the maximum growth rate that a firm can attain without having to raise new external capital. Higgins suggests that uncontrolled growth beyond the sustainable rate can lead to financial risk, undermining the long-term financial viability of the firm.

Later studies (Jegers, 2003; Chen et al., 2012; Altahtamouni et al., 2022) emphasized profitability, financial performance, and capital structure as key determinants of SGR. Jegers (2003) pointed out that nonprofits must also maintain a balance between financial performance and capital structure in order to achieve sustainable development. On the other hand, Chen et al. (2012) showed that growth rate and profit distribution are important factors in sustainable financial strategies.

Fonseka et al. (2012) emphasize sustainable growth as the ability to facilitate balanced and sustained expansion. According to Thu (2024), the secret of sustainable

growth is to determine which revenue growth rate is suitable for the reality of the company and the financial market. In order to achieve the desired revenue growth rate, managers are willing to invest more in goods, machinery, equipment, real estate, increasing receivables excessively, leading to financial exhaustion and a very high risk of bankruptcy. Therefore, a business with a high growth rate is not necessarily sustainable. Fonseka et al. (2012) believing that it is necessary to maintain a reasonable balance between profitability and business growth, Escalante et al. (2006) share the view that a model with sustainable growth is one where the increase in sales is balanced with the change in profit margin, thereby helping in strategic planning and control for the company in the context of modern financial management.

3.2 Measuring sustainable growth

Higgins (1977) first proposed a formula for measuring sustainable growth through sales (revenue) growth rate. for businesses. Higgins (1981) added criteria for determining SGR through four financial ratios (dividend payout, profit margin, asset turnover, and capital structure). Platt et al. (1995) extended Higgins' SGR model for use in a crisis context, emphasizing the need to maintain a balance between revenue growth and capital expenditure. The following are the definitions of sustainable growth by Platt et al. (1995) as follows:

$$SGR = \frac{\Delta S}{S} = \frac{M(1-d)(1+\frac{D}{E})}{\frac{A}{S} - M(1-d)(1+\frac{D}{E})}$$

In there:

+ SGR: sustainable growth rate;
+ S: revenue;
+ A: total assets;
+ M: profit margin;
+ d: dividend pay-out ratio;
+ D: total debt;
+ E: equity.

Kaplan and Norton (1996) also showed that the financial objectives in the growth stage are the percentage growth rate in revenue and the growth rate in sales in target markets. Van Horne (1997) analyzed the maximum annual sales growth percentage that can be achieved based on the operating targets, debt, and dividend payout ratio. Altahtamouni et al.'s research (2022) showed that the use of SGR in the context of banking and construction companies helps to evaluate financial performance and growth strategy. Thu (2024) also applied this formula to evaluate sustainable growth rates, demonstrating the suitability of SGR for long-term analysis.

3.3 The impact of profitability on sustainable growth

From a financial perspective, there have been many studies in the world examining factors affecting the sustainable growth of organizations (Higgins, 1977, 1981, 2007; Van Horne, 1987; Phillips et al., 2010; Teng et al., 2021; Xu & Wang, 2018; Garg et al., 2024; …), but only a few have examined the impact of profitability on sustainable growth. Chen et al. (2012)extended Higgins' model to show that ROE reflects profitability and has a positive impact on sustainable growth rate. Altahtamouni et al. (2022) analyzed the impact of factors on sustainable growth in Saudi banks during the period 2010-2019. The

research results found that both profitability (ROE: Return on Equity) and retention rate (R: Retention Rate) have a positive impact on SGR, and the variables of the model explain 90% of sustainable growth. Therefore, it can be confirmed that profitability has an effect on the sustainable growth rate.

However, profitability is not only reflected through ROE but also through many other measurement criteria, in which ROA is considered the most obvious indicator reflecting the profitability of a business (Rivard and Thomas, 1997). Through the ROA indicator, Liow (2010) studied the financial factors affecting SGR of real estate enterprises in the period 2000-2006 and found that ROA has a positive impact on SGR, which is consistent with the observation that real estate companies with high profitability often have high growth. In addition, the study also found that size (SIZE) also has a positive impact on SGR of real estate companies in Asia and Europe, but is not statistically significant for real estate companies in North America. The results indicate that SGR is affected by different factors in different regions.

In Vietnam, Thu (2024) studied the impact of digital transformation on sustainable growth in 194 companies listed on the Ho Chi Minh Stock Exchange in the period of 2018-2022. The results showed that ROA has a positive impact on sustainable development at a statistical significance level of 10%. This contributes to affirming that the higher the profitability of a business, the greater the ability to develop sustainably. However, (Thu, 2024) observed profitability as a control variable for the sustainable growth model. Moreover, the empirical research data from Ho Chi Minh City is not applicable to all domestic enterprises.

This study was conducted by the author to analyze the impact of profitability through the ROA index on the sustainable growth of listed companies in Vietnam during the period 2019-2023.

4 Research methodology

Research data was collected from the financial statements of 355 listed companies in Vietnam in the period 2019-2023. The data source was collected by the author from the website: https://finance.vietstock.vn , which is one of the reputable websites that publishes information on reputable businesses in Vietnam.

The author measures sustainable growth by calculating the revenue growth rate ($\Delta S/S$). In addition, to minimize the influence of external factors, the author uses other factors including financial leverage, company size, inflation rate and the impact of Covid-19 on listed companies in Vietnam.

Based on the research overview, the author built a linear regression model to test the hypothesis H0: Profitability has a significant positive impact on sustainable growth.

The research model has the following form:

$SGR = \beta_o+\beta_1 ROA+\beta_2 LEV+\beta_3 SIZE+\beta_4 INF+\beta_5 COVID +\varepsilon$

In there:

+ Dependent variable: SGR
+ Independent variable: ROA
+ Control variables: LEV, SIZE, INF, COVID
+ β_o : intercept coefficient
+ $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$: individual regression coefficients (slope coefficients).
+ ε: random error

Table 1: Variables and calculation formula

Variable	Variable name	Calculation formula
SGR	Sustainable growth	(Net revenue $_{i}$ - Net revenue $_{(i-1)}$) / Net revenue $_{(i-1)}$
ROA	Profitability	Profit after tax/Total assets
LEV	Financial leverage	Liabilities/Equity
SIZE	Company size	Ln(Total Assets)
INF	Inflation rate	INF% = log(CFI $_{n1}$ /CFI $_{n0}$)
COVID (dummy variable)	Impact of COVID19	Years with Covid have value = 1, years without COVID = 0

Source: Author

Table 1 provides an explanation of the variables used in the research analysis. The author uses Stata17 tool to analyze panel data using the pooled regression model (OLS), performs the necessary tests to choose between the fixed effects model (FE), the random effects model (RE) and handles the defects to obtain the guaranteed estimation model (GLS).

5 Results and Discussion

5.1 Descriptive statistics

Table 2 below shows the statistical results describing the mean, standard deviation, maximum and minimum values of the representative variables in the model of the research data.

Table 2: Descriptive statistics of variables

Variable name	Average value	Standard deviation	Minimum value	Maximum value
SGR	0.0884	3.3388	-116.4356	55.0593
ROA	0.0546	0.0790	-0.4834	0.6537
LEV	1.4652	5.4803	-59.6083	162.3079
SIZE	28.5021	1.4721	23.3691	34.1348
INF	-0.0051	0.1660	-0.2499	0.2499
COVID	0.8	0.4001	0	1

Source: Author

The results show that sustainable growth has an average value of 0.0884, there is a significant difference in sustainable growth rate (SGR) between companies (highest 55.0593; lowest -116.4356) with a standard deviation of 3.3388. For profitability measured through ROA, the average is 0.0546 and ranges from -0.4834 to 0.6537, reflecting differences in profitability in the period 2019-2023, some businesses suffered heavy losses and some businesses operated effectively. LEV has a high average (1.4652), which shows that listed companies in Vietnam use large financial leverage to finance long-term projects during the Covid-19 period.

5.2 Correlation analysis

The results of the correlation analysis are shown in the following table:

Table 2: Correlation matrix

Variable	SGR	ROA	LEV	SIZE	INF	COVID
SGR	1,000					
ROA	0.043*	1,000				

LEV	-0.006	-0.152***	1,000			
SIZE	0.006	-0.089***	0.122***	1,000		
INF	-0.051**	-0.023	-0.021	0.020	1,000	
COVID	-0.008	-0.063***	0.001	0.044*	0.277***	1,000

****** p<0.01, ** p<0.05, * p<0.1***

Source: Author

Table 2 shows the relationship between the variables in the model, ROA has a positive correlation at the 10% significance level with SGR (4.3%), on the contrary, INF has a negative correlation with SGR (-5.1%) at the 5% significance level, the remaining variables are not significantly correlated with sustainable growth. There is a negative relationship at the 1% significance level with ROA, which is LEV (-15.2%), SIZE (-8.9%) and COVID (-6.3%), in addition, the INF variable is not significantly correlated with ROA. In terms of financial leverage, the SIZE variable has a positive correlation (12.2%) at the 1% significance level, the two variables INF and COVID are not correlated. Although INF is not associated with SIZE, COVID19 has a 5% significance level with SIZE (4.4%) and a 1% significance level with INF (27.7%). The SIZE variable indicates that listed companies in Vietnam during this period have different sizes, with the lowest being 23.3691 and the highest being 34.1348.

5.3 Regression analysis results

After running the OLS pooled regression model, the author checked for multicollinearity through the VIF coefficient.

```
. vif

    Variable |       VIF       1/VIF
-------------+----------------------
       COVID |      1.09    0.919236
         INF |      1.08    0.923062
         LEV |      1.04    0.964284
         ROA |      1.03    0.968182
        SIZE |      1.02    0.978309
-------------+----------------------
    Mean VIF |      1.05
```

Figure 1: Multicollinearity test

Source: Author

The result obtained with VIF coefficient of 1.05 (less than 3) proves that the OLS regression model does not have multicollinearity.

Next, the author uses the Hausman test to select the appropriate model for the research data. The test results are shown in Figure 2.

```
             ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       fe           re         Difference          Std. err.
-------------+------------------------------------------------------------
         ROA |   7.392564     1.826693        5.565871        1.437237
         LEV |  -.0006596    -.0012759        .0006164        .0080602
        SIZE |  -.2464087     .0248292       -.2712379        .2584259
         INF |  -1.024003    -1.061477        .0374736        .0207008
       COVID |   .1812194     .0697507        .1114687         .044763
------------------------------------------------------------------------------
                b = Consistent under H0 and Ha; obtained from xtreg.
     B = Inconsistent under Ha, efficient under H0; obtained from xtreg.

Test of H0: Difference in coefficients not systematic

    chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
            =  16.46
Prob > chi2 = 0.0025
(V_b-V_B is not positive definite)
```

Figure 2: Hausman test results

Source: Author

The hypothesis tested is that the random effects model is the appropriate model, however the results in Figure 2 show that the Sig coefficient (significance level) is 2.5% (less than 5%), thus rejecting the hypothesis proposed to confirm that the fixed effects (FE) model is appropriate for SGR regression.

To test the defects of the FE model, the author uses the "Modified Wald test" to get the Sig coefficient equal to 0, thus rejecting the null hypothesis and concluding that there is heteroscedasticity. At the same time, using the "Wooldridge test" to obtain the Sig coefficient equal to 5.71% (greater than 5%), thus there is no autocorrelation in SGR. Then, the author corrects the heteroscedasticity defect using GLS and summarizes the regression results in Table 3.

Table 3: SGR regression results

	(OLS)	(FE)	(RE)	(GLS)
	SGR	SGR	SGR	SGR
ROA	1,798*	7,393***	1,827*	1,179***
	(1.76)	(4.21)	(1.79)	(10.46)
LEV	-0.00130	-0.000660	-0.00128	0.000929
	(-0.09)	(-0.04)	(-0.09)	(0.46)
SIZE	0.0249	-0.246	0.0248	0.0245***
	(0.46)	(-0.94)	(0.45)	(5.16)
INF	-1.062**	-1.024**	-1.061**	-0.205***
	(-2.14)	(-2.07)	(-2.14)	(-4.74)
COVID	0.0694	0.181	0.0698	0.0000751
	(0.34)	(0.86)	(0.34)	(0.00)
_cons	-0.778	6,560	-0.778	-0.712***
	(-0.50)	(0.88)	(-0.50)	(-5.26)
N	1773	1773	1773	1773
R-sq	0.005	0.017		
t statistics in parents				
* p<0.1, ** p<0.05, *** p<0.01				

Source: Author

In Table 3, the regression analysis results between the models have certain differences. Through the process of testing and correcting defects, the results obtained from the GLS model are the basis for evaluating the effectiveness of this study. At the 99% confidence level, Table 3 shows that profitability has a significant positive impact of 1.179 times on sustainable growth rate. The value of R-squared of the FE model is 0.017, meaning that the model variables explain about 17% of the changes in sustainable growth. In other words, sustainable growth should not only be considered from a financial perspective but also be considered in combination with other aspects such as technology, environment and society.

Based on this finding, the conclusion is to accept the Ho hypothesis, which means that profitability has a significant positive impact on sustainable growth of listed companies in Vietnam during the period 2019-2023. This reflects that companies with higher profitability often achieve better sustainable growth rates, thanks to the efficiency of asset utilization and cost management. The results are consistent with previous studies,

which show the great dependence of sustainable growth on profitability and financial management (Altahtamouni et al., 2022; Fonseka et al., 2012; Higgins, 1977; Jegers, 2003; Liow, 2010), these studies also emphasize that profitability not only affects SGR but is also a decisive factor in maintaining financial stability and optimizing sustainable development strategies. However, the findings of the study are inconsistent with those of (Arora et al., 2018; Nugroho, 2020; Wang et al., 2019), these studies show that ROA has no significant impact on SGR.

Table 3 shows that the size of the company also has a positive effect on SGR (0.0245 times) with a confidence level of 99%. Some previous studies (Fonseka et al., 2012; Liow, 2010; Mat Nor et al., 2020; Thu, 2024)have not confirmed the significance of the impact of company size on sustainable growth, but this result is agreed with the study of (Liow, 2010; Xu & Wang, 2018) indicating that large enterprises have the ability to access resources and manage financial risks more effectively than small enterprises. However, it is inconsistent with the study by (Teng et al., 2021) which found that SIZE has a negative and statistically significant impact on SGR.

Inflation is an exogenous factor for sustainable business growth, and the inflation rate has a negative impact on SGR. This finding is consistent with research, which shows that during the Covid-19 pandemic, high inflation increases input costs, which affects the profitability and growth rate of businesses in Vietnam.

The results of the study found that at the 1% significance level, inflation rate has a negative impact on SGR (-0.712 times), this result is contrary to the study of (Kanapiyanova et al., 2023), (Arora et al., 2018) although inflation expectations reduce sustainable growth, the results did not find the impact of INF on SGR.

Table 3 regression results do not support the claim that LEV has an impact on sustainable growth. This result is consistent with studies (Fonseka et al., 2012; Lee, 2014; Phillips et al., 2010), disagreeing with the finding when finding a negative impact of LEV on SGR (Thu, 2024; Xu & Wang, 2018), however, the study of Teng et al. (2021) found that LEV has a positive impact on SGR mainly at the 25th percentile.

The study also found that COVID related illnesses lost their ability to explain the impact on SGR when combined with other factors in this study's analysis of SGR impacts.

6 Conclusion

The findings of this study confirm that profitability has a significant positive impact on the sustainable growth rate of listed construction companies in Vietnam. Enterprises with higher return on assets are better able to sustain and expand their business operations in the long term, and can easily cope with financial crises more effectively. From this, it can be seen that the sustainable growth of listed companies in Vietnam during the Covid-19 crisis depends largely on profitability, and enterprises with higher ROA are better able to maintain stable growth in the long term. Therefore, to maintain operational efficiency and ensure sustainable growth, manager need to focus on improving asset efficiency, reducing operating costs and taking advantage of scale. In addition, it is necessary to quickly implement digital transformation and apply technology in project management to minimize the impact of exogenous factors such as inflation and any fluctuations that may occur in the future.

The findings of the study contribute to the scientific literature on sustainable growth and profitability. However, the study is not without certain limitations as follows: First, due to data collection limitations, the author only used revenue growth rate as a measure

of sustainable growth. Therefore, future researchers can fill the research gap by adding SGR measurement criteria. Second, the article was only conducted in Vietnam during the Covid-19 period, so the author recommends that researchers re-examine the research models by expanding the scope and time in similar areas.

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GREEN FINANCE IN VIETNAMESE BANKS: CURRENT SITUATION AND SOLUTIONS FOR PROMOTION

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Abstract: Climate change and the depletion of natural resources are presenting significant challenges to the global economy, and Vietnam is no exception. As one of the most vulnerable countries to climate change, Vietnam has made strong commitments at COP26 to achieve net-zero emissions by 2050. To realize this goal, green finance has emerged as a strategic tool to support sustainable economic projects and activities, reducing negative environmental impacts.

In this context, commercial banks play a central role in providing green financial products, from financing renewable energy projects to issuing green bonds. However, the implementation of green finance in Vietnam still faces many challenges, including limited legal frameworks, insufficient awareness among stakeholders, and a lack of long-term financial resources.

The need to research green finance in the banking sector in Vietnam arises not only from the environmental protection requirement but also to promote innovation in banks and enhance their competitiveness in the context of international integration.

1. Introduction

1.1. Problem Statement

Climate change and the depletion of natural resources are presenting significant challenges to the global economy, and Vietnam is no exception. As one of the most vulnerable countries to climate change, Vietnam has made strong commitments at COP26 to achieve net-zero emissions by 2050. To realize this goal, green finance has emerged as a strategic tool to support sustainable economic projects and activities, reducing negative environmental impacts.

In this context, commercial banks play a central role in providing green financial products, from financing renewable energy projects to issuing green bonds. However, the implementation of green finance in Vietnam still faces many challenges, including limited legal frameworks, insufficient awareness among stakeholders, and a lack of long-term financial resources.

The need to research green finance in the banking sector in Vietnam arises not only from the environmental protection requirement but also to promote innovation in banks and enhance their competitiveness in the context of international integration.

1.2. Research Objectives

This study aims to achieve the following key objectives:

- Analyze the current implementation of green finance in the Vietnamese banking system, including current products, services, and policies.
- Evaluate the challenges and barriers to the development of green finance from the perspective of banks and related organizations.

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- Propose specific and feasible solutions to promote green finance, contributing to the nation's sustainable development goals.

1.3. Research Questions

To achieve the above objectives, the study will focus on answering the following questions:

1. What is the current status of green finance in the Vietnamese banking system?
2. What are the biggest challenges that banks face when implementing green finance?
3. What solutions can be applied to enhance the implementation of green finance in Vietnam?

1.4. Research Significance

The research not only provides a comprehensive picture of the status of green finance in the Vietnamese banking system but also contributes scientific and practical foundations for the development of appropriate policies and strategies. The proposed solutions can help commercial banks seize opportunities from the global green finance trend, while promoting sustainable economic development in Vietnam.

2. Literature Review

2.1. Theoretical Framework

2.1.1. Concept of Green Finance

Green finance refers to financial activities aimed at supporting projects and economic activities that benefit the environment, reduce greenhouse gas emissions, and protect natural resources. According to the World Bank (WB), green finance includes various forms such as green loans, green bonds, green investment funds, and disaster risk insurance. The core elements of green finance are transparency, sustainability, and the ability to promote economic development goals linked to environmental protection.

2.1.2. Role of Banks in Green Finance

Banks play an important intermediary role in mobilizing and allocating capital for green projects. Commercial banks provide financial products such as preferential loans for renewable energy, green bonds to raise long-term capital, and funding for sustainable projects. Banks are also the bridge between public policy and the private market, contributing to the realization of national sustainable development goals.

2.1.3. Legal Framework and Green Finance Standards

The implementation of green finance requires a solid legal framework and international standards. Organizations like the World Bank, the International Capital Market Association (ICMA), and the United Nations have developed detailed guidelines on green standards, such as the Green Bond Principles and the UN Principles for Responsible Banking. In Vietnam, the legal documents related to green finance are still in the process of being completed. Resolution 55/NQ-TW in 2020 laid the foundation for the development of renewable energy and green finance policies.

2.2. Overview of Previous Research

2.2.1. International Experience

- **China**: China is a pioneer in developing green finance with clear policies and strong government support. The People's Bank of China (PBoC) has developed a green credit classification system, helping commercial banks easily identify green projects for financing.
- **European Union (EU)**: The EU implements the Sustainable Finance Strategy,

where commercial banks must comply with strict regulations on issuing green bonds and transparent reporting. The ESG (environmental, social, and governance) classification system is an effective tool for financial institutions to manage risks and optimize green investments.

2.2.2. Domestic Research

In Vietnam, green finance has become a topic of increasing interest to researchers and regulatory bodies. Some notable studies have made significant contributions to analyzing the current situation and proposing solutions for the field:

- **Nguyen Thi Lan Anh (2022)**: "Analysis of the Impact of Green Finance on Sustainable Growth in Vietnam," published in the Journal of Economics and Development. This study focuses on evaluating the relationship between green credit and GDP growth, emphasizing the role of banks in financing renewable energy projects.
- **Tran Van Binh (2023)**: "The Role of Commercial Banks in Energy Transition in Vietnam," published in the Journal of Banking. The author points out that green financial products are still underdeveloped and emphasizes the need for a policy framework to encourage green investment.
- **Pham Thi Hoai (2021)**: "Legal Framework for Green Finance in Vietnam: Limitations and Improvement Directions," published in the Journal of Finance. This study provides detailed analyses of legal documents related to green finance and suggests policy improvements to help commercial banks participate more actively in green finance activities.
- **Le Quang Minh and Nguyen Thanh Huyen (2020)**: "Application of Green Finance in Commercial Banking Activities in Vietnam," published in the Journal of Sustainable Development. The authors conducted an empirical survey at several large banks like Vietcombank, BIDV, and Techcombank, emphasizing the role of leadership in shifting strategic thinking.
- **Đinh Thi Thu Hang (2023)**: "Challenges and Opportunities for Green Finance in Vietnam," published in the Journal of Public Policy. The article highlights significant challenges such as the lack of long-term capital, insufficient awareness among businesses and individuals, and the urgent need for specialized training in the field.

2.3. Research Gaps

Despite growing attention to green finance in recent years, research in this field in Vietnam still has certain limitations. Identifying these research gaps is crucial for positioning the topic and determining the scientific contributions of this study.

2.3.1.Limitations in Analyzing the Status of Green Finance

Many studies have focused on introducing the concept of green finance and general trends, but there has been no comprehensive and systematic picture of the status of green finance in the Vietnamese banking system.

- Current studies are mostly qualitative, lacking specific empirical data to assess the effectiveness and level of green finance implementation.
- There has been no detailed comparison between commercial banks, particularly between state-owned and private banks, in implementing green finance.

2.3.2.Lack of Models to Assess Green Finance Effectiveness

The measurement of green finance effectiveness in Vietnam has not been thoroughly studied.

- Existing research has not developed specific Key Performance Indicators (KPIs) to

evaluate the success of green financial products such as green loans and green bonds.

- No study has integrated ESG factors (Environment, Social, Governance) into Vietnamese banking financial models to analyze sustainable impacts.

2.3.3. Challenges from Legal Framework and Policies

The legal system and policies supporting green finance in Vietnam still have many shortcomings, but the evaluation and proposed improvements have not been studied in depth.

- Many studies merely list legal barriers without proposing practical policy frameworks.
- The coordination between regulatory agencies (State Bank of Vietnam, Ministry of Finance, Ministry of Natural Resources and Environment) in building and implementing green finance policies has not been clearly analyzed.

2.3.4. Lack of Research on Stakeholder Behavior

Stakeholder awareness and behavior, including banks, businesses, and customers, are key factors determining the success of green finance. However, this is a significant gap in research in Vietnam.

- There are not many studies on the readiness of commercial banks to transition to green finance, both strategically and in terms of internal capacity.
- Customers and businesses—those who benefit from green finance—have not been fully surveyed regarding their needs, awareness, and access to these products.

2.3.5. Limitations in Learning from International Experiences

Although international studies on green finance are abundant, applying lessons from developed or similarly developing countries into Vietnam's context is still very limited.

- No studies have made detailed comparisons between Vietnam and pioneering countries in green finance (China, EU, Singapore).
- Proposals for developing green credit classification systems and ESG governance models from international sources have yet to be adjusted to Vietnam's realities.

Research Contribution Directions

The identified gaps serve as the foundation for this research to focus on:

1. Building a comprehensive and systematic analysis of the status of green finance in Vietnam, based on empirical data from major commercial banks.
2. Developing indicators to measure the effectiveness of green finance, integrating ESG factors into the evaluation model.
3. Proposing solutions to improve the legal framework and policies, based on lessons from exemplary countries, but adjusted to fit Vietnam's context.
4. Surveying stakeholder awareness and behavior to understand the factors influencing the implementation of green finance.

3. Research Methodology

3.1. Research Design

The study uses a mixed-methods approach, combining both qualitative and quantitative research:

- **Qualitative research** aims to collect in-depth information, analyzing policies, strategies, and legal frameworks related to green finance.
- **Quantitative research** uses empirical data to assess the current status of green finance in the Vietnamese banking system and test the relationships between various

influencing factors.

3.2. Data Collection Methods

3.2.1.Secondary Data

Secondary data is collected from January 2024 to March 2024, from the following sources:

- Annual reports of commercial banks in Vietnam (Vietcombank, BIDV, Techcombank, etc.) for the period 2018-2023.
- Banking sector reports from the State Bank of Vietnam and documents from international organizations such as the World Bank (WB), and the Asian Development Bank (ADB).
- Scientific articles in international and domestic journals related to green finance, gathered from databases like Scopus, Web of Science, and reputable journals in Vietnam.

3.2.2.Primary Data

Primary data is collected from April 2024 to June 2024, through two main methods:

- **Expert interviews**:
  - Duration: From April 15, 2024, to May 30, 2024.
  - Participants: 10 experts in the fields of banking, finance, and environmental policy, including bank leaders, experts from the State Bank of Vietnam, and international organizations in Vietnam.
  - Method: Semi-structured interviews conducted in-person or online.
- **Field surveys**:
  - Duration: From May 1, 2024, to June 30, 2024.
  - Participants:
    - 200 bank employees from 10 major commercial banks in Vietnam.
    - 150 businesses and individual customers related to green financial products.
  - Method: Direct surveys and online platforms (Google Forms).

3.3. Data Analysis Methods

The data analysis in this study aims to assess the factors influencing the development of green finance in Vietnamese banks. To achieve this, we will apply both quantitative and qualitative data analysis methods, ensuring comprehensive and accurate insights into the factors affecting green finance.

3.3.1.Quantitative Analysis

Quantitative analysis will help describe and test the relationships between the factors influencing the development of green finance in banks. The analysis steps are as follows:

1. Data Cleaning and Processing:
2. After collecting data from surveys, we will clean the data to remove missing or erroneous values. The data will be standardized and validated to ensure accuracy during analysis.
3. Descriptive Analysis:

Descriptive analysis will be used to summarize the basic characteristics of the data, including measures like mean, standard deviation, percentage ratios, and distribution charts. The main factors influencing green finance will be described using these statistical measures.

Here is a descriptive data table from the survey of banks:

Table 1: Survey Data from Banks on Green Finance

Factor	Mean	Standard Deviation	% Agreement	Min - Max
Policy and Legal Framework	4.2	0.89	95%	3 - 5
Bank Awareness	3.8	1.10	90%	2 - 5
Green Finance Demand from Enterprises	4.0	1.05	85%	3 - 5
Opportunities from International Organizations	4.5	0.72	80%	3 - 5
Bank Readiness to Implement Green Finance Products	3.9	1.04	88%	2 - 5

Explanation of the table:

- **Mean**: The average value reflects the level of agreement among banks on each factor. For example, "Policy and Legal Framework" has a mean of 4.2, indicating that most banks believe the legal framework strongly supports green finance.
- **Standard Deviation**: This measures the dispersion of data. The factor "Opportunities from International Organizations" has a small standard deviation (0.72), suggesting high consistency among banks on this perception.
- **% Agreement**: This indicates the percentage of banks that agree with each factor, evaluating the importance of each factor for green finance.
- **Min - Max**: The range of responses, from the lowest to the highest.

4. Hypothesis Testing:

We will use hypothesis testing to identify the factors with the most significant influence on the development of green finance at banks. A linear regression model will be applied, with independent variables including legal frameworks, bank awareness, and the demand for green finance from enterprises.

Linear Regression Model: To analyze the influence of these factors, the linear regression model is as follows: $Y = \beta0 + \beta1X1 + \beta2X2 + \beta3X3 + \epsilon$

Where:

- Y: The dependent variable (development of green finance at banks)
- X1, X2, X3: The independent variables (legal framework, bank awareness, green finance demand)
- $\beta0$, $\beta1$, $\beta2$, $\beta3$: Regression coefficients
- ϵ: Random error

The regression results will be analyzed using t-tests and F-tests to assess the model's goodness-of-fit.

Table 2: Regression Test Results on the Factors Affecting Green Finance

Factor	Regression Coefficient (β)	p- value	Explanation
Policy and Legal Framework	0.35	0.02	Strong and significant impact
Bank Awareness	0.28	0.04	Strong and significant impact
Green Finance Demand from Enterprises	0.22	0.08	Significant but weak impact

Opportunities from International Organizations	0.15	0.15	Minor impact, not statistically significant

Explanation of Results:

- **Policy and Legal Framework**: With a regression coefficient of 0.35 and a p- value of 0.02, this factor has a strong and statistically significant impact, proving that policy and legal frameworks are the most important factors affecting the development of green finance in banks.
- **Bank Awareness**: A regression coefficient of 0.28 and a p-value of 0.04 indicates that bank awareness of green finance significantly affects the implementation of green finance products.
- **Green Finance Demand from Enterprises**: With a regression coefficient of 0.22 and a p-value of 0.08, the relationship is weaker and not statistically significant.
- **Opportunities from International Organizations**: Although valued highly, the regression coefficient of 0.15 and p-value of 0.15 show that this factor has little influence and is not statistically significant.

3.3.2.Qualitative Analysis

In addition to quantitative analysis, we will also apply qualitative analysis to assess the factors affecting green finance from the subjective perspectives of stakeholders such as banks, businesses, and financial organizations. The qualitative methods used include:

1. **In-depth Interviews**:

Bank executives, financial experts, and business managers will be interviewed to gain insights into the challenges and opportunities of implementing green finance in Vietnam.

2. **Focus Group Discussions**:

Focus groups will be organized to discuss green finance-related issues. Experts from the fields of finance, environment, and banking will participate to provide detailed analysis and insights.

3. **SWOT Analysis**:

SWOT analysis will help us assess the strengths, weaknesses, opportunities, and threats in the development of green finance at banks. The results from interviews and focus groups will be used to construct a SWOT analysis.

Here is part of the SWOT analysis table for green finance at Vietnamese banks:

Table 3: SWOT Analysis of Green Finance at Vietnamese Banks

Factor	Strengths	Weaknesses	Opportunities	Threats
Banks	- Increasing awareness of green finance	- Lack of experience in implementing green finance products	- Opportunities from international funding sources	- High initial investment cost for green finance products
	- Strong legal support policies	- Inconsistencies in banking policies across regions	- Supportive policies and regulations from the government	- Difficulty measuring and assessing the effectiveness of green finance

	- Actively seeking green finance opportunities from enterprises	- Lack of specialized human resources in green finance	- Growing demand for green finance in the business community	- Barriers in awareness among certain customer groups
Businesses	- Growing demand for green finance	- Insufficient understanding of green financial products	- Opportunities for collaboration with banks to develop	- Limited financial resources to
			suitable green products	access green finance products
	- Large enterprises have access to international green funding	- Lack of long-term green finance strategy	- Collaboration with international organizations in implementing green products	- Small businesses are not yet fully engaged with green finance

Explanation of SWOT Analysis:

- **Strengths**: Vietnamese banks are increasingly aware of the importance of green finance, with strong policy support from the government and international organizations. Many banks are actively seeking opportunities to develop green financial products that meet the needs of businesses.
- **Weaknesses**: Despite progress, banks still lack experience in implementing green financial products and face challenges in measuring the effectiveness of these products. Inconsistencies in policies between banks create barriers to green finance development.
- **Opportunities**: Collaboration with international organizations and participation in international funding programs offer significant opportunities for banks to develop green finance products. Government policies also provide favorable conditions for the development of green finance.
- **Threats**: The development of green finance faces significant threats, such as high initial investment costs, lack of specialized human resources, and barriers in customer awareness, especially among small and medium-sized enterprises.

3.3.3. Conclusion on Data Analysis Methods

The combination of quantitative and qualitative data analysis methods provides a comprehensive understanding of the current situation and factors influencing the development of green finance at Vietnamese banks. Descriptive analysis and linear regression help identify the key factors affecting green finance, while SWOT analysis from interviews and focus groups offers insights into the challenges and opportunities in the implementation process.

Based on these analysis results, solutions and recommendations will be proposed to promote the development of green finance at banks, particularly focusing on improving policies, raising awareness, and enhancing the readiness of banks to implement green finance products.

4. Current Status of Green Finance in Vietnam

This section will analyze the current implementation of green finance in Vietnam,

covering factors such as policies, green financial products, the actual implementation within banks, and the challenges and opportunities for green finance in Vietnam.

4.1. Policy and Legal Framework for Green Finance in Vietnam

Green finance in Vietnam has started to gain attention in recent years, especially when the country committed to sustainable development goals in international forums such as COP21 and COP26. However, the legal framework and policies supporting green finance are still lacking in some areas:

- **National Policy and International Commitments**:

Vietnam has made strong commitments to sustainable development and responding to climate change. This has driven the creation of policies supporting green finance, such as issuing green bonds to raise resources for environmental protection projects. Vietnam has also joined the ASEAN Green Finance Initiative and developed national strategies for green development in sectors such as energy and transportation.

- **Legal Framework for Green Finance**:

Currently, the legal system for green finance in Vietnam is still under development. Legal documents related to green finance mainly focus on issuing green bonds and other sustainable financial instruments. However, the development of green financial products in commercial banks is not yet fully supported by specific regulations. Some policies are unclear and not synchronized among regulatory bodies.

4.2. Green Financial Products in Banks

Although green finance is a new topic in Vietnam, many large commercial banks have started to implement green financial products such as green credit and green bonds:

- **Green Credit**:

Several large commercial banks such as Vietcombank, BIDV, and Agribank have started offering green credit, focusing on funding projects that protect the environment, renewable energy, and pollution reduction. However, these green credit products are not yet widely implemented and have limited scale. Awareness of green credit among businesses and customers is still limited, leading to delays in accessing these products.

- **Green Bonds**:

Commercial banks have also begun participating in the green bond market, but the number of issuances remains small. Green bonds mainly focus on renewable energy projects, green transportation, and sustainable infrastructure. Despite the large potential for green bonds, the market still lacks clear standards and guidelines to ensure transparency and effectiveness of these products.

- **ESG Governance and Reporting**:

Some large banks have started applying environmental, social, and governance (ESG) criteria in their management strategies and credit activities. However, applying ESG standards still faces many challenges, including a lack of qualified personnel and reliable data to evaluate these factors.

4.3. Challenges in Implementing Green Finance

The implementation of green finance in Vietnam faces several major challenges:

- **Awareness and Readiness of Banks**:

Although large banks have begun implementing green finance products, most banks still lack a strong commitment to green finance due to high initial implementation costs and a lack of clear motivation. This leads to a lack of initiative and interest in developing green financial products.

- **Customer Accessibility and Requirements**:

Businesses and customers are not fully aware of the benefits of green finance. Access to green financial products is limited due to complex procedures and a lack of information about these products. Additionally, due to the high costs of green projects, many small and medium-sized enterprises (SMEs) cannot afford to access green finance.

- **Difficulty in Pricing and Assessing Environmental Impact**:

Assessing the environmental impact of green finance projects is difficult due to a lack of tools, standards, and complete data. Financial institutions and banks still face challenges in identifying projects that qualify as "green," which affects the widespread implementation of green financial products.

4.4. Opportunities and Prospects for Green Finance in Vietnam

Despite the challenges, there are many opportunities for green finance to develop in Vietnam in the future:

- **Government Policies and Support**:

The Vietnamese government is increasingly implementing stronger policies to promote green finance development, such as tax incentives for green projects, supporting businesses and banks in accessing international green capital. This creates a favorable environment for the growth of green financial products.

- **Green Market Potential**:

Vietnam has great potential for developing renewable energy and green industries. This will drive the demand for green financial products, particularly green credit and green bonds. Additionally, Vietnam's integration into international trade agreements will also create significant opportunities for banks to raise green capital from international financial organizations.

- **Growing Awareness and Interest from Businesses**:

A shift in awareness among businesses about the benefits of green finance will drive demand for green financial products. Businesses are beginning to recognize the importance of sustainable development in their long-term strategies, further promoting the use of green financial products like green credit and green bonds.

5. Solutions to Promote Green Finance in Vietnam

This section will propose solutions to promote the development of green finance in Vietnam. The solutions will focus on key areas such as improving the legal framework, developing green financial products, raising awareness, and enhancing international cooperation. Implementing these solutions will help Vietnam achieve its sustainable development goals and respond to climate change.

5.1. Improve the Legal Framework and Policies Supporting Green Finance

One of the key factors to promote green finance in Vietnam is improving the legal framework and supporting policies. Solutions may include:

- **Complete and Harmonize Legal Policies**:

The government needs to continue developing and refining legal documents related to green finance, including regulations on issuing green bonds, green credit, and other green financial products. This will provide banks and financial institutions with a clear legal basis to implement these products. At the same time, harmonizing policies between regulatory bodies such as the State Bank of Vietnam, Ministry of Finance, and environmental agencies will create a more favorable legal environment for the development of green finance.

- **Encourage and Support Banks in Implementing Green Finance**:

The government can create mechanisms to encourage commercial banks to develop green financial products by offering tax breaks, providing interest rate incentives for green projects, or financially supporting banks in developing green finance tools. These policies should be designed to stimulate bank participation while ensuring the sustainability of the financial system.

- **Create Mechanisms for Environmental Impact Assessment**:

Regulations on assessing the environmental impact of green finance projects need to be improved to ensure that projects genuinely deliver environmental benefits. The government can build a system of standards and indicators to evaluate the environmental impact of green financial products, helping banks and businesses easily identify and prove the sustainability of green projects.

5.2. Develop Green Financial Products at Banks

To promote green finance in Vietnam, banks need to actively research and develop green financial products while enhancing the implementation and promotion of these products to customers. Solutions include:

- **Expand Green Credit Products**:

Banks need to increase the provision of green credit products, particularly loans for businesses implementing environmental protection projects, renewable energy, and emission reduction. At the same time, banks need to improve lending procedures and reduce risks for green projects to help businesses easily access green finance.

- **Enhance Green Bond Issuance**:

Banks and financial institutions can increase the issuance of green bonds to raise capital for green projects, especially in renewable energy, environmental protection, and sustainable infrastructure. To do this, clear and transparent standards for green bonds need to be developed, helping investors easily assess and choose these products.

- **Develop Innovative Financial Instruments**:

Banks can develop innovative financial instruments, such as green funds or insurance products related to green finance, to attract investors and businesses. This will not only help grow green financial products but also make the green finance market in Vietnam more diverse and comprehensive.

5.3. Raise Awareness and Training on Green Finance

Another important factor is raising awareness about green finance within the business community, banks, and customers. Solutions include:

- **Increase Education and Training on Green Finance**:

Banks, financial organizations, and regulatory bodies should organize training programs, seminars, and educational campaigns to raise awareness about green finance among financial institutions and businesses. These programs will help banks understand green financial products, implementation methods, and the benefits they offer. Additionally, courses should be organized for investors to understand the potential and positive impact of green financial products.

- **Promote and Raise Customer Awareness**:

Banks should actively promote green financial products to customers, helping them understand the benefits of using these products in environmental protection and sustainable development. This can be achieved through marketing campaigns, communication activities, and community education events.

5.4. Strengthen International Cooperation and Mobilize Capital from International Financial Organizations

Vietnam can leverage international cooperation opportunities to promote the development of green finance through global initiatives and programs. Solutions may include:

- **Join Global Green Finance Initiatives**:

Vietnam should actively participate in global green finance initiatives such as the Asian Development Bank (ADB) or the World Bank (WB) to access funding from these organizations. These organizations can provide concessional loans or technical assistance to help Vietnam develop green finance.

- **Attract Investment from International Financial Organizations**:

Vietnam needs to create favorable mechanisms to attract investment from international financial organizations into green finance projects, including issuing international green bonds and attracting capital from international investors. This will help strengthen financial resources for sustainable development projects in Vietnam.

6. Conclusion

Green finance has become an important part of the global sustainable development strategy, particularly in the context of climate change and increasing environmental challenges. In Vietnam, although the green finance market is still in its early stages, significant progress has been made, with increasing attention from both the government, financial organizations, and businesses.

In this study, we have analyzed the current status of green finance in Vietnam, including legal policies, green financial products, and the challenges and opportunities for development. Vietnamese banks have started to implement green financial products such as green credit and green bonds, but there are still many issues to address in order to accelerate the growth of this sector. The lack of a comprehensive and synchronized legal framework, unclear standards for environmental impact assessment, and limited awareness among stakeholders are the main barriers.

However, green finance in Vietnam still has significant opportunities for future growth. The government is actively developing policies and legal frameworks to support green finance projects. Commercial banks have also recognized the potential of green finance and are making efforts to develop appropriate products. Solutions such as completing the legal framework, developing green credit products, raising community and business awareness, and promoting international cooperation will play a key role in boosting green finance in Vietnam.

To achieve the goal of sustainable green finance development, Vietnam needs to implement stronger financial policy reforms and increase the involvement of stakeholders. In particular, close cooperation between government agencies, financial organizations, businesses, and international communities is essential. Initiatives such as issuing green bonds, enhancing green finance education, and creating mechanisms to encourage banks to develop green products will help make green finance a key driver for sustainable economic development in Vietnam.

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PROMOTING TECHNOLOGY AND INNOVATION - A DRIVING FORCE FOR THE SUSTAINABLE DEVELOPMENT OF SMALL AND MEDIUM ENTERPRISES (SMEs) IN VIETNAM

Han Nhu Thien, Trinh Hong Vi

Abstract: The article analyzes the significant role of technology and innovation in promoting the sustainable development of small and medium enterprises (SMEs) in Vietnam. Technology helps businesses improve productivity, enhance product quality, and optimize management processes, while innovation creates sustainable value and enables enterprises to maintain a competitive edge. However, Vietnamese SMEs face challenges such as limited financial resources, lack of technological skills, and difficulties in accessing training opportunities. The government and support organizations have implemented policies to facilitate the application of technology and innovation for these enterprises. The article concludes that, with proper support and strategic development, SMEs can leverage technology and innovation to achieve sustainable growth and adapt to the global market.

Keywords: *SMEs, innovation, technology, sustainable development*

1. Introduction

In the context of Vietnam's rapidly transforming economy, small and medium enterprises (SMEs) play a critical role in driving the nation's economic development. However, for SMEs to survive and develop sustainably, they must confront various challenges, especially in how to effectively innovate and apply technology. Promoting technology and innovation is not only a factor that helps SMEs improve productivity and quality but also the key to maintaining competitiveness in the globalized economic environment.

Studies have shown that, in the era of Industry 4.0, technology is not just a support tool but a decisive factor in enhancing production efficiency, expanding markets, and improving management processes (Nguyen, 2020). In particular, innovation not only helps SMEs improve product quality but also increases their adaptability to the market, thereby creating sustainable value. However, barriers such as limited financial resources, difficulties in workforce training, and inconsistencies in support policies have affected the innovation process of SMEs.

Therefore, the question arises: How can SMEs in Vietnam maximize opportunities from technology and innovation to develop sustainably, overcome challenges, and adapt to market changes? This article will analyze the importance of technology and innovation in promoting the sustainable development of SMEs while proposing solutions to help these businesses successfully incorporate these factors into their development strategies.

2. Theoretical Framework

2.1. Concepts of Technology and Innovation in SMEs

Technology and innovation are two key factors that help small and medium-sized enterprises (SMEs) improve productivity, product and service quality, and enhance

competitiveness in the market. According to Schumpeter (1934), innovation is a critical element in driving economic development, especially in the business environment. He emphasized that innovation is not only about improving existing products but also about creating new products and production processes. Accordingly, innovation in SMEs can be demonstrated in three main forms: product innovation, process innovation, and organizational innovation. Innovation thus refers to the process of generating original ideas along with deeper commercialization and the adoption of new products, technologies, or significant improvements to existing products, services, or technologies. At this point, it is necessary to create a prototype or a model that enables the practical application of the new idea. "The final stage of innovation involves the industrial production of products demanded by the market and obtaining the anticipated profits from selling these products (or from selling the licenses for the corresponding patents)" (Bediy & Kolesnikov, 2011). This stage is called commercialization. Therefore, innovation is a multi-stage process, starting from the idea development of a product, service, or technology to its commercialization.

Additionally, according to Rogers (2003), innovation in businesses also depends on the acceptance and adoption of consumers and other businesses. For SMEs, applying technology and innovation requires not only reasonable strategies but also readiness and technological understanding from employees, leaders, and target markets.

2.2. The Role of Technology and Innovation in SMEs

Technology and innovation are crucial factors that enable SMEs to enhance their competitiveness and optimize production and business operations. Innovation plays an essential role in the sustainable development of SMEs, helping them improve adaptability and competitiveness in an ever-changing business environment. Innovation is not only about creativity in products but also includes innovations in production processes, business models, and market access strategies. According to Mazzucato (2013), innovation not only brings economic benefits but also helps businesses create new values to meet the increasingly high demands of the market. Particularly for SMEs, innovation enables them to overcome financial and resource constraints while improving their ability to meet customer demands in a constantly changing market. This creates new opportunities to increase value and build a sustainable brand.

Digital technology, in particular, can help SMEs overcome significant challenges related to financial and resource constraints. A World Bank (2018) study found that adopting IT and advanced management systems enables Vietnamese SMEs to improve production efficiency and reduce operational costs. Solutions like ERP (Enterprise Resource Planning), CRM (Customer Relationship Management), and other digital technologies have allowed SMEs to better manage activities such as resource management, production planning, and customer relations. An OECD (2017) report also highlighted that technology adoption not only boosts productivity growth but also contributes to sustainable transformation within businesses. Enterprises investing in digital technology are more likely to achieve higher profitability and greater long-term competitiveness. According to the Central Institute for Economic Management (2022), businesses that apply IT in management are 30% more efficient than those that do not. Using technology helps optimize operations, save time, and improve labor productivity, enabling SMEs to sustain long-term growth.

A study by Tran Minh Hoa and colleagues (2020) found that Vietnamese SMEs

adopting technology and innovation could improve operational efficiency and minimize negative environmental impacts, thereby achieving sustainable development. Specifically, the study showed that SMEs could save up to 20% of production costs by applying new technologies and improving production processes.

3. Defining Small and Medium Enterprises (SMEs)

SMEs are among the most critical drivers of economic growth, fundamentally influencing the overall development of a nation's economy (Banyte et al., 2008). According to Decree 80/2021/ND-CP, effective from October 15, 2021 (replacing Decree 39/2018/ND-CP dated March 11, 2018), the criteria for defining SMEs are specifically outlined by industry sectors as follows:

Sector	**Agriculture, forestry, fisheries, industry, construction**		**Trade, services**	
Small enterprises	Number of employees participating in social insurance ≤100 people/year	Total revenue ≤50 billion VND/year or total capital ≤ 20 billion VND/year	Number of employees participating in social insurance ≤ 50 people/year	Total revenue ≤ 100 billion VND/year or total capital ≤50 billion VND/year
Medium enterprises	Number of employees participating in social insurance ≤200 people/year	Total revenue ≤ 200 billion VND/year or total capital ≤100 billion VND/year	Number of employees participating in social insurance ≤100 people/year	Total revenue ≤ 300 billion VND/year or total capital ≤100 billion VND/year

4. Challenges in Adopting Technology and Innovation in SMEs

Although technology and innovation offer numerous benefits, many small and medium enterprises (SMEs) in Vietnam face significant challenges in adopting new technological solutions. According to a World Bank report (2018), one of the major issues SMEs encounter is the lack of financial resources, skilled labor, and inadequate awareness of the benefits of technology. The International Finance Corporation (IFC) report (2019) highlights that only 30% of SMEs in Vietnam have sufficient financial capacity to invest in technology. Furthermore, a shortage of highly skilled workers is also a critical problem for SMEs.

In addition, SMEs often struggle to access and implement advanced technologies due to a lack of training and skill development support. A study by Tran Thi Huong (2018) revealed that more than 60% of SMEs in Vietnam lack the workforce capable of utilizing advanced technologies such as enterprise management software or automated production technologies. The shortage of skilled personnel with expertise in applying technology is one of the primary reasons many SMEs fail to effectively implement innovation. Moreover, the absence of supportive policies and limited connections with research and development (R&D) institutions further hinders SMEs in their innovation efforts.

Table 1. Key Challenges in Adopting Technology and Innovation in SMEs in Vietnam

Challenge	Percentage of SMEs Facing the Challenge (%)	Source
Lack of financial resources	70%	World Bank (2018), *"Challenges of SMEs in Adopting Technology"*.
Shortage of highly skilled workforce	60%	Tran Thi Huong (2018), *"Survey on Human Resources and Technology in SMEs"*.
Lack of awareness about the benefits of technology	50%	World Bank (2018), *"Challenges of SMEs in Adopting Technology"*.
Difficulty in accessing	55%	IFC (2019), *"Survey on SMEs' Financial Capability for Technology Investment"*.
Lack of supportive policies and R&D connections	65%	Tran Thi Huong (2018), *"Survey on Human Resources and Technology in SMEs"*.
Weak IT infrastructure	60%	IFC (2019), *"Survey on SMEs' Financial Capability for Technology Investment"*.

Source: Compiled by the author

5. Solutions to Promote Sustainable Development in SMEs

To foster the sustainable development of SMEs, several solutions must be actively implemented. First, it is essential to create a legal framework and supportive policies for adopting new technologies and encouraging innovation. Governments can implement financial support programs, tax reductions for businesses investing in research and development, as well as provide workforce training programs and consulting services on technology for SMEs. According to Tran Thi Huong (2018), these supportive policies help businesses alleviate financial burdens when investing in technology and innovation.

Second, it is necessary to promote collaboration between SMEs and research organizations, universities, and institutes to access advanced technologies and innovative solutions. This collaboration not only allows SMEs to tap into intellectual resources but also creates opportunities for them to learn and apply scientific and technological achievements in production and business. Promoting the use of shared, open, and cross-disciplinary data enhances the output efficiency of research and development activities. Encouraging the development of open science is also key.

Applying the Balanced Scorecard (BSC) in SMEs is a strategic solution to efficiently manage and evaluate critical factors for achieving strategic objectives. The Sustainable Balanced Scorecard (SBSC), developed by Chai (2009), provides a useful tool for building sustainable business performance evaluation systems. The model comprises four factors considered as performance measurement metrics. These are arranged in a specific order and influence each other upward according to pre-established plans.

Figure 1. Diagram of the Sustainable Balanced Scorecard Model

Source: Rabbani et al. (2014)

This is a strategic management model at its most basic level, guiding businesses throughout the process of establishing, implementing, monitoring, and measuring the results of their set strategies. In addition to financial factors, the model focuses on three other non-financial metrics that influence business performance: customers, internal processes, and learning & development. These aspects help balance short-term and long-term goals, financial and non-financial factors, input and output indicators, socially-oriented activities, and internal operations. The aspects of the model are closely interrelated and complement each other according to the cause-and-effect principle. This helps businesses explain the impact of various activities within the organization on achieving strategic goals and fostering sustainable development in an ever-changing business environment.

Finally, businesses must proactively connect with research and development (R&D) organizations to access advanced technologies and innovative solutions. This connection aims to raise awareness of the importance of technology and innovation. It can be achieved through training courses, workshops, and forums to share experiences on technology and innovation. These initiatives help SMEs better understand the long-term benefits of integrating technology into production and business processes.

6. Conclusion

Promoting technology adoption and innovation is a core factor in helping SMEs in Vietnam achieve sustainable development amid the context of globalization and intense competition. Despite facing many challenges in adopting technology and innovation, with efforts to improve their capacity for new technology adoption, SMEs can not only enhance production efficiency but also maintain competitiveness in the market. The

government, the business community, and research and development organizations must work closely together to create a favorable environment for technological and innovative development in SMEs.

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THE IMPACT OF FOREIGN DIRECT INVESTMENT ON SUSTAINABLE DEVELOPMENT IN ASEAN COUNTRIES

Nguyen Duc Huy

Abstract: Foreign Direct Investment (FDI) plays a significant role in stimulating economic growth, technology transfer, and improving living standards in host countries. While accompanied by benefits, FDI also brings challenges such as financial imbalances, economic inequality, and negative environmental impacts. The ASEAN region, with its strategic geographic location and abundant resources, has become an attractive destination for international investors, while concurrently facing sustainable development issues. This research analyzes the impact of FDI on sustainable development in ASEAN countries through a PVAR model, revealing both positive and negative effects, thereby proposing suitable policies for sustainable development.

Keywords: ASEAN, FDI, Sustainable Development

1. Introductions

Foreign direct investment (FDI) is a capital movement between developed countries to increase market share. Nowadays, FDI has shifted its focus towards emerging markets to produce products at lower costs and exploit natural resources. However, this comes with both costs and benefits for society and the economy, particularly regarding environmental issues. Therefore, the current focus is on the relationship between FDI, economic development, and environmental protection. Hoskisson et al. (2000) argued that low-income countries with rapid growth and economic liberalization as the main growth drivers have more fragile economies. This fragility is a significant barrier to sustainable development (Vovchenko et al., 2022). Therefore, developing countries can achieve sustainable development goals by mitigating risks in attracting foreign capital to serve the goal of economic growth while simultaneously controlling environmental issues.

In 2022, Southeast Asia witnessed a significant surge in FDI inflows, nine times higher than in the previous 20 years. As a regional hub for many investors, Singapore received more than half of the total inflows. However, since the COVID-19 pandemic, new green investment projects have experienced a severe decline and have yet to see any signs of improvement. According to the ASEAN Investment Report 2022, Vietnam and Indonesia attracted significant green FDI, amounting to approximately 232-242 billion USD, followed by Malaysia and Singapore with around 153-14 billion USD. FDI has made a substantial contribution to sustainable development in Southeast Asia. Many foreign enterprises have introduced significantly newer products and services than their domestic counterparts in most ASEAN countries, and this greater innovative capacity suggests the potential for knowledge and technology transfer to domestic firms.

In 2023, FDI inflows in ASEAN, as reported in the ASEAN Investment Report 2023, increased by 1.2% to 226.3 billion USD despite uneven distribution across member countries due to the impact of global monetary tightening. For instance, Singapore experienced a 13% increase to nearly 160 billion USD, while Vietnam saw a 3.4% growth to 18.5 billion USD. However, Indonesia, Malaysia, and Thailand recorded significant declines of 15% to 59% compared to the previous year, following the global downward trend in 2023 as economic activities slowed down in response to the tightening monetary

policy stance of many central banks. Southeast Asia is attracting an average of over 27 billion USD per year in FDI for renewable energy projects during 2020-2023, accounting for a quarter of the region's new FDI. Significant FDI inflows were directed towards the extraction and processing of essential minerals, renewable energy power generation, and sustainable manufacturing. Renewable energy supply chain-related projects accounted for 12 of the 20 most significant projects in the region during 2020-2023, with a concentration in Vietnam, Indonesia, and the Philippines.

It is evident that sustainable development has gained significant attention and attracted increasing FDI inflows each year. Given its attractiveness and the urgency of research on the impact of FDI on sustainable development, the author has chosen to conduct a study titled "THE IMPACT OF FDI ON SUSTAINABLE DEVELOPMENT IN ASEAN COUNTRIES."

2. Research overview

Endogenous growth theory (developed by economists such as Paul Romer, Robert Lucas, and Robert Barro) emphasizes explaining economic growth based on a country's internal factors. Unlike classical economic growth theories, this theory considers external factors like capital, labor, and natural resources. It emphasizes the role of technological innovation, investment in human capital, and the formation of efficient economic institutions. FDI can promote economic growth by enhancing endogenous factors such as technology transfer, improving management capabilities, creating jobs, boosting exports, and improving infrastructure. With the pollution halo hypothesis, Uche et al. (2023) suggest that FDI can improve environmental quality under certain conditions, such as when clean technologies are applied in specific areas. This implies that FDI can promote the adoption of higher environmental standards. FDI can help host countries optimize resource utilization and reduce emissions by providing developing countries with advanced technologies and production processes. This technology transfer can include providing energy-saving solutions while

applying environmentally friendly production processes, reducing pollution, and improving environmental efficiency.

However, to maximize the benefits of FDI, countries need appropriate policies to attract high-quality FDI and minimize negative impacts such as unfair competition with domestic enterprises, especially small and medium-sized enterprises. FDI enterprises may repatriate profits, reducing the host country's budget revenue and causing environmental pollution. Dominikus et al. (2023) support the pollution haven hypothesis and argue that foreign companies seek profits by pouring FDI into developing countries and taking advantage of lax environmental regulations, which can lead to more significant environmental damage.

Kreuger's (1991) Environmental Kuznets Curve (EKC) hypothesis suggests an inverted U-shaped relationship between environmental quality and per capita income. This is explained by the fact that as a country becomes more affluent, it has more resources to improve its technology, and polluting technologies are replaced by environmentally friendly ones (Galeotti & Lanza, 2005). However, at a certain threshold, income can lead to environmental degradation. Beckerman (1992) argues that environmental quality can be considered a standard or luxury good. The income elasticity of demand for environmental quality is greater than 0 or greater than 1. In this case, as income increases, individual environmental awareness improves, and subsequently, the demand for environmental quality

also increases. Increasing environmental quality leads to changes in the economic structure, shifting from dirty production to cleaner production and from weak to strict environmental regulations (Grossman and Kreuger, 1991 & 1995).

Yuan et al.'s (2022) study shows that the impact of FDI on environmental pollution is not uniform but depends on the mechanism of action. In some cases, FDI improves the environment through technology transfer. The most significant impact of FDI on the environment occurs in the early stages (two cycles) through economic scale and industrial structure. With technological improvements, the positive effect peaks around the 4th to sixth cycle. Similarly, Hoang Viet Nguyen and Thanh Tu Phan (2023) point out that FDI is an important driver through providing capital, technology transfer, and sustainable practices. However, the effectiveness depends on whether the investment is consistent with local development priorities and environmental standards.

3. Research methods

Building on the research of Yuan et al. (2022) and Hoang Viet Nguyen and Thanh Tu Phan (2023), our research team proposes a model to investigate the impact of foreign direct

investment on sustainable development in Southeast Asian countries. The specific model is as follows:

$$SDG_{i,t} = FDI_{i,t} + GDP_{i,t} + INF_{i,t} + UNE_{i,t} + COC_{i,t} + Ps_{i,t} + CO2_{i,t} + INTERNET_{i,t} + e_{i,t} \quad (1)$$

In this model, SDG is the dependent variable representing sustainable development. The total score of sustainable development indicators in ASEAN countries.

Independent variable: FDI is the independent variable representing foreign direct investment (FDI-net inflows), calculated as the net value of FDI inflows into a country after deducting FDI outflows, measured in US dollars.

Control variables: GDP growth, inflation, unemployment rate, political stability and absence of violence/terrorism, control of corruption, CO2 emissions, Human Development Index (HDI), and number of internet users. These variables are described in Table 1 as follows:

Table 1. Describe the variables

Variable Name	Expected Sign	Used by Authors
Dependent Variable		
SDG		Zainal, N., & Yi, A. K. J. (2023)
Independent Variable		
FDI	+/-	Yuan et al. (2022)
Control Variables		
GDP	+	Yuan et al. (2022); Lazreg, M., & Zouari, E. (2018)
INF	-	Lazreg, M., & Zouari, E.(2018)
UNE	-	Lazreg, M., & Zouari, E. (2018)
COC	+	Forson, J. A. (2024)
PS	+	Okara, A. (2023)

CO2	-	Guoyan, Khaskheli, Raza and Şah (2021); Ko, K. W. (2007)
INTERNET	+	Ko, K. W. (2007)

Source : Compiled by the author

Research data: SDG data was collected from the Sustainable Development Report for 2014-2023 in ASEAN countries. FDI, GDP, INF, UNE, COC, PS, CO2, and INTERNET data

were collected annually from 2014 to 2023 from the World Development Indicators (WDI) and The International Energy Agency (IEA).

Research method: Yuan et al. (2022) suggested using the Panel Vector Autoregression (PVAR) model as it can analyze the dynamic relationship between endogenous variables in panel data. The PVAR model was chosen to examine the dynamic mechanism of FDI's impact on the environment through economic scale, industrial structure, and production technology. The advantage of this model is its ability to handle individual and time effects and address the issue of individual heterogeneity in the data. Therefore, to suit the data of this study, which includes 10 ASEAN countries and 10 years, the author used the PVAR model to analyze the dynamic relationship between variables such as FDI, economic growth, and sustainable development. This model effectively handles panel data with many observations over a short period. It allows for assessing mechanisms such as economic scale, government structure, and the environment, ensuring more accurate results.

4. Research results and discussion

4.1 Unit root test

Table 2. Stationarity test results at the original level

Variable Name	Lin & Chu	Im, Pesaran	ADF	PP	Stationarity Test Result
SDG	0.0228	0.9864	0.8958	0.416	Non-stationary
HDI	0.0000	0.0869	0.1157	0.0001	Non-stationary
FDI	0.0009	0.0412	0.0134	0.0003	Stationary
GDP	0.0000	0.0075	0.0116	0.0011	Stationary
INF	0.0006	0.2508	0.0456	0.0251	Non-stationary
UNE	0.0000	0.0037	0.0051	0.0027	Stationary
COC	0.0000	0.0205	0.009	0.0608	Non-stationary
PS	0.0464	0.3227	0.1797	0.0025	Non-stationary
CO2	0.0000	0.0011	0.0027	0	Stationary
INTERNET	0.0143	0.8261	0.7144	0.1368	Non-stationary

Source: Author's calculation

The table above shows that the variables SDG, HDI, INFLATION, COC, PS, and INTERNET do not stop at the original string. The author uses first-order differences to make the variables stationary.

Table 3. Test results for stationarity at level 1

Variable Name	Lin & Chu	Im, Pesaran	ADF	PP	Stationarity Test Result
SDG	0.0000	0.0036	0.0024	0.0000	Stationary
HDI	0.0000	0.0000	0.0000	0.0000	Stationary

FDI	0.0000	0.0000	0.0000	0.0000	Stationary
GDP	0.0000	0.0000	0.0001	0.0003	Stationary
INF	0.0000	0.0000	0.0000	0.0000	Stationary
UNE	0.0000	0.0000	0.0000	0.0000	Stationary
COC	0.0000	0.0000	0.0000	0.0000	Stationary
PS	0.0000	0.0000	0.0000	0.0000	Stationary
CO2	0.0000	0.0000	0.0000	0.0000	Stationary
INTERNET	0.0000	0.0017	0.0007	0.0009	Stationary

Source: Author's calculation

After performing the first difference and retesting the stationarity of the variables, all variables satisfy the stationarity condition. Data meets the conditions to perform the following steps.

Table 4. Cointegration test results

	t-Statistic	Prob.
ADF	-2.35679	0.0092
Residual variance	1.47362	
HAC variance	0.44586	

Source: Author's calculation

With Prob's result of 0.0092, which is smaller than the 5% significance level, the variables in the model are cointegrated at the 5% significance level, meaning these variables have a long-run equilibrium relationship during the tested period.

Table 5. Hausman test

	Chi statistic	Prob.
Cross-section	7.856362	0.5763

Source: Author's calculation

Based on the above results table, we can draw the following conclusions: The Hausman test's p-value is 0.5763, more significant than the significance level of 0.05. Because the p-value is greater than the significance level, we cannot reject hypothesis H0 that the estimates from the two models (fixed effects and random effects) are not statistically different. Therefore, the author chose a random effects model.

Table 6. Granger causality test

	ValueProbability	
F-statistic	8.763744	0.0000
Chi-square	78.87639	0.0000

Source: Author's calculation

With the p-value of the test: Both the p-value of the F statistic and chi-square are equal to 0.0000, less than the significance level of 0.05. Since the p-value is very small, we reject hypothesis H0, meaning that at least one of the explanatory variables significantly influences the dependent variable. In other words, the Panel VAR model is statistically significant, meaning the explanatory variables can explain the change in the dependent variable.

Table 5. Estimated results

Variable	**Coefficient**	**Prob.**
C	0.57227	0
HDI	0.283023	0.015

FDI_NI	0.0002	0.8401
GDP_GROWTH	-0.000163	0.2004
INFLATION	-0.000377	0.4538
UNEMPLOYMENT_RATE	7.43E-05	0.9732
COC	0.000203	0.2804
PS	-0.000408	0.6453
CO2_EMISSIONS	0.015299	0.019
INTERNET	0.002587	0.1795

Source: Author's calculation

The selected model is a cross-sectional random effects model, assuming that individual effects are random and uncorrelated with the explanatory variables.

Using the PVAR model, this study analyzed the dynamic relationship between variables such as FDI, GDP growth, inflation, unemployment rate, government governance index, and environmental factors like CO2 emissions and internet usage. Results from the model show that FDI can promote sustainable development through technology transfer and job creation but can also have negative environmental impacts if not strictly controlled by environmental regulations. From the estimation results, the HDI and CO2 emissions positively and statistically significantly impact sustainable development. This indicates that investment in human capital and controlling CO2 emissions are important in improving the Sustainable Development Goals (SDG) index. Besides, the PVAR model also shows that not all independent variables strongly impact sustainable development. Factors such as GDP, unemployment rate, inflation, government governance index, and internet usage have little effect on SDG in this model, possibly due to complex relationships or indirect impacts of these factors.

The research results are similar to those of Uche et al. (2023) when analyzing the relationship between foreign direct investment (FDI) and CO2 emissions, showing that FDI can negatively impact the environment, primarily when investment projects are related to high- emission industries such as mining and manufacturing. However, this impact is not uniform, and FDI in green industries can help reduce CO2 emissions when applying clean technologies. In addition, Dominikus Leonardo et al. (2023), on the impact of FDI on environmental degradation and sustainable development in developing countries, showed that FDI can lead to increased CO2 emissions, especially in countries with weak or underdeveloped environmental policies. The study also mentions the possibility of controlling the negative impacts of FDI through policy measures and clean technologies. FDI can contribute to sustainable development if adequately regulated. The study by Hoskisson et al. (2000) examined the role of FDI in promoting economic growth and development, emphasizing its impact on the Human Development Index (HDI) and the environment. The study highlights how FDI can lead to increased technology transfer, improved human capital, and higher living standards, promoting HDI. However, the environmental impact of FDI remains complex, with some sectors contributing to environmental degradation. The study emphasizes the importance of managing FDI to ensure that FDI supports both economic and environmental sustainability. The study by Yuan et al. (2022) shows the heterogeneous impact of FDI on the environment and sustainable development. It is also consistent with studies in CO2 emissions control and investment in clean technologies.

5. Conclusion

This study analyzes the impact of FDI on sustainable development in ASEAN countries, using a theoretical framework and synthesizing results from the PVAR model. The findings show that FDI plays a crucial role in promoting economic growth and technology transfer and enhancing the competitiveness of ASEAN countries. It can also improve the Human Development Index (HDI) through education, healthcare, and infrastructure investments.

However, besides the positive impacts, FDI also brings significant challenges to sustainable development, especially environmental pollution. As the research of Yuan et al. (2022) has shown, FDI can contribute to reducing environmental pollution when applying clean technologies and environmentally friendly production processes. However, in some cases, FDI can also lead to increased pollution when foreign enterprises exploit natural resources without paying attention to environmental standards, especially in countries with lax environmental policies.

Therefore, ASEAN countries must implement appropriate policies to attract high-quality FDI, especially investments in green technology and renewable energy, to maximize the benefits of FDI and protect the environment. These measures may include tax incentives for environmentally friendly projects and tightening regulations on emissions and resource use. In particular, ASEAN countries must focus on developing human resources, improving technological capacity, and enhancing infrastructure to create a solid foundation for sustainable development.

ASEAN countries can adjust their policies appropriately and strictly protect the environment, and FDI genuinely becomes a driving force for sustainable development. The combination of economic growth and environmental protection will help ASEAN countries achieve sustainable development goals and enhance their competitive position in the context of globalization and increasing climate change.

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POLICIES TO PROMOTE THE DIGITAL ECONOMY: INTERNATIONAL EXPERIENCES AND REFERENCE VALUE FOR VIETNAM

Dr. Vu Thi Phuong Le[1], Tran Duy Lam[2]

Abstract: This article analyzes policies to promote the development of the digital economy from typical countries worldwide, drawing lessons and providing reference value to Vietnam. The digital economy serves as a driving force for economic growth and opens up opportunities to improve competitiveness in an increasingly fierce global environment. The study emphasizes that clear policy setting, investment in information technology infrastructure development, encouragement of digital skills education, and increased private sector participation are key factors that determine the success of each country's digital economy development journey.

Keywords: Digital economy, policy, international experience.

1. Special Issues

The development of the digital economy is becoming a global trend that is considered one of the measures to evaluate the development of a country's economy, this process takes place over many years and even decades. The content of digital transformation of each country is different based on the geographical situation and characteristic socio-economic conditions, so the development of the digital economy will be associated with many different fields, depending on the approach and orientation of international organizations as well as countries. Each country can have its own strategies to exploit opportunities and respond to challenges in the digital economy.

2. Research content

2.1. Experience in developing the digital economy of countries around the world

Although there are different approaches, international organizations and countries often agree to focus on the main contents when it comes to digital economy development, including*: (1) Strengthening research, application and use of digital technology, and supporting the digital transformation process in economic sectors and sectors; (2) Ensure the necessary conditions for the development of the digital economy, including the completion and development of digital infrastructure, building digital human resources and developing data and information systems; (3) Reform and improve institutions as well as policies related to digital economy development* [6]. In particular, the most concerned issue is policies to promote the development of the current digital economy. Developed countries have gone through many turning points and policy changes to adapt and develop the digital economy, which can be a valuable reference value for Vietnam today.

The Singapore government approved the "Digital economy framework for action" in early 2021, with the goal of *"Leading and continuously innovating the digital economy*". Some of the main contents of Singapore's digital economy development action program include: (1) Acceleration: Strong digital transformation of industries and fields. Focus on

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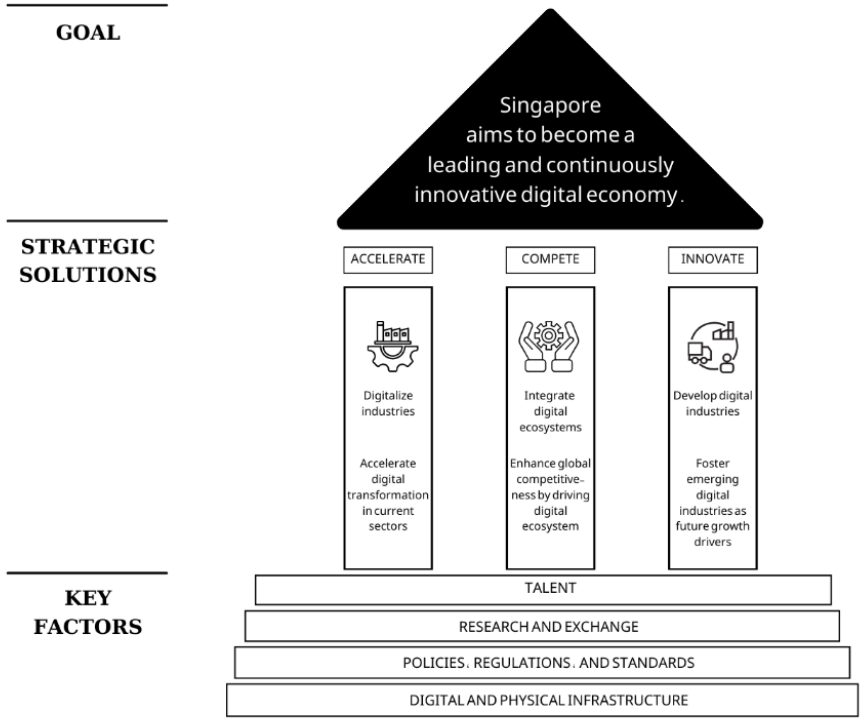
digital transformation of enterprises; especially small and medium-sized enterprises; (2) Competitiveness: Increasing national competitiveness with digital platforms (for a new integrated ecosystem focused on customer needs) capable of going global; (3) Innovation: Develop next-generation digital technology industries to create growth drivers and promote digital transformation of the industry [6].

Figure 1.1. Singapore's Digital Economy Action Framework

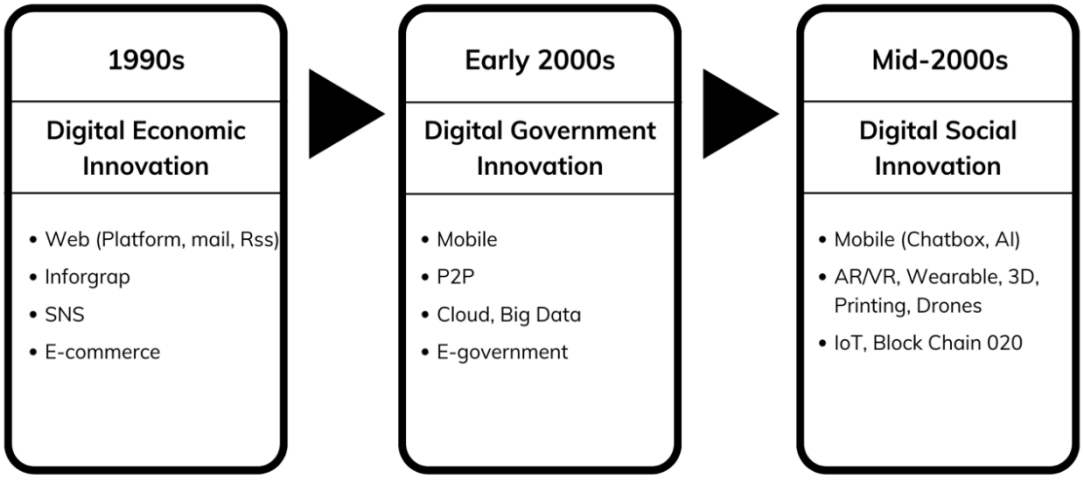


Source: Singapore: Digital Economy Framework for Action, https:// www.imda.gov.sg/-/media/files/SG-Digital/SGD-framework-for-Action.pdf.

To implement solutions to promote the digital economy, the Singapore Government has focused on developing based on four foundations: (1) Human resources: Continuous training, digital retraining and development of the digital human force; (2) Research and innovation: supporting enterprises in creating and leveraging intellectual property to enhance competitiveness and capitalize on the scientific community's potential; (3) Policies, regulations and standards: ensuring a competitive legal environment and digital economy policies; (4) Digital and physical infrastructure: maintaining connected networks, platforms, data systems, and other digital infrastructures to support the digital economy. These efforts have led to achievements that position Singapore as one of the leading digital economy centers in Asia and the world.

Korea is one of the pioneering countries in developing a modern economy, starting in the 1990s, marking the beginning of successes in the field of technology with the goal of modernization towards technology 4.0. To promote the digital economy, in addition to building an e-government to facilitate business activities, the Korean Government focuses on implementing policies in key areas such as technology infrastructure, innovation in businesses, e-commerce, cybersecurity, and e-entertainment.

Figure 1.2. The emergence process of innovation through digital transformation in Korea



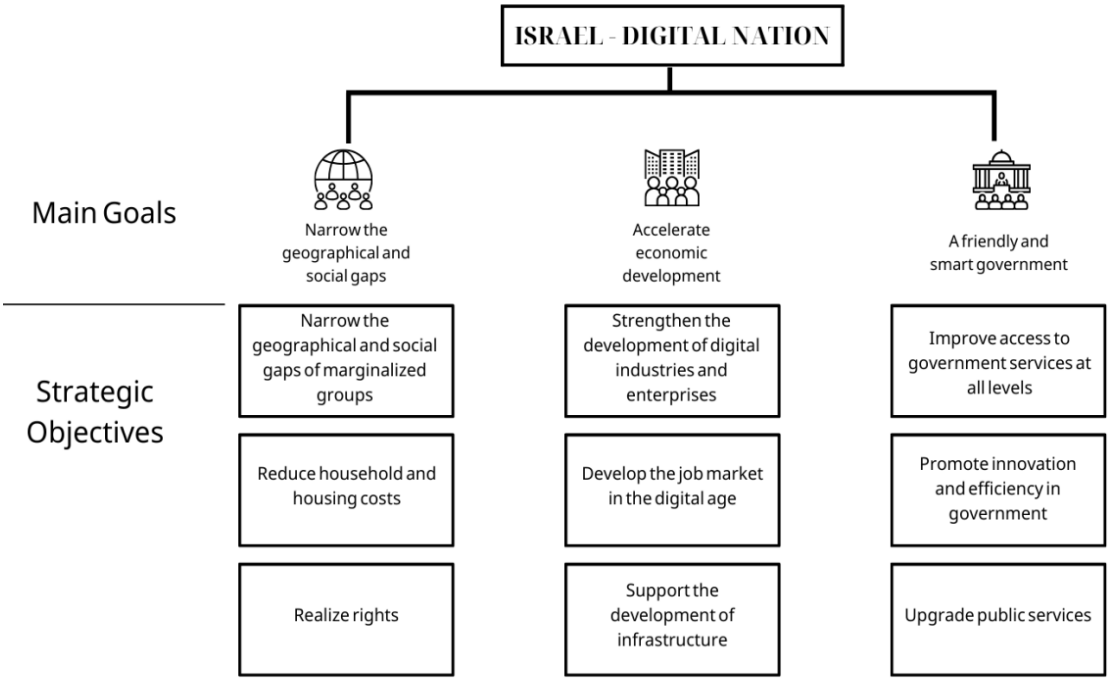
Source: Ministry of the Interior and Safety: All that Digital Gov. Korea,2021 [6].

The Korean government has made significant decisions to address issues arising in the digital economy, including regulating "virtual currency" activities through fair and transparent taxation policies—an area where many developing countries still lack specific guidelines. In addition, the Korean government has built a government system to serve businesses, including a one-stop service portal dedicated to businesses, nationwide trade centers (u-Trade Hubs), e-customs services and centralized business support services. The G2B (Government to Business) model is a form of non-commercial online interaction between the Government (including local and central governments) and businesses. In this form, government agencies provide information about laws, regulations, policies, as well as online public administrative services for businesses.

Recognizing the importance of digital transformation, the Government of Israel has proactively pursued this agenda since 2013. The "Digital Israel Initiative" was identified as one of six strategic priorities in the Socio-Economic Assessment Report of the National Economic Council and formalized through Resolution No. 1046. This is the foundation for implementing the national policy on information technology application. In 2015, the Government of Israel officially approved the Digital National Program, marking an important step forward in this journey.

In the context of the digital economy, the Israeli government has set a general goal of *"Accelerating the growth rate of the digital economy"*. Israel's digital economy development policy focuses on specific areas including: Promoting digital businesses and industries; Developing the labor market in the digital age; Supporting infrastructure development; Promote a favorable environment for the development of digital technology - digital economy, invest in education, establish research centers and institutes; Promoting businesses to become digital enterprises; Strengthen and encourage the use of digital technology and e-commerce platforms.

Figure 1.3. Objectives of the Israel National Digital Program



Source: Digital Transformation - International Experience and Roadmap for Vietnam: Monograph, Bui Quang Tuan, Ha Huy Ngoc, p170, National Political Truth Publishing House, 2023 [9].

The Israeli government has achieved many impressive achievements in the field of digital economy, standing out as the world's leading startup center, especially in information technology and software. The country has a strong startup ecosystem thanks to support from the government and investment funds, along with significant investment in research and development (R&D). In addition, Israel also focuses on STEM education to improve the skills of the younger generation and actively participates in international cooperation initiatives. These factors have contributed to making Israel a symbol of innovation and technology on a global level.

The digital transformation process in Thailand is prioritized by the Government and the Thailand Digital Economy and Society Development Plan is formed based on the advanced standards of the European Union (EU). United States, and the Asia-Pacific Economic Cooperation (APEC) Forum. Identified as a policy of strategic importance for the sustainable development of the Thai economy, this plan is directly led by the Deputy Prime Minister. According to the national digital economy master plan, Thailand has identified 5 pillars to focus on investment and development, including: (1) Hard infrastructure; (2) Digital service infrastructure; (3) Soft infrastructure; (4) Accelerating the digital economy through the development of a digital ecosystem that supports small and medium-sized enterprises, startups, e-commerce and innovation; (5) Digital social knowledge. The Thai government has been actively overcoming problems related to procedures and processes, which are obstacles to the competitiveness of businesses.

In addition, the Government has deployed electronic channels to modernize this process, including the construction of an integrated business licensing system, such as the

"Biz Portal" business portal. This system makes it easy for businesses to take steps such as business registration, personnel declaration, application for permits and insurance, as well as registration of construction permits and requirements for electricity and water connections. At the same time, the Thai government also provides a one-stop service platform, data linkage for exporters and importers to reduce the cost and time of transactions in international trade, thereby supporting farmers to improve their access and search for markets.

2.2. Reference value for Vietnam

The vast majority of countries around the world, including developed and developing countries, see the development of the digital economy as an important step forward and an economic model of the future. They have come up with many solutions to transform to the digital economy. However, each country has its own characteristics and advantages, leading to the application of different mechanisms, policies and measures to develop the digital economy. In summary, Vietnam can refer to some of the following key values:

First increasing awareness for subjects, including cadres, civil servants, businesses and people, about the digital economy is necessary, especially about the potential, contributions, benefits and challenges that the digital economy brings. This is to create unity and consensus in the process of economic development.

Monday countries are actively building and perfecting institutions, laws, as well as policies to create a framework for the development of the digital economy. A common feature of countries is the establishment of specialized agencies and institutions with high authority and responsibility in developing the digital economy. This agency usually belongs to the Government, coordinating with relevant ministries and branches. Some countries have also set up specialized agencies in sectors and localities to promote digital transformation and digital economy development in specific regions.

Countries also focus on developing standardized policies and standardizing production processes to strengthen connectivity and interconnection. Most governments in countries have issued laws and policies on cyber security and information security, which serve as a basis for establishing standards for information exchange between parties, and at the same time ensuring the security of data of organizations, individuals and businesses in the digital economy.

In addition, to establish a legal framework for new technologies, new business models and methods in the digital economy, many countries have built a controlled test management mechanism (Sandbox). The legal framework of the Sandbox needs to be clearly defined in terms of space and time, and there are specific regulations in case of unsuccessful testing to limit legal risks for businesses.

Tuesday Countries have identified key industries and fields to develop the digital economy based on their own strengths and characteristics. They also fully identify areas of the digital economy that have a positive impact on market expansion and consumption promotion, including digital information, digital communication, digital entertainment, and e-commerce. In addition, basic fields such as digital infrastructure, digital resources, digital services and digital markets are also focused. In addition, countries identified important and core areas that need to develop and master technologies and techniques, such as digital data, smart materials, next-generation robots, artificial intelligence, smart vehicles, and smart energy. These factors will help build reasonable policy solutions for the development of the digital economy.

Wednesday To support entities and businesses in the economy to access the digital economy, some countries have developed specific plans and guidelines on digital transformation for businesses. These plans are often associated with financial resources and annual budgets to facilitate businesses in accessing the digital economy. At the same time, countries have also established consulting and support centers for businesses in the digital transformation process, such as the Center for Enterprise Support for Industry 4.0, the Center for Industrial Transformation, and the Center for Smart Factory Construction.

Thursday countries are focused on solving problems arising from the development of the digital economy. Developed countries have clearly identified occupations at risk of being "killed", new occupations will emerge, and workers can be replaced by robots and artificial intelligence. At the same time, countries also strive to protect the rights of consumers in the digital environment, as well as ensure cyber security and information security. In addition, it is necessary to pay attention to the handling of contradictions and conflicts between traditional business models and emerging models. From there, countries can propose appropriate solutions and policies.

Friday countries are focusing on developing human resources and infrastructure for the digital economy, with the goal of focusing on developing and attracting digital technology experts as well as digital businesses. In addition, it is necessary to apply many innovative measures in education and training to retrain the workforce, helping them keep up with digital technology trends. These measures include: updating digital skills for cadres, civil servants and managers; supplementing and updating the curriculum on digital technology and digital skills in the education system; promote the linkage between schools and businesses in practicing the application of digital technology; and transform the training model in the direction of "Learn, learn more, learn forever", with a focus on flexibility, practical learning and lifelong learning, with practice as the focus. To develop digital infrastructure, in addition to investment from the State, many countries have also implemented policies to attract investment capital from the private sector. Moreover, in efforts to develop digital infrastructure, countries also focus on investing in modern infrastructure such as 5G networks so as not to be outdated compared to global trends.

2.3. Some recommendations for the development of the digital economy for Vietnam today

Firstly, to deeply grasp the Party's viewpoint and the State's policies, in order to raise society's awareness of the meaning and importance of digital transformation as well as the development of the digital *economy*

Party committees at all levels, leaders of state agencies, as well as organizations in the political system at all levels and branches, especially the heads, need to fully and deeply understand the Party's guidelines and views, along with the State's laws and policies on digital transformation and digital economy development. In addition, it is also necessary to actively and actively participate in the fourth industrial revolution. This is a great opportunity but also a challenge for the country. If we make good use of this opportunity, we can shorten the development gap with advanced countries in the world. On the contrary, if the opportunity is not taken advantage of, the risk of lagging behind in the level of economic development will be great, which may threaten the political, economic and social stability of the country, as well as the prestige of the Party and Vietnam in the international community.

The transformation of awareness into action is necessary; Therefore, it is necessary

to proactively and actively develop and implement digital transformation and digital economy development programs and plans in the sectors, fields and localities under their charge. Leaders of the Fatherland Front and socio-political organizations need to closely supervise the implementation, as well as propagate and mobilize people to actively participate in this process, considering this as one of the focuses of their activities. Press and media agencies should also strengthen propaganda about digital transformation and digital economy development, as well as their significance and importance to the country's development.

Secondly, focus on building and perfecting institutions for digital economy development

Closely follow the practical situation and promptly study and adjust mechanisms and policies, creating a favorable legal framework for the development of the digital economy. For new business models, methods and products of the digital economy, it is necessary to pilot a number of mechanisms and policies within a certain scope and time (Sandbox mechanism), not prohibiting just because things have not been managed or how to manage them well.

To study and amend and supplement the contents of the Law on Information Technology (2006, amended 2017), the Law on Public Investment (2019, amended 2022), the Law on the State Budget (2015, amended 2020) in order to encourage investment in research and application of technology, strongly develop the information and communication technology industry, contributing to the development of digital infrastructure, digital platforms, digital services, promoting digital transformation and encouraging innovative start-up activities in the field of digital technology.

Improve institutions to encourage all economic sectors to invest in the development of digital infrastructure, including connectivity infrastructure systems (fiber optic cables, internet, 4G and 5G networks), digital databases in sectors and for the whole country; infrastructure system to ensure cyber safety and security; training and fostering human resources for the digital economy. Improve preferential policies, support and encourage digital transformation in economic fields, develop new fields and business models based on digital technology. It is necessary to clarify the relationship, rights, obligations and responsibilities between companies providing technology platforms and businesses operating on that platform. This will create a basis for management, dispute resolution and tax collection activities from these entities, such as the relationship between Grab, GoJet, Fastgo, Bee, etc. with taxi companies using the technology provided by them, and between corporations such as Google, Facebook, Tiktok and digital content creators on their platforms.

It is necessary to improve institutions to protect intellectual property rights and intellectual assets created by Vietnam, thereby creating a driving force for innovation; encourage the commercialization and transfer of intellectual property in a reasonable and effective manner, and prevent and strictly handle violations. Improve the institution to protect the interests of consumers in the digital economy, such as the interests of online shoppers in terms of goods quality and delivery time, users of online ride-hailing services or online hotel reservations in terms of service quality.

Develop and improve institutions, laws, policies, processes and standards related to database construction, data governance, data access, exploitation, use and sharing; ensuring cyber safety and security, protecting personal information and personal secrets;

and at the same time create a legal basis for digital identification and national electronic authentication.

Third, comprehensively develop digital infrastructure

Building digital infrastructure is an important first step, creating a foundation for the formation, operation and development of the digital economy. In addition, regularly upgrading and improving digital infrastructure is essential to meet the needs of connecting, transmitting, storing and processing more and more information from the developing digital economy, along with the growth of digital government and digital society. Based on the strategy and goals for the development of the digital economy, digital government and digital society by 2025, it is necessary to review, supplement and complete the planning and plan for the development of digital infrastructure. It is necessary to accelerate the development and upgrading of fiber optic networks and broadband internet, and complete the transition from IPv4 to IPv6 on a national scale, starting from major cities, economic centers, industrial parks and high-tech parks, then expand to all localities, agencies, units and residential areas, connecting with the region and the world.

It is necessary to develop an Internet of Things network, integrated with essential infrastructure systems such as transportation, electricity and water, especially in large cities, in order to create a common digital infrastructure system serving all sectors and fields. In addition, it is necessary to promote the synchronous construction of the national database system, regional data centers and specialized databases, ensuring synchronous and unified connection to form a complete and reliable data system for the whole country. In particular, it is necessary to prioritize investment in databases on population, land, finance, business and health.

It is necessary to standardize the process of processing documents in the cyber environment, including sending and receiving documents between state management agencies, socio-political organizations, enterprises and non-business units; at the same time, digitize records and archives to develop digital databases. In addition, it is necessary to promote research and mastery of modern technologies such as cloud computing, artificial intelligence, blockchain, and virtual reality/augmented reality, in order to apply them at Party and State agencies, large enterprises and non-business units. This will help process information and exploit databases to support leadership, management and production and business activities.

It is necessary to attract social resources to invest in the form of public-private cooperation to build cloud computing centers and apply strong artificial intelligence technology for information analysis and data processing. The State needs to promulgate standards and regulations on information safety and security for all digital infrastructure construction and upgrading projects, as well as safety standards for technological devices, ensuring the inspection and issuance of certification stamps for each device before being installed and connected to the network.

It is necessary to develop a set of criteria to assess the level of cyber safety and security in Vietnam, especially for important networks. Organizations and businesses that provide and operate digital infrastructure need to commit to implementing safety and security measures, including the ability to automatically detect and prevent cyberattacks. State management agencies also need to carry out periodic inspections and assessments to ensure compliance with these standards. The state should invest in a risk monitoring

and warning system, helping to detect cyber attacks early, and coordinate and respond to cyber security incidents to protect national cyber safety. It is necessary to build cyber incident emergency response centers at all levels, sectors and enterprises, as well as establish support centers for small and medium-sized enterprises in handling information security incidents.

Strengthen propaganda and education to raise awareness of security and safety protection, law compliance, cultural behavior, and preservation of moral values in the community. At the same time, it is necessary to develop codes of conduct and communication culture in cyberspace, applicable to all classes of people and all subjects participating in online activities.

Fourth, synchronous *development of science and technology*

In order to promote the restructuring of public scientific and technological research organizations, the State needs to focus on modernizing facilities, improving the capacity of national science and technology centers as well as a number of key research centers in developed economic sectors. At the same time, it is necessary to encourage the establishment and development of non-State science and technology organizations, especially in large foreign enterprises such as NVIDIA, Google, etc.

It is necessary to strengthen cooperation and linkages between scientific and technological research institutions and universities and enterprises, and at the same time connect research, training and production and business. Both basic research and applied research need to be focused, with the goal of absorbing and mastering advanced technology from the world. In particular, priority will be given to research and application of high and core technologies for the development of digital technology and digital economy, as well as typical technologies in the Fourth Industrial Revolution such as nanotechnology, new materials, 3D printing technology, etc new energy and clean energy.

It is necessary to drastically renew the management mechanism of scientific and technological activities. It is necessary to increase investment from the State and promote the public-private cooperation model, and reform the formulation of science and technology development strategies and plans to solve major problems and achieve the country's development goals. To expand the mechanism of the State to place orders and bid for scientific and technological tasks, accompanied by advice, evaluation and criticism from independent scientific and technological organizations on the quality of final products.

Develop a national innovation system with business as the center, while universities and scientific institutes serve as strong research subjects. It is necessary to promote an innovative start-up ecosystem, especially in economic, scientific and technological centers such as Hanoi, Ho Chi Minh City and Da Nang. Breakthrough mechanisms and policies also need to be applied to create strong developments in the process of digital transformation and digital economy development. contributing to the creation of new business models, products and services based on digital technology.

It is necessary to improve the quality of scientific and technological information activities, build a national database system on science and technology, as well as improve institutions to develop organizations for consultancy, appraisal and evaluation of scientific and technological products, in order to promote the development of the market for these products.

Training, fostering and developing human resources in science and technology at home and abroad, especially highly qualified experts, is essential to meet the country's development requirements. Policies are needed to attract, remunerate and promote the talents of Vietnamese scientists and experts working abroad as well as good experts from abroad.

Finally, it is very important to expand and strengthen international cooperation in science and technology, thereby cooperating in training, research and technology transfer with countries, science and technology organizations, as well as large enterprises around the globe to improve the country's scientific and technological level and potential.

Fifth, develop and improve the quality of human resources, implement digital transformation, promote digital *economic development, build a digital government and form a digital society*

It is necessary to innovate the content and curriculum of education and training in the direction of developing capacity, creative thinking, and the ability to adapt to rapid changes in technology. The general education program needs to integrate knowledge and skills related to digital technology, safety and cybersecurity, along with a culture of behavior in cyberspace, suitable for each group of students. Universities and colleges need to add training content on information technology and digital technology to the curriculum. Universities specializing in science and technology should become centers for research and training of highly qualified experts in core technologies in the field of digital technology and information technology. At the same time, it is necessary to implement programs to improve leadership skills and manage digital transformation, develop the digital economy for cadres, civil servants and public employees in the political system as well as business managers.

It is necessary to innovate teaching and learning methods, along with education management based on the application of digital technology. The integration of technology into the management of all school activities and the education and training system is very important, from the management of staff, teachers, students, students to teaching, learning, scientific research and financial management, facilities. Digitizing textbooks and documents, building databases and knowledge resources for teaching and learning; develop a technology platform for remote teaching and learning, online exams and tests. At the same time, it is necessary to encourage new educational models based on digital technology, such as educational models that integrate science, technology, engineering, business and English (STEM, STEAM, etc.).

Sixth, synchronous *development of the digital economy in all sectors and fields*

To focus on and prioritize the development of information technology, electronics and telecommunications industries for the production of digital technology machinery and equipment (hardware), the construction of digital platforms and digital services (software), and the development of digital infrastructure. It is necessary to ensure cyber security and safety, create a foundation for promoting digital transformation and developing the digital economy in the entire economy. At the same time, promote digital transformation and develop the digital economy in traditional industries, production of means of production and consumption in order to transform into smart industries. Improving the digital transformation process and developing the digital economy in the agricultural sector, towards the development of large-scale production agriculture, high-tech and smart application, and environmentally friendly. Paying special attention to and

focusing on the development of the digital economy in the fields of health and education because this is one of the two fields that directly affect people's livelihoods.

Seventh, promote digital transformation in Party agencies, the State and organizations in the political system

Amending, supplementing and perfecting institutions, regulations and operating regulations of agencies and organizations in the political system to suit the new mode of operation on the digital technology platform. Build a digital infrastructure system to connect Party organizations, state agencies and organizations in the political system from the central to local levels, and at the same time ensure security and safety for these networks.

Establish a database for each system, including: database on Party organization and Party members; the work of building the Party related to politics, ideology, organization of cadres, inspection and enforcement of discipline of the Party, as well as the people's mobilization work through the periods; a database on the organization and contingent of cadres, civil servants and public employees at state agencies and public non-business units, as well as the activities of the state apparatus through historical periods; and a database on the organization and activities of other organizations in the political system.

Apply cloud computing technology and artificial intelligence to exploit and process data, serving the work of Party building, State development and reform of organizations in the political system.

3. Conclusion

The digital economy has now become an important trend and one of the criteria for evaluating the strength of the national economy. For Vietnam, it is necessary to strengthen international cooperation and actively participate in international and regional cooperation efforts, mechanisms and initiatives. At the same time, develop a mechanism for policy coordination with countries both at the bilateral and multilateral levels in fields related to digital economy development, as well as solve problems arising from this process. In particular, it is necessary to focus on developing the fundamental areas of the digital economy such as digital infrastructure, digital resources, digital services and digital markets. Vietnam also needs to have specific plans and strategies to access and master the core technologies of the digital economy through multilateral support and cooperation policies.

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IMPACT OF ICT ON ENVIRONMENTAL QUALITY: CASE STUDIES IN DEVELOPING COUNTRIES IN 2002-2021

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Abstract: Along with the strong development of the digital economy, nowadays, many scientists are interested in the impact of ICT on environmental quality. This study also aims to examine the impact of ICT on environmental quality. The study used FGLS regression model with data collected from 25 developing countries from 2002-2021. The research results highlight a positive correlation between ICT and CO2 emissions. Specifically, the finding shows that a 1% increase in internet penetration could increase CO2 emissions by 0.0018%. Moreover, the study also shows the positive effect of GDP, energy consumption and financial development on CO2 emissions. Based on the research results, the study proposed some recommendations and solutions for increasing the environmental quality in developing countries.

Keywords: *ICT, environment quality, CO2 emission*

1. Introduction

Balancing economic growth and environmental quality is a complex and ever-present issue of global concern. In the process of industrialization and modernization, many countries have achieved significant economic achievements. However, economic growth has negatively impacted the environment, causing many serious consequences. Environmental quality in developing countries remains a significant problem due to rapid urbanization, industrialization and population growth. One of the most serious problems is air pollution, with developing countries facing dangerous levels of fine particulate matter (PM2.5), leading to millions of premature deaths. According to the "State of Global Air 2024" report, air pollution caused more than 8 million deaths globally in 2021, with the majority of deaths occurring in low-income countries. Children under the age of five are particularly vulnerable, with more than 700,000 deaths linked to air pollution each year. Water quality in many developing countries in Asia is also a major issue by 2024. Pollution, water shortages, and the impacts of climate change are adding to the challenges.

Nowadays, the development of the digital economy is expected to help reduce the negative impact on the environment. Therefore, there have been many empirical studies on the impact of ICT on the quality of the environment. However, in reality, the digital economy not only brings opportunities but also comes with many environmental challenges. Specifically, according to researchers, the actual global greenhouse gas emissions rate of the information technology (ICT) industry could be around 2.1-3.9%. Although there is some error, these figures show that the ICT industry has larger emissions than the aviation industry, which accounts for about 2% of total global emissions. In addition, the study also warns that new trends in information technology and ICT, such as big data, artificial intelligence (AI), the Internet of Things (IoT), as well

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as blockchain and cryptocurrency, are at risk of significantly increasing the greenhouse gas emissions of the ICT industry.

Therefore, to clarify the impact of ICT on environmental quality in specific cases in developing countries, the study used a panel data model to quantify the specific impact of ICT, represented by the number of internet users, on CO2 emissions. Based on the theoretical inheritance of factors affecting CO2 emissions, the study studied specific cases in 25 developing countries in the period 2002-2021.

2. Literature review

ICT stands for Information and Communication Technologies, defined for this paper as "a diverse set of technological tools and resources used to communicate, create, disseminate, store, and manage information." These technologies include computers, the Internet, communication technology (radio and television), and telephones (Victoria L. Tinio, 2003). ICT is now the foundation of social development, the increasingly rapid explosion of ICT is reflected in the popularity of digital devices, the development of the Internet, the emergence of social networks, the development of big data and artificial intelligence, etc. Along with the development of ICT is the fluctuation of environmental quality.

Previous scientific studies have shown that ICT has positive impacts on improving environmental quality and reducing CO2 emissions. The study by Higon et al. (2017) investigated the relationship between ICT and CO2 emissions for 116 developing countries and 26 developed countries from 1995 to 2010. Their empirical results showed that ICT contributed positively to reducing CO2 emissions. Haseeb et al. (2019) examined the impact of ICT (i.e. Internet usage and mobile phone subscriptions), globalization, electricity consumption, financial development, and economic growth on CO2 emissions for BRICS economies during 1994-2014. Their results confirmed that ICT has reduced CO2 emissions in the long run and contributed positively to environmental quality. In addition, ICT can improve environmental quality by reducing transportation costs, raising ecological awareness (Zhang and Liu, 2015), improving energy efficiency, and developing smart applications (Ramzan et al., 2022). ICT can positively change working and communication conditions through e-commerce, videoconferencing, and various media, thereby reducing the negative impact of humans on nature (Belkhir and Elmeligi, 2018).

On the other hand, ICT may have a negative impact on CO2 emissions and no positive impact on environmental quality. Ozcan, B., Apergis, N (2018) analyzed the impact of Internet usage, used as a proxy for ICT, on CO2 emissions for 20 emerging economies during the period 1990-2015. They found that increased Internet access leads to CO2 emissions increase because ICT equipment, such as computer systems, are made from materials containing toxic chemicals, which lead to environmental degradation (Shabani and Shahnazi, 2019). ICT can increase environmental degradation because it leads to more industrialization and production (Raheem et al., 2020).

In summary, previous research has shown that ICT can play an important role in improving environmental quality through reducing CO2 emissions, optimizing energy, and raising ecological awareness. However, the use of ICT also has negative impacts, such as increasing emissions from equipment and production processes. Therefore, ICT development needs to be carried out in a sustainable manner, combining technological innovation and environmental protection measures to maximize the benefits of ICT while minimizing negative impacts.

3. Methodology and data

3.1. Data

The sample was composed by yearly of 25 developing countries in the period of 2002-2021, i.e., Bangladesh, Benin, Bhutan, Bolivia, Cabo Verdo, Cote d'lvoire, Egypt, Eswatini, Ghana, Haiti, Honduras, Jordan, Kenya, Kyrgyz republic, Nepal, Nicaragua, Pakistan, Philippines, Senegal, Solomon Islands, Tanzania, Tunisia, Vanuatu, Vietnam, Palestine. This classification is based on the UNCTAD (2011), World Investment Report. The dependent variable in this research is CO2 emision which obtained from the Our World in data website. Besides, this study also obtained data of individuals using Internet from the World Bank data as the proxy of ICT (Asongu et al. 2017).

On the other hand, the study also used the other control variables based on literature on the determinants of CO2 emission such as energy comsumption, trade openess, financial development. (Table 1)

Table 1: Variable description

Variable	Symbol	Definition	Source
CO2 emission	CO2	Annual CO_2 emissions - Annual total emissions of carbon dioxide (CO_2), excluding land-use change, measured in million tonnes.	Our World in Data
ICT	INT	Individuals using the Internet (% of population)	World Bank data
GDP	GDP	Gross capital formation (constant 2015 US$)	World Bank data
Trade openness	Trade	Trade (% of GDP)	World Bank data
Financial Development	FD	Domestic credit to private sector (% of GDP)	World Bank data
Energy consumption	EN	Primary energy consumption per capita - Measured in kilowatt-hours per person.	Our World in data

3.2. Empirical model

Based on the previous studies in the relevant literature such as Olatunji Abdul Shobande et al (2021), Usama Al-mulali (2012), the study used the following econometric model:

$$CO2_{it} = \alpha_{it} + \beta_1 GDP_{it} + \beta_2 INT_{it} + \beta_3 Trade_{it} + \beta_4 EN_{it} + \beta_5 FD_{it} + e_{it} \quad (1)$$

for i=1,…,N, t=1,…T. Where $CO2_{it}$, GDP_{it}, INT_{it}, $Trade_{it}$, EN_{it}, and FD_{it} stand for carbon dioxide emission, gross capital formation, individuals using the Internet, trade openness, energy consumption and financial development, respectively, of country I in the year t.

Panel data has been used for analyses as they provide useful information, consistency, less co-linearity among variables, efficiency and a greater degree of freedom (Gujarati et al., 2012). Further, it is possible to identify and measure effects in panel data that are otherwise not measurable in pure cross-section or pure time-series data. The most significant advantage of panel data is that it minimizes bias in results.

The study used Stata 16 software to estimate parameters and perform necessary tests for the study. Firstly, the study conducts (1) descriptive statistics to get basic parameters

about the variables, (2) Pearson correlation analysis, (3) a test for the cross-sectional dependence, (4) a test of the stationarity of the variables, (5) a test for cointegration, (6) select the suitable model and take steps to regress the model. (7) After that, the research will conduct a test of the defects for the model and there will be corrections to overcome the defects to give a more suitable result.

4. Results

4.1. Descriptive statistic

The statistical description of the variables is summarized in table 2. It is observed that the average level of CO2 emissions (in metric tons) for the sample is 34,56 metric tons—besides, the average individuals using the internet account for about 22.013% of population.

Table 2: Descriptive statistic of variables

Variable	N	Mean	Max	Min	Sd
CO2	500	34.55564	363.3427	0.047632	62.86868
GDP	500	2095.107	4920.865	556.3682	1002.584
INT	500	22.01336	86	0.13992	20.58713
Trade	500	74.6544	186.6758	23.12902	32.34892
EN	500	5239.649	27785.36	23.12902	32.34892
FD	500	35.21008	124.2829	4.178299	22.42068

4.2. Pearson correlation analysis

In order to test the correlation of variables, the study used Pearson test. The result was shown in the table 3

Table 3: Correlation test of variables

	CO2	GDP	INT	Trade	EN	FD
CO2	1.0000					
GDP	0.1827	1.0000				
INT	0.2036	0.5679	1.0000			
Trade	-0.0571	0.4328	0.1639	1.0000		
EN	0.1622	0.5257	0.3930	0.4434	1.0000	
FD	0.2508	0.5571	0.4808	0.4755	0.3697	1.0000

The results table showed that, among the independent variables, there is no correlation coefficient too large (greater than 0.6).

4.3. Test for the cross-sectional dependence

The study used the Pesaran test to test the cross-sectional dependence of variables with the following hypothesis:

$$\begin{cases} H_0: \ Panel\ data\ has\ cross-sectional\ dependence \\ H_1: Panel\ data\ has\ no\ cross-sectional\ dependence \end{cases}$$

The results obtained after running stata software are as follows:

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Pesaran's test of cross sectional independence =    56.018, Pr = 0.0000
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The results show that P-value=0.0000<10%, so we reject hypothesis H1 (panel data has no cross-sectional dependence) and accept hypothesis H0 (panel data has cross-sectional dependence). Therefore, in the next step, the study will use the 2nd generation stationarity test - CIPS to test the stationarity of the variables.

4.4. Test the stationarity of the variables

Table 4 presents the results of the CIPS unit root test. The results showed that all the CIPS absolute values at level 1 were greater than the absolute values of Critical values at 5% significant level. We concluded that all variables were stationary at level 1.

Table 4: CIPS unit root test

Variable	CIPS	First difference	
Int	-0,541	-2,707	I(1)
Tradeopendes	-1,329	-3,440	I(1)
Energyuse	-1.651	-3.852	I(1)
FD	-1.427	-3.490	I(1)
CO2	-0,750	-3,942	I(1)
GDP	-0,767	-2,230	I(1)
Critical values at	10%	5%	1%
	-1,47	-1,58	-1,76

4.5. Test for cointegration

The Westerlund test was used to test for cointegration and to consider whether the variables are cointegrated or not in their mutual relationship.

Table 5: Cointegration test

	Statistic	**P-value**
Variance ratio	-0.5360	0.2960

The test results in Table 5 show that the P value = 0.2960> 5%, so the Ho hypothes (no cointegration between variables) should be accepted, so there is no cointegration between variables at the significance level $\alpha = 0.05$. This result is suitable for running the following steps such as Pooled OLS or FEM, REM or FGLS in the model.

4.6. Select the suitable model

The study has regressed four models REM, FEM, Pooled OLS, FPGS and conducted tests to select between these models.

Firstly, in order to select between REM and FEM models, the paper used the Hausman test resulted in the value of Prob>chi2=0.9951. Therefore, REM model was selected.

Secondly, in order to select between REM model and Pooled OLS, the paper used Preusch and Pagan Lagrangian multiplier test resulted the value of Prob>chibar2=0.000. Therefore, the study uses REM regression to measure impact of ICT and other control variables in developing countries during the period of 2002-2021.

After selecting a suitable regression model, the study conducted a regression model with 5 independent variables and test autocorrelation, variance error of model. The result of first order autocorrelation by Wooldridge test (Table 6) showed that this model does not have first order autocorrelation.

Table 6: Result of autocorrelation test

```
. xtserial DC02 DGDP DInt DTrade DE DFD

Wooldridge test for autocorrelation in panel data
H0: no first order autocorrelation
    F(  1,      24) =      0.172
           Prob > F =      0.6823
```

However, this model has a variance error. The result of Breusch and Pagan Lagraingian multiplier test for random effects showed that the Prob>chibar2 value = 0.000 <5%. Therefore, the REM model has a variance error. To overcome the phenomenon of heteroskedasticity, the study selected the FGLS model. The results of the FGLS model are shown in table 7 below:

Table 7: FGLS regression model result

Variable	Coefficient	Std.err	z	P>|z|	[95% conf.	Interval]
DGDP	0.0000583	0.0000312	1.87	0.062	-2.91e-06	0.0001195
DINT	0.0017614	0.0007461	2.36	0.018	0.0002989	0.0032238
DTrade	-0.0000202	0.0002455	-0.08	0.935	-0.0005013	0.000461
DEN	0.0000415	6.93e-06	5.98	0.000	0.0000279	0.0000551
DFD	0.0012169	0.0006349	1.92	0.055	-0.0000247	0.0024613
-cons	-0.0028433	0.0034877	-0.82	0.415	-0.009676	0.039925

From the estimation result of table 7, equation (1) is written as below:

$$DCO2_{it} = -0.0028 + 0.0000583DGDP_{it} + 0.0018DINT_{it} - 0.0000202DTrade_{it} + 0.0000415DEN_{it} + 0.0012DFD_{it} + e_{it} \quad (2)$$

In the report of model regression results, the coefficient of determination R2 = 27.08%. It means the independent variables in the model can explain 20.19% the change of the dependent variable.

According to the regression result, ICT has a significant positive impact on CO2 emissions in 25 developing countries from 2002 to 2021. The coefficient of DINT is 0.0018 which suggested that 1% increase in the rate of internet penetration could increase CO2 emisions by 0.0018%. The negative impact of ICT on environment quality can be explained by the fact that ICT equipment, such as computer systems and smartphones, are made from materials that contain toxic chemicals, leading to environmental degradation (Shabani and Shahnazi, 2019). Besides, ICT can decrease the environment quality because it leads to industrialization and more production (Raheem et al., 2020). Another reason could be due to the inefficient use of energy by ICT equipment. This finding is consistent with the research result of Désiré Avom et al. (2020), who find that a 1% increase in the rate of the Internet increases CO2 emissions by 0.0358%. Similarly, Park et al (2018) showed the same results in some countries such as Belgium, Bulgaria, Finland and Poland. Also, the study result supports the hypothesis of Añón Higón et al. (2017) who explored an inverted -U shaped curve between ICT and CO2 emission in the sample of 142 countries. They found that the developing countries were on the left side, which implied that those countries have not yet reached the threshold level from which further increases in ICT reduce CO2 emissions.

In term of the control variables, it is easily to see that the variables like DGDP, DEN and DFD has positive correlation with CO2 emissions. Besides, trade openness is the only variable which is not statistically at 5% or 10% significant. The negative impact of economic growth in enviroment quality in this study is consistent with Kuznet curve theory. So, Therefore, it can be seen that the developing countries studied in this study are all in the stage of industrialization and have not yet reached the point where economic growth will help reduce CO2 emissions.

Table 7 also shows that the increase in energy consumption can lead the environmental degradation. Specifically, 1% increase in energry consumption can increase 0.0000415% in CO2 emissions. It can be due to the overdependence and the

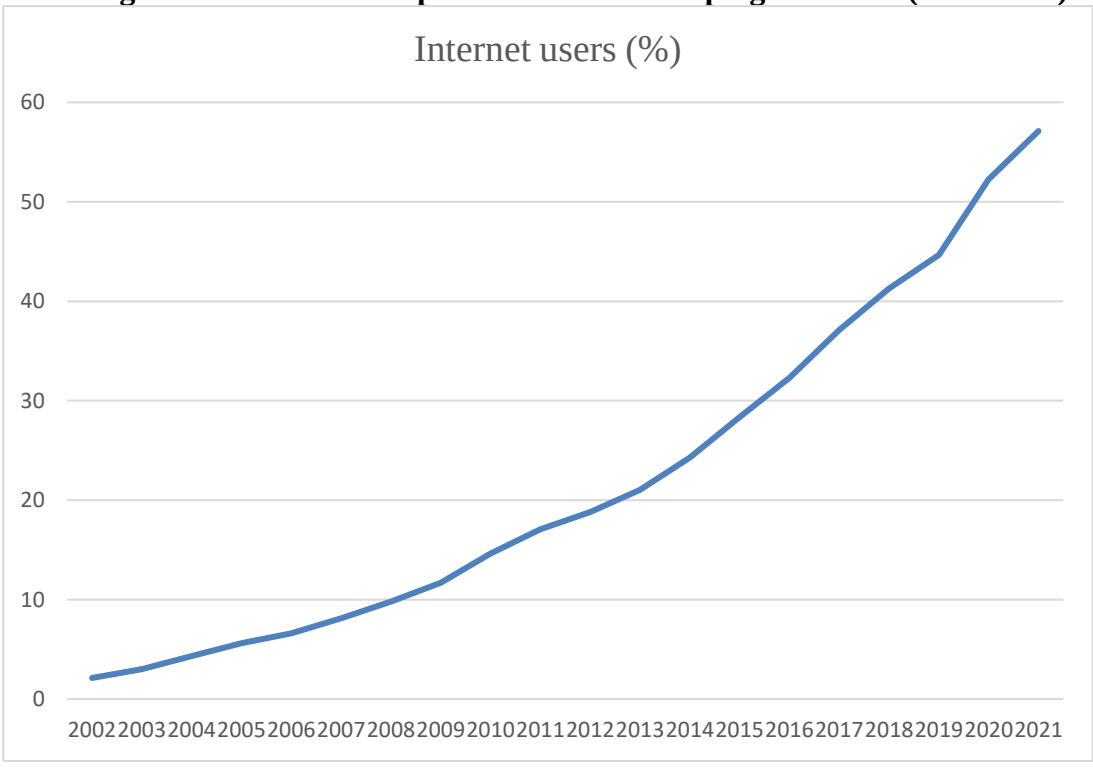
inefficient use of fossil fuels in developing countries. This result is consistent with Désiré Avom et al (2020) and Heidari (2015).

On the other hand, financial development also shows the positive correlation with carbon emissions. The coefficient of DFD is 0.0012, which suggests that a 1% increase in domestic credit to the private sector could increase CO2 emissions by 0.0012%. This result can be explained that the bank loans can provide strong support for firms to increase investment in industrial activities and generates more pollution. This finding is also consistent with Désiré Avom et al (2020) and Zhang (2011).

4.1. The status of ICT development in developing countries

Figure 1 shows a visual description of the evolution of ICT in developing countries in the period of 2002-2021.

Figure 1: Trend of ICT penetration in developing countries (2002-2021)

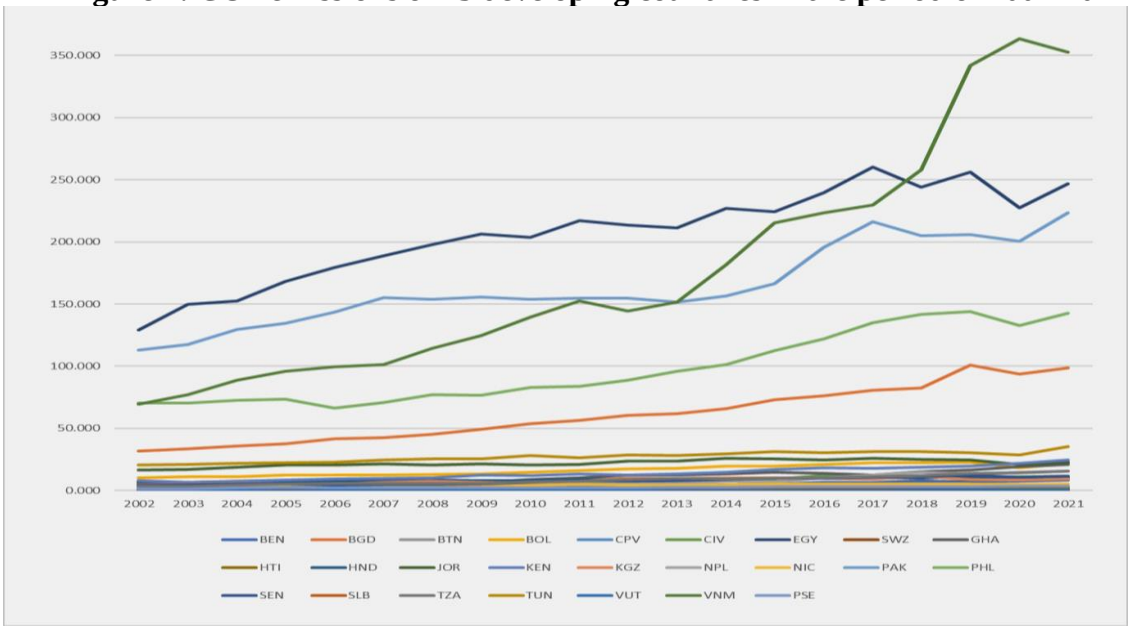


Source: According to the authors's calculation

It clearly shows the increasing trend of the average number of internet users in developing countries from about 2.12% in 2002 to 57.11% in 2021. It can be seen that information technology in developing countries is receiving a lot of attention and focus on development. Many countries have issued many ICT development programs at the regional and national levels. However, it can also be seen that there is a large difference in the number of internet users in different countries. Bhutan and Jordan are the two countries with the largest number of internet users, with 86% in 2021, followed by the Philippines, Kyrgyzstan, and Vietnam with 82%, 75%, and 74%. Meanwhile, in some developing countries in the African region, this number is still quite modest. For example, in Tanzania and Beni, the number of people using the Internet as of 2021 only reached 30% and 31%.

4.2. The status of environment quality in developing countries

Figure 2: CO2 emissions of 25 developing countries in the period of 2002-2021



Source: According to the authors's calculation

The figure 2 shows that, over the past two decades, the trend of global CO2 emissions has shown an increase, reflecting a close relationship with economic growth. This period was marked by two main factors: the strong growth of developing economies and uneven efforts to control emissions at the global level.

Many countries, especially in developing regions such as Vietnam, Bangladesh and Pakistan, witnessed a significant increase in greenhouse gas emissions, with Vietnam being particularly prominent, as CO2 emissions increased from 69,528 million tons (2002) to 352,553 million tons (2021), i.e. more than 5 times in 19 years, reflecting the increase in energy demand due to population growth, industrialization and urbanization. This shows that in the process of economic development, countries face a trade-off between growth and environmental protection. Although there are some countries with low and stable emissions such as Bhutan (BTN) with emissions from 0.417 million tons (2002) to 1.062 million tons (2021), Vanuatu (VUT) from 0.084 million tons (2002) to 0.210 million tons (2021) and Cape Verde (CPV) from 0.381 million tons (2002) to 0.559 million tons (2021), CO2 emissions are very low and remain stable throughout this period. This can be explained by the small economic scale and sustainable development policies focusing on environmental protection. With Bhutan having a carbon negative economy, Vanuatu with a small-scale economy mainly based on agriculture

Notably, African countries such as Ghana (GHA), Kenya (KEN) and Senegal (SEN) also have increased emissions over time. Ghana, with emissions from 6,483 Mt (2002) to 20,966 Mt (2021), shows growth in the energy and industrial sectors, although still low compared to developed industrial countries. These countries are all in the process of economic development and transition from an agricultural to an industrial economy, which leads to increased energy use and CO2 emissions

Notably, the COVID-19 pandemic in 2020 interrupted this trend, with emissions falling temporarily due to the slowdown in global economic activity. However, 2021 saw a rapid recovery in emissions as economic activity resumed, underscoring the challenge

of maintaining economic growth without increasing environmental pressures.

Overall, the 2002-2021 period highlights the need for more effective global emissions controls, particularly in the context of international commitments on climate change. Achieving emission reduction targets will require close cooperation between countries and the robust adoption of renewable energy technologies, along with changes in sustainable development policies.

5. Recommendations

Developing countries have witnessed a rapid increase in ICT penetration in term of individuals using Internet. However, the study has demonstrated that this development can cause the environmental degradation. Therefore, it is necessary to get action from governments for sustainable development. From the research results, the study would like to give some following recommendations:

(1) Developing countries should change to use innovative ICT devices to reduce carbon emissions.

(2) Investing more in green ICT infrastructure that can reduce the CO2 emissions and make the environment cleaner, more sustainable.

(3) Investing more in the renewable energy sectors to reduce their dependence on non-renewable energy sources.

(4) Increase energy productivity by increasing energy efficiency, implementing energy-saving projects, and energy infrastructure outsourcing to achieve their GDP growth.

(5) policymakers could promote the development of green solutions through the reduction of constraints on financing costs of environmental friendly technologies and projects. These incentives should take the form of *green subsidies* for technology development and/or adoption.

6. Conclusion

The debate on the effect of ICT on environmental quality remains a puzzle in empirical research. This study contributes to the theoretical and empirical literature in the following ways: (1) whether ICT increases CO2 emission has been investigated for a panel of 25 developing countries (2) the study covers a 20 years period (2002-2021) and (3) the methodology contribution of the study is based on FGLS model. The research results highlight a positive correlation between ICT and CO2 emissions. Specifically, the finding shows that 1% increase in the rate of internet penetration could increase CO2 emisions by 0.0018%. Moreover, the study also shows the positive effect of GDP, energy consumption and financial development on CO2 emissions. Based on the research results, the study proposed some recommendations and solutions for increase the environment quality in developing countries

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DEVELOPMENT OF ELECTRONIC BANKING SERVICES IN THE DIGITAL ECONOMY

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Abstract: Developing E-Banking services is an inevitable and objective trend in the current digital economy. The benefits of E-banking are huge for customers, banks and the economy thanks to its convenience, speed, accuracy and security. Digital technology is gradually changing fundamentally the form of providing financial and banking services. The development of E-banking services on the basis of digital technology can help banks comprehensively innovate from the process of providing products and services, innovating the distribution channel system, and expanding the product portfolio, providing services to a wider range of customers at a lower cost. From this situation, it is required to have practical summaries as well as solutions to promote the development of E-banking services in the current digital economy era.

Key words: *E-banking, Digital economy, Banking services.*

1. PROBLEM STATEMENT

In Viet Nam, E-banking began to be known and had the first foundations in the mid-2000s. However, it was not until 2010, under the development and impact of the 4.0 revolution, that the E-banking trend really exploded. The popularity of the Internet and modern technology devices such as smartphones, tablets, laptops, etc. have reatedfavorable conditions for E-banking to develop. The fact that Viet Nam's population is young, sensitive to technology, and has a high rate of mobile phone and Internet usage (over 50% of the population) contributes to the demand for convenient services such as E-banking. The appearance of technology makes customers' habits and behaviors gradually change. They want to experience safe and convenient financial services, being able to transact anytime, anywhere right on a portable electronic device instead of spending time and effort commuting but poses the problem of service innovation for banks. E-banking services bring new values to customers: save time and costs, conveniently perform anytime, anywhere, quickly and efficiently. Developing E-banking services is one of the top development strategies of commercial banks in the world. Determining that promoting E-banking services is one of the focus of operations, commercial banks have taken many concrete steps, from implementing, building and modernizing payment systems to creating advanced payment technology infrastructure systems. However, the implementation of e-banking services in Viet Nam in the current digital economy still has many limitations. For the purpose of further research on the development of e-banking services in the digital economy, research opportunities as well as challenges to develop e-banking services, thereby contributing solutions to deploying e-banking services, to further successfully develop e-banking services in Viet Nam, the author chooses the topic "**Development of electronic banking services in the digital economy**" as his research content.

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2. CONTENT

2.1. The current situation of developing e-banking services in Viet Nam

Developing e-banking services is an inevitable trend in the context of international economic integration. Not only since the Covid-19 pandemic has digital payments developed, but for a long time, in many countries around the world, not using cash has become a strongly promoted payment trend. In Viet Nam, since 2006, the State Bank has submitted to the Prime Minister for approval the Scheme of non-cash payment. This scheme has been adapted to the development of the economy and the development of cashless payment technology. In the past, non-cash payment activities in our country have been expanded in both scale and quality; has made strong progress with many new, convenient and modern payment products and services based on information technology applications.

In 2015, the NAPAS card system handled more than 90% of automatic teller machine (ATM) switching transactions, the figure in 2019 was only about 40%. In the first months of 2020, when the Covid-19 epidemic occurred and especially during the period of social isolation, electronic payment activities took place smoothly and safely, payments via internet channels increased by nearly 50% in price. Transaction value while paying via mobile phone channel increased by more than 160% over the same period in 2019 (Source: State bank report 2019-2020).

In 2021, we will witness rapid progress from pre-tax revenue to Viet Nam's financialbanking industry. Impressive numbers continuously appeared and crashed a series of peaks in the same period in previous years. With innovation, acceptance of application and integration of many advanced technology platforms, E-Banking Viet Nam is going further and further. Typically, the outstanding growth from banks like Vietcombank, Techcombank, MB and VPBank is a clear example. One of the key deciding factors is mobile technology and quick processing of user data. According to Statista 2020, there are currently more than 120 million mobile subscribers in Viet Nam, with more than 75% of them able to register to use financial-banking services and online payment transactions. This is as a springboard for the development of e-Banking technology and of course, the mobile platform is given top priority. According to statistics of the State Bank of Viet Nam, non-cash payment has developed rapidly and strongly in the past, it has had great significance in terms of socio-economic development in the face of the impacts of the Industrial Revolution 4.0, helping to increase quick adaptation, quick recovery, to unpredictable social events. Especially in the context of the outbreak of the COVID-19 pandemic in the world as well as in Viet Nam, non-cash payment has clearly demonstrated its advantages in safety, limiting the spread and contagion, which is also the convincing explanation for the current trend of strong shift from cash payment activities to non-cash payment activities. In fact, according to data from Viet Nam National Payment Joint Stock Company (Napas), in 2021, the Napas electronic clearing and financial switching system has processed more than 800 million transactions, corresponding to more than 8 million billion dong, an increase of 113% in volume and 169% in transaction value over the same period in 2020. Total value of card payment transactions at points of sale (POS) and total value of card payments, e-wallets via Napas online payment gateway grew by 50% and 125% respectively over the same period in 2020.

The far-reaching impacts of the COVID-19 pandemic across all aspects have

accelerated the transition towards cashless payments - one of the key priorities to promote the National Financial Inclusion Strategy to 2025 and vision to 2030 of the Government. The banking sector has introduced many solutions to boost cashless payments, especially in the context of the complicated developments of the COVID-19 outbreak as at present, making important contributions to realizing the goal of the above Strategy and maintaining the smooth operation of banking and financial activities, the lifeline of the national economy.

On the side of credit institutions: Up to now, most credit institutions have been actively applying the technologies of the industrial revolution 4.0 or cooperating with Fintech companies to optimize and simplify the process. business processes, improve operational efficiency and customer transaction experience. Many basic operations have been completely digitized (100%), many banks have recorded a rate of more than 90% of customer transactions done via digital channels. Banks have applied artificial intelligence (AI), machine learning (ML), big data (Big Data) technologies in customer assessment, classification and disbursement decisions, etc. to help simplify procedures and withdrawal time for disbursement and lending. In addition, credit institutions also focus on establishing partnerships, business cooperation, expanding the digital ecosystemof banking and non- anking products and services to attract and retain customers. Deeply integrate banking services into the daily digital journey of customers. In addition, banks have researched and applied many new, modern, safe and convenient technologies (Tokenization application, mobile payment, QR Code use, eKYC...) in their operations. pay. By the end of June 2022, there are 5.6 million accounts and 8.9 million cards opened using this method. By July 2022, there were 82 credit institutions implementing payment via the Internet and 51 credit institutions implementing payment via Mobile, more than 100,000 points accepting QR Code payments. The State Bank has licensed 48 payment intermediary service providers. Non-cash payment in the first 10 months of 2022 achieved a high growth compared to the same period in 2021. According to the Payment Department - State Bank, transactions through the interbank electronic payment system increased by over 4 6% in quantity and over 33.06% in value; through the financial switching and electronic clearing system, increased by 99.79% in quantity and 106.09% in value; non-cash payment transactions increased by 87% in quantity and 34% in value; via Internet channel increased 86.9% and 40.4% respectively; via mobile phone channels increased by 115.9% and 97.2% respectively; via QR Code method increased 169.4 and 204.7 % respectively *(Source: State bank report 2021-2022).*

E-payment activities continue to grow rapidly in 2022 with the total number of transactions and transaction value increasing by 96.5% and 87.3% respectively compared to 2021. In which, the proportion of transactions Chip cards made through the NAPAS system continue to increase from 26% in 2021 to more than 60% in 2022. NAPAS 247 fast transfer service with VietQR code has also grown impressively after more than a year of launch and has become one of the fastest-growing service providers. popular form of payment. Particularly for the program of exemption and reduction of switching and clearing service fees, the total NAPAS fee has been reduced for member organizations in 2022 to reach VND 1,743 billion. *(Source: State bank report 2022).*

According to the latest statistics of the State Bank, the whole market has 120 million e-wallets. Of which 47 million wallets are active and 29 million wallets are active. Up to 3,300 billion VND is maintained by people in e-wallets for payment. In addition, non-

cash payment activities in the first 11 months of 2022 achieved high growth compared to the same period in 2021, up 85.6% in quantity and 31.39% in value. In which, transactions via Internet channel increased respectively 89.36% (in quantity) and 40.55% (in value); via mobile phone channel increased by 116.1% and 92.3% respectively. In addition, transactions via QR code increased by 182.5% and 210.6% respectively; transactions via POS increased by 53.57% and 48.78% respectively *(Source: State bank report 2022).*

2.2. Opportunities and challenges for developing e-banking services at commercial banks in present-time

2.2.1. Opportunities

Firstly, Viet Nam is a country with a large population, currently ranked 15th in the world, with a young and educated population structure, and has an ability of accelerated access to technology. According to statistics, the current population of Viet Nam is over 98.76 million people, the population structure is young and well-trained, so it has quick access to technology and the internet. By 2022, the number of smartphone subscribers reached 90.5 million (accounting for 73.4% of mobile phone subscribers) (Source:Report to the Ministry of Information and Communications 2022).

Secondly, the high determination of the Government and the State Bank of Viet Nam. Seeing the importance of digital banking development, over the past time, the Government, as well as the State Bank of Viet Nam, have given drastic directions and issued many legal documents to manage and promote the development of digital banking. development of cashless payment services, initially establishing a legal infrastructure for the implementation of digital banking, such as: Decree No. 101/2012/ND-CP on non-cash payments (amended and supplemented in Decree No. 80/2019/ND-CP); Decision No. 35/2007/QD-NHNN on principles of risk management in e-banking activities; Decree No. 35/2007/ND-CP on electronic transactions in banking activities; Decision No. 2545/ QD-TTg approving the project of developing non-cash payment in Viet Nam in the period of 2019-2020; Circular No. 16/2020/TT-NHNN allows opening personal payment accounts by electronic method (eKYC); Circular No. 09/2020/TT-NHNN stipulating information system safety in banking activities to update new regulations of the Law on Cyber Information Security...With the drastic direction and high determination of the Government, the State Bank of Viet Nam, along with the issuance of legal documents that have been and are being completed, are one of the solid premise for the banks to develop digital banking more conveniently.

Thirdly, the awareness and determination of Commercial banks in Viet Nam. In fact, compared to traditional banking activities, digital banks have many outstanding advantages based on the digitized operating model platform, digital banking will provide many new financial instruments such as mobile payment, trust loans on consumption based on advanced data analysis technology, digital insurance instruments, digital investments,...

With outstanding advantages, digital banking helps commercial banks reduce operating expenses, increase profits, increase processing speed and ensure operational efficiency, helping customers reduce costs and be more convenient. Recently, commercial banks have been proactive and highly determined in developing digital banking to keep up with the trend of the times, as well as meet the requirements of competition and international integration.

2.2.2. Challenges

Firstly, the legal framework for digital banking has not kept pace with the speed of technology development. As we all know, the operations of banks must comply with the regulations of the law, so in order to develop digital banking, banks must be based on the regulations of the law. It can be seen that in the recent times, despite the intense and close attention and direction of the Government and the State Bank of Viet Nam, with the rapid technological development, while the promulgation of regulations The law is not velocious but requires a certain period of time, so it has partly affected the development of digital banking. For example, the digital payment segment has developed for many years, but the legal writings for this activity were only issued by 2020 through Circular No. 16/2020/TT-NHNN; Circular No. 09/2020/TT-NHNN.

Secondly, the investment cost for digital technology is large with today's rapid technological development, the technology that was born in a very short time has been replaced by new and more modern technologies. Therefore, in order to adapt to the development of new technology, the banking system must regularly upgrade, improve, maintain, and innovate technology to meet competition, which puts great pressure on financial resources. For banks, especially small and medium sized banks, the financial pressure will not be small. This is also one of the challenges for commercial banks.

Thirdly, the limitation in human resources, especially human resources in the field of information technology. Digital banking operations need high-quality human resources, especially information technology staff. Meanwhile, according to the statistics of recruitment channels, the current recruitment demand of the information technology industry in Viet Nam has increased 4 times, in which the software development industry has always achieved double growth, accounting for more than 50% of the recruitment demand of the entire information technology industry. This is also a group of industries with high-quality intellectual human resources, including a collection of engineers in multi-functional management software solutions, programming engineers, information security...

Fourthly, difficulties in customer information security. It can be affirmed that digital banking brings a lot of conveniences to customers and banks, but besides that, it also has to face the problem of personal information security, when customers and banks are always the target. of high-tech crime. In reality, there are many cases where customers use the service incorrectly and unmatched with the instructions, or fake information leads to being deceived and taken advantage of by crooks to appropriate money in their accounts.

Fifthly, the habit of using cash is still popular. Digital banking services are used quite a lot in urban areas. But the habit of using cash is still quite common, especially in rural areas. Therefore, changing people's consumption habits also poses many challenges to the digital transformation process of Vietnamese banks.

2.3. Solutions recommended to develop e-banking services in the current digital economy

According to the current situation of e-banking service development in Viet Nam, the author proposes some solutions to develop e-banking services in the digital economy, in specific:

Firstly, developing information technology, improving the level of modernization of banking technology constantly, applying new technologies to increase competitiveness, focusing on private and network security. Banks must concentrate on investing,

researching and applying the most advanced security technologies in their e-banking services to create trust-worthiness for customers when using the services.

Secondly, the infrastructure and technical facilities need to be upgraded so that the implementation of e-banking services can become more feasible in non-urban regions, especially in remote areas,.., and even the international market.

Thirdly, if the e-banking services want to develop sustainably, three important factors should be combined: users (customers) - especially, customers' decisions to use e-banking services, service providers (e.g. banks) and environmental factors.

Fourthly, diversifying products, creating outstanding differences of products. When providing new services, the commercial banks must focus on customer participation, placing customers at the center of all services. At the same time, continuously innovateand diversify products and services of e-banking to attract customers, constantly improve the quality of products and services to satisfy customers' needs as well as ensure the implementation of commitments about the services provided.

Fifthly, paying special attention to customer care policy. Set up an online customer care department to advise and answer customers' questions 24 hours a day, and collect feedback from customers. Timely assessment of customer information and opinions contributing to improve the service quality and meet the increasing demands of customers.

Sixthly, banks need to actively invest in research and development, human resources, and develop specific and clear marketing strategies to promote the bank's images and enhance their brands.

Seventhly, simplification, that is, making everything easy to use is the most basic way for banks to win the hearts of online savings customers. The products themselves should be simple, the registration process for a product should be uncomplicated, but still ensure the necessary security and confidentiality.

3. CONCLUSION

Through analyzing the current situation, pointing out opportunities and challenges for the development of e-banking services in Viet Nam, as well as through surveying customers using e-banking services, analyzing results from SPSS show factors affecting e-banking services. The author has proposed seven solutions to promote the development of e-banking services in Viet Nam, including: Developing the information technology; attaching special importance to grow the infrastructure; combining the customers, suppliers and environmental factors; diversifying products; promoting the customer support and care policies; promote investment in human resource training and develop specific and clear marketing strategies; Simple process packaging to make it easy for customers to use and uncomplicated for consultants to advise. In order to implement these solutions, the close attention and direction from the Government, Ministries, Departments are necessary and most importantly, the focus on the banks themselves in the system are needed. Strong internal force will promote the strengths and limit the weaknesses. With this study, the author wishes to contribute to the development of e-banking services in the current digital economy era and to help e-banking services reach everywhere in all parts of the country.

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VIETNAM'S INTERNATIONAL BALANCE OF PAYMENTS: CURRENT SITUATION AND RECOMMENDATIONS

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The balance of international payments (Balance of Payments - BoP) is an important macroeconomic index that reflects the overall international economic picture of a country. Looking at the recent BoP changes, it can be seen that in Vietnam, BoP has continuously been in surplus, even when severely affected by the Covid-19 pandemic. Vietnam's BoP surplus has enhanced Vietnam's foreign position but has put pressure on currency appreciation and possibly future macroeconomic strengthening. Based on the statistical methods of description, comparison, analysis and synthesis, this article analyzes the actual state of Vietnam's BoP and gives some recommendations for BoP balance orientation for Vietnam. The study will help provide a comprehensive view of the change in the international balance of payments and propose recommendations to improve this situation. The knowledge gained will have important implications for policymakers, investors, and stakeholders in stabilizing the economy and enhancing international integration.

Keywords: Balance of Payment, trade balance, surplus.

1. **INTRODUCTION**

In the context of deepening globalization, maintaining a stable balance of payments has become a critical factor for ensuring sustainable economic development and national financial stability. The balance of payments is not merely a statistical indicator but also a comprehensive tool that reflects external economic activities, the level of integration, and Vietnam’s competitiveness in the international market. Fluctuations in the balance of payments often directly impact exchange rates, capital flows, and foreign exchange reserves, significantly influencing economic growth objectives, inflation, and monetary policies.

Vietnam, as a developing economy with a high degree of openness, is heavily influenced by global economic fluctuations. Challenges such as export growth pressures, the ability to attract and sustain foreign direct investment (FDI), and the need to balance the services trade deficit all require timely adaptive strategies. Between 2019 and 2023, during a period marked by global economic disruptions from the COVID-19 crisis, trade tensions, and shifts in global supply chains, Vietnam faced significant impacts on its balance of payments. Surpluses or deficits in various components of the balance of payments can either serve as a positive driver for growth or, conversely, exert pressure on inflation and monetary policy.

Moreover, the balance of payments serves as a foundation for policymakers to understand the status of exports, imports, services, FDI and foreign portfolio investment (FPI) flows, and transfers. From this, Vietnam can shape appropriate economic regulatory and development measures, enhancing the country’s resilience and position against

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external shocks. At the same time, detailed analysis and evaluation of the balance of payments can guide policies to reduce reliance on foreign capital flows, optimize internal resources, and better capitalize on opportunities arising from international integration.

Given these challenges and opportunities, in-depth research on Vietnam's balance of payments is not only an urgent requirement but also a vital task to propose practical policy recommendations. This article aims to identify the current state of the balance of payments and provide a scientific perspective to develop optimal solutions for macroeconomic management and stabilization in the future.

2. OVERVIEW OF THE BALANCE OF PAYMENTS

2.1. Theoretical Basis of the Balance of Payments

The balance of payments (BOP) is a systematically compiled statistical report that records the value of all economic transactions between a country and the rest of the world over a specific period. These transactions, primarily between residents and non-residents, include flows of goods, services, and income; transactions involving assets and financial liabilities between a country and the rest of the world. Transactions are considered as economic flows that reflect the creation, transformation, exchange, transfer, or settlement of economic values, leading to changes in the ownership of goods or financial assets, provision of services, or supply of labor and capital.

In summary, the balance of payments of a country is a record of all economic transactions between the residents of the reporting country and the residents of other countries within a given time period (usually a year). These transactions include trade in goods and services, income flows, transactions in assets and financial liabilities, and unilateral transfers. Thus, the balance of payments serves as an external account within the system of national accounts. Its status influences changes in exchange rates, foreign exchange reserves, and the overall economy of a country, particularly in the area of external economic activities.

The balance of payments is one of the most critical tools in economic policy formulation. It provides a comprehensive reflection of external economic activities and, to a certain extent, the socio-economic situation of a nation through components such as the trade balance, capital account, and foreign currency reserves. It indicates whether a country is a debtor or creditor to the rest of the world. Furthermore, it reflects the degree of openness and integration of the national economy into the global economy, as well as the country's financial standing on the international stage. It also demonstrates the supply and demand for foreign currency in a country, significantly affecting exchange rates, exchange rate policies, and national monetary policies.

Therefore, the balance of payments is an essential document for macroeconomic policymakers. A good or poor set of data in the balance of payments can impact exchange rates, triggering fluctuations in socio-economic development. The status of the balance of payments influences policymakers to adjust the content of economic policies. Consequently, governments rely on the balance of payments to design economic and social development strategies and adopt appropriate policies for different periods.

2.2. Literature Review

Research on the current state of Vietnam's Balance of Payments (BOP) has not received significant attention from both domestic and international scholars. Discussions on Vietnam's BOP are often brief and generalized within macroeconomic reports produced by research organizations or economic research institutions in Vietnam. As

such, only a few comprehensive studies on Vietnam's BOP can be highlighted, such as those by Nguyen Thi Vu Ha (2017, 2018) and Nguyen Van Song (2020).

From a theoretical perspective, Nguyen Van Song (2020) analyzed the states of the BOP and the impact of key factors (such as interest rates, domestic commodity prices, and exchange rates) on the balance of payments and national income through the use of mathematical models. The results demonstrated that the BOP plays a crucial role in national income and foreign exchange reserves. The BOP is influenced by multiple factors, among which three fundamental ones stand out: bank interest rates; domestic prices of goods and services; and the elasticity of export goods to domestic prices and exchange rates. Similarly, using a qualitative research approach, Nguyen Thi Vu Ha (2017, 2018) explored the fluctuations in Vietnam's BOP from the time Vietnam joined the World Trade Organization (WTO) to 2017. The author found that economic openness and integration significantly influenced the components of Vietnam's BOP.

While comprehensive studies on Vietnam's overall BOP are limited, research on specific components of the BOP has garnered more interest from scholars. These studies often focus on analyzing the relationship between Vietnam's current account and other macroeconomic indicators. By analyzing the current state and combining it with empirical research on the relationship between the current account and Vietnam's economic growth using the VECM model, Nguyen Duc Trung and Le Hoang Anh (2021) found evidence that the current account positively impacts economic growth in both the short and long term.

From the above studies, it is evident that research on Vietnam's BOP has not been sufficiently prioritized, despite the fact that Vietnam's BOP has shown consistent surpluses in recent years, with emerging implications for the economy. Therefore, understanding the status of the BOP and its effects on other macroeconomic indicators is essential. By collecting data from the State Bank of Vietnam, the General Statistics Office, and databases such as those of the World Bank (WB) and the International Monetary Fund (IMF), this paper will examine, analyze, compare, and evaluate the status and fluctuations of Vietnam's BOP components. Based on this analysis, the author provides several recommendations for Vietnam in the coming period.

3. Current Status of Vietnam's Balance of Payments

3.1. Overview of Vietnam's Balance of Payments

From 2019 to 2023, Vietnam's overall balance of payments (comprising the current account, capital and financial account, and errors and omissions) consistently recorded surpluses. The peak occurred in 2019, when the surplus reached over USD 23.25 billion, equivalent to 8.88% of the year's GDP. Generally, while the international balance of payments posted surpluses of USD 16.6 billion and USD 14.3 billion in 2020 and 2021, respectively, Vietnam experienced a deficit of USD 22.4 billion in 2022. However, by 2023, the deficit had transitioned back into a surplus. (Figure 3.1).

The performance of Vietnam's balance of payments during the 2019-2023 period marked significant achievements, contributing notably to the country's economic growth rate.

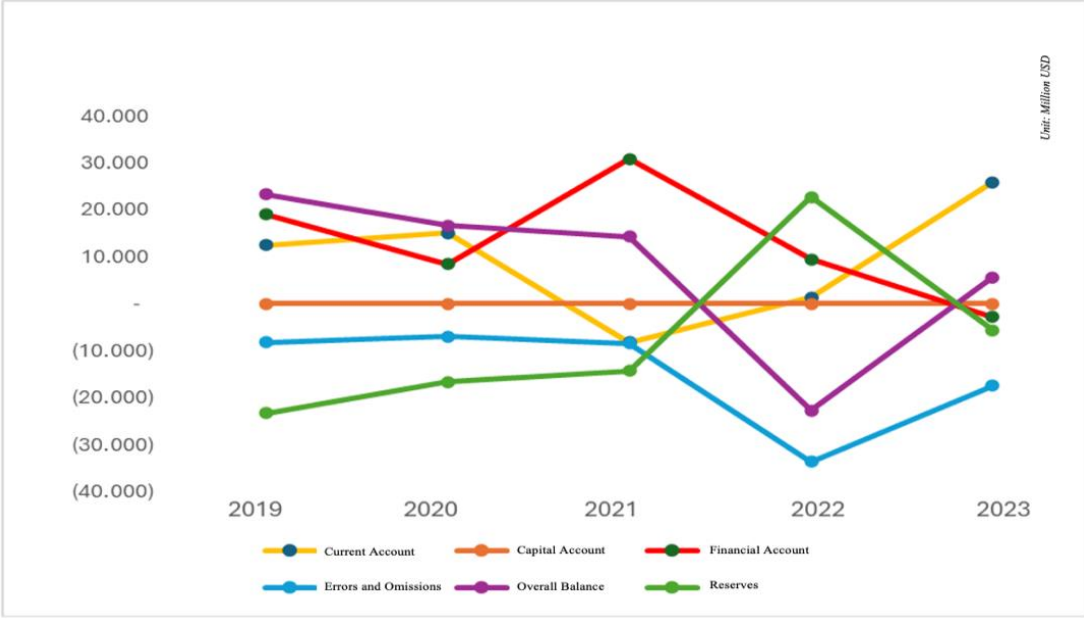
Table 3.1. Vietnam's Balance of Payments (2019-2023)

Unit: Million USD

Indicators	2019	2020	2021	2022	2023
Current Account	12	15.060	(8.149)	1.402	25.833

Indicators	2019	2020	2021	2022	2023
Capital Account	-	-	-	-	-
Financial Account	18.971	8.484	30.837	9.470	(2.842)
Errors and Omissions	(8.215)	(6.912)	(8.398)	(33.617)	(17.383)
Overall Balance	23.254	16.632	14.290	(22.745)	5.608
Reserves	(23.254)	(16.632)	(14.290)	22.745	(5.608)

(Source: Compiled from the State Bank of Vietnam)



(Source: Compiled from the State Bank of Vietnam)

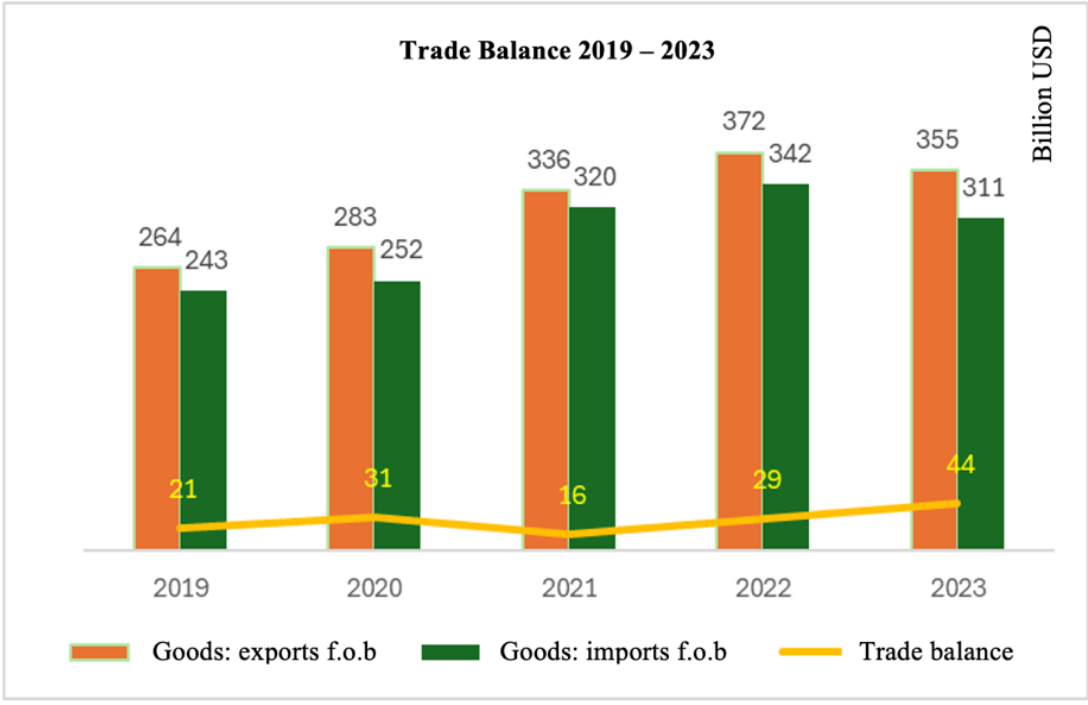
Figure 3.1. *Vietnam's Balance of Payments (2019-2023)*

3.2. Current Account

Trade Balance:

Vietnam's trade balance consistently recorded surpluses from 2019 to 2023. Notably, the goods balance has always been in surplus. The trade surplus rose from $21.2 billion in 2019 to over $44.4 billion in 2023, increasing the contribution of the goods balance to GDP from 8.0% in 2019 to 10.3% in 2023 (*General Statistics Office & State Bank of Vietnam*). However, due to the severe impact of the COVID-19 pandemic, the surplus in 2021 decreased by more than 51% compared to 2020.

The trade surplus has significantly contributed to Vietnam's economic growth and created domestic employment opportunities, particularly in 2020, 2022, and 2023, when Vietnam and the world faced the challenges of the COVID-19 pandemic. (*Figure 3.2.*)

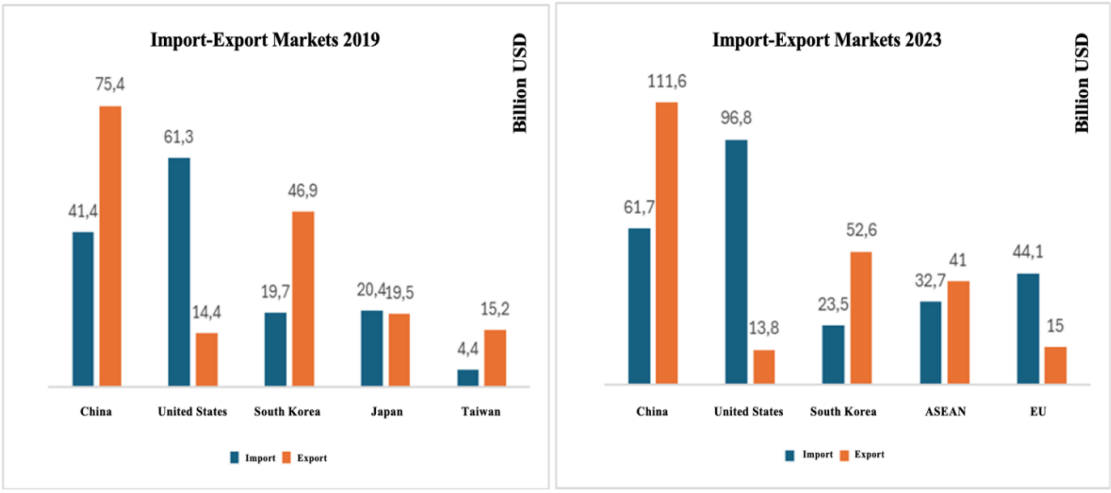


(Source from the State Bank of Vietnam)

Figure 3.2. ***Trade balance for the period 2019 - 2023***

Regarding the trade balance by product, clothing items; clothing accessories, shoes, and similar items; and machinery, electrical equipment, and components are significant contributors to Vietnam's trade surplus in goods. A positive aspect is that imports of clothing, apparel, and shoes account for a very small share, indicating that Vietnam's localization capacity and production advantages for these products have greatly improved. However, Vietnam remains highly dependent on imports of machinery, electrical equipment, and components, which are imported by foreign enterprises. This highlights Vietnam's heavy reliance on importing this category of goods and the risk of foreign companies dominating the market. Computers, electronic components; machinery, and equipment were the largest import categories for Vietnam in 2022 and 2023 and are key inputs for Vietnam's production.

Regarding the export and import markets for goods, the United States has consistently been Vietnam's largest export market, with steadily increasing export turnover, reaching $61.3 billion in 2019 and $96.8 billion in 2023. Meanwhile, China has always been Vietnam's largest import market, with turnover of $75.5 billion in 2019 and an estimated $111.6 billion in 2023. Vietnam achieved a trade surplus in goods with several major markets, including the United States, with a surplus of $46.9 billion in 2019 and $83 billion in 2023, indicating a growing surplus in the U.S. market. Other surplus markets include Japan and the EU. On the other hand, Vietnam experienced a trade deficit with several major markets, including China, with a deficit of $34 billion in 2019, increasing by 47% to $50 billion in 2023. Other deficit markets include South Korea and ASEAN countries. (Figure 3.3)

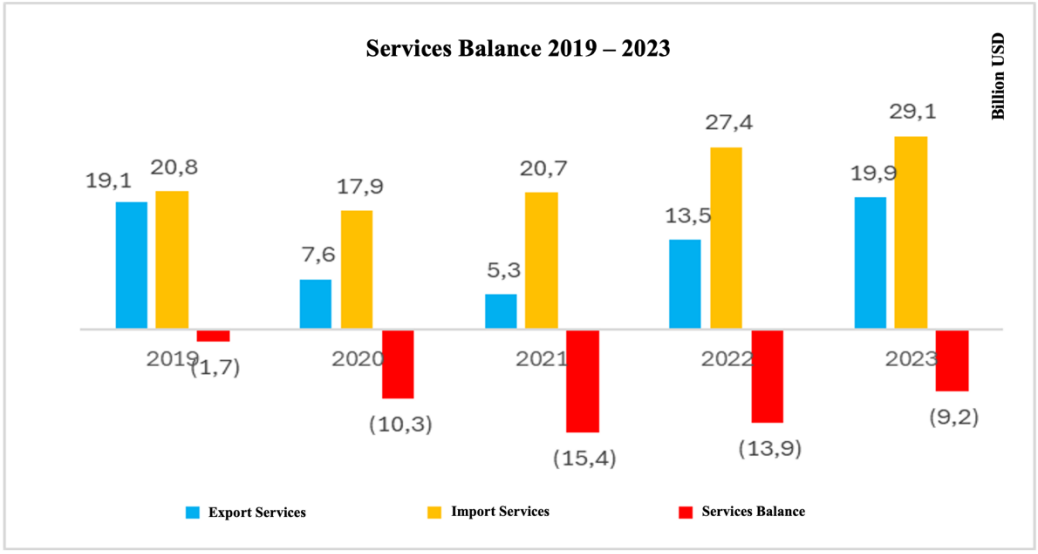


Source: General Department of Customs

Figure 3.3. Major Import-Export Markets in 2019 and 2023

Regarding the services balance:

Vietnam's services balance has always been in deficit, with a notable peak in 2021 when the services balance recorded the largest deficit in the period from 2019 to 2023 (-15.4 billion USD). The Covid-19 pandemic severely impacted Vietnam's services exports, reducing the value of service exports by nearly five times, from 19.1 billion USD in 2019 to 5.3 billion USD in 2021. However, there was a slight recovery in 2022 and 2023, reaching 13.5 billion USD and 19.9 billion USD, respectively. By 2023, net income in the services sector had not shown positive changes, continuing to register a deficit of -9.2 billion USD. **(Figure 3.4)**. However, the net income of the current account still recorded remarkable growth in the goods sector, as it has been continuously in surplus, reaching a record number of about 44 billion USD.



(Source: State Bank of Vietnam)

Figure 3.4. Services Balance from 2019 - 2023

Regarding the export and import value of services by sector, tourism services export holds a significant share of the total services export. Specifically, in 2019, tourism

services exports reached 11.83 billion USD, accounting for 61.9% of the total services export value. In 2020-2021, due to the impact of the Covid-19 pandemic, both the total services export value and the tourism services export value decreased, with the most significant drop occurring in 2021, when the total services export value reached only 5.26 billion USD (of which tourism services exports amounted to just 0.14 billion USD). By 2022 and 2023, tourism services exports began to recover, with the export value in 2023 reaching 9.16 billion USD, accounting for 46% of the total services export value.

Regarding income and current transfers:

Vietnam's income balance is divided into two distinct directions: the primary income balance always runs a deficit, while the current transfer balance (secondary income) is always in surplus. This indicates that payments for foreign investment in Vietnam are much higher than the income received from Vietnamese investments abroad. Payments for foreign investments in Vietnam during the period from 2019 to 2023 amounted to over 103.6 billion USD, fluctuating around 20.7 billion USD per year. Meanwhile, income from Vietnamese investments abroad only reached 11.5 billion USD for the entire period, or approximately 2.3 billion USD per year on average. As a result, Vietnam's primary income balance has always been in deficit, with an annual deficit of 18.4 billion USD. This deficit has significantly reduced the surplus of Vietnam's current account balance.

In contrast to the primary income balance, the current transfer balance, also known as Vietnam's net unilateral transfers, has always been in surplus, averaging about 9.5 billion USD annually. This surplus is mainly due to the substantial amount of remittances flowing into Vietnam each year. In the period from 2019 to 2023, Vietnam received over 65 billion USD in unilateral transfers, while the amount of unilateral transfers leaving Vietnam was 17.3 billion USD. In 2021, despite facing many difficulties, Vietnam's current transfer balance still showed growth compared to previous years, reaching nearly 10.3 billion USD. **(Table 3.2.)**

Table 3.2. Income and Current Transfer Balance from 2019 - 2023

Unit: Million USD

Indicators	2019	2020	2021	2022	2023
Primary Income: Receipts	2.237	1.428	982	2.321	4.551
Primary Income: Payments	18.555	16.245	19.731	22.049	27.014
Income Balance	**(16.318)**	**(14.817)**	**(18.749)**	**(19.728)**	**(22.463)**
Current Transfers: Receipts	11.609	11.427	13.568	12.287	16.112
Current Transfers: Payments	2.366	1.971	3.246	6.652	3.057
Current Transfers Balance	**9.243**	**9.456**	**10.322**	**5.635**	**13.055**

(Source: State Bank of Vietnam)

Thus, the current account balance during the 2019-2023 period was mostly in surplus, with the highest peak reaching 25.8 billion USD in 2023, more than double the surplus recorded in 2019. The only exception was in 2021, when the current account balance recorded a deficit of 8.1 billion USD due to the impact of the Covid-19 pandemic. **(Figure 3.5.)**

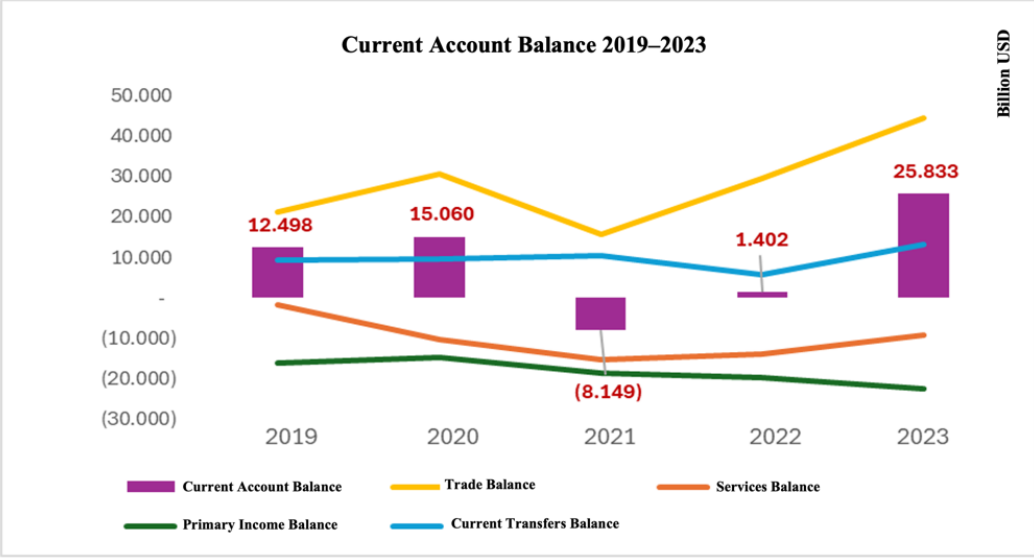


Figure 3.5. Current Account Balance, 2019-2023

3.3. Capital and Financial Account

Contrary to the positive trends of the current account balance, the financial account shifted from an average surplus of 17 billion USD between 2019 and 2022 to a deficit of 2.84 billion USD in 2023. This trend occurred despite net FDI inflows into Vietnam totaling 16.3 billion USD during the 2019-2023 period. However, net portfolio investment inflows into Vietnam were unstable; they recorded surpluses in 2019, 2021, and 2022 but faced net outflows of nearly 1.3 billion USD and 1.2 billion USD in 2020 and 2023, respectively. This reflects the continuous net selling trend of foreign investors in Vietnam's stock market during 2023.

In other investment activities, the amount of cash and deposits from Vietnamese entities abroad increased from 8.1 billion USD in 2019 to 14.2 billion USD in 2023. Conversely, cash and deposits from foreign financial institutions were withdrawn from Vietnam in 2023, totaling nearly 4.2 billion USD. This marked a sharp reversal from the average net inflows of 3.1 billion USD annually recorded during 2019-2022.

This occurred as interest rates on foreign currencies, such as the US dollar, became more attractive in other countries. This was due to the US Federal Reserve (Fed) continuously raising the federal funds rate in 2022 and 2023, while Vietnam maintained a 0% ceiling interest rate on US dollar deposits.

Table 3.3. Financial Account, 2019-2023

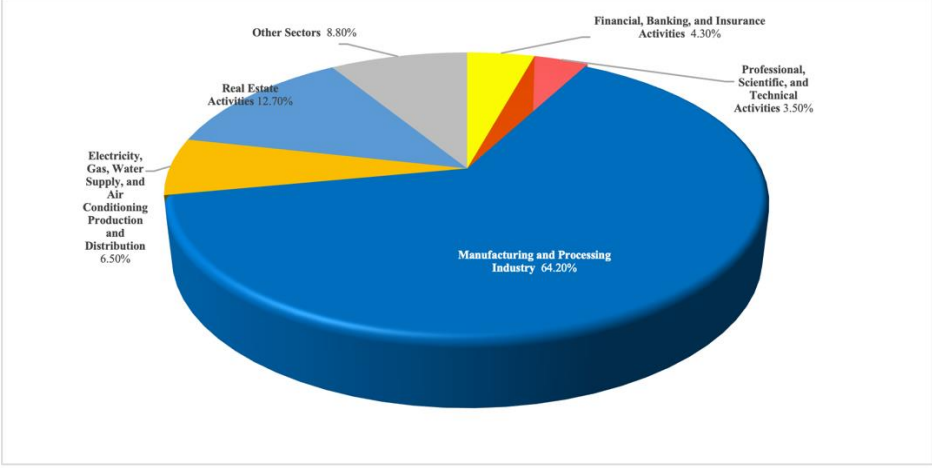
Indicators	**2019**	**2020**	**2021**	**2022**	**2023**
Direct Investment Abroad: Assets	(450)	(380)	(377)	(2.674)	1.550
Direct Investment into Vietnam: Liabilities	16.120	15.800	15.660	17.900	18.500
Direct Investment (Net)	**15.670**	**15.420**	**15.283**	**15.226**	**20.050**
Portfolio Investment Abroad: Assets	3	4	10	2	(34)
Portfolio Investment into Vietnam: Liabilities	2.995	(1.260)	271	1.510	(1.155)

Indicators	2019	2020	2021	2022	2023
Portfolio Investment (Net)	**2.998**	**(1.256)**	**281**	**1.512**	**(1.189)**
Other Investments: Assets	(7.789)	(8.436)	(627)	(13.663)	(14.341)
Including Cash and Deposits	*(8.081)*	*(8.447)*	*(8.447)*	*(13.750)*	*(14.171)*
Other Investments: Liabilities	8.092	2.756	15.900	6.395	(7.362)
Including Cash and Deposits	*2.875*	*397*	*8.851*	*8.851*	*(4.159)*
Other Investments (Net)	**303**	**(5.680)**	**15.273**	**(7.268)**	**(21.703)**
Financial Account	**18.971**	**8.484**	**30.837**	**9.470**	**(2.842)**

(Source: State Bank of Vietnam)

In 2023, foreign investors invested in 18 out of 21 national economic sectors. The manufacturing and processing industry led with total investment exceeding 23.5 billion USD, accounting for 64.2% of total registered investment and increasing by 39.9% compared to the previous year. The real estate sector ranked second with total investment nearing 4.67 billion USD, making up over 12.7% of total registered investment and rising by 4.8% year-on-year. Electricity production and distribution, and banking and finance ranked third and fourth, with registered investments reaching over 2.37 billion USD (up 4.9%) and nearly 1.56 billion USD (almost 27 times higher), respectively. Other sectors accounted for the remaining investments.

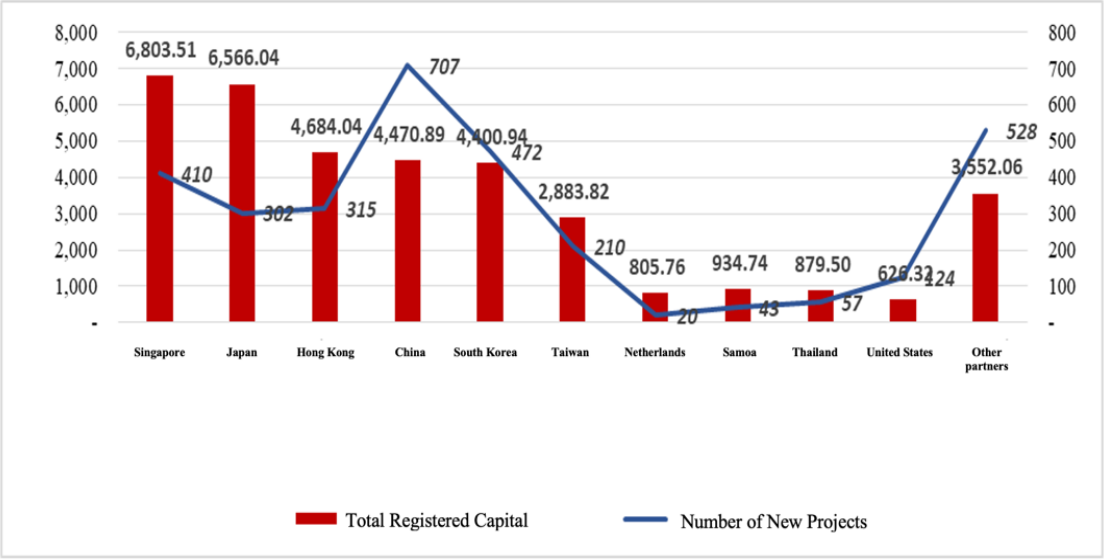
In terms of the number of new projects, the manufacturing and processing industry also led in both new projects (33.7%) and capital adjustments (54.8%). Meanwhile, wholesale and retail topped the list for capital contribution and share purchase transactions (41.5%).



(Source: General Statistics Office)

Figure 3.6. Foreign Investment in 2023 by Economic Sector

In 2023, 111 countries and territories invested in Vietnam. Singapore ranked first with a total investment of over 6.8 billion USD, accounting for 18.6% of total investment in Vietnam, up 5.4% from the previous year. Japan was second with nearly 6.57 billion USD, making up more than 17.9% of total investment, increasing by 37.3% year-on-year. Hong Kong SAR ranked third with registered investment exceeding 4.68 billion USD, accounting for nearly 12.8% of total investment, a 2.1-fold increase from the previous year. Following were China, South Korea, Taiwan, and others.



(Source: General Statistics Office)

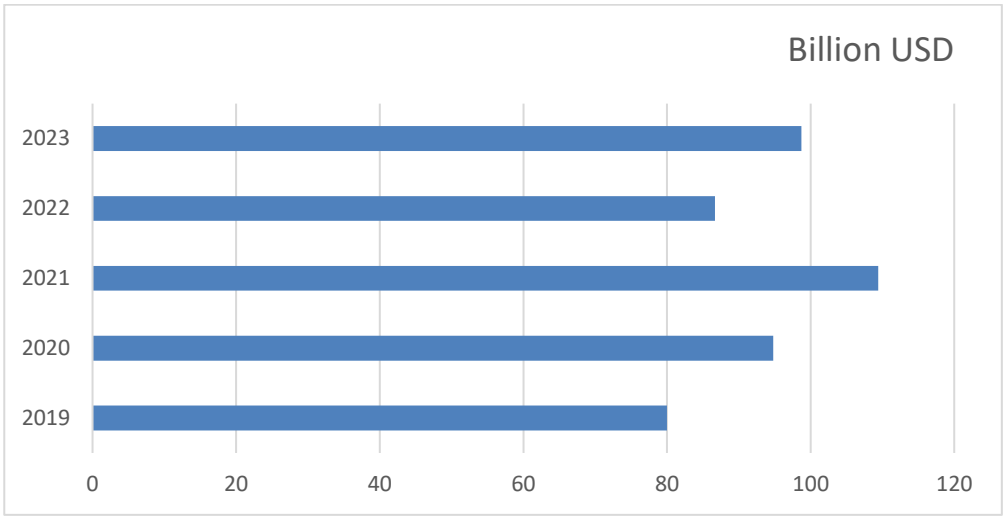
Figure 3.7. Foreign Investment in 2023 by Partners

Foreign investors have invested in 56 provinces and cities across the country in 2023. Ho Chi Minh City led in attracting investment with a registered capital of over 5.85 billion USD, accounting for nearly 16% of the total registered capital, increasing by 48.5% compared to 2022. Hai Phong ranked second with over 3.26 billion USD in registered capital, accounting for 8.9% of the total national investment, up 66.2% from the previous year. Following were Quang Ninh with 3.11 billion USD (8.5%, up 31.3%) and Bac Giang with 3.01 billion USD (8.2%, up 148.3%)...

In contrast, Vietnamese investors have almost not invested abroad, with a net outflow of -2.3 billion USD from 2019 to 2023. The imbalance between FDI into Vietnam and Vietnam's outward direct investment is one of the reasons why the income received from Vietnam's outward direct investment is much smaller than the payments Vietnam has to make for investments from non-residents.

3.4. Foreign Exchange Reserves

The official balance of payments records interventions in the foreign exchange market by the central bank (SBV). When Vietnam's international payments balance is in surplus, meaning there is an excess of foreign currency, the SBV will purchase foreign currency (USD) to limit the supply of foreign currency in the market and increase the country's foreign exchange reserves. On the other hand, during periods of deficit in the balance of payments, the SBV will sell foreign currency to stabilize the exchange rate due to the increased demand for foreign currency to pay for imports. According to data from the IMF, Vietnam's foreign exchange reserves from 2019 to 2023 averaged nearly 94 billion USD. Analysts explain this achievement as a result of abundant remittances flowing into Vietnam as well as the consistent surplus in the trade balance in recent years.



(Source: State Bank of Vietnam)

Figure 3.8. Foreign Exchange Reserves from 2019 to 2023

3.5. Errors and Omissions

One noteworthy point is the significant level of errors and omissions in Vietnam's Balance of Payments (BOP). During the 2019-2023 period, the total value of errors and omissions reached -74.5 billion USD, equivalent to twice the total surplus value of the overall balance. This presents a considerable challenge for Vietnam's macroeconomic management.

In summary, the BOP is a key macroeconomic indicator that reflects the overall picture of a nation's international economic transactions. Based on the findings regarding Vietnam's recent BOP surplus, the following observations can be made:

First, the surplus in Vietnam's current account is primarily driven by a surplus in the trade balance. This demonstrates Vietnam's comparative advantage in providing goods. However, the country's exports are mainly contributed by the FDI sector, meaning any fluctuations in the direct investment balance will significantly impact Vietnam's exports. The current account surplus has put upward pressure on the Vietnamese dong, prompting the central bank to intervene to stabilize the exchange rate. Such interventions, while necessary, create pressures on money supply and inflation on one hand and could lead to trade tensions with partner countries on the other. Therefore, Vietnam needs to prioritize between exchange rate stability and independent monetary policy, particularly as the capital account becomes increasingly liberalized.

Second, the surplus in Vietnam's financial account is largely due to the significant inflow of FDI into the country. However, when external economic conditions become less favorable or the domestic economic environment becomes unstable, these capital flows can fluctuate significantly, causing economic instability. Moreover, the financial account surplus in Vietnam is unsustainable because, apart from FDI, other investment flows into and out of Vietnam exhibit substantial volatility. This creates challenges for managing foreign capital flows and poses risks of capital flow reversals in Vietnam.

3.6. Evaluation of Vietnam's Balance of Payments (BOP)

Achievements

- **Consistent Trade Surplus:** Amidst low global consumer demand, Vietnam leveraged the recovery of major markets to boost exports. The trade balance recorded

consistent surpluses over the five years from 2019 to 2023, with an average annual surplus of $28 billion. The structure of exported goods has been continuously shifting positively, with a decrease in raw exports and an increase in processed and industrial products. This shift enables Vietnam to deepen its integration into global production and supply chains.

- **Stable FDI and Remittances:** According to data from the General Statistics Office and the State Bank of Vietnam, foreign direct investment (FDI) into Vietnam has steadily increased over the past five years. By the end of 2023, 129 countries and territories had invested in Vietnam, with FDI projects present across the country. Vietnam has become a prominent destination for large-scale foreign investments, such as the LNG-to-power project in Bac Lieu, valued at $50 billion by Delta Offshore Energy (Singapore), and Samsung's R&D center with an investment of approximately $220 million.
- **High Foreign Exchange Reserves:** Official data indicates that Vietnam's foreign exchange reserves reached approximately $102 billion by the end of 2023, an increase of over $23 billion compared to 2019 ($79 billion).

Limitations

- **Service Account Deficits:** The service account has consistently recorded deficits, with an increasing trend. In 2019, the deficit stood at $1.7 billion. Over the subsequent four years (2020-2023), the deficits grew significantly, reaching $10.3 billion (2020), $15.4 billion (2021), $13.4 billion (2022), and $9.2 billion (2023). Persistent service account deficits can lead to increased demand for foreign currency to pay for imported services, potentially depreciating the local currency. Additionally, payments for imported services reduce foreign exchange reserves, limiting the national economy's flexibility in responding to global fluctuations.
- **Dependence on FDI and Remittances:** The rapid increase in foreign investment inflows has heightened Vietnam's economic reliance on external funding. Global disruptions could prompt foreign investors to withdraw their capital, potentially slowing the country’s economic growth and development.
- **Low Economic Competitiveness:** Vietnam's economic structure still exhibits weaknesses in the international context. When prioritizing key sectors for development, two critical indicators are the domestic spillover effect and the import stimulation index. However, in sectors such as industry and construction, which receive substantial investment, the domestic spillover effect remains low, while the import stimulation index has surged. Although investments in trade and services have supported export growth, they have also fueled increased imports. Furthermore, Vietnam faces challenges in optimizing the benefits of joining the WTO, bilateral trade agreements, and agreements with major markets like the US, EU, and China. The country’s advantage as a low-cost manufacturing hub is gradually being eroded.
- **Lack of Diversity and Dependence on Specific Export Sectors:** Vietnam’s export structure remains under-diversified, with a limited variety of export products. New export items with significant revenue potential account for a small proportion. The export sector has yet to establish distinct values and remains reliant on inherent advantages. Vietnam’s export-oriented industries are still largely tied to primary agricultural, forestry, and fishery products. Meanwhile, industrial products such as footwear and electronic components are predominantly assembly-based.

4. Recommendations

First, establish sustainable linkages between policies, particularly monetary and

fiscal policies. This will provide a robust foundation for production and business growth. The implementation of these policies should be carefully calculated, considering the impact of each to select measures appropriate to the economic context.

Second, renew strategies to attract FDI. Given Vietnam's current growth in FDI inflows in terms of both scale and speed, the government needs to shift its focus from quantity to quality. Future efforts should aim at attracting investment into high-tech industries and new services to enhance Vietnam's position in technology markets. Strengthening collaboration between domestic and foreign enterprises is crucial to absorb technological advancements, increase productivity, and promote development.

Third, implement exchange rate adjustment measures. The State Bank of Vietnam should adopt exchange rate policies that balance domestic and foreign economic objectives. Maintaining exchange rate stability in line with market supply and demand dynamics will stimulate exports, limit imports, improve the balance of payments, and increase foreign exchange reserves. Additionally, efforts should be made to enhance the reputation of the Vietnamese đồng (VND), paving the way for its eventual convertibility. Coordination with foreign exchange policies is necessary to counter dollarization. The government should also refine foreign exchange policies to leverage international capital, boost trade, services, tourism, remittances, and investment while safeguarding the sovereignty of the VND and achieving monetary policy objectives.

Fourth, invest in improving production capacity and the competitiveness of export goods. Priority should be given to sectors with stable growth potential, high labor utilization, and significant use of domestic materials. Emphasis must be placed on raising quality standards and aligning production with market demands for quality and design. The government should support private enterprises, particularly those in manufacturing industries with strong export orientation. Encouraging the development of new products and markets is essential. Vietnam should expand export markets, embracing a policy of market and partner diversification while reducing dependence on a few markets. Focus should be directed toward high-purchasing-power markets like the U.S., EU, Japan, China, and Southeast Asia.

Fifth, regulate imports. The government should prioritize importing materials, equipment, and advanced technologies that support the country’s industrialization and modernization. Simultaneously, increased use of domestically produced materials and equipment should be encouraged to save foreign exchange and boost domestic production. Import restriction measures should only be temporary, as their effectiveness is limited and could negatively impact economic growth. To address trade deficits, Vietnam should prioritize accelerating export growth rather than relying on import reductions as previously done.

5. Conclusion

To enhance the effectiveness of the balance of payments, Vietnam must continue to foster the development of high-value-added industries, particularly in technology and services. Diversifying export markets and strengthening financial self-reliance will help mitigate risks from external factors. Finally, improving the investment environment and adjusting financial policies will contribute to maintaining stability and attracting high-quality capital inflows.

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THE IMPACT OF GLOBAL ENERGY, FERTILIZER, AND FOOD PRICES INTERACTIONS ON DOMESTIC FOOD PRICES IN VIETNAM

Cao Thi Thanh Van[1], Thach Phuoc Hung[2]

Abstract: This study investigates the interplay between global energy, fertilizer, and rice prices and their influence on inflation in Vietnam, a critical rice-exporting nation. Utilizing structural vector autoregressions (SVARs), the analysis examines how global natural gas, nitrogenous fertilizer and rice prices impact domestic inflation dynamics. The findings highlight the significant ripple effect originating from global price fluctuations, which permeates Vietnam's agricultural production and food markets.

Keywords: *energy price, fertilizer price, food price, SVAR model*

1. Introduction

Modern rice varieties, bred for high yields, have an increased demand for nutrients to thrive, with urea, a nitrogen-rich fertilizer, playing a vital role in meeting this requirement. Nitrogen is crucial for plant growth, fostering healthy foliage, increased tillering, and ultimately, higher grain yields (Jagtap et al., 2018).

However, the price of urea is volatile and subject to various factors, including global energy prices, geopolitical events affecting major producers, and disruptions in supply chains due to natural disasters. The year 2022 witnessed unprecedented highs in energy, fertilizer, and food prices, leading to widespread distress among households and firms globally. Consequently, policymakers implemented contractionary measures to curb rampant inflation.

Between May 2020 and November 2021, natural gas prices surged nearly 19-fold from US$1.45 to US$27.20, the producer price index for nitrogenous fertilizers rose by 52% to 148.4, and the global food price index climbed 34% from 96.51 to 129.77 (FRED, 2021). These increases were attributed to disrupted supply chains caused by the COVID-19 pandemic and the harsh European winter in 2021. The anticipation and onset of the Russo-Ukrainian war further exacerbated inflation.

Rice holds significant importance in both household well-being and national economic development in Vietnam. Studies by Vu (2008) and Nguyen et al. (2020) demonstrate that rice constitutes a considerable portion of household consumption, particularly among low-income families. Additionally, Ha et al. (2015) underscore that rice production serves as a vital income source for many rural households, especially those in poverty. Moreover, rice exports contribute approximately 3% to Vietnam's GDP (General Statistic Office, 2011). The country's transition from a net food importer to a major rice exporter, following agricultural reforms, is hailed as a success story in poverty alleviation (Pingali and Xuan, 1992; Che et al., 2001; Ravallion and Van de Walle, 2008; Kompas et al., 2012).

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Despite being one of the world's largest rice exporters, Vietnam heavily relies on urea fertilizer imports from China and other nations. Fluctuations in fertilizer and rice export prices can drive up domestic rice prices, leading to inflationary pressures. This study aims to evaluate how energy, fertilizer, and rice prices influence inflation in Vietnam. In which, we analyze the impact of natural gas and nitrogenous fertilizer prices on rice prices and inflation in Vietnam using structural vector autoregressions (SVARs).

2. Literature review

Recent research delves into the interconnectedness of commodity markets, focusing on energy (oil, natural gas), food, and fertilizer. This research can be categorized as: (1) energy-food price relationships, (2) fertilizer-food price relationships, and (3) energy-fertilizer price relationships.

Energy-Food Prices: Studies reveal some connections, though the mechanisms are complex. Some find a unidirectional impact, with rising energy prices leading to higher food prices (Shahnoushi et al., 2017; Taghizadeh-Hesary et al., 2018; Ji et al., 2018). Others suggest a more nuanced dynamic, with short-term effects for positive energy price changes and long-term impacts for both positive and negative changes (Chowdhury et al., 2021). However, Fowowe (2016) and others (Meyer et al., 2018; Eissa and Al Refai, 2019) challenge this notion, finding no long-term connection between energy and food prices. The timeframe and methodology used in these studies seem to influence the results.

Some research highlights a two-way relationship between energy and food prices (Rezitis, 2015; Su et al., 2019). De Gorter and Just (2008) even suggest that agricultural shocks, like corn demand fluctuations, can impact oil prices.

Fertilizer-Food Prices: Limited research exists, with mixed findings. Dillon and Barrett (2016) found minimal fertilizer price effects on local maize prices. However, Ismail et al. (2017) observed that fertilizer prices, particularly urea, can influence the prices of some agricultural commodities like rice and sugar. Kalkuhl et al. (2016) even suggest high fertilizer prices can decrease the global supply response to higher crop prices.

Energy-Fertilizer Prices: Studies show a connection between energy prices and fertilizer prices. Chen et al. (2012), Sanyal et al. (2015), and Wongpiyabovorn (2021) all found that changes in oil and natural gas prices significantly impact fertilizer prices. This might be due to the energy-intensive nature of fertilizer production.

The Gap: While research provides insights, a crucial gap exists - how do these price interactions affect domestic food prices in food-exporting countries?

Limited Research on Exporting Countries: Most research focuses on price transmission between domestic and international markets in developing country, like Asian countries (John, 2013; Ghoshray, 2011; Dawe, 2008; Conforti, 2004; Sharma, 2002), African countries (Minot, N., 2011; Benson, T., 2008), and Latino American (de Janvry, A., and E. Sadoulet, 2010; Robles, M., 2011). These studies suggest a close alignment between domestic and world prices, with domestic prices reacting quickly to changes in international markets.

The Need for Further Research: This limited research on exporting countries highlights the need for further investigation into how the complex interplay between energy, fertilizer, and food prices at the global level affects inflation via domestic food prices in rice-exporting countries like Vietnam.

3. Data and preliminary analysis

3.1. Data

In this study, we analysed monthly data over the period from March 2004 to November 2023 of four distinct series - natural gas price, urea price, rice price, and Consumer Price Index (CPI). The selection of natural gas price as the energy price metric stems from its pivotal role as a primary input in the production of nitrogen fertilizer, contributing significantly to variable production costs. Urea price was chosen as the representative fertilizer metric due to its widespread utilization in rice production. The spot prices of natural gas and urea considered in this analysis are sourced from the United States. In the case of rice price, the exporting price from Thailand was utilized, as it is deemed analogous to Vietnam's exporting rice price. All data of natural gas, urea, and rice prices were sourced from www.indexmundi.com. The inflation data utilized in this research was obtained from the monthly CPI provided by the General Statistics Office of Vietnam.

3.2. Unit root test

Before estimating the SVAR model we first conduct the KPSS unit root test to examine if the four time series are stationary. The null hypothesis of KPSS test is the stationarity. For original time series, KPSS statistics reveal that all four time series are not stationary. For the first order difference series, the statistics of the test indicate that they are stationary, which suggests that all the series are integrated with the order of one (I(1)) process.

3.3. Cointegration test

According to Engle and Granger (1987), if two time series with the same order of integration are cointegrated, vector error correction model (VECM) can better capture their joint dynamics than VAR. Recognizing this perspective, we should examine whether there are cointegration relationships among the variables. To this end, we employ a residual-based test developed by Engle and Granger (1987) to scrutinize the potential cointegration relationships among the variables. In most cases, the test statistics reject the null hypothesis of cointegration relationships. The absence of cointegration indicates that VAR model is appropriate and superior to vector error correction (VEC) model in terms of short-run forecast variance. Therefore, we will use VAR model to capture joint dynamics between gas, urea, rice price and inflation.

4. Methodology

We use SVAR model to investigate the effects of gas shock on rice price and inflation. In the literature, SVAR models are always used to investigate theoretical hypotheses from economic theory since standard VAR models do not distinguish among the endogenous models. Consequently, both impulse-response functions and variance decompositions that are obtained from Cholesky decomposition approach are getting sensitive to ordering of variables in the VAR model. In this research, we use the AB model by imposing exclusive restrictions on short-term relations.

A structural VAR specification based on the vector time series $y_t = (\Delta gas_t, \Delta urea_t, \Delta rice_t, \Delta i_t)$ where gas, urea, rice, i are, respectively, global price of natural gas, urea, exporting rice price and CPI of Vietnam. Δ is the first order difference operator. We use the first order difference series as they are stationary. The specification of SVAR can be written as follows:

$$\Delta y_t = \alpha + \sum_{i=1}^{j} B_i \, y_{t-i} + \epsilon_t \quad (1)$$

The lag length j is determined based on information criteria. The reduced-form of

structural representation of Eq. (1) is given by:

$$y_t = \omega + \sum_{i=1}^{j} B_i^* y_{t-1} + u_t$$

The structural innovations are derived from the reduced-form errors by imposing exclusive restrictions on the matrix A− 1. Following Kilian (2009), we employ only short-term restrictions on contemporaneous relations and do not use any long-run restrictions. We adopt the following recursive exclusion restrictions scheme:

$$e_t = \begin{pmatrix} e_t^{\Delta gas} \\ e_t^{\Delta urea} \\ e_t^{\Delta rice} \\ e_t^{\Delta i} \end{pmatrix} = \begin{pmatrix} a_{11} & 0 & 0 & 0 \\ a_{21} & a_{22} & 0 & 0 \\ a_{31} & a_{32} & a_{33} & 0 \\ a_{41} & a_{42} & a_{43} & a_{44} \end{pmatrix} \begin{pmatrix} \epsilon_t^{\Delta gas\ shock} \\ \epsilon_t^{\Delta urea\ shock} \\ e_t^{\Delta rice\ shock} \\ e_t^{\Delta inflation\ shock} \end{pmatrix}$$

We relate four shocks as follows:

- Only gas shock can shift gas contemporaneously.
- Only shocks to gas and urea can shift urea price contemporaneously.
- Only shocks to gas, urea, and rice can shift rice contemporaneously
- All shocks can affect inflation contemporaneously.

Once the SVAR in Equation (1) is identified, impulse response functions (IRFs) are calculated.

5. Empirical Result

The analysis begins by examining the response of urea prices to a natural gas price shock, as depicted in Figure 1. The chart illustrates an immediate increase in urea prices following the shock, with an initial rise of 2.5 USD/metric ton, peaking at 10 USD/metric ton over the subsequent 2.5 months. However, after this peak, urea prices gradually decline, returning to pre-shock levels within the 4 following months. Statistically, the positive effects of the natural gas price shock are observed for approximately 2.5 months before diminishing.

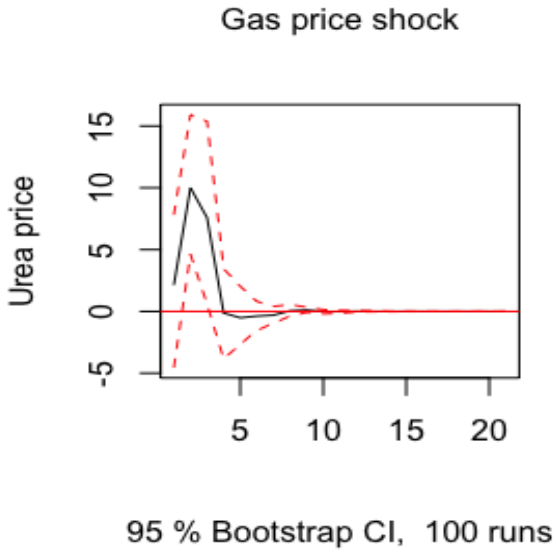

Figure 1: The responses of urea price to the price shock from natural gas

Moving on to Figure 2, we examine the response of rice prices in exporting countries to shocks in urea prices. The chart indicates that a shock in urea prices initially leads to a positive influence on rice prices, with an immediate increase of 4 USD observed. However, this initial rise is quickly followed by a sharp decline in rice prices, resulting in a negative impact lasting for three months. Subsequently, rice prices fluctuate around zero before diminishing. From a statistical standpoint, the positive effect of urea prices on exporting rice prices is short-lived, lasting only one month.

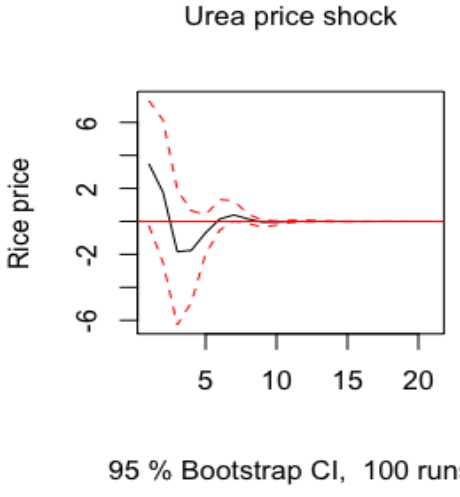

Figure 2: The response of exporting rice price to the shock from urea price

Finally, we discuss the impact of shocks in exporting rice prices on the Consumer Price Index (CPI), as shown in Figure 3. The chart reveals that shocks in exporting rice prices have a positive impact on the CPI. Immediately following a shock, the CPI experiences a sharp increase, peaking at 0.15%. However, this increase is short-lived, as the CPI begins to decline, reaching zero within a month before turning negative. The negative change in the CPI reaches its lowest point at -0.05% before rebounding to 0.03% in the fifth month. Over the following four months, the change in the CPI fluctuates close to zero before the impact diminishes. Statistically, the effects of the exporting rice price shock lasts only 2 months.

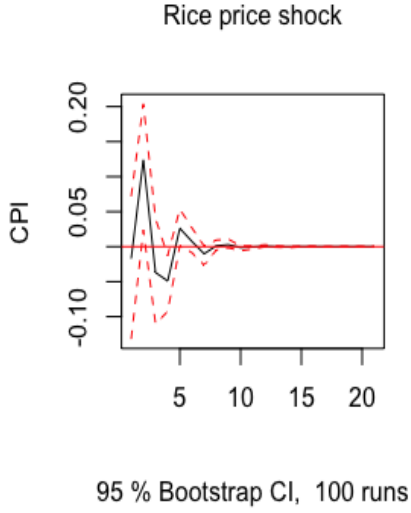

Figure 3: The response of CPI to the shock from exporting rice price

In summary, the analysis underscores the intricate relationships within commodity markets and the consequential impacts of exporting rice prices on domestic rice prices, with the Consumer Price Index (CPI) serving as a proxy. While natural gas price shocks initially generate positive effects in other markets, such as the rise in urea prices influencing rice prices and subsequently bolstering the CPI, these effects tend to be short-lived, rapidly diminishing over time, less than 8 months. These results are aligned with the view that energy, fertilizer, and food commodity prices co-move.

6. Discussion and conclusion

The analysis underscores the substantial impact of global energy, fertilizer, and food prices' interactions on domestic food prices in Vietnam, a critical rice-exporting nation. This influence stems from a mechanism termed the ripple effect, originating from inputs in the fertilizer industry and agricultural production. Despite the initial appearance of counterintuitiveness, rice prices are affected by the expectations of traders engaged in fertilizer trading and rice exporting, as well as by farmers. Consequently, they may engage in speculative behavior, withholding fertilizers and rice in anticipation of higher prices. This could lead to supply shortages and immediate price increases in these markets.

Within the context of Vietnam's inflation, the price of exported rice emerges as a pivotal determinant. Expectations of income growth through rice exports, coupled with higher domestic prices, directly influence inflation dynamics. This income effect may spur increased consumption expenditure. Additionally, farmers may foresee higher prices for their products, even if primarily consumed domestically, due to the elevated price of exported rice. Moreover, the availability of exported rice may stimulate domestic consumer demand, thereby exerting upward pressure on prices and contributing to inflationary tendency.

Therefore, strengthening market transparency and regulating speculative activities are critical to reducing price volatility caused by hoarding and anticipatory behavior among traders and farmers. Investments in domestic fertilizer production and strategic rice reserves can help stabilize supply chains and prevent price shocks. Additionally, balancing rice export policies with domestic price stability measures is essential to safeguarding both economic growth and food security. Targeted subsidies and inflation management policies can protect vulnerable populations, while promoting sustainable farming practices and alternative inputs can reduce dependency on volatile global markets. These integrated strategies will enable Vietnam to manage price dynamics effectively and maintain its role as a leading rice-exporting nation.

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ASSESSING THE SPILLOVER EFFECTS IN EXCHANGE RATES IN EAST ASIA: A STUDY WITH BIVARIATE BEKK GARCH MODEL

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Abstract: The target of our study is to examine whether and how exchange rate volatility is transmitted across East Asian countries which were largely involved in 1997 Asian financial crisis over the period of 2001 - 2023. To ease the computation and interpretation, we use bivariate BEKK GARCH models for 4 daily currency time series which are Indonesia Rupiah, Korea Won, Thai Baht and Singapore Dollar. Among the main findings of our paper is that the models we estimate reveal almost no transmission of volatility in exchange rates across the 4 currencies except for the transmission from Thai Baht and Singapore Dollar to Indonesia Rupiah.

Key words: spillover, GARCH, BEKK, volatility, exchange rates

I. INTRODUCTION

Asian crisis is an inspiration for volatility studies of which GARCH model plays a significant contribution. The evidence of volatility of equity and foreign exchange market in certain periods such as crisis and active ones has been well theorized as contagion. The volatility study have fueled a resurgent interest owing to the need of global investors who aim to make their portfolio less risky and governments target for a more proper exchange rate system and more stable financial system.

Indeed, the 1997 Asian currency crisis has prompted a re-examination of what might constitute a more appropriate exchange rate system for the region (Colm and Andrew, 2000). This is of much more significance in the case that East Asian countries are now aiming for a more flexible exchange rate regimes such as Korea and Thailand (Amit and Ramkishen, 2009).

There exists an imperative need for Asia to consider and assess exchange rates relationships in the area. This arises from the fact that Asia is one of the most volatile areas in the 1990s. However, as evidenced by recent researches, the issue of how exchange rate volatility transmits within the area of Asian countries is little examined. The recent notable studies on exchange rate volatility in the area are Stefan and Marc (2000), Andrew and Helen (2004), Angesles and Juan (2004) and Mardi and Vance (2004). In their research on prediction of Asian currency exchange rates, Stefan and Marc (2000) adopted GARCH structure for modeling the returns on certain return series such as the highly volatile exchange rates of East Asian currencies against the US dollar. Another study using GARCH method is Mardi and Vance (2004) with focus on measuring contagion in the East Asian currency crisis of 1997 - 1998. The data set is daily closing exchange rates of Thai baht, the Malaysian ringgit, the Indonesian rupiah and the Korean won, all expressed in US dollars from March 1995 to August 1998. The contagion is

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found with the contribution of contagion estimated at 9 per cent of total volatility for the Thai baht and 46 per cent for the South Korean won. Indonesia is found to be the most affected in terms of basis points (Mardi and Vance, 2004).

While in Angesles and Juan (2004)'s paper, the dynamic linkages between international stock market volatility during the Asian crisis in 12 relevant stock exchanges at an international level are assessed. In particular, they focused on the contagion hypothesis around the world using a bivariate GJR-GARCH model for each pair of factors associated to a specific international trading area: Europe, America, and Asia (Angesles and Juan, 2004).

Andrew and Helen (2004) examine the transmission of equity returns and volatility among Asian equity markets and investigate the differences that exist in this regard between the developed and emerging markets. BEKK MGARCH model is used to identify the source and magnitude of spillovers with weekly data in the period of 1998 - 2000.

In this study, we make new contribution with the usage of multivariate GARCH model to examine the volatility transmission of exchange rates among Asian countries with the most updated dataset. The daily data over the period of 25/01/2001 and 8/10/2023 is used to estimate bivariate GARCH models of staple East Asian exchange rates including the Thai Baht, the Singapore Dollar, the Korean Won and the Indonesia Rupiah. These are countries which were largely involved in the 1997 Asian currency crisis. An important feature of our analysis is the use of the Baba, Engle, Kraft, and Kroner (1990), ie., the BEKK parameterization, of the multivariate GARCH process without imposing the restriction of constant correlation. Another noteworthy facet is the adoption of daily data. According to Colm and Andrew (2000), daily data of exchange rates show a greater tendency to transmit volatility than the data of other frequencies such as weekly or monthly ones. It has been maintained that daily return data is preferred to the lower frequency data such as weekly and monthly returns because longer horizon returns can obscure transient responses to innovations which may last for a few days only (Elyasiani et al., 1998, p. 94).

Our paper is structured as follows. Section 2 describes the data and outlines the general form of the multivariate GARCH model that we use in our analysis. Section 3 presents the empirical results that we obtain from estimating the models on daily data. Section 4 summarizes the main results and their implications, and Section 5 presents our conclusions.

II. DESCRIPTION OF DATA

The dataset for the analysis in this study is daily exchange rates data of the East Asian countries which were most involved in Asian financial crisis in 1997. It includes Thai Baht (THB), Singapore Dollar (SGD), Indonesia Rupiah (IDR) and Korean Won (KRW) which are employed to examine the volatility transmission. Although Malaysia Ringgit was also involved in the 1997 crisis but it is not used in this study as Malaysia Ringgit had been fixed in the period of 1998 - 2005 at the rate of 3.8 Ringgit per 1 US dollar. Therefore, it is not appropriate to be covered in an analysis of volatility. The data period includes observations from 25/01/2001 to 8/10/2023 is used to estimate bivariate GARCH model of THB and SGD, THB and IDR, THB and KRW, IDR and SGD, and IDR and KRW. The dataset is obtained from Datastream and daily observations are at the close of business. All exchange rates are expressed as units per US dollar and are log-differenced

into continuously compounded returns.

Table 1 shows the main descriptive statistics for the exchange rate returns. Means of all returns are approximate to zero. All returns fluctuate around the means. THB and SGD, IDR and KRW exhibit similar standard deviations that are 0.1628 and 0.1469, 0.3233 and 0.3110, correspondingly. All currency returns display variations from zero skewness. THB and IDR display relatively large positive skewness in compare with SGD and KRW. As a common feature of financial time series, all currency returns exhibit excess kurtosis. The Jacque-Bera p-values which test how close the series resemble a normal distribution are shown on the sixth column. We reject the hypotheses that these series are approximately normal distribution with all p-values equals to zero.

Standard inference procedures do not apply to regressions which contain an integrated dependent variable or integrated regressors. Therefore, it is important to check whether a series is stationary or not before using it in a regression. The formal method to test the stationarity of a series is the unit root test. As shown on the 7th column of Table 1, we can confirm that all currency returns are stationary at 1 percent significance level.

Based on the suggestion by Engle (1982), we use the test for ARCH effects in the error term for the first moment of the models. This test is conducted by first squaring the residuals from the first moment models, then regressing these squared residuals on a constant and on the once-lagged squared residuals. The test statistic for ARCH effect is calculated as TR2, where T is the number of observations and R^2 is the coefficient of determination from the lagged squared errors regression. The test statistic is distributed as a χ^2_u where u is the number of lags, in this case equal to one. The null hypothesis is that no ARCH is present in this data. The results show that all currency returns exhibit ARCH(1) effects in their error terms at 1 percent significance level.

III. DESRIPTION OF THE MULTIVARIATE GARCH MODEL

Econometrics models of the second moment in finance have been paid a great amount of interest and attention in the recent decades with the wide usage of the class of Engle (1982)'s ARCH process. To examine whether cointegration relationship exist between the exchange rates, Johansen (1995) mulitvariate cointegration test is employed. No cointegration relationships are found and this fact complies with the efficient market theory. This study consequently proceeds to use log difference of the exchange rates of East Asian countries described as below.

$$R_{i,t} = 100*(\ln(ER_{i,t}) - \ln(ER_{i,t-1})) \quad (1)$$

$$R_{i,t} = \mu_i + \varepsilon_{i,t} \quad (2)$$

$$\varepsilon_{i,t} \mid \Omega_{t-1} \sim N(0,H_t) \quad (3)$$

Where:

$R_{i,t}$ is the return on currency i between time t and t-1

$ER_{i,t}$ is the spot rate of currency i measured in USD at time t

μ_i is the long term drift coefficient of currency i

$\varepsilon_{i,t}$ is the error term of currency i at time t

i = THB (Thai Baht), SGD (Singapore Dollar), IDR (Indonesia Rupiah) and KRW (Korean Won)

The models for the first moment are estimated simultaneously with those for second moment. In this study, BEKK parameterization is used because of its advantages in compare to the other models in the class of multivariate GARCH. BEKK GARCH model ensures a positive H, matrix, which is necessary for the estimated variance to be greater

than or equal to zero. This comes from the usage of quadratic forms. The BEKK parameterization for multivariate GARCH(1,1) model is written as:

$$H_t = AA' + B'H_{t-1}B + C'\varepsilon_{t-1}\varepsilon_{t-1}'C \quad (4)$$

Where:

$$H_t = \begin{bmatrix} \sigma_{1,t}^2 & \sigma_{12,t} \\ \sigma_{12,t} & \sigma_{2,t}^2 \end{bmatrix}; A = \begin{bmatrix} a_{11} & 0 \\ a_{21} & a_{22} \end{bmatrix}; B = \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{bmatrix}; C = \begin{bmatrix} c_{11} & c_{12} \\ c_{21} & c_{22} \end{bmatrix}; \varepsilon_t = \begin{bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \end{bmatrix} \quad (5)$$

The model can be expanded in the matrix form as:

$$\begin{bmatrix} \sigma_{1,t}^2 & \sigma_{12,t} \\ \sigma_{12,t} & \sigma_{2,t}^2 \end{bmatrix} = \begin{bmatrix} a_{11} & 0 \\ a_{21} & a_{22} \end{bmatrix}\begin{bmatrix} a_{11} & a_{21} \\ 0 & a_{22} \end{bmatrix} + \begin{bmatrix} b_{11} & b_{21} \\ b_{12} & b_{22} \end{bmatrix}\begin{bmatrix} \sigma_{1,t-1}^2 & \sigma_{12,t-1} \\ \sigma_{12,t-1} & \sigma_{2,t-1}^2 \end{bmatrix}\begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{bmatrix} + \begin{bmatrix} c_{11} & c_{21} \\ c_{12} & c_{22} \end{bmatrix}[\varepsilon_{1,t-1} \quad \varepsilon_{2,t-1}]\begin{bmatrix} c_{11} & c_{12} \\ c_{21} & c_{22} \end{bmatrix} \quad (6)$$

Bivariate GARCH(1,1) is expressed in equation form as :

$$\sigma_{1,t}^2 = a_{11}^2 + b_{11}^2\sigma_{1,t-1}^2 + 2b_{11}b_{21}\sigma_{12,t-1} + b_{21}^2\sigma_{2,t-1}^2 + c_{11}^2\varepsilon_{1,t-1}^2 + 2c_{11}c_{21}\varepsilon_{1,t-1}\varepsilon_{2,t-1} + c_{21}^2\varepsilon_{2,t-1}^2$$

$$\sigma_{12,t} = a_{11}a_{21} + b_{11}b_{12}\sigma_{1,t-1}^2 + (b_{11}b_{22} + b_{12}b_{21})\sigma_{12,t-1} + b_{21}b_{22}\sigma_{2,t-1}^2 + c_{11}c_{12}\varepsilon_{1,t-1}^2 + (c_{11}c_{22} + c_{12}c_{21})\varepsilon_{1,t-1}\varepsilon_{2,t-1} + c_{21}c_{22}\varepsilon_{2,t-1}^2$$

$$\sigma_{2,t}^2 = (a_{21}^2 + a_{22}^2) + b_{12}^2\sigma_{1,t-1}^2 + 2b_{12}b_{22}\sigma_{12,t-1} + b_{22}^2\sigma_{2,t-1}^2 + c_{12}^2\varepsilon_{1,t-1}^2 + 2c_{12}c_{22}\varepsilon_{1,t-1}\varepsilon_{2,t-1} + c_{22}^2\varepsilon_{2,t-1}^2 \quad (7)$$

We assume normally distributed errors in estimation process which implies the following log-likehood function,

$$LL(\theta) = -\frac{TN}{2}\ln(2\pi) - \frac{1}{2}\sum_{t=1}^{T}(ln|H_t| + \varepsilon_t' H_t^{-1}\varepsilon_t)$$

Where T is the number of observations, N is the number of variables in the system and 0 represents the vector of parameters to be estimated.

To examine the volatility transmission from one currency to another currency, these following hypotheses are tested,

Ho: $b_{21}^2 = 0$ (no volatility spillover from currency 2 to currency 1)

H1: $b_{21}^2 \neq 0$ (volatility in currency 2 spillover to that in currency 1)

And,

Ho: $b_{12}^2 = 0$ (no volatility spillover from currency 1 to currency 2)

H1: $b_{12}^2 \neq 0$ (volatility in currency 1 spillovers to that in currency 2)

The hypothesis test use significance level of 5 percent.

As we can see in the model, the parameters a_{ij}, b_{ij} and c_{ij}, (i=1,2 and j=1,2) cannot be interpreted on individual basis. Instead, the parameters of lagged variance in equations (7) that are a^2_{ij}, and b^2_{ij} are of interest. To execute significance tests, we need to calculate the expected values and the standard errors of these nonlinear functions. The expected values of nonlinear function of random variables are the function of the expected values of the parameters in case the estimated values of parameters are unbiased. Besides, calculation of standard errors of the nonlinear function of the coefficients is not straightforward. A first order Taylor series help to linearise the function and enable us to calculate its standard errors.

$$Var[g(x)] \cong [g'(x)]^2 Var(x) => Var(b^2) \cong (2b)^2 Var(b) \cong 4b^2 Var(b)$$

IV. EMPIRICAL RESULTS

Ideally, we would estimate a 4-variable multivariate GARCH model of the full set of currencies. However, this would require the estimation of a large number of parameters. This is very complicate under the availability of prevailing computing softwares. To ease interpretation, we therefore focus our attention on subsets of 2-variable models to check the robustness of the results on volatility transmission. The significance level of coefficients is at 0.05 or better.

Table 1: Descriptive statistics of return series

Currencies	THB	SGD	IDR	KRW
Mean	-0.0041	-0.0043	0.0027	-0.0022
Standard Deviation	0.1628	0.1469	0.3233	0.3110
Skewness	2.5505	0.1211	1.5706	-0.7041
Kurtosis	147.56	7.8572	72.4360	59.1900
JB value	0.0000	0.0000	0.0000	0.0000
P-value for unit root test	0.0000	0.0001	0.0000	0.0000
ARCH(1) p-value	0.0024	0.0000	0.0000	0.0000

Table 2, 4, 6, 8 and 10 show the original estimate results of BEKK GARCH(1,1) for bivariate models of IDR and THB, KRW and THB, SGD and THB, IDR and KRW, and IDR and SGD, correspondingly. Each table displays 11 parameters and their standard errors including a_{11}, a_{21}, a_{22}, b_{11}, b_{21}, b_{12}, b_{22}, c_{11}, c_{21}, c_{12} and c_{22}.

Table 2: Estimates of BEKK GARCH(1,1) for Indonesia Rupiah and Thai Baht

Parameter	Estimate	Standard Error	t-value	P-value
a_{11}	0.00571	0.00055	10.32	0.0001
a_{21}	0.00304	0.00094	3.23	0.0012
a_{22}	0.00083	0.00013	6.62	0.0001
b_{11}	-0.7791	0.01734	-44.92	0.0001
b_{21}	0.16725	0.04587	3.65	0.0003
b_{12}	-0.0313	0.01456	-2.15	0.0316
b_{22}	0.92013	0.00778	118.25	0.0001
c_{11}	0.69558	0.0308	22.58	0.0001
c_{21}	-0.0016	0.01981	-0.08	0.934
c_{12}	-0.0028	0.0071	-0.39	0.6932
c_{22}	0.37995	0.0177	21.47	0.0001

Table 3: Calculation of spillover parameters for Indonesia Rupiah and Thai Baht

Independent variables	$\sigma^2(THB_t)$	$\sigma^2(IDR_t)$
$\sigma^2(THB_{t-1})$	0.846639* (0.013066)	0.027972* (0.010303)
$\sigma^2(IDR_{t-1})$	0.000979 (0.00124)	0.606996* (0.012123)

Table 4: Estimates of BEKK GARCH(1,1) for Korea Won and Thai Baht

Parameter	Estimate	Standard Error	t-value	P-value
a_{11}	0.00077	0.00013	5.78	0.0001

a_{21}	0.0004	0.00009	4.53	0.0001
a_{22}	0.00083	0.00013	6.59	0.0001
b_{11}	0.95453	0.00366	260.55	0.0001
b_{21}	0.00512	0.00507	1.01	0.3133
b_{12}	0.0032	0.0024	1.34	0.1814
b_{22}	0.88944	0.00941	94.56	0.0001
c_{11}	0.28212	0.01219	23.15	0.0001
c_{21}	-0.0261	0.01272	-2.05	0.0401
c_{12}	-0.0063	0.0079	-0.8	0.4258
c_{22}	0.44131	0.01958	22.54	0.0001

Table 5: Calculation of spillover parameters for Korea Won and Thai Baht

Independent variables	$\sigma^2(THB_t)$	$\sigma^2(KRW_t)$
$\sigma^2(THB_{t-1})$	0.791103*	2.62e-05
	(0.014053)	(0.000125)
$\sigma^2(KRW_{t-1})$	0.00001	0.911127*
	(8.14e-05)	(0.017964)

Table 6: Estimates of BEKK GARCH(1,1) for Singapore Dollar and Thai Baht

Parameter	Estimate	Standard Error	t-value	P-value
a_{11}	0.00031	0.00006	5.12	0.0001
a_{21}	0.00028	0.00007	3.83	0.0001
a_{22}	0.00086	0.00012	6.92	0.0001
b_{11}	0.96636	0.00367	263.29	0.0001
b_{21}	-0.0042	0.00344	-1.23	0.2186
b_{12}	0.01661	0.00716	2.32	0.0204
b_{22}	0.89191	0.00974	91.57	0.0001
c_{11}	0.23520	0.01261	18.66	0.0001
c_{21}	0.00650	0.00869	0.75	0.4550
c_{12}	-0.04577	0.02194	-2.09	0.0370
c_{22}	0.42439	0.02001	21.21	0.0001

Table 7: Calculation of spillover parameters for Singapore Dollar and Thai Baht

Independent variables	$\sigma^2(THB_t)$	$\sigma^2(SGD_t)$
$\sigma^2(THB_{t-1})$	0.795503*	0.000017
	(0.039137)	(0.000106)
$\sigma^2(SGD_{t-1})$	0.000275	0.933851*
	(0.000289)	(0.018825)

Table 3, 5, 7, 9 and 11 show the calculations of spillover parameters of BEKK GARCH(1,1) for bivariate models of IDR and THB, KRW and THB, SGD and THB, IDR and KRW, and IDR and SGD, correspondingly. Each table displays 4 parameters and their standard errors including b^2_{11}, b^2_{21}, b^2_{12} and b^2_{22}. These results come from the calculation based on the results of Table 2, 4, 6, 8 and 10.

Table 8: Estimates of BEKK GARCH(1,1) for Indonesia Rupiah and Korea Won

Parameter	Estimate	Standard Error	t-value	P-value
a_{11}	0.00414	0.00052	7.93	0.0001
a_{21}	-0.00016	0.00023	-0.70	0.4866
a_{22}	0.00067	0.00012	5.56	0.0001
b_{11}	0.78174	0.01968	39.73	0.0001
b_{21}	0.06312	0.0083	7.61	0.0001
b_{12}	0.0023	0.00557	0.41	0.6797
b_{22}	0.9571	0.00391	244.85	0.0001
c_{11}	0.66693	0.03093	21.56	0.0001
c_{21}	-0.17811	0.02199	-8.10	0.0001
c_{12}	0.00095	0.01240	0.08	0.9391
c_{22}	0.27441	0.01282	21.40	0.0001

Table 9: Calculation of spillover parameters for Indonesia Rupiah and Korea Won

Independent variables	$\sigma^2(KRW_t)$	$\sigma^2(IDR_t)$
$\sigma^2(KRW_{t-1})$	0.91604* (0.023736)	0.003984 (0.003905)
$\sigma^2(IDR_{t-1})$	0.000005 (0.000101)	0.611117* (0.006113)

Table 10: Estimates of BEKK GARCH(1,1) for Indonesia Rupiah and Singapore Dollar

Parameter	Estimate	Standard Error	t-value	P-value
a_{11}	0.00398	0.00053	7.53	0.0001
a_{21}	0.00232	0.00144	1.62	0.1061
a_{22}	0.00041	0.00010	4.03	0.0001
b_{11}	0.78009	0.01445	53.98	0.0001
b_{21}	-0.2472	0.09029	-2.74	0.0062
b_{12}	0.04077	0.01908	2.14	0.0327
b_{22}	-0.9785	0.00415	-235.81	0.0001
c_{11}	0.67198	0.02615	25.70	0.0001
c_{21}	0.20456	0.03012	6.79	0.0001
c_{12}	0.00158	0.00710	0.22	0.8238
c_{22}	-0.18826	0.01126	-16.72	0.0001

Table 11: Calculation of spillover parameters for Indonesia Rupiah and Singapore Dollar

Independent variables	$\sigma^2(IDR_t)$	$\sigma^2(SGD_t)$
$\sigma^2(IDR_{t-1})$	0.60854* (0.006475)	0.001662 (0.002456)
$\sigma^2(SGD_{t-1})$	0.061107* (0.012929)	0.957462* (0.013895)

Given the results of Table 2-11, we can see that all diagonal variance coefficients (b^2_{11} and b^2_{22} for 5 bivariate models) are statistically significant at the 5% level. Only a few number of statistically significant off-diagonal transmission variance coefficients indicates little interaction between the variables' second moments. More specifically, only 2 off-diagonal variance coefficients are statistically significant at the 5% level out of the total of 10 off-diagonal variance coefficients. In detail, on Table 3, $b^2_{21} = 0.029972$ is statistically significant and displays the unidirectional volatility transmission from Thai Baht to Indonesia Rupiah, and on Table 11, $b^2_{21} = 0.957462$ is statistically significant and displays the displays the unidirectional volatility transmission from Singapore Dollar to Indonesia Rupiah. All the other transmission coefficients are not statistically significant at the conventional 5% level. As a result, there is no bidirectional spillover effect in exchange rates volatility between Korea Won and Thai Baht, Singapore Dollar and Thai Baht, Indonesia and Korea Won. And there is no unidirectional spillover effect in exchange rates volatility from Indonesia Rupia to Thai Baht, and from Indonesia Rupiah to Singapore Dollar. As such, Indonesia is the only country in our analysis dataset that receive currency volatility transmission from the other countries which are Thailand and Singapore. These results also support the hypothesis that Thailand was a trigger for the East Asian crisis and Indonesia Rupiah was the most affected and volatile.

These findings are mostly consistent with that of Mardi and Vance (2004). In their research results, there is no statistical evidence of contagion from Indonesia or Korea in the model and contagion from Thailand to the other countries is clearly statistically significant.

As a matter of fact, the exchange markets in East Asian countries are not the most contagious channel. This result is noteworthy when we look at the result of Andrew and Helen (2004) which concluded that all Asian equity markets are highly integrated.

V. SUMMARY AND CONCLUSIONS

The target of our study is to examine whether and how exchange rate volatility is transmitted across East Asian countries which were largely involved in 1997 Asian financial crisis over the period of 2001 - 2023. To ease the computation and interpretation, we use bivariate BEKK GARCH models for 4 daily currency time series which are Indonesia Rupiah, Korea Won, Thai Baht and Singapore Dollar.

Among the main findings of our paper are that the models we estimate reveal almost no transmission of volatility in exchange rates across the 4 currencies except for the transmission from Thai Baht and Singapore Dollar to Indonesia Rupiah. This supports a large part of findings of Mardi and Vance (2004), who report there is no statistical evidence of contagion from Indonesia or Korea in the model and contagion from Thailand to the other countries is clearly statistically significant.

This analysis could be extended in a number of ways. First, multivariate GARCH models could be used to examine the volatility transmission of all countries in the area to check the robustness of their results to the choice of specification. Second, the model could be expanded to include other assets such as equities to increase the number of potential contagious channels.

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RENEWABLE ENERGY CONSUMPTION BEHAVIOR AND ITS ROLE IN SUPPORTING VIETNAM'S GREEN ECONOMIC DEVELOPMENT

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Abstract: This study analyzes the consumption behavior of renewable energy in response to the growing demand for green economic development in Vietnam. It highlights Vietnam's significant potential for renewable resources and their role in promoting a sustainable green economy. The research encourages greater consumption of renewable energy to raise community awareness and motivate businesses to engage in the green energy market. The findings emphasize the vital role renewable energy consumption plays in achieving Vietnam's green economic goals in the near future.

Keywords: Renewable energy, green economy, energy consumption, sustainable development.

1. Introduction

The fact that nations focus solely on exploiting natural resources without considering the efficiency of exploitation has helped economies achieve high growth rates over long periods. However, this development has caused certain consequences such as the depletion and scarcity of natural resources, alarming levels of environmental pollution (air, water, oceans); soil degradation; deforestation; loss of biodiversity; increased greenhouse gas emissions like CO2, SO2, CH4, leading to threats to economic-social activities as well as human life in general. At the 2021 United Nations Climate Change Conference (COP 26), Prime Minister Pham Minh Chinh committed Vietnam to "developing and implementing stronger measures to reduce greenhouse gas emissions using its own resources, along with international cooperation and support, including financial and technology transfer, and implementing mechanisms under the Paris Agreement, to achieve net-zero emissions by 2050"

Additionally, one of the biggest challenges facing the world today is the depletion of fossil fuels, including oil, coal, and natural gas. According to the International Energy Agency (IEA), global supply is expected to reach a record level by 2024. It is projected to increase by 1.5 million barrels per day, reaching an unprecedented 103.5 million barrels/day, while coal and natural gas sources could also run out by the end of this century. Therefore, green consumption has become a global trend, as environmental concerns are now a top priority for many nations.

It can be said that the concept and awareness of the green economy remain unclear,

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with various interpretations and terminology. Western countries define it as a green economic model, while developing countries adopt green growth strategies. For instance, China is transitioning its economic development methods with a focus on green development and ecological civilization. In Thailand, the model is termed the "sufficient economy." Despite different approaches, there is a consensus that the green economy is based on three pillars: economic development (economic growth, employment issues...); environmental sustainability (reducing carbon energy and minimizing natural resource depletion...); and society (improving education quality, ensuring equality in opportunities created by the green economy, providing a healthy living environment).

Today, consumers are beginning to realize that their consumption behaviors can significantly impact the natural environment. According to a recent study, about 80% of Vietnamese consumers are willing to spend more on products that are environmentally friendly, and 79% are willing to pay extra for safe products that do not contain undesirable ingredients.

2. Literature review

Regarding domestic studies, in the research paper *The Relationship Between Green Growth, Green Economy, Circular Economy, and Sustainable Development*, Nguyen Hoang Nam and colleagues (2020) stated: “When compared to the concept and 17 goals of sustainable development, it can be seen that the green economy is similar to but does not replace sustainable development.”. Reseach studies sharing this perspective include those by Do Phu Hai (2018), Le Anh Quoc (2023), Nguyen Duy Phuong (2023), and Do Manh Hien (2023).

The definition of the green economy is elaborated by Do Manh Hien (2023) in his research *Lessons in Green Economy Development in Several Asian Countries*, emphasizing three factors: low carbon emissions, efficient use of resources, and ensuring social equity. This view is also reflected in studies by authors such as Nguyen Hoang Nam and colleagues (2020) and Nguyen Duy Phuong (2023).

In the study *The Role of Green Economy in Sustainable Development (Case Study: The EU States)*, Lavrinenko and colleagues (2019) highlighted that discussions on green concepts have long been associated with broader debates about the relationship between sustainable development and the environment. Some authors suggest that reducing economic activity levels is a solution to environmental impact. However, this study presents a contrasting viewpoint: “Environment” and “economic growth” should not be seen as conflicting objectives, based on an analysis of the situation in EU countries during the 2016-2017 period. This perspective is also found in studies by authors such as Mieczysław, Adamowicz (2022), and Mochammad (2024).

In their study *Green Economy and Related Concepts: An Overview*, Loiseau and colleagues (2016) stated: “The generic framework of a green economy shows that different concepts and approaches are available and can be used to support the transition towards sustainability.” The study also examined skepticism from other researchers regarding the green economy's ability to support sustainable development by analyzing two theoretical frameworks related to the green economy: *weak sustainability* and *strong sustainability*. The weak sustainability theory posits a perfect substitution between natural capital and human capital. Neymar (2007) argued that losses in one aspect could be compensated by gains in another. Conversely, the strong sustainability theory in bioeconomics asserts that natural capital and artificial capital are complementary but

cannot be entirely substituted for one another. Neumayer (2007) emphasized that losses in natural capital cannot be compensated by increases in human-made capital.

3. Theoretical Framework and methodology

Green Economy is a relatively new topic in recent years and represents an inevitable economic shift as the previously dominant "brown economy" model in developing countries is increasingly misaligned with the global economic objectives. The concept of a green economy was first introduced by Pearce and colleagues in 1989 in response to the undervaluation of environmental and social costs in current pricing systems (Le Blanc, 2011). Green economy has been defined in various ways, but no universally accepted definition yet. However, one of the most comprehensive definitions is provided by the United Nations Environment Programme (UNEP, 2011b, p.2): *"A green economy is an economy that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In its simplest terms, a green economy can be thought of as low-carbon, resource-efficient, and socially inclusive."* From this definition, the core elements of a green economy include low carbon emissions, efficient resource utilization, and the assurance of social equity. Scholars have approached the green economy from various perspectives, but there is consensus on its three pillars: **Economic**: Eliminating poverty, promoting growth, and creating green jobs for society; **Environmental**: Reducing carbon emissions, efficient energy use, and effective resource management; **Social**: Ensuring human well-being and prosperity. *"The green economy does not replace sustainable development but rather represents a way to achieve it, with greater emphasis on environmental protection and addressing climate change" (Đỗ Phú Hải, 2018).* Thus, environmental resources and climate change adaptation are central to the green economy, whereas sustainable development emphasizes balancing environmental protection with economic growth and social progress.

Characteristics of the Green Economy

The shared characteristics of a green economy, as recognized by multiple studies, include: 1). Facilitating sustainable development; 2) Emphasizing natural resource protection and climate change adaptation; 3) Respecting planetary boundaries; 4) Measuring economic progress beyond GDP; 5) Ensuring equity: Promoting fairness among nations and generations; 6) Protecting biodiversity and ecosystems: Safeguarding the richness of life and natural systems; 7) Poverty reduction and livelihood improvement, enhancing living standards and access to essential services, including democracy, community participation, accountability, and stability.

Roles and Goals of the Green Economy

The role of the green economy is consistently identified in the majority of studies with three common roles:1) Contributing to poverty alleviation;2) Mitigating climate change;3) Maintaining and enhancing natural capital. Three main goals : Ensure that resources and the environment are protected and utilized efficiently while improving human quality of life; The green economy also contributes to building sustainable economic systems and enhancing labor productivity; Green economic activities include investment in renewable energy sectors, production of environmentally friendly goods and services, sustainable resource exploitation, development of green urban areas, and strengthening environmental management and sustainable development (Trương Phi Cường, 2023).

Methodology and Data sources

This study uses a literature review approach, analyzing global and domestic research, legal frameworks, and statistical data, including reports from the World Bank and Vietnam's Ministry of Industry and Trade.

4. The Current Situation of Renewable Energy Utilization in Vietnam

Renewable energy plays a crucial role in Vietnam's national power system, contributing to energy security and the transition towards a "green economy." In recent years, Vietnam has made significant progress in renewable energy development. By 2018, renewable energy accounted for approximately 15.71% of the total electricity supply, with renewable energy generation reaching 36 billion kWh in 2019 (BritCham, 2023). The share of renewable energy increased to 25.3% of total installed capacity in 2020 (Dr. Nguyen Thanh Huyen, Dr. Ngo Thi Quyen, 2024). As of 2023, the total installed capacity of renewable energy sources (wind and solar power) was 21,664 MW, accounting for 26.9% of the national capacity (EVN, 2024).

In this context, the government has set clear targets for renewable energy development through various policies. Notably, on May 15, 2023, Power Development Plan VIII was approved under Decision No. 500/QD-TTg, providing a specific roadmap for the electricity sector's development from 2021 to 2030, with a vision to 2050. Specifically, this plan targets increasing the share of renewable energy in the power structure to 30.9%-39.2% by 2030, aiming for 71.5% by 2050. International commitments such as the Just Energy Transition Partnership (JETP) will further support Vietnam in accelerating its energy transition, integrating large-scale renewable energy sources, and reducing greenhouse gas emissions, contributing to achieving the goal of net-zero emissions by 2050 (FULL TEXT: Power Development Plan VIII, 2023).

Solar energy

Vietnam is a country with significant solar energy potential due to its favorable geographical location, receiving abundant solar radiation year-round. According to data from the Global Solar Atlas, the average daily Global Horizontal Irradiance (GHI) in Vietnam ranges from 3.16 to 5.5 kWh/m², with average sunshine hours between 1,400 and 3,000 hours per year. Specifically, the GHI in the northern regions is estimated to range from 3 to 4 kWh/m². In contrast, the southern regions, Central Highlands, and South Central Coast, with stable temperatures and 2,000 to 2,500 sunshine hours per year, have a daily GHI ranging from 4 to 5.5 kWh/m² (Thi Khanh Huyen Nguyen, Giang Vu, Xuan-Truong Nguyen, 2020).

Before 2017, despite having great potential for solar power, as of August 2017, the total installed capacity of solar power was only about 28 MW, primarily from small-scale, off-grid systems. However, following the Government's issuance of Decision No. 11/2017/QD-TTg on April 11, 2017, regarding mechanisms to encourage the development of solar power projects in Vietnam, opportunities for significant project development emerged (Thuy, 2021).

According to Vietnam Electricity (EVN), by June 30, 2019, the total installed capacity of solar power integrated into the national grid had reached 4,460 MW. The National Power Dispatch Center (A0) reported that 82 solar power plants with a combined capacity of 4,464 MW had been successfully commissioned. These projects benefited from a fixed feed-in tariff (FIT) of 9.35 US cents/kWh for 20 years under Decision No. 11/2017/QD-TTg issued by the Prime Minister. Of these, 72 solar power plants (totaling

4,189 MW) were managed by A0, while the remaining 10 plants (totaling 275 MW) were operated by regional dispatch centers. By mid-April 2019, only 4 solar power plants in the entire national power system had capacities below 150 MW. Solar power accounted for 8.28% of the total installed power capacity at that time. According to EVNSPC, by the end of October 2019, the total installed rooftop solar capacity of customers was 148,813 kWp, achieving 156% of EVN's plan. Up to 8,299 customers had installed two-way meters for selling rooftop solar electricity to power companies, and the cumulative power output to the grid in the first 10 months of 2019 reached 35.33 million kWh (Tuan, 2019).

Thanks to incentive mechanisms (Decision No. 11/2017/QD-TTg on April 11, 2017, and Decision No. 13/2020/QD-TTg on April 6, 2020), by the end of 2020, the total installed solar power capacity in Vietnam reached approximately 19,400 MWp (equivalent to 16,500 MW), accounting for about 25% of the total installed capacity of the national power system. In addition, 2020 marked a breakthrough year for rooftop solar power, with over 100,000 projects and a combined capacity of 9,300 MWp.

According to EVN, by the end of 2023, the combined capacity of solar and wind power reached 21,664 MW, equivalent to 27% of the total installed power capacity. Data from the International Renewable Energy Agency (IRENA) in 2023 showed that solar energy accounted for more than one-third of the total installed renewable energy capacity in Vietnam. This reflects the robust development of the domestic solar energy sector, which has attracted major investments. For instance, First Solar, a renowned American thin-film solar module manufacturer, has invested in Vietnam with two factories located in Cu Chi District, Ho Chi Minh City, involving a total investment of $830 million out of a committed $1.2 billion. In Bac Giang, JA Solar Investment (Hong Kong) Limited has invested in three projects in Quang Chau and Viet Han Industrial Parks, with a total registered capital of $589 million. By April 2023, two projects in Quang Chau Industrial Park had already been operational (Van Nguyen, 2024).

Policy Directions: The Vietnamese government has issued several policies to promote solar energy development. Decision No. 11/2017/QD-TTg, issued by the Prime Minister, outlines mechanisms to encourage solar power projects in Vietnam. It sets the purchasing price for grid-connected solar power at 2,086 VND/kWh (equivalent to 9.35 US cents/kWh, excluding VAT), effective from June 1, 2017, to June 30, 2019.

Circular No. 16/2017/TT-BCT (September 12, 2017) and Circular No. 05/2019/TT-BCT (March 11, 2019) from the Ministry of Industry and Trade further facilitated the development of solar power projects, including model power purchase agreements for both large ground-mounted systems and small rooftop systems.

On April 6, 2020, Decision No. 13/2020/QD-TTg was officially approved by the Prime Minister, replacing the expired Decision No. 11/2017/QD-TTg. This decision, effective from May 22, 2020, demonstrated the government's commitment and responsiveness by setting specific targets, ensuring purchase prices for photovoltaic systems, offering practical incentives, and establishing technical standards to support grid connection. These efforts have become a driving force for investors and energy organizations to focus on renewable energy development. The above actions by the Vietnamese government and other organizations highlight a promising future for renewable energy development (Thi Khanh Huyen Nguyen, Giang Vu, Xuan-Truong Nguyen, 2020).

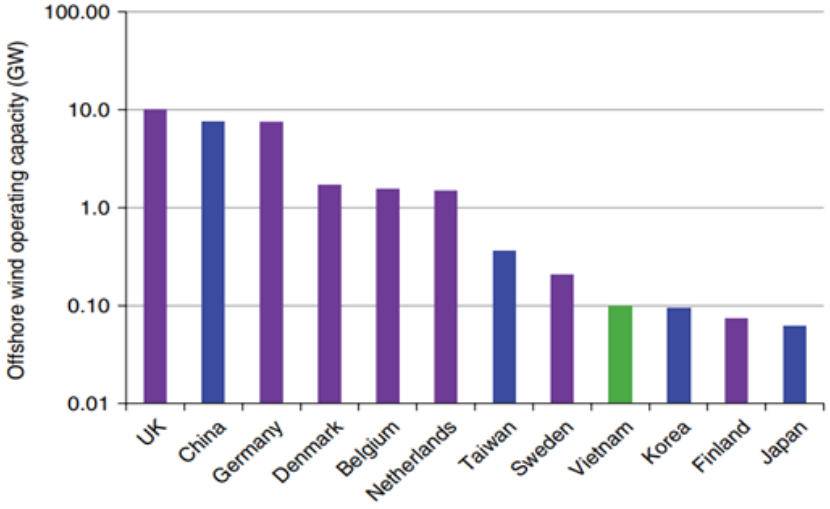
Decree No. 135/2024/ND-CP, issued on October 22, 2024, focuses on promoting self-production and self-consumption of rooftop solar power systems. Systems with a capacity of under 100 kW or not connected to the national grid are exempt from operational licensing requirements, reducing administrative barriers. This decree encourages the use of on-site renewable energy, helps reduce the load on the national grid, and improves sustainable energy efficiency (Ngoc Thuy, 2024).

Wind energy

With a coastline of 3,260 km stretching from north to south, Vietnam has many opportunities to develop offshore wind energy projects. In the study by Nguyen Duc Luong (2015), various opinions on potential areas for development and wind energy production potential in Vietnam are discussed. The World Bank's report, *Wind Resource Map for Southeast Asian Countries* (Cambodia, Laos, Thailand, and Vietnam, 2001), indicates that 39% of Vietnam's land area is estimated to have an average wind speed greater than 6 m/s (the speed suitable for operating large wind turbines) at 65 meters above ground level (AGL). This area is estimated to have a potential wind energy capacity of 513,360 MW. However, Vietnam's wind energy potential may be overestimated due to significant uncertainties in the simulation model. To verify this hypothesis, the author presents two additional research results: one from EVN (2007), which estimates wind energy capacity in Vietnam at 1,785 MW, and another from the Ministry of Industry and Trade (MOIT) in cooperation with the World Bank (WB) (2010), using an upgraded version of the WB (2001) study, which estimates potential wind capacity at 26,763 MW—19.2 times lower than the WB's (2001) estimate. However, it should be noted that this comparison does not account for the differences in wind data heights between the two studies (65 m AGL in the WB (2001) study and 80 m AGL in the MOIT-WB (2010) study).

Wind energy is analyzed into three types according to the Electricity and Renewable Energy Department & the Danish Energy Agency in the *Vietnam Energy Outlook Report - The Road to Net-Zero Emissions* (2024), specifically: onshore wind, nearshore wind, and offshore wind. Among these, offshore wind is further divided into two categories: fixed-bottom offshore wind and floating offshore wind. Offshore wind energy is projected to have the potential to account for nearly 40% of global renewable electricity production by 2050, according to the International Renewable Energy Agency (IRENA) (2022). Additionally, the World Bank, in its *Offshore Wind Roadmap for Vietnam* (2021), indicates that Vietnam has quickly become one of the pioneers in offshore wind energy, with nearshore projects in the southern region. As of the end of 2019, Vietnam ranked ninth globally in installed offshore wind capacity, with 99 MW in operation, as shown in Figure 1. This figure is higher than that of Japan, South Korea, and the United States. However, this result contrasts with the statement in the *Vietnam Energy Outlook Report - The Road to Net-Zero Emissions*, which was developed by the Electricity and Renewable Energy Department of the Ministry of Industry and Trade in collaboration with the Danish Energy Agency. Specifically, the report states that the assumed potential for fixed-bottom offshore wind is 101 GW and for floating offshore wind is 117 GW (in sea areas within 6 nautical miles to 150 km from the coast, excluding shipping lanes, with an average wind speed greater than 7 m/s). However, as of 2024, no offshore wind projects have been operational. Despite the absence of operational offshore wind projects, the 8th Power Plan aims to install 6 GW of offshore wind capacity by 2030 (fixed-bottom)

and expects that by 2050, the capacity will increase at least tenfold. However, some offshore wind projects may face issues of misclassification or unclear distinctions between "offshore wind projects" and "nearshore wind projects" due to a lack of specific differentiation in current legal regulations. Even in the 8th Power Development Plan (PD8), there is no clear distinction between offshore and nearshore wind projects, which has been pointed out by the international law firm WFW. Specifically: “However, most projects installed to date with accumulated capacity of just around 1 GW, are in inter-tidal zones. From a technical perspective, such projects are normally classified as “nearshore wind power projects”, rather than “offshore wind power projects” which are constructed farther from shore. Although these two classifications are mentioned in PDP8, current legislation has not clarified the difference between them”. This distinction is crucial because offshore wind projects, typically located in deeper waters, require different technological, environmental, and logistical considerations compared to nearshore projects. The lack of clarity in the regulations could affect the planning, investment, and development of large-scale offshore wind projects in Vietnam.



Resource: BVG (nguồn: báo cáo World Bank)

As of now, wind energy is the second-largest renewable energy source in Vietnam. Notably, in the first 7 months of 2023, wind power generation reached 6.606 billion kWh, accounting for approximately 30% of the total renewable energy output (22.11 billion kWh) and about 3.8% of the total electricity generation in the entire system (160.58 billion kWh). The wind power output in the first 7 months of 2023 met 2.63% of Vietnam's electricity demand in 2023, which is expected to reach 251 TWh. As of November 3, 2023, according to EVN, there are 81 out of 85 wind power projects that have submitted electricity price negotiation documents and power purchase agreements (PPA). These projects have a total capacity of 4,597.86 MW. Of these, 69 projects with a total capacity of 3,927.41 MW proposed a temporary price at 50% of the ceiling price according to the price framework under Decision No. 21/QĐ-BCT dated January 7, 2023, by the Ministry of Industry and Trade. EVN and the project developers have completed the price negotiation and signed provisional PPAs for 63 out of 69 projects, and the Ministry of Industry and Trade has approved the temporary price for 62 projects with a total capacity of 3,399.41 MW. Among the 85 projects, 77 are wind power projects. Out

of these, 62 wind power projects proposed a temporary price at 50% of the ceiling price under the Decision No. 21/QĐ-BCT, and 16 wind power projects have successfully negotiated prices with EVN and have officially commenced commercial operation, with a cumulative electricity output of 594,587.85 MWh as of November 10, 2023.

Biomass energy

Vietnam is a country with great potential for developing biomass energy thanks to favorable natural conditions such as a hot and humid climate, abundant rainfall, fertile soil, a rich river network, and a long coastline. These factors have enabled the rapid and diverse growth of biomass. Notably, with agriculture playing a vital role in the economic structure, Vietnam is considered to possess abundant biomass resources (Nguyen Phuong Anh, 2019), estimated at around 200 million tons of oil equivalent (TOE), accounting for about 25% of the total renewable energy potential nationwide. Biomass in Vietnam can be produced from organic materials such as trees, grass, agricultural crops, firewood, rice husks, coffee shells, straw, and bagasse (Le Thi Thoa, 2020).

Biomass energy exists in various forms, such as biomass electricity, ethanol and biodiesel, biogas, bioheat, gas from waste, and more. Among these, ethanol, diesel, and biogas are the most commonly used fuels. As an agricultural country, Vietnam has substantial potential for biomass energy development. The main sources of biomass fuel include wood, agricultural waste and by-products, livestock waste, municipal waste, and other organic materials. Specifically, the potential for biomass energy from agricultural by-products such as straw, rice husks, bagasse, and other crops is nearly 53.5 million tons, equivalent to 12.8 million tons of crude oil. Notably, this energy source will continuously regenerate and grow steadily over the next 30 years (Khanh Linh, 2020). According to Vietnam's Renewable Energy Development Strategy to 2030, with a vision to 2050, the government aims to have biomass electricity production account for 1.2% of total electricity by 2025 and 2.1% by 2030.

Vietnam has implemented numerous policies to encourage the development of biomass electricity, including a Feed-in Tariff (FIT) mechanism to support electricity prices, with the government proposing higher purchase prices than before. However, biomass electricity in Vietnam has not yet achieved the expected results. Currently, the country has only about 10 biomass power plant projects, of which only three projects are recorded with capacity on the National Power System Operation Center, including KCP Phu Yen Plant, An Khe Gia Lai Biomass Power Plant, and Bourbon Tay Ninh Biomass Power Plant. The total biomass electricity capacity accounts for less than 1% of the country's installed capacity, while the commercial electricity output fed into the grid is less than 0.1%.

According to the Vietnam Electricity Group (EVN), some biomass power plant projects are under construction. In the North, the Biomass Power Plant project in Xanh Forest, Phong Chau Town, Phu Ninh District, Phu Tho Province, has been granted an investment certificate with a total investment of VND 1,160 billion, a capacity of 40 MW, and is expected to be operational in 2013 with an electricity output of 331.5 million kWh per year. In the South, Doosan Group (South Korea) has prepared procedures to invest in building a biomass thermal power plant in Minh Hung Korea Industrial Park (Chon Thanh District, Binh Phuoc Province) with a designed capacity of 19 MW and steam supply of 70 m^3/hour. The raw materials for the plant mainly come from agricultural and forestry by-products. The group aims to complete legal procedures, and the project could be

operational by 2015.

To encourage biomass power project development, the government issued Decision No. 08/2020/QD-TTg, amending and supplementing Decision No. 24/2014/QD-TTg on support mechanisms for biomass power project development. According to Article 6 of Decision No. 24/2014/QD-TTg dated March 24, 2014, by the Prime Minister on support mechanisms for developing biomass power projects in Vietnam: Investment in biomass power projects is implemented according to planning. The appraisal and approval of biomass power projects added to the planning are conducted per current legal regulations on planning. Biomass power projects under approved power development plans at all levels are implemented according to the transitional provisions of Article 59 of the 2017 Planning Law and Resolution No. 751/2019/UBTVQH14 dated August 16, 2019, by the Standing Committee of the National Assembly interpreting some provisions of the 2017 Planning Law. This is not only aimed at attracting investors to participate in biomass power projects but also at creating a favorable legal environment for enterprises to boldly invest in this field, thereby promoting renewable energy growth in Vietnam."

5. Policy Implication

The consumption of renewable energy is currently a promising issue with positive growth indicators in Vietnam. With inherent potential and efforts to explore new energy sources, renewable energy presents both opportunities and challenges in developing the energy sector to meet Vietnam's green economic development needs. Alongside identifying barriers, this study also aims to propose long-term recommendations to promote the development of renewable energy consumption, enhancing the achievements in advancing a green economy—a strategic economic model that is a growing trend among nations worldwide.

Firstly, the development of renewable energy consumption requires solid financial resources to ensure the infrastructure needed for renewable energy adoption is not hindered. To ensure efficiency and expedite project implementation as scheduled, domestic investors often collaborate with foreign investors by transferring part or all of a project to access foreign loans with low-interest rates. Beyond policy mechanisms, government subsidies for renewable energy projects remain insignificant. To generate financial support, it is recommended that the government issue policies requiring organizations and individuals using fossil fuels for energy purposes to pay an environmental fee proportional to the amount of fuel consumed. A portion of this environmental fee should be allocated to encourage the development and use of renewable energy sources through the Sustainable Energy Development Fund.

Secondly, investment in renewable energy infrastructure is essential, such as upgrading the power grid, expanding transmission lines to leverage geographical advantages for energy storage, and managing loads. This supports the implementation of solar power, wind power, and electricity storage, strengthening the domestic supply chain. A crucial point is shifting focus from large-scale solar farms of several tens to hundreds of megawatts (MW) to promoting rooftop solar power on residential homes, factories, and commercial buildings. Rooftop solar power has significant advantages, including its small scale and decentralized layout. In addition, the power transmission and distribution sector needs to invest in upgrading smart grids to enhance the absorption and transmission capacity of renewable energy. It is crucial to equip capabilities for short-term solar power fluctuation forecasts based on variation rules, meteorological,

hydrological, and weather predictions, and operational characteristics of renewable energy sources to actively mobilize alternative and supportive energy sources. According to the recommendations of the international consultant EGI, it is essential to establish a renewable energy monitoring and control center (at the National Load Dispatch Center and subordinate dispatch centers), provide additional power quality monitoring software, and invest in data collection and renewable energy capacity forecasting systems.

Thirdly**,** universities need to design and implement specialized training programs in renewable energy, including wind power, solar power, and biomass energy. Strengthening the development of an appropriately skilled workforce promptly to meet the demands of this emerging energy sector is imperative. Actively participating in energy transition activities in multilateral forums and leveraging opportunities for collaboration through initiatives and exchanges between countries to gain experience is vital. For example, the Clean Energy Demand Initiative (CEDI) could serve as a model for developing countries like Vietnam. CEDI is a public-private partnership between the Department of State and the Clean Energy Buyers Alliance, connecting countries with companies interested in investing in clean energy to power their operations.

Conclusion

The study has provided practical evaluations of the development and consumption of renewable energy in Vietnam while emphasizing the role of clean energy sources such as solar, wind, and biomass in supporting the greening of the economy. The study also highlights limitations, including barriers related to infrastructure, finances, and an inconsistent legal framework, which hinder the effective development of renewable energy. To overcome these challenges, it is essential to strengthen supportive policies, establish financial funds dedicated to renewable energy, invest in energy storage technologies, and enhance the quality of human resources. Additionally, fostering international cooperation will enable Vietnam to fully utilize its renewable energy potential, contributing to the sustainable development of the green economy in the future. However, the linkage between renewable energy and the green economy remains insufficiently clarified, particularly in terms of quantifying the specific impacts of renewable energy consumption on sustainable economic growth and environmental protection.

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DETERMINANTS INFLUENCING VIETNAM'S FRESH DURIAN EXPORTS TO CHINA

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Abstract: This study aims to analyze the determinants influencing the export of fresh durians from Vietnam to China in the short term and long term, as well as to investigate the causal relationships between variables. This analysis utilize secondary data in the form of monthly time series data from July 2022 to July 2024, totaling 24 months. Multiple linear regression analysis and the Autoregressive distributed lag (ARDL) model are employed to examine the short-term and long-term equilibrium relationships between variables. The results reveal that the determinants with inverse impact on the export volume of fresh durians from Vietnam are the export price of fresh durians from Vietnam and the crude oil price. In contrast, China's real Gross Domestic Product (GDP) and the VND/RMB exchange rate positively influence the volume of fresh durian exports from Vietnam to China. In the long term, however, the export price of fresh durians from Vietnam and the exchange rate between VND/RMB have an inverse impact on the export volume of fresh durians from Vietnam to China; the real GDP of China and crude oil prices do not affect the export volume of fresh durians from Vietnam to China. This implies that, in the long term, fresh durians are categorized as a luxury product. Consumers with a genuine demand for luxury goods have higher incomes and crude oil prices, which represent transportation costs for luxury goods; have negligible impact.

Keywords - Export, fresh durian, Vietnam, China, demand theory
JEL Classification Codes - F23, F44, M16

1. Introduction

Durian is a long-lived fruit tree that thrives well in hot and humid conditions. It has a distinctive aroma but is rich in nutrients and offers many health benefits. It is high in vitamins and minerals, including vitamin C, potassium, and fiber. Durian is also known for its high antioxidant content, which helps prevent aging and reduces the risk of chronic diseases. In addition, durian is a source of healthy fats that contribute to cardiovascular health. Many consumers love durian for its unique taste and nutritional richness, earning it the title "king of fruits." It is also one of Vietnam's most important export fruits. Durian is a tropical fruit native to Malaysia, primarily produced in countries such as Thailand, Vietnam, Malaysia, Indonesia, Cambodia, and Myanmar. Many types of tropical fruitsare increasingly penetrating the Chinese market and durian is one of them. The Regional Comprehensive Economic Partnership (RCEP) agreement includes a total of 15 member countries, including 10 ASEAN countries along with Japan, South Korea, China, Australia, and New Zealand. This agreement has facilitated easier import and export of

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goods among the member countries. Among the RCEP member countries Vietnam, Thailand, Malaysia, and the Philippines are the primary ASEAN countries exporting durian to China; among them, Vietnam and Thailand have the largest durian export volumes. Although most durians are produced in tropical countries, China is the largest consumer of durian in the world.

Since 2022, China has imported durian worth approximately USD 6 billion, accounting for 91% of global durian demand. The main exporters of durian to China are from Vietnam, Thailand, Malaysia, and Philippines. Durian has become a strategic product in the economic and trade exchanges between China and ASEAN countries. With its high economic value, durian has changed agricultural cultivation habits in Southeast Asian countries, with many farmers shifting large areas from rice farming to durian cultivation.

Figure 1: Map of the key durian cultivation areas in Vietnam

Currently, the area of durian cultivation in Vietnam has exceeded 112,000 hectares, accounting for 9% of the country's total fruit-growing area, with an estimated annual production of 863,000 tons. The durian cultivation areas in Vietnam are concentrated in four regions: the Central Highlands, the Mekong River Delta, the Southeast, and the South Central Coast. The Central Highlands region has the largest durian cultivation area, with 51,400 hectares and a production of approximately 336,400 tons, accounting for 46.7% of the country's total durian cultivation area and 39.6% of the total production. The Mekong River Delta is the second largest area with 33,000 hectares and a production of approximately 372,000 tons, accounting for 29.9% of the country's total durian cultivation area and 43.8% of the total production. The Southeast region ranks third, with 20,800 hectares and a production of approximately 122,900 tons, accounting for 18.9% of the

country's total durian cultivation area and 14.5% of the total production. The South Central Coast is the fourth largest area with 5,000 hectares and a production of approximately 17,800 tons, accounting for 4.2% of the country's total durian cultivation area and 2.1% of the total production. Figure 1 shows the map of the key durian cultivation areas in Vietnam.

In 2023, Vietnam exported 595,000 tons of durian to China, accounting for 98.6% of the total durian exports. Among Vietnam's fruit and vegetable exports to China, durian is the most valuable fruit export, with an estimated turnover of USD 254 million in the first quarter of 2024, an increase of 66% compared to the same period in 2023. In the second quarter of 2024, durian exports to China reached 79.3 thousand tons, valued at USD 369.8 million, an increase of 91% in volume and 81.9% in value compared to the same period in 2023. Vietnam surpassed Thailand to become the number one exporter of fresh durian to China with a volume of 32,750 tons, valued at USD 161 million, an increase of 2.4 times in volume compared to the same period last year. Vietnam's durian market share in China, in terms of value, increased from 32% in 2023 to 57% in the first two months of this year. In the first two months of 2024, Thailand was the second-largest durian exporter after Vietnam, exporting 19,016 tons of durian with a total value of USD 120.3 million. However, the quantity and value of Thai durians decreased from 50.3% to 45.2% compared to the same period last year. Besides Vietnam and Thailand, China also imports durians from countries like the Philippines and Malaysia, but their market share is relatively small, accounting for only about 2% of the total import volume (around USD 1 million).

Vietnam has many advantages over Thailand in exporting durians to China. It has an abundant supply that can be harvested and exported year-round, whereas Thai durians are only available seasonally. Additionally, Vietnam shares a border with China, which makes transportation convenient and allows quick and low-cost durian shipments from Vietnam to China. Moreover, the price of Vietnamese durians is about 20% lower than that of Thai durians, providing a competitive price advantage. These advantages have led to a remarkable development of Vietnamese durians in just under two years since they were officially exported to the Chinese market.

This research is structured as follows: Section 2 reviews the suitable literature and presents the core theories relating to the research topic. Section 3 describes the data sample collection and methodology employed in the conduct of the research. Section 4 sets out key results, while Section 5 shows some discussions and potential further research.

2. Literature review and theoretical framework

2.1. Literature review

Phuong (2024) states that durian is a unique specialty fruit of ASEAN countries and is an important fruit for the economies of these countries. Currently, the main exporters of durian to the Chinese market are Vietnam, Thailand, Malaysia, and the Philippines. Vietnam leads in durian exports to China, offering varieties such as Ri 6, Chuong bo, Kho qua, Cai Mon, Ruot do, Musang King, and Dona. Among these, Musang King, Thai, and Ri 6 are most commonly consumed verities. Due to the soft, fragrant, and delicious quality of durian flesh many Chinese consumers prefer to give durian as a gift to show wealth and to present to friends and family during holidays and festivals.

Long (2024) argues that China has a large population, potential, and a vast consumer

market. As the living standards of the people continue to improve, the consumption perception of Chinese consumers has also evolved. Chinese consumers have become more concerned about health and nutrition after the COVID-19 pandemic. They consider durian to be highly nutritious, anti-aging, and very beneficial for health. Therefore, the consumption of durian has become widely popular; not only among middle-aged individuals but also among the youth in China.

Khoi (2024) opines that the trend and demand for durian among Chinese consumers will continue to grow. In the first four months of 2024, China imported 202,500 tons of fresh durian, worth over 1 billion USD. Vietnam has more advantages than Thailand in exporting fresh durian, as Vietnamese durian is about 20% cheaper than Thai durian, and the distance between Vietnam and China is shorter than that between Thailand and China, allowing for quicker transportation and lower shipping costs. However, in the coming years, Vietnamese durian will face increased competition as Chinese investors have invested in large-scale durian cultivation in Laos. Moreover, Thailand and Malaysia will focus on their local durian varieties such as Musang King. As a result, it is expected that over the next five years, the volume of fresh durian exports to China will continue to increase, however, as supply exceeds demand, this shift in consumer trends may affect the quantity and price of fresh durian exported from Vietnam to China.

Vinh (2024) argues that the official export of durians to China has created significant opportunities and momentum for the development of durian production in Vietnam, increasing income for farmers and profits for businesses. Durian products have brought encouraging signals for Vietnam's exports. However, there is currently no specific agricultural development strategy for durian cultivation. The organizational structure of the durian export industry is not sustainable. Businesses and farmers do not have concrete plans to ensure the quality of durians. Nonetheless, this study has not delved into an experimental analysis of the specific factors affecting the export of fresh durians from Vietnam.

Bui (2023) assesses the situation by stating that determinants influencing the volume of fresh durian exports from Vietnam to China, apart from price competition with durian from countries like Malaysia and the Philippines, also include determinants such as income level, the economic situation in China, and the exchange rate of the Vietnam Dong against the Chinese yuan (Chinese currency), a depreciation of the Vietnamese Dong compared to the yuan could negatively impact the export of fresh durian from Vietnam.

However, studies on the export of fresh durian from Vietnam to China are currently limited and there is no experimental model that comprehensively evaluates the above-mentioned determinants. Therefore, this research aims to analyze the determinants influencing the export of fresh durian from Vietnam to China, including the export price of fresh durian from Vietnam, China's real GDP, the VND/RMB exchange rate, and crude oil prices, which represent transportation costs, thereby formulating effective trade promotion plans and strategies, as well as appropriate measures to enhance the export of fresh durian from Vietnam.

2.2. Theoretical framework

Theory of competitive advantage

Porter (1990) proposed the Theory of Competitive Advantage to explain why some countries excel in the production of certain products, and why some countries have a competitive advantage in certain products. This theory is based on the interconnection of

various factor groups, such as production, low costs, cultural differences, etc. Thus, the analysis of comparative advantage will reflect the competitiveness and export advantage of fresh durian from Vietnam to China. Currently, fresh durian from Vietnam holds 57% of the market share in China. Despite the high market share, Vietnam must remain cautious of potential challenges from stronger competitors.

Export capability

Shoham (1996) defined export capability as the current export performance of a product in the export market. Weinstein (2011) further elaborated on this definition with determinants such as export ratio in terms of sales or export revenue growth, export profits, export market share, etc. It can be said that export capability is evaluated through three main determinants: export product turnover, export product market share, and export product growth.

Demand theory

Bohm (2017) introduced the Demand Theory (Demand: D), which refers to the quantity of goods or services that buyers are able and/or willing to purchase at different price levels within a specific period. Demand refers to desires that can be realized under specific conditions, including both willingness to pay and the ability to pay, meaning buyers must have purchasing power. When the price of a product decreases, consumers are likely to buy more of the product to replace similar products. Changes in consumers' real income and purchasing power can affect the demand for goods or services. From the meaning of demand, it is evident that the determinants influencing the quantity demanded include: consumer behavior; consumer tastes; the price of the product; the prices of related goods; consumer income; population, and consumer expectations about the future; all of which can impact consumers' current demand. The demand function is as follows:

$$\boldsymbol{Q_d = f(P, I, P_a, \dots X_n)} \quad \textbf{(1)}$$

In which:

Q_d is the quantity demanded of the product

P is the price of the product

I is the consumer's income

P_a is the price of related goods

X_n is represents other determinants influencing the quantity purchased

Based on the Demand theory, Bohm (2017) employs real GDP as a proxy for consumer income and argues that an increase in real GDP reflects a rise in purchasing power which in turn leads to an increase in the consumption of goods. Martin (2012) argues that the price of a product represents the level of exchange between the buyer and the seller. An increase in the price of the product will lead consumers to reduce the quantity of the product they purchase. In addition, Diewert (2017) suggests that fluctuations in exchange rates will affect exports; it means when exchange rates increase, the price of exported goods decreases in international markets, leading to heighten competition and encourage consumption, thereby supporting the expansion of exports. Hallak (2013) argues that crude oil prices are one of the key determinants influencing the consumer price index; oil prices directly affect transportation costs and supply chains, which can put pressure on product prices, leading to a decrease in the quantity of goods exported.

3. Research methodology

3.1. Data collection

Vietnamese durian is being officially exported to China since July 2022. This study uses secondary data from July 2022 to July 2024. The volume of fresh durian exported from Vietnam to China is denoted as Q_{VN} as the dependent variable. The data is sourced from World Databank, World Development Indicators (WDI).

The export price of fresh durian from Vietnam to China denoted as P_{VN}, serves as the independent variable, with data sourced from the Food and Agriculture Organization (FAO). The hypothesis is that the export price of fresh durian from Vietnam has an inverse relationship with the quantity exported Q_{VN}. In other words, as P_{VN} increases, Q_{VN} decreases, denoting that an increase in the export price of Vietnamese durian will lead to a reduction in the quantity of durian exported from Vietnam.

Actual GDP is an independent variable representing the income of Chinese consumers, denoted as GDP_{CN}, the data is sourced from the World Databank, WDI. The hypothesis is that China's actual GDP has a positive influence on the volume of fresh durian exports from Vietnam. In other words, as GDP_{CN} increases, Q_{VN} increases, implying that an increase in China's actual GDP will lead to an increase in the volume of fresh durians exported from Vietnam.

The VND/RMB exchange rate represents Vietnam's international competitiveness as an independent variable, denoted as $\mathrm{EXC_{VND}}$, the data is sourced from the International Monetary Fund (IMF, UNCTAD). The hypothesis is that the VND/RMB exchange rate positively influence the volume of fresh durian exports from Vietnam to China. In other words, as $\mathrm{EXC_{VND}}$ increases, Q_{VN} increases, meaning that an increase in the exchange rate will lead to an increase in the volume of fresh durian exports from Vietnam.

The crude oil price represents transportation costs as an independent variable, denoted as P_{OIL}. The data is sourced from Organization of the Petroleum Exporting Countries (OPEC). The hypothesis is that the crude oil price inversely impact on the volume of fresh durian exports from Vietnam to China. In other words, an increase in P_{OIL} causes decrease inQ_{VN} meaning that an increase in the crude oil price will lead to a decrease in the volume of fresh durian exports from Vietnam to China.

3.2. Variables and hypotheses

The variables and hypotheses of the research model are presented in the Table 1, below:

Table 1: Variables and Hypotheses

Variables	Codings	Contents	Hypotheses
Dependent variable	$\mathrm{Q_{VN}}$	Fresh durian exports from Vietnam to China (kilogram)	
Independent variables	$\mathrm{GDP_{CN}}$	China's actual Gross Domestic Product (USD)	+
	$\mathrm{P_{VN}}$	The export price of fresh durian from Vietnam to China (VND/ kilogram)	-
	$\mathrm{EXC_{VND}}$	The VND/RMB exchange rate (VND/RMB)	+
	$\mathrm{P_{OIL}}$	The crude oil price (USD/barrel)	-
	B	The coefficient of each variable.	
	ε_i	Error term	

Note: *"+" indicates a positive correlation between the independent variable and the dependent variable,*

"-" indicates an inverse correlation between the independent variable and the dependent variable.

3.3. Research model and techniques

Based on the theoretical demand model (1), the research model is as follows:

$$\mathbf{Q_{VN}} = \mathbf{f(P_{VN}, GDP_{CN}, P_{OIL}, EXC_{VND})} \quad \textbf{(2)}$$

The Multiple Regression Equation:

$$\mathbf{Q_{VN}} = \boldsymbol{\beta_0} + \boldsymbol{\beta_1 P_{VN}} + \boldsymbol{\beta_2 GDP_{CN}} + \boldsymbol{\beta_3 P_{OIL}} + \boldsymbol{\beta_4 EXC_{VND}} + \boldsymbol{\varepsilon_i} \quad \textbf{(3)}$$

Taking the logarithm of both sides of model (3) will be as follows

$$\mathbf{lnQ_{VN}} = \boldsymbol{\beta_0} + \boldsymbol{\beta_1 lnP_{VN}} + \boldsymbol{\beta_2 lnGDP_{CN}} + \boldsymbol{\beta_3 lnP_{OIL}} + \boldsymbol{\beta_4 lnEXC_{VND}} + \boldsymbol{\varepsilon_i} \quad \textbf{(4)}$$

The study utilizes a multiple linear regression equation to analyze the relationship between the independent variable and the dependent variable.

The study employs the Autoregressive Distributed Lag (ARDL) model as a basis for determining long-term effects and then uses the Error Correction Model (ECM) to analyze short-term effects.

The results of the Granger causality test are employed for verifying the direction of impact between variable pairs through t-statistic and F-statistic.

4. Research results

The correlation between variables

The article analyzes Pearson correlation to examine strong linear correlation between the dependent variable and independent variables, as well as to early identify the issue of multicollinearity when the independent variables also have strong correlations with each other. Furthermore, it is necessary to identify multicollinearity issues when the independent variables also exhibit strong correlations with one another. The signs of suspicion are based on the value Sig. of the correlation between the independent variables being less than 0.05 and the Pearson correlation values being greater than 0.4. Through the results of the Pearson correlation analysis, the significance value of the independent variables with the dependent variables is also less than 0.05, indicating that there is a correlation between the independent variables and the dependent variables. This article will examine two types of correlation relationships: the correlation between the dependent variable and the independent variables, and the correlation between the independent variables with each other.

The relationship between the independent variables and the dependent variables is as follows:

Table 2: Correlation between independent variables and dependent variables

		Q_{VN}	P_{VN}	GDP_{CN}	P_{OIL}	EXC_{VND}
Q_{VN}	Pearson Correlation	1	.624**	.374**	.578**	.331**
	Sig. (2- tailed)		.000	.000	.000	.000
	n		24	24	24	24

Pvn	Pearson Correlation	.623**	1	.326**	.352**	.373**
	Sig. (2- tailed)	.000		.000	.000	.000
GDPcn	Pearson Correlation	.375**	.325**	1	.356**	.084
	Sig. (2- tailed)	.000	.000		.029	.017
Poil	Pearson Correlation	.568**	.352**	.353**	1	.124*
	Sig. (2- tailed)	.000	.000	.000		.022
EXC_{VND}	Pearson Correlation	.302**	.374**	.081	.123*	1
	Sig. (2- tailed)	.000	.000	.012	.021	

Note: **: Correlation is significant at the 0.01 level (2-tailed); *: Correlation is significant at the 0.05 level (2-tailed)

The correlation between the independent variables and the dependent variables, tested using Pearson correlation, shows that the significance Sig. is less than 0.05. Thus, there is a linear relationship between these independent variables and the dependent variable. The linear regression equation indicates that the dependent variable Q_{VN} has a strong relationship with four independent variables: the crude oil price P_{OIL} (USD/barrel), the VND/RMB exchange rate EXC_{VND} (VND/RMB), China's actual $GDPGDP_{CN}$ (USD), and the export price of fresh durian from Vietnam to China P_{VN} (VND/ kilogram). The absolute value of the correlation coefficients between the pairs of variables is all less than 0.4, indicating that there is no strong correlation between the independent variables themselves, hence the likelihood of collinearity/multicollinearity is also very low. This shows that the regression model is appropriate. Therefore, these research variables will be included in the regression analysis.

Results of Model Testing Using Regression Method

Regression analysis is a statistical technique used to estimate the best-fitting equation for a set of observed results of the dependent variable and independent variables. Multiple regression analysis aims to determine the important role of each factor in assessing the relationship between the dependent variable and the independent variables. To evaluate the model's fit, researchers use the coefficient of determination R^2 (R-Squared), which has been proven to be a non-decreasing function of the number of independent variables included in the model. Adjusted R^2 is used to better reflect the degree of fit of the multiple linear model because it is not dependent on the size of R^2. Using the adjusted R^2coefficient to assess the model's fit will be more reliable.

Table 3: Model summary

Model	R	R2	Adjusted R2	Std. Error of the Estimate	Durbin-Watson
1	0.791	0.700	0.698	0.35766	1.854

The results show that the Adjusted R Square is 0.698, meaning that the model explains 69.8% of the variance of the dependent variable. This indicates that the five independent variables included in the model influence 69.8% of the changes in the dependent variable.

The Durbin-Watson (DW) statistic is used to test for first-order autocorrelation. DW varies between 0 and 4; if the error terms are not correlated with each other, the value will be close to 2. The results show that the Durbin-Watson statistic (DW) = 1.854, which is less than 2, indicating that the error terms are not correlated with each other in a first-order manner.

The stability test for each variable in the model using the Augmented Dickey-Fuller (ADF) method

Table 4: The results of the Unit-Root Test using the Augmented Dickey-Fuller method

Variables	Test equation	First-order difference	ADF-Statistics	P value	Conclusion
$\ln Q_{VN}$	Trend and Intercept	1	-6.1343	0.0000***	Stability
$\ln P_{VN}$	Trend and Intercept	0	-9.7875	0.0000***	Stability
$\ln GDP_{CN}$	Trend and Intercept	0	-7.3235	0.0000***	Stability
$\ln P_{OIL}$	Trend and Intercept	0	-2.6786	0.0689*	Stability
$\ln EXC_{VND}$	Trend and Intercept	2	-2.7549	0.0643*	Stability

*Note: *** and ** are statistically significant at the 99% and 95% confidence levels.*

The results show that the variables $\ln Q_{VN}$, $\ln P_{VN}$ and $\ln GDP_{CN}$ reject the null hypothesis at the 0.01 significance level, while the variables $\ln P_{OIL}$ and $\ln EXC_{VND}$ reject the null hypothesis at the 0.10 significance level. The stability test indicates that all variables are I(0), so all of these variables are used to analyze the equilibrium relationships with the Autoregressive Distributed Lag (ARDL) model in the short term.

Table 5: Results of the Autoregressive Distributed Lag model in the short term

	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.6345	0.1243	-5.2235	0.0000***
$\ln P_{VN}$ (-1)	-0.6876	0.3654	-2.2678	0.0319**
$\ln GDP_{CN}$	0.3235	0.1678	1.9785	0.0518*
$\ln P_{OIL}$	-0.2511	0.3244	1.1678	0.2387*
$\ln EXC_{VND}$ (-4)	4.8868	2.6446	1.8875	0.0723*
R2	0.9346			
Adjusted R2	0.8097			

*Note: *** and ** are statistically significant at the 99% and 95% confidence levels.*

Determinants affecting the export of fresh durian from Vietnam to China in the short term

Estimated coefficients of ARDL (1, 0, 0, 4), R2 = 0.9346 indicating that the dependent variable's variation is 93.46%. Considering the t-statistic values, the coefficient for P_{VN} is significantly different from 0 at the 0.05 significance level. The coefficients for GDP_{CN} and EXC_{VND} are different from 0 at the 0.01 significance level.

Thus, in the short-term relationship, it shows that when the price of fresh durian exported from Vietnam to China P_{VN} increases by 1%, the volume of fresh durian export from Vietnam to China Q_{VN} decreases by 0.6876%.

When the VND/RMB exchange rate EXC_{VND} increases by 1%, the volume of fresh durian exports from Vietnam to China Q_{VN} increase by 4.8868%.

When China's actual GDP GDP_{CN} increases by 1%, the volume of fresh durian exports from Vietnam to China Q_{VN} increases by 0.3235%.

When the crude oil price P_{OIL} increases by 1%, the volume of fresh durian exports from Vietnam to China Q_{VN} decreases by 0.2511%. The results of this study are consistent with the research hypotheses and align with the demand theory.

Determinants influencing the export of fresh durian from Vietnam to China in the long term

Estimated coefficients of ARDL (1, 0, 0, 4), cointegration testing results with F-statistic = 4.0457 > 4, higher than the upper bound critical value at the 0.025 significance level and indicating a long-term relationship (see Table 6).

Table 6: Bound test and long-term relationship among variables

Test Statistic	Value	Significance	I (0)	I (1)
			Asymptotic: n=1000	
F-statistic	4.0457	10%	2.16	3.18
K	4	5%	2.45	3.47
		2.5%	2.74	3.82
		1%	3.36	4.31

When examining the determinants influencing the export of fresh durian from Vietnam to China in the long term, it is observed that the coefficients of P_{VN} and EXC_{VND} are different from 0, with the t-statistic values being smaller than the significance levels of 0.05 and 0.10 respectively (see Table 7).

In the long-term relationship, when the export price of fresh durian from Vietnam to China P_{VN} increases by 1%, the volume of fresh durian exports from Vietnam to China Q_{VN} decreases by 1.1243%.

When the VND/RMB exchange rate EXC_{VND} increases by 1%, the volume of fresh durian exports from Vietnam to China Q_{VN} decreases by 5.9444%.

The research results show that in the long term, China's actual GDP GDP_{CN} and crude oil prices P_{OIL} do not affect the volume of fresh durian exports from Vietnam to China Q_{VN}. This means that in the long term, durian is classified as a luxury product. Consumers with a real demand for luxury goods have typically higher incomes. Crude oil prices represent transportation costs; however, for luxury goods, transportation costs are almost nonexistent.

Table 7: Results of the Autoregressive Distributed Lag model in the long-term

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$\ln P_{VN}$	-1.1243	0.3663	2.9167	0.0059*

$\ln GDP_{CN}$	-0.7467	0.5996	-1.3985	0.1467
$\ln P_{OIL}$	-0.1875	0.5356	-0.1876	0.8768
$\ln EXC_{VND}$	-5.9444	2.4855	-2.3348	0.0209**
C	18.9842	6.3397	2.9845	0.0047***

*Note: ***, ** and * are statistically significant at the 99%, 95% and 90% confidence levels*

From the results in Table 7, model (4) can be expressed as follows:

$$\ln Q_{VN} = -1.1243 \ln P_{VN} - 0.7467 \ln GDP_{CN} - 0.1875 \ln P_{OIL} - 5.9444 \ln EXC_{VND} + 18.9842 \quad (5)$$

Pairwise Granger Causality Tests

The results of the Pairwise Granger Causality Tests show that P_{VN} and Q_{VN} have an F-statistic higher than the critical value, which is statistically significant at the 99% confidence level (Prob. < 0.01) (see Table 8).

Table 8: Pairwise Granger Causality Tests

Null Hypothesis	n	F-Statistic	Prob.
P_{VN} does not Granger Cause Q_{VN}	24	3.68561	0.0010***
GDP_{CN} does not Granger Cause Q_{VN}	24	3.02579	0.0044***
EXC_{VND} does not Granger Cause P_{VN}	24	2.40502	0.0254**

*Note: ***, ** and * are statistically significant at the 99%, 95% and 90% confidence levels*

The two pairs of variables, GDP_{CN} and Q_{VN}; EXC_{VND} and P_{VN} have F-statistics higher than the critical value, with statistical significance at the 95% confidence level (Prob. < 0.05). This means that:

The export price of fresh durian from Vietnam P_{VN} is the cause of changes in the volume of fresh durian exports from Vietnam to China Q_{VN}.

China's actual GDP GDP_{CN} is the cause of changes in the volume of fresh durian exports from Vietnam to China Q_{VN}.

The VND/RMB exchange rate EXC_{VND} is the cause of changes in the export price of fresh durian from Vietnam to China P_{VN}.

5. Discussion and conclusion

The findings reveal that the export price of fresh durian from Vietnam has an inverse relationship with the export volume of fresh durian both in the short term and the long term. Therefore, in the short term, business operators in the import-export sector need to control the export price of fresh durian from Vietnam, ensuring that the prices are not excessively high, at the same time, there must be a plan to ensure the appropriate supply of goods to avoid shortages. Although Vietnam is currently the largest exporter of fresh durian to China, it faces growing competition from countries like Thailand, Malaysia, and the Philippines. In the long term, farmers need to reduce production costs to compete with rivals on price. In addition, Vietnam should control the quality of fresh durian exports both in the short term and the long term, thereby managing the export price of fresh durian to China.

China's actual GDP in the short term, positively impact the volume of fresh durian exports from Vietnam. Nevertheless, in the long term, it does not affect the volume of fresh durian exports from Vietnam to China because fresh durian is a luxury item, and consumers are those with higher incomes. This means that whether China's actual GDP

increases or decreases, it does not impact consumer demand for fresh durian. Therefore, Vietnamese policymakers need to implement effective trade promotion policies to help Vietnam maintain its leading position in exporting fresh durian to China. The Vietnamese government, in bilateral and multilateral diplomatic meetings, needs to introduce and promote Vietnam's durians to expand the export market for durians.

For the Chinese market, the Vietnamese government needs to make efforts to seek opportunities to increase the export of durian products, durian derivatives, and frozen durians to this market, as currently, Vietnam is only allowed to export fresh durians to China. In addition, the Vietnamese government needs to strengthen supply-demand connection activities and expand the durian consumption market; enhance the promotion and guidance for businesses to leverage the advantages of new-generation free trade agreements (FTA) to expand the durian export market and diversify partners; effectively implement various forms of trade promotion suited to each market; provide guidance and support for businesses to actively participate in high-value-added durian supply chains such as Musang King durian and Dona durian etc; strengthen comprehensive cooperation mechanisms with major distribution systems in both domestic and international markets.

For trade promotion activities to be more effective, it requires the efforts of all levels of government, trade promotion organizations, especially participating businesses, to strive harder, focusing on key solutions such as improving the legal system for managing and implementing trade promotion activities; accelerating the application of information technology in trade promotion through online platforms and digital transformation; supporting the provision of market and product information, and focusing on exploiting markets that have FTAs with Vietnam. The Vietnamese government needs to support trade promotion activities from the central to local levels to organize trade promotion activities associated with building and developing a brand for Vietnam's durians; promote linkage and coordination activities between trade promotion organizations and businesses, as well as between businesses themselves; apply administrative modernization to create favorable conditions for individuals, organizations, and businesses in carrying out administrative procedures.

In the short term, The VND/RMB exchange rate positively impacts the volume of fresh durian exports from Vietnam to China. However, in the long term, the VND/RMB exchange rate can cause changes in the export price of fresh durian from Vietnam to China. When the exchange rate increases, the export price of fresh durian from Vietnam rises, which lead to a decrease in the volume of fresh durian exports to China. The issue of exchange rate fluctuations will affect the export market in the long term, thereby impacting export trends. Regarding this matter, investors must pay close attention, arrange reasonable trading plans, and effectively avoid exchange rate risks. Therefore, durian import-export businesses need to enhance competitiveness in the international market, adapt to the times and development trends, adopt advanced technology and experience, and accelerate the adjustment of product structures to increase their competitiveness in international trade and improve the reputation of Vietnamese durians. Businesses must fully understand the impact of exchange rate fluctuations between the Vietnamese dong and the Chinese yuan, pay attention to exchange rate risks, and raise awareness about avoiding such risks. Businesses participating in international trade should be proactive in changing their business strategies, keeping up with the trends in the international financial market, establishing appropriate risk prevention mechanisms,

and mitigating exchange rate risks. For the Vietnamese government, it is necessary to improve exchange rate management measures to ensure stability in the exchange rate between the Vietnamese dong and the Chinese yuan, and to control stable economic and financial policies to avoid monetary fluctuations.

For relevant government agencies, such as the Ministry of Agriculture and Rural Development, it is essential to stabilize production and improve quality to enhance the competitiveness of Vietnamese durians. Therefore, the Ministry of Agriculture and Rural Development (MARD) and the Ministry of Industry and Trade (MoIT, Vietnam) need to closely coordinate with the Ministry of Industry and Trade to encourage farmers to adopt innovative methods in the cultivation and harvesting of fresh durians helping to reduce production costs by using drones for fertilization, spraying, and meeting phytosanitary requirements, ensuring that pesticide residues do not exceed permissible levels. The production, packaging, and export processes of durian must comply with the regulations and standards related to food safety set by the Chinese government. Additionally, it is necessary to analyze the soil's nutritional determinants to plan and control the residue of fertilizers and pesticides used in agriculture, helping to establish a stable strategy for exporting fresh durian from Vietnam to the Chinese market. Although Ri 6 and Dona durians are the most widely cultivated varieties and can supply the Chinese market year-round, durian farming in Vietnam is still at a medium and small scale, there is no established quality management model, there is a lack of advanced techniques in durian cultivation and care. Therefore, although Vietnam can ensure a year-round supply of durian, it only achieves high revenue from April to June each year. During other months, durians are mainly harvested in the Central Highlands, where heavy rainfall in June and July affects both the quantity and quality of durians for export. Some durian varieties are grown on unsuitable soils, such as heavy clay or acid-sulfate soils, which adversely affect the growth and development of the trees. To address these challenges, the Ministry of Agriculture and Rural Development needs to closely collaborate with researchers, policymakers, and import-export businesses to develop a quality management model and disseminate information about advanced techniques for durian cultivation and care to farmers. MARD Vietnam needs to coordinate with localities to review the planting areas as well as the entire durian cultivation process. It should analyze the nutritional factors of the soil to plan and control the residual levels of fertilizers and pesticides used in agriculture, thereby developing proposals and plans for concentrated production development by region and area. Emphasis should be placed on investing in infrastructure and packaging facilities, while directing localities to maintain effective monitoring to ensure that all planting area codes, packaging facilities, and purchasing businesses comply with the laws, regulations, and standards related to food safety in China.

Currently, Vietnamese durians are facing many warnings from the Chinese market regarding shipments that do not comply with the phytosanitary requirements for fresh durians exports. The main warnings are related to infestations by pest species banned by China, and packaging facilities purchasing durians from unregistered planting areas or with unclear origins. Additionally, the uncontrolled increase in durian cultivation area, the ability to meet technical requirements, and the level of compliance with phytosanitary requirements and chemical residues in Vietnamese durians still face many limitations. The organization of durian cultivation and purchasing remains fragmented and lacks professionalism, which poses many risks in quality control and leads to imbalances in

supply and demand. The Ministry of Agriculture and Rural Development needs to implement synchronized solutions, from technical processes to punitive measures, to ensure the productivity and quality of exported durians, as well as to meet the requirements of importing countries. At the same time, it should strengthen communication efforts to prevent farmers from spontaneously expanding durian cultivation in areas with unsuitable soil and irrigation conditions and from indiscriminately cutting down other crops to switch to durian cultivation. If regulations are not followed, there should be strict penalties.

However, the study has several limitations. First, it relies on collecting quantitative data using secondary sources from the review of related studies to concepts, theories, etc. Therefore, the analysis may not be comprehensive. Collecting data through in-depth interviews could validate the variables used in the model and provided clearer insight. This research will and stimulate future study, which may consider expanding other independent variables such as the price of fresh durians exported from competing countries like Thailand, the Philippines, Malaysia, and the population of China, etc.

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FACTORS AFFECTING THE APPLICATION OF ACCOUNTING INFORMATION SYSTEMS IN SMALL AND MEDIUM-SIZED ENTERPRISES

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Abstract: Small and medium-sized enterprises (SMEs) play a crucial role in Vietnam's economy, making up a large portion of the total number of businesses today. They not only contribute to job creation and drive economic growth but also encourage innovation. This type of business faces various challenges, including access to capital, competition, regulatory frameworks, management processes, and technological advancements. The application of technology in accounting within these enterprises brings numerous benefits. An accounting information system helps businesses enhance management efficiency and control costs, as well as assess operational performance. However, the implementation of technology in SMEs still faces many challenges, particularly in accounting. This article clarifies the role of accounting information systems and summarizes the factors influencing the implementation of these systems in small and medium-sized enterprises.

Keywords: AIS, accounting information system, implementation of ais, technology, operational efficiency.

1. Introduction

In the context of a rapidly developing global economy, adopting technology in small and medium-sized enterprises (SMEs) is essential for enhancing competitive capacity. Worldwide, technological solutions like cloud computing, artificial intelligence, and automation have helped SMEs reduce operational costs, optimize customer services, and improve competitiveness. In Vietnam, these businesses are increasingly recognizing the importance of technology in improving production processes, increasing management efficiency, and expanding markets. Small and medium-sized enterprises in Vietnam are starting to apply these technologies in their management and production processes. However, the implementation of technology in SMEs still faces many challenges, particularly in accounting.

Studies on Accounting Information Systems (AIS) in small and medium-sized enterprises (SMEs) emphasize their importance for operational performance and competitiveness. The synchronization of AIS, influenced by organizational characteristics, individual characteristics, and contextual factors, affects the operational performance of SMEs (Budiarto et al., 2015). The application of AIS and improved performance measures are closely linked in Spanish SMEs (Grande et al., 2011) and Implementing AIS on computers enhances SMEs' ability to secure funding from financial institutions (Fagbemi & Olaoye, 2016).

However, many SMEs in Vietnam have been struggling with implementing AIS in their accounting practices. The question arises as to what factors affect the application of Accounting Information Systems in these types of businesses? The goals of this article

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are to:

- Identify the role of Accounting Information Systems (AIS) in the operational efficiency of small and medium-sized enterprises (SMEs).

- Summarize and analyze the key factors influencing the application of AIS in this type of business.

2. Basis of theory

2.1 Concept of Accounting Information System

2.1.1 Concept

An accounting information system is understood as a method for collecting, processing, and storing financial information related to the production and business operations of an entity, utilizing information technology resources. This system serves as a link in the value chain of a business, providing financial information for decision-making. There are several definitions of an accounting information system as follows:

- AIS is the whole of the related components that are working together to collect, store and disseminate data for the purpose of planning, control, coordination, analysis and decision making. (Soudani, 2012).

- An accounting information system is a system that collects, records, stores, and processes data to generate information for decision-making users. It includes people, processes, directives, data, software, information technology infrastructure, internal control, and security measures (Romney and Steinbart, 2015).

- An accounting information system (AIS) is a structure that a business uses to collect, store, manage, process, retrieve and report its financial data so that it can be used by accountants, consultants, business analysts, managers, chief financial officers (CFOs), auditors and regulatory and tax agencies (Cleary, 2017).

- An AIS is the whole of the related components that are put together to collect information, raw data or ordinary data and transform them into financial data for the purpose of reporting them to decision makers (Salehi et al., 2010).

2.1.2 Functions of the Accounting Information System:

The Accounting Information System (AIS) plays a crucial role in business operations by collecting, storing, processing, and reporting financial data (Cleary, 2017). These systems serve multiple functions, including recording, reporting, and controlling (Guragai et al., 2017). Key elements of an effective AIS include trained human resources, financial data form, hardware, software, processes, communication networks, and databases (Meiryani et al, 2020). AIS generates financial reports that must meet quality characteristics such as completeness, relevance, and reliability (Meiryani et al, 2020). Understanding the functions and impact of AIS is essential for accountants, managers, and other stakeholders in today's business environment.

Thus, the accounting information system includes the following basic functions:

– **Collecting** data from financial transactions and the business activities of the enterprise.

– **Processing** accounting data to generate financial reports and management information.

– **Storing** financial information for retrieval when necessary.

– **Providing** information to both internal and external parties such as business management, investors, credit institutions, tax authorities, etc.

2.2 Small and Medium Enterprises in Vietnam

2.2.1 Characteristics

Small and medium scale: SMEs usually have limited capital and workforce. According to regulations, a small enterprise has no more than 50 employees, while a medium enterprise has between 51 and 200 employees

Flexibility: SMEs can adapt quickly to market changes, thanks to simple management processes and fast decision-making.

Diverse industries: SMEs operate in many different fields, from manufacturing and trade to services, contributing to the diversity in the economy.

2.2.2 The Role of SMEs in the Economy

Small and medium enterprises (SMEs) are highly valued for development in many countries due to the following roles:

Job Creation: SMEs are a main source of employment for workers, helping to reduce unemployment rates and stabilize society. They are a key and sustainable element in generating jobs and income for workers outside the state sector.

Boosting Economic Growth: SMEs contribute significantly to the national GDP, fostering economic development through the creation of products and services. This sector is sensitive, dynamic, flexible, and ready for innovation, and it has developed steadily; therefore, it acts as a driving force in the business environment.

Encouraging Innovation: With a smaller and more flexible scale, SMEs often have a higher capacity for innovation and creativity compared to large enterprises, thereby promoting technological development and improving production processes.

Promoting Local Economic Development: SMEs are present in more geographical areas than large companies, contributing to a better income distribution. They often operate in rural and remote areas, which helps develop the local economy and reduce regional disparities. They are also an important component of economic development and efforts to eradicate poverty on a broad scale.

3. The role of Accounting Information Systems (AIS) in the operational efficiency of small and medium-sized enterprises (SMEs)

Accounting Information Systems (AIS) have been shown to significantly impact organizational performance and decision-making processes. Multiple studies have demonstrated that AIS implementation leads to improved managerial decision-making, enhanced internal controls, and higher quality financial reporting (Giaglis et al., 2012; Trabulsi, 2018). AIS adoption in small and medium-sized enterprises (SMEs) has been associated with cost reduction, quality improvement, and more effective decision-making (Trabulsi, 2018). The efficiency of AIS is closely linked to sound internal control systems, which are crucial for achieving operational goals and performance targets (Hla et al., 2015). Overall, AIS is considered an essential tool for businesses, facilitating management decision-making, strengthening internal controls, and streamlining company transactions across various organizational contexts (Giaglis et al., 2012; Hla et al., 2015; Trabulsi, 2018). There are some basic roles such as:

- AIS is an effective tool for providing financial information to interested parties, including managers, accountants, regulatory agencies, and others. This system delivers accurate and timely information that helps leaders make strategic decisions. A well-designed AIS can effectively give managers the necessary information for decision-making, as demonstrated in a study by Foolad Mehr Sahand Company (Baghersefat et al., 2013). ccounting Information Systems (AIS) have become crucial for businesses in

today's dynamic environment, providing timely and accurate information for decision-making and internal control (Khan, 2016).

- AIS enhances internal control by monitoring and managing financial transactions, thereby minimizing the risk of fraud. This system helps increase transparency and reliability in financial reporting The implementation of AIS, coupled with efficient internal control measures, can improve the reliability of financial information processes, boost control effectiveness, and enhance overall firm performance (Teru et al., 2017) as well as financial reporting quality (Ramdany, 2015; Rashedi et al., 2019). AIS components include risk assessment, databases, and software that process financial data (KerrPreferred, 2014). When companies align their computerized internal control mechanisms with AIS, they can ensure reliable financial information processes and improved operational goals (Teru et al., 2017). In cash receipts and disbursements, AIS effectiveness is particularly important for supporting internal control and mitigating risks of misappropriation (Nurpasya et al., 2024). Overall, AIS and internal control are interconnected, playing a vital role in maintaining organizational control and achieving business objectives in today's competitive global environment.

- AIS helps improve operational performance and improve the competitiveness of businesses. In fact, the accuracy of financial information is a decisive factor in strategic decision-making. Multiple studies have found a significant positive relationship between AIS adoption and SMEs performance (Siyanbola et al., 2019; Msomi & Vilakazi, 2023; Lopung & Rulindo, 2023). Specific AIS characteristics, such as broad scope and timeliness, have been identified as particularly beneficial for SMEs' financial performance (Lopung & Rulindo, 2023). Research on Yemeni SMEs demonstrates that AIS success positively affects key performance measures such as cash flow, net profit, and return on investment (Kabra et al., 2021). Therefore, it is very important to use quality and highly reliable accounting information. Optimizing accounting and financial management processes, as well as automating accounting processes, not only saves time but also minimizes errors in financial reporting, thereby improving the operational efficiency of businesses (Belfo & Trigo, 2013).

4. Key factors affecting the application of Accounting Information System in small and medium-sized enterprises

Based on studies on accounting information systems in general, as well as studies on factors affecting the application of accounting information systems in small and medium-sized enterprises. The implementation of Accounting Information Systems (AIS) in Small and Medium Enterprises (SMEs) is influenced by several factors including as:

The first is the organizational readiness.

Organizational readiness significantly influences the adoption and effectiveness of Accounting Information Systems (AIS) in Small and Medium Enterprises (SMEs). This factor is a key factor affecting AIS usage among Jordanian SMEs (Abdalwali Lutfi et al., 2017). Technology readiness is a key component of organizational readiness, which is essential for small and medium-sized enterprises (SMEs) to successfully implement accounting information systems (AIS), develope knowledge management capabilities, and foster innovation. (H. Kareem et al., 2022). Organizational readiness, as viewed by managers, refers to their assessment of the business's awareness, resources, commitment, and governance required for the successful adoption of information technology (Tan et al., 2007).

The second is the top manager.

Ismail (2009) and Kar et al. (2018) highlight the significance of managerial knowledge and support from top management. The behavior of top management directly influences the utilization of accounting information systems (AIS). Their support is an organizational factor that reflects the capability to implement digital accounting systems (Lutfi et al., 2022). Furthermore, this support is crucial for AIS implementation and can enhance sustainable business performance in small and medium-sized enterprises (SMEs). Consequently, those who receive strong backing from top management are more likely to adopt cloud-based accounting information systems (Lutfi et al., 2022).

The third is the ability to be compatible with the characteristics and needs of the business. Compatibility refers to the degree to which cloud accounting, as an innovation, aligns with the values, needs, and experiences of small and medium-sized enterprises (SMEs) (Sastararuji et al., 2022). An accounting information system is viewed as sufficient when the information it delivers effectively meets the needs and requirements of its users (Mohammad, 2018). To successfully implement AIS, SMEs should ensure compatibility with their business characteristics and needs, acquire sufficient accounting knowledge, engage qualified vendors, and leverage relationships with accounting firms (Ismail, 2009; Lutfi et al., 2022). Proper AIS implementation can help SMEs improve their operations, competitiveness, and sustainability, especially during challenging times like the COVID-19 pandemic (Lutfi et al., 2022).

The fourth is Perceptions of Usability.

Perceived ease of use positively affects AIS quality and implementation (Azizah, 2017; Wiryanti & Fardinal, 2020). User competence and attitudes towards use are additional factors impacting AIS effectiveness (Meiryani et al., 2021; Azizah, 2017). When users recognize that digital accounting systems (DAS) can boost their performance, they tend to experience higher satisfaction and a greater likelihood of continued use. Moreover, user-friendly technologies provide more advantages. If users find DAS easy to navigate and low in effort and time requirements, their satisfaction and perception of its usefulness significantly improve (Al-Hattami & Almaqtari, 2023).

The fifth is Perception of Ease.

Perceived ease of use and attitude toward using are key factors affecting the implementation of computer-based accounting information systems in SMEs (Azizah,2017). Recognizing the perception of ease of use as an essential element in the adoption and utilization of technology is vital, particularly in the development phase (Pramuka & Pinasti, 2020). Technologies that prioritize user-friendliness offer greater benefits to users. When users find digital accounting systems (DAS) to be easy to use and requiring minimal effort and time, their satisfaction and perception of its usefulness significantly increase (Al-Hattami & Almaqtari, 2023).

5.Conclusion:

In summary, the implementation of accounting information systems (AIS) in small and medium enterprises (SMEs) is influenced by various factors. Each factor influences businesses to varying degrees. Consequently, gaining a direct understanding of the factors and barriers related to the use of accounting information systems in each organization can facilitate more effective implementation in small and medium-sized enterprises. As a result, designing a suitable accounting information system can enhance operational efficiency for businesses.

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RESEARCH ON ACCOUNTING INFORMATION SYSTEMS (AIS) AND LESSONS LEARNED FOR VIETNAMESE ENTERPRISES

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Abstract: An Accounting Information System (AIS) plays a vital role in the creation, management, and maintenance of accounting information, which is essential for analyzing, assessing, planning, and diagnosing the financial health of an organization. Any business aiming to grow or remain competitive cannot afford to overlook the importance of an effective financial system that governs all its operations. For this to happen, accounting information must be disseminated accurately and in a timely manner. A well-structured AIS not only helps prevent fraud and errors but also forms an integral part of an organization's internal control mechanisms. With advancements in technology, information systems now extend beyond basic accounting software, encompassing all business functions across various departments. Whether in multinational corporations or small and medium-sized enterprises, AIS facilitates smooth operations, saving both time and money. By eliminating inefficiencies and reducing overlapping processes, AIS mitigates the risk of fraud and financial losses, offering a solution to these challenges.

Keywords: *Accounting, accounting information system (AIS), lessons learned*

1. INTRODUCTION

Accounting is an important part of the financial economic management tool system, playing an active role in managing, operating and controlling the production and business activities of the Enterprise. Enterprise Accounting (Enterprise) plays a very important role in providing accounting information to serve the management and operation of the Enterprise, is the basis for making economic and operational decisions of the Enterprise owner as well as for related subjects such as State management agencies, business partners, investors,... Along with the development of the country and the management goals of each period, the level of accounting information needed in each period is also different, the expression is also different. The Vietnamese Accounting System has had clear successes with full legal basis from the Law on Accounting, Decrees guiding the Law on Accounting, the System of Accounting Standards and circulars guiding Accounting Standards; Accounting regimes for types of Enterprises. In addition, all types of Enterprises must have an accounting information system (AIS) to help internal stakeholders such as administrators and external parties such as investors, government agencies, banks, etc. make decisions for each specific goal.

AIS is the place where accounting information is maintained and created for organizations to analyze, evaluate, plan, and diagnose the dynamics of operations and financial situations. AIS is an indispensable structure in an entity that uses available resources and other components to transform financial/accounting transaction data into information with the purpose of meeting the needs of users.

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Without quality AIS, there will be no quality accounting information. Sajady et al., (2008) asserted that effective AIS will improve the quality of accounting and financial reporting. Poor information quality can have a negative impact on decision making. Meiryani (2014) argued that it is necessary for companies to use an accounting information system as a tool for making business decisions in competitive conditions. Research results by Nguyen Thi Phuong Thao (2014) show that most Vietnamese enterprises have applied accounting information systems for management purposes, although at different levels, they have partly met the information needs for internal management within the company. However, the implementation of accounting and information systems in Vietnamese enterprises still has many limitations such as unsynchronized and unsystematic implementation, many outdated and overlapping contents, simple technical methods, lack of attention to exploiting modern information processing tools and techniques, and failure to create connectivity and stability.

2. Basic Theory of Accounting Information Systems (AIS))

2.1. Concept of AIS, basic components

2.1.1 Concept of AIS (AIS)

Accounting information system (AIS) is a system that collects, processes, synthesizes and stores data to provide useful information related to accounting and finance, serving decision making.

An accounting information system (AIS) is a framework for coordinating resources (data, equipment, suppliers, personnel, and funding) to transform inputs into outputs of financial and economic information used to carry out an entity's activities and provide accounting information to interested parties (Wilkinson, 1999). Accordingly, AIS is an integral structure within an entity that uses available resources and other components to transform financial-accounting transaction data into information, with the aim of meeting the needs of users. Mowen (2007) explains, AIS is meant as a manual and computerized system, using processes such as collecting, recording, summarizing, analyzing (using programming models), and managing data to provide output information to users. Operating a digital AIS uses a process that transforms inputs into outputs to achieve the overall goals of the system.

All business organizations, including non-profit organizations, rely on accounting information, which helps internal stakeholders such as managers and external stakeholders such as investors, government agencies, banks, etc. achieve their goals when making economic decisions (Hansen and Mowen, 2007, 2). BoDoanhnghiar and Hopwood (2004) believe that AIS is a set of resources, such as people and equipment, designed to transform financial and other data into information that can be communicated to decision makers. Hall (2011) believes that the basic purpose of AIS is to provide accounting information to external audiences, managers and executives of the enterprise. The subsystems of AIS handle both financial and non-financial transactions, but the direct impact is on the processing of financial transactions. Thus, AIS is the intersection between accounting and information systems, so studies often view AIS as a computerized information system.

Kieso et al (2012) explained that the essence of AIS is to collect raw data, which is then presented as accounting information that is useful to the information users. Romey and Steinbat (2012, 26) revealed that AIS is a system that collects, records, stores and processes data to provide information to decision makers to plan, manage and operate

their businesses. In this case, accounting information is viewed as a system that helps managers plan and control by providing relevant, reliable information for decision making (Romey and Steinbat, 2012). At the same time, Marshall and Paul (2012) stated that AIS includes people, processes and information technology (IT), performing important functions such as collecting and storing data generated during operations and transactions to help the unit review events, process data into useful information for decision making, and provide and control sufficient information to protect the unit's assets, including AIS data.

2.1.2 Basic components that make up AIS

An information system (IS) is a set of components that are related to each other through the collection, storage, and provision of data and information to support the functional activities of an organization, supporting the decision-making process of management levels through providing information to plan, organize, implement and control the organization's operations (Kenneth C. Laudon & P. Laudon, 2012; Ralph M. Stair & W. Reynolds, 2010). There are 6 components of AIS (Rommey, 2012), namely: (1) System users; (2) Procedures and instructions for collecting, processing and storing data; (3) Data about the organization and business activities; (4) Software used to process data; (5) Hardware; (6) Internal control measures and security measures to protect AIS data.

According to Rommey and Steinbart (2017), AIS is defined as a basic information system of an organization consisting of 6 components, including: (1) System users; (2) Procedures and instructions for collecting, processing, and storing data; (3) Organizational data and business operations of the unit; (4) Software; (5) Infrastructure; and (6) Information technology.

Through that, we see that each author will have different views on AIS. However, AIS still plays a very important role in Enterprises. In the context that countries around the world as well as Vietnam are trying to promote Enterprises to apply the achievements of the 4th Industrial Revolution to the economy, the strategic role of AIS for Enterprises is to find ways to combine information and economic events, using technology as a basic tool to trigger innovation and important support for decision-making processes.

2. 2. Functions and roles of AIS in Enterprise

Accounting Information System (AIS) is an important structure in collecting, storing, and processing financial accounting data of Enterprises. With this key role, AIS has the following ***the following*** roles and functions:

- Timely provision of financial reports: AIS ensures that financial reports are provided promptly and accurately to stakeholders such as customers, investors, auditors, and internal management. This helps stakeholders grasp the financial situation of the Enterprise to make timely decisions.

- Update and prepare accurate information: AIS continuously updates and prepares necessary information to support the planning and operation of the daily operations of the Enterprise. This information includes figures on cash flow, costs, revenues, and other financial factors, helping Enterprise management make effective strategic decisions.

In addition, the AIS system also plays a role in supporting business control through:

- Monitoring compliance with business processes: AIS helps ensure that business processes are carried out in accordance with regulations and standards, thereby minimizing risks and errors in business operations.

- Intellectual and physical property protection: AIS provides tools to protect the assets of the Enterprise, including intellectual and physical property. This system helps to monitor and control the use of the assets of the Enterprise, preventing the loss or misuse of assets.

- Ensure accuracy and timeliness of information: AIS helps ensure that all financial and accounting information is processed accurately and promptly. This not only helps businesses maintain operational efficiency but also enhances their competitiveness in the market.

Thanks to these functions, AIS makes an important contribution to improving the operational efficiency and decision-making ability of Enterprises, thereby helping Enterprises gain competitive advantages and sustainable development.

2.3 Accounting information system models in Enterprises

In each different Enterprise, there are different AIS models. According to James A. Hall, depending on the level of IT application of the Enterprise, the AIS model includes:

- Manual process model
- Flat data model (Flat - File)
- Database Model (Data base)
- REA model
- Enterprise Resource Planning (ERP) System Model
- Cloud computing model

3. Applications of (AIS) in Enterprises)

3.1 Applications of Accounting Information Systems (AIS))

Accounting Information Systems (AIS) are crucial in providing financial data that supports decision-making within an organization. The availability and value of information provided by AIS largely depend on the timeliness and quality of that information. Both can be improved through the involvement of non-financial stakeholders in the preparation process and through the reuse of that information across multiple business processes (Butkevičius, 2009). Accounting information systems in an ERP environment are primarily built on a computer-based basis to manage accounting as the core information system. In addition to process-based accounting, there are also production and operations activities that involve people, materials, finance and other information together to manage customer demand, and will also integrate production and business activities, implement production plans, cash flow, cost control and other aspects, effectively reduce the company's resources, waste money and improve the economic efficiency of the enterprise (Zheng, 2015). AIS is responsible for collecting, storing and processing financial and accounting data used for internal management decision-making purposes, including non-financial transactions that directly affect the processing of financial transactions. Typically, AIS consists of three main subsystems: (1) Transaction Processing System (TPS) that supports daily business operations; (2) General Ledger System and Financial Reporting System (GLS/FRS) and (3) Management Reporting System (MRS). For most professionals in the accounting field, the main idea of an organization's information system and in particular AIS is applied by Enterprise Resource Planning (ERP), which includes all the essential functions to support an organization and is implemented in most large organizations. Current literature is gradually moving away from this established view of the AIS field, now considering a more modular approach to AIS, in which new technologies such as Business Intelligence (BI) systems or Balanced

Scorecard (BSC) play an increasingly important role [3, 8]. The work presented in this paper proceeds from the idea that there is a large set of new technologies that can complement or integrate the current AIS and its existing utilities (Fernando Belfo, 2013). The benefits of implementing an accounting information system based on ERP can be assessed by its impact on improving decision-making processes, quality of accounting information, performance evaluation, internal control, and facilitating corporate transactions (Kocsis, 2019). The usefulness of an accounting information system depends on the quality of the output of the information system that can meet the needs of users. In general, an accounting information system 1) provides daily and weekly financial reports and 2) provides useful information to monitor the decision-making process and performance of the organization. A good design and implementation of an accounting information system based on ERP will help in operational success (Hazar Daoud, 2013)

Accounting Information System (AIS)

The Accounting Information System (AIS) plays a crucial role in collecting, processing, and providing financial information to businesses, particularly in the context of globalization and the growth of international enterprises. AIS not only enhances financial management processes but also helps organizations comply with legal regulations and improve overall business performance.

- Support financial decision making

AIS helps international business managers collect and process financial information from branches or representative offices in different countries. Financial reports generated from this system provide important information about profits, expenses and overall financial situation, helping leaders make accurate strategic decisions.

- Supply chain and warehouse management

International businesses often have to manage complex supply chains with multiple partners in multiple countries. AIS can be integrated with supply chain management systems to track goods and resources throughout the stages from production, transportation to consumption, ensuring efficiency and cost savings.

- Support for international financial reporting and regulatory compliance

AIS helps international businesses comply with international financial regulations and country-specific tax laws. The system can automatically update financial reporting requirements, helping businesses avoid legal risks and minimize costs associated with complying with these regulations.

- Optimize the financial reporting process

AIS helps automate the financial reporting process, reducing human intervention and improving accuracy. In an international business environment, where businesses need to generate reports for different countries and markets, this system saves time and effort.

- Financial data analysis

AIS provides powerful financial analysis tools that enable international businesses to analyze and evaluate their financial situation, thereby making data-driven business decisions. This helps businesses detect financial trends, manage costs effectively and maximize profits.

- Support cross-border transactions

In international business, cross-border transactions are a vital component. AIS efficiently handles multi-currency transactions and international payments, facilitating smooth and swift dealings with foreign partners.

In the global business environment, the application and development of Accounting Information Systems (AIS) in international enterprises not only helps improve financial management efficiency but also ensures compliance with regulations and optimizes operations. These applications contribute significantly to the success and sustainable growth of enterprises in the international market.

3.3.1. ERP system - Enterprise Resource Planning - human resource planning system

An ERP system is a complex set of software applications designed to integrate processes and functions within a company. This system provides a comprehensive view of the company's business operations by sharing a common, integrated database. ERP can be described in different ways from various perspectives.

In simple terms, according to Davenport (1998), ERP is an integrated software package used to manage all business information, including human resources, supply chain, finance, accounting, sales, and more. Shanks and colleagues (2003) describe an ERP system as a set of application software modules packaged with a unified structure, used by organizations as the main engine to integrate data, processes, and information technology in real time across both internal and external value chains.

Pincher (2010) describes a new ERP trend with the theme "Big ERP is dead, long live agile." In this context, cloud-based ERP and Software as a Service (SaaS) are considered the "hot" topics today.

Popular ERP software:

- *SAP ERP:* The leading ERP software for large and global enterprises. SAP has flexible solutions for almost every industry.
- *Oracle ERP Cloud* : A comprehensive cloud ERP solution from Oracle, especially useful for multinational organizations.
- *Microsoft Dynamics 365* : ERP software popular with small and medium-sized businesses, offering modules for finance, supply chain management, and human resources.

➢ ***The Relationship of ERP to AIS***

- Data integration:

ERP and AIS have a close relationship in sharing and integrating financial data. Financial data (such as invoices, transactions, expenses, revenues) from different departments in ERP will be transferred to AIS to perform accounting operations, creating accurate and timely financial reports.

- Financial and accounting management:

ERP helps in generating and sharing financial data, while AIS uses this data to generate detailed financial reports, helping management make informed financial decisions.

- Accuracy and consistency in financial reporting:

When ERP and AIS are integrated, financial reporting becomes more accurate, errors are reduced, and transparency in financial information is increased.

- Optimize processes and operational efficiency:

ERP enhances business performance by providing accurate data to the AIS, thereby streamlining accounting processes, generating timely financial reports, and supporting swift decision-making.

- Consolidated financial report:

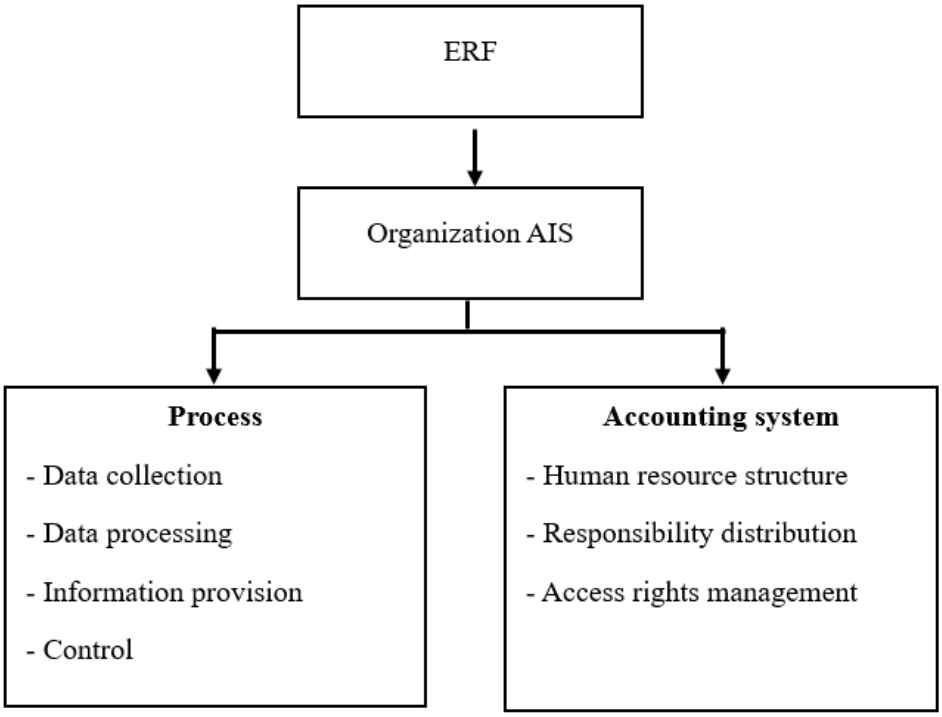
ERP provides the database for AIS to generate comprehensive financial reports, helping businesses track their financial situation accurately and efficiently.

- Cost and budget management:

The modules in ERP help AIS get accurate data to perform cost analysis and prepare budget reports, helping businesses control finances more effectively.

The Impact of ERP on AIS

Chart: relationship between ERP and AIS



➢ ***Benefits of combining ERP with AIS***

With increasing competitive pressure, businesses are always looking for solutions to improve business management efficiency. ERP is a system that allows the application of information technology to the planning and effective management of business resources. The application of ERP creates a close connection within the business. Each business activity is no longer an independent process but is restructured and standardized. Coordination and sharing of resources helps manage activities, costs and improve labor productivity. However, in order to be able to manage the whole, the accounting department as well as other departments in the business may face the challenge of changing the work process. ERP is not simply a software but a new management style on the basis of information technology application.

- Financial data integration: ERP and AIS both deal with managing financial information, but ERP provides a comprehensive system for every department in the organization, while AIS focuses on accounting and financial reporting activities. Financial data from the ERP system can be used in AIS to generate accurate financial reports.

- Accounting features in ERP: Many modern ERP systems include accounting modules (financial modules) that help process and manage accounting transactions. This helps reduce duplication of work and ensures consistency between financial reports and

business data.

- Processes and efficiency: ERP helps optimize the business operations, from production, warehouse management to sales and accounting. When these modules are integrated with AIS, it creates an accurate and easily accessible financial information system for different departments within the organization.

- Financial reporting and analysis: Both ERP and AIS can provide important financial reports. ERP gives an organization an overview of its financial situation through modules related to sales, revenue, and inventory, while AIS specializes in detailed financial reports such as balance sheets and income statements.

3.4. AI and Accounting Information Systems

AI (Artificial Intelligence) is having a profound impact on Enterprise Information Systems (AIS) across many industries and sectors. Here are the major impacts of AI on AIS of Enterprises:

- Increase operational efficiency:

AI automates processes within the AIS, reducing human intervention and boosting efficiency. Tasks such as data entry, processing, analysis, and reporting can be handled automatically by AI, allowing businesses to save time and resources.

- More powerful data analysis and forecasting:

AI enhances the big data analytics and forecasting abilities of AIS. By detecting patterns in business data, machine learning algorithms help predict trends, optimize marketing strategies, and support more precise financial decision-making.

- Improve strategic decisions:

AI not only analyzes data but also has the ability to make strategic recommendations. In AIS systems, AI helps provide insights into key business metrics, helping managers make informed decisions and long-term strategies.

- Enhanced data security:

AI can detect threats and abnormal behavior within enterprise AIS systems. Advanced technologies such as deep learning and behavioral analytics can identify signs of cyberattacks and fraud, thereby protecting critical enterprise data.

- Automate business processes:

AI can integrate with ERP, CRM, and other systems within AIS to automate tasks from manufacturing to customer management, reducing errors and personnel costs.

- Optimize financial management:

AI enables businesses to track costs, analyze profits, and forecast cash flows with enhanced precision. By integrating AI into AIS, businesses can streamline auditing, improve financial reporting, and gain deeper insights into financial fluctuations.

- Improve customer experience:

AI in AIS can help businesses better understand customer needs and behaviors through big data analytics. This creates personalized marketing strategies, optimizes promotions, and improves customer satisfaction.

- Supply chain optimization:

AI-powered AIS systems can forecast product demand, manage inventory more efficiently, and optimize supply chains. AI helps analyze data from suppliers, predict product demand, and automatically adjust logistics processes.

In short, AI has been dramatically changing the way businesses deploy and use AIS, bringing many opportunities to improve performance, reduce costs and enhance

competitiveness. However, deploying AI in AIS also requires businesses to have a reasonable plan and strategy to maximize the potential of this technology.

4. Accounting Information System (AIS) in Vietnam

4.1 AIS application situation in Vietnamese Enterprises

✓ **Accounting software**

Accounting software is a program that processes accounting information on a computer, starting from updating documents, processing information on documents to printing accounting books and accounting reports (Ministry of Finance, 2005). According to Ghasemi & colleagues (2011), accounting software can be divided into two groups: separate software in which all accounting functions are organized into one software and accounting subsystems, in which accounting functions are integrated with many other functions of the enterprise in the overall management software.

Accounting software today is developed with many features to support financial management, bookkeeping, financial reporting, taxes, and many other accounting tasks. Below are some popular accounting software and their features:

➢ *MISA*

- Automatically enter purchase voucher data of electronic invoice
- Automatically warn about the operating status of the Enterprise
- No need for USB token, can still sign financial statements to submit to the state
- Automatic bank connection: Transfer money, check balance, check transaction history, etc.
- Provide full legal documents related to finance and accounting in a timely manner.
- Convenient tax declaration via software
- Bookkeeping: Provides the feature of entering accounting transactions into the accounting books.

➢ *Fast Accounting*

- Support small and medium sized businesses
- Built and developed under Microsoft platform with C#net programming language.
- The software can run on a local computer, a single computer, or work remotely.

➢ *Bravo*

- Monitor and balance financial capacity
- Support financial control and business situation of the Enterprise
- Support currency exchange rate update
- Allow data linking
- Automatic data backup
- Function to find and automatically edit data

➢ *LinkQ*

- Suitable for large-scale companies with many branches
- Support management of all accounting work at the Enterprise
- Track and account for multiple currencies in parallel
- Automate all management tasks
- Extract reports to various text formats
- Regularly update new documents
- Ensure user security.

➢ *ERPNext (integrated ERP accounting software)*

- General accounting management: Manage all financial transactions, record them

into automatic ledgers.

- Financial reporting: Provide standard financial reports, including balance sheets and income statements.
- Debt management: Manage receivables and payables, track loans.
- Warehouse management: Track inventory and calculate product cost.
- Human resource management: Calculate and manage employee salaries, related insurance and taxes.
- Integration with other software: Integration with other modules in the ERP system such as sales, purchasing, manufacturing, CRM.

➢ *3Tsorf*

- Multi-language integration
- Unlimited users and data processing capabilities
- Operations are arranged logically and flexibly.

➢ *Simpa*

- Automatically compare, evaluate documents and books, create reports, help optimize financial management of the Enterprise.
- Synthesize information and create financial reports with relevant forms, helping users easily monitor and evaluate business performance.
- Automatically enter data and create documents from sales invoices
- Direct connection with banks and tax authorities, allowing users to get bank statements and pay taxes through the software.

Depending on the size of the business, the industry, and the financial management needs, you can choose the appropriate accounting software. Modern accounting software today has a high level of automation, helping to save time and minimize errors in accounting work.

As a country with a developing economy, Vietnam has been gradually integrating into the global economy. International economic integration is a favorable and important condition for the development of our country's economy, but besides that, the market economy with its harsh rules also has a great impact on the existence and development of Vietnamese enterprises.

To improve operational capacity and competitiveness, business administrators need to use management tools, including a very important tool: the accounting information system (AIS). AIS provides necessary information on the economic and financial activities of the business accurately and promptly to those in need. An effective and properly organized AIS will provide appropriate information, best meeting the needs of those using accounting information.

➢ *Benefits of AIS for Vietnamese Enterprises*

- Increase transparency and accuracy in financial reporting
- Improve financial management efficiency
- Support strategic decision making and financial forecasting
- Improve legal compliance and reduce legal risks
- Improve operational efficiency and productivity
- Support digital transformation and enhance competitiveness
- Minimize financial errors and fraud

4.2 Factors affecting AIS deployment in Vietnam

For AIS to be truly effective for the production and business activities of the

Enterprise, and to maximally meet the information needs of managers, according to the author, when building AIS, the following factors need to be taken into account:

(1) Management needs in Enterprises.

(2) Management level.

(3) Characteristics of organizing production and business activities in the Enterprise.

(4) Level of application of equipment and IT in Enterprises.

(5) Professional qualifications of accounting staff.

(6) Legal environment.

(7) Information needs of other relevant parties.

5. Lessons learned for Vietnamese Enterprises

- Investment in information technology infrastructure:

In the present era, the strong development of IT leads to significant changes in the world of commerce and business environment. In Enterprises, the volume, complexity and globalization of economic transactions are increasing. Therefore, electronic AIS in Enterprises appears as an inevitable result. Accordingly, accountants have been strongly influenced by the clear and specific changes of this new business environment. The accounting profession is required to respond promptly to those changes. To do so, in addition to mastering the current accounting standards and regulations, accountants must keep up with recent changes, the most important of which are advances in the field of IT. This contributes to ensuring the quality of AIS provided, creating trust for domestic and international information users.

In the IT environment, many traditional accounting functions have been merged and incorporated into new systems, requiring a combination of technology and accounting knowledge. Therefore, the IT environment creates many new challenges and opportunities for stakeholders in responding to these changes. Organizations require employees, including executives, managers, and workers in the accounting and finance fields to have a full range of IT skills. Organizations strive to employ and recruit people with IT-related qualifications and skills, and some professional associations and organizations in the accounting profession have included the concept of IT or electronic data environment as an important part of the knowledge, skills, and competencies of the accounting profession.

- Human resource training and skill development: Training accounting staff to effectively use AIS is extremely important. Enterprises need to build regular training programs to improve the capacity of accounting staff and related staff.

- Create changes in thinking and working processes: For AIS implementation to be successful, businesses need to change traditional working methods, encourage employees to get familiar with technology and apply automated accounting systems.

- Building a flexible financial reporting system: AIS helps businesses build flexible and transparent financial reports. These reports will help managers make accurate and timely decisions, while meeting the requirements of tax authorities and investment partners.

- Integrate AIS with other management systems: To maximize efficiency, businesses need to integrate AIS with other management systems such as warehouse management, sales and human resources. This will create a synchronized information ecosystem, thereby enhancing management and decision-making efficiency.

6. Conclusion

6.1. Recommendations for Vietnamese Enterprises

An accounting information system is of quality when it achieves the set goals such as: Providing useful information, reasonable development time, satisfying the information needs of enterprises, users, including accounting staff. Therefore, the accounting information system is always changed, updated and improved according to each development stage of the enterprise. To overcome the above limitations, in addition to promoting the application of information technology, it is necessary to improve the accounting information system in the following directions:

- *Improve accounting information security:* Securing accounting information systems will help prevent information leaks.

- *Strengthening the application of information technology:* Currently, most enterprises have applied IT in accounting. Although the level of IT application in accounting is not the same, basically, enterprises are applying accounting software in accounting work and management work of the whole enterprise. Regular application of IT will affect the way of collecting, processing data and providing accounting information, thereby limiting risks as well as management and control of AIS. Awareness and assessment of errors and fraud in the process of collecting and processing data of AIS in the computer environment, thereby having important control measures contribute to improving the quality of AIS. However, accounting systems and software are not yet operating stably, so it is necessary to promote especially accounting software. Accounting software must meet the requirements of users: the software must provide outputs that meet the legal requirements on accounting, provide desired outputs. The software must provide the best support to users during use through error reports, error correction instructions, user manuals, online support, and be friendly and easy to use.

- *Improve the qualifications and quality of staff:* Enterprises should focus on training human resources in the direction of developing management capacity and professional capacity to grasp techniques and analyze data; apply advances in science and technology to the cycle of accounting information systems, requiring understanding of information technology for an accountant.

- *Correctly identify the key role of applying information technology in the development process*, thereby allocating more investment capital to the development of the enterprise 's information technology infrastructure, investing in purchasing computers and equipping software, aiming towards the overall management software of the enterprise.

- *Assign authority and responsibility to employees:* In addition to preventing unauthorized access, businesses can also track and monitor all access activities to the system through access logs, control login time, access codes, access request types and access data.

- *Perfecting the management accounting reporting system:* Enterprises need to establish a management accounting reporting system suitable to the characteristics of their operations. The information needs of managers need to be directed towards creating reports to provide control information, make management decisions... The reporting system also needs to be applied in a combined, supplementary and increase management efficiency of managers.

6.2. Conclusion

Accounting information systems in the context of applying information technology

in enterprises, as well as the application of information technology in accounting, have and will make strong changes in the field of financial accounting. The quality of AIS information when applying technology will become faster, more timely and more accurate, the integrated information is diverse and extensive, including financial and non-financial information. This will help managers have multi-dimensional and extensive information when analyzing and making decisions in business and enterprise management. In addition, currently, based on the application of smart sensors, communication devices and integrated management solutions, enterprises can digitize the entire process of operation from production, business to management. Information from the production process, through sensors, is digitized into real-time data and transmitted to processing systems and management systems. As a result, centralized management systems always have complete, updated and accurate data to help managers make timely management decisions. The more complete the level of digitization, the more updated and accurate the information.

The Industrial Revolution has driven the development of smarter technologies with enhanced processing power. These innovations allow managers to access comprehensive business information—from a broad overview to detailed transaction data—anytime and anywhere, eliminating the need to consult multiple sources or individuals. This improves labor productivity and streamlines work processes, leading to greater operational efficiency.

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FACTORS AFFECTING THE LEVEL OF IMPLEMENTATION OF ACTIVITIES TOWARDS GREEN GROWTH GOALS IN MANUFACTURING AND TRADING ENTERPRISES IN INDUSTRIAL PARKS IN THE NORTH CENTRAL REGION, VIETNAM

Dr. Tran Thị Thanh Thuy[1]

Abstract: This study aims to identify factors affecting the level of implementation of activities towards green growth goals in manufacturing and business enterprises in Industrial Parks in the North Central region of Vietnam. Applying the method of exploratory factor analysis (EFA) and regression analysis on the basis of data collected from 347 survey subjects of 75 manufacturing and business enterprises, the study identified 5 factors affecting the level of implementation of activities towards green growth goals in manufacturing and business enterprises in Industrial Parks in the North Central region, including: Government regulations; Pressure from relevant subjects of the enterprise; Leadership role in the enterprise; Corporate cultural environment; Business operational goals. The research results show that these factors are closely related to the level of implementation of activities towards green growth goals in manufacturing and business enterprises, and at the same time provide a scientific basis for state management agencies, industrial park management boards and enterprises themselves to develop and implement policies to promote the level of implementation of activities towards green growth goals in manufacturing and business enterprises in industrial parks in the North Central region.

Keywords: green growth, industrial parks, North Central.

1. INTRODUCTION

Green growth or building a green economy is the process of restructuring economic activities and infrastructure to achieve better results from investments in resources, human resources and finance, while reducing greenhouse gas emissions, responding to climate change, exploiting and using less natural resources, creating less waste, contributing to hunger eradication and poverty reduction, creating momentum to promote sustainable economic growth and reducing social inequality. Identifying green growth as an inevitable development trend, Vietnam is a pioneer, proactively integrating on the global green journey. In the process of structural transformation from "brown" to "green", the business community is identified as a key factor.

Currently, Vietnam is classified in the group of developing countries, with increasing polluting emissions due to the industrialization and modernization process. In addition, green growth is becoming a trend for businesses around the world, as well as in Vietnam. Businesses in Vietnam, especially manufacturing and trading enterprises, are increasingly facing the need to reduce emissions and environmental pollution in addition to the goal of economic development.

Currently, manufacturing and trading enterprises in industrial parks in the North

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Central region in particular and industrial parks in the whole country in general play an important role in green growth because they are the direct force involved in the production process, promoting economic development... Therefore, manufacturing and trading enterprises need to clearly identify challenges and opportunities, in order to ensure compliance with environmental regulations, innovate technology and improve production efficiency, restructure, limit the development of areas that generate large amounts of waste, cause pollution, environmental degradation....

2. LITERATURE REVIEW

2.1. Studies related to green growth

OECD (2011) defines green growth as promoting economic growth and development with the assurance that natural resources will continue to be able to meet the resource and environmental needs of people in the future.

According to the World Bank (2012), green growth is an efficient, clean and resilient growth model - efficient in the use of natural resources, clean in minimizing the impact of environmental pollution and resilient, resilient to natural disasters and natural disasters.

At the international level, the system of green growth assessment indicators is developed by many international organizations, such as OECD, EU, UNEP, GGKP. At the domestic level, green growth indicators focus on resource efficiency and productivity. The Netherlands uses indicators for water use intensity and greenhouse gas emissions in consumption. India incorporates ecological values into its national accounting system, China develops a set of environmental and resource performance indicators and an energy and resource efficiency index, while the Korean government has developed up to 30 indicators to assess green growth. The groups of indicators include:

- Greenhouse gas emission intensity in production
- Energy efficiency
- Material use intensity in production

Table 1. Green growth indicators of some international organizations

Organization	Criteria	Indicators
UNEMG	Decoupling economic growth and environmental degradation; Resource efficiency	- Raw materials used/GDP - Waste generated/GDP - Land used/GDP - Ecosystem change/GDP - Hazardous waste/GDP
UNEP	Environmental issues and goals	- Resource efficiency (Btu/GDP) - Material productivity (ton/GDP) - Water productivity (m3/GDP) - CO2 related productivity (ton/GDP)
OECD	Environmental and resource productivity	- Carbon and energy - Resource productivity: raw materials, water, nutrients - Total factor productivity - Demand for environmental services
	Natural assets	- Renewable resources: water, forests, fish - Non-renewable resources: minerals - Biodiversity and ecosystems
	Environmental	- Health and environmental hazards

	aspects of quality of life	- Environmental services and amenities
	Economic opportunities and adaptation policies	- Technology and innovation - Environmental goods and services - International financial flows - Prices and transfers between stakeholders - Skills and training - Regulation and governance
EU	Raw material intensity in production	- Resource productivity (GDP/domestic consumption of raw materials-ineuro/tonne) - Water (extracted water index - %) - Land (man-made land - km2) - Greenhouse gas emissions (tonnes) - Natural ecological capital (ecosystems developed by the EEA) - Energy efficiency - Environmental impact of resource use (life cycle resource efficiency indicators) - Land for agricultural production and forests (km2) - Water consumption - Carbon footprint of products

Source: Allen and Clouth (2012)

In Vietnam, the concept of green growth has been concretized and included in the Government's green growth strategy. Specifically, green growth, moving towards a low-carbon economy, enriching natural capital has become the main trend in sustainable development, reducing emissions and increasing the ability to absorb greenhouse gases have gradually become mandatory and important indicators in economic development (Government, 2012).

According to Nguyen Thi Thanh Tam (2019), green growth is an important content of sustainable development and is a development process that closely, reasonably and harmoniously combines socio-economic development and environmental protection, meeting the needs of the current generation, but does not affect future generations. To promote the implementation of the Green Growth Strategy, in the coming time, it is necessary to focus on the following contents: (i) Completing the planning and investment policy framework; (ii) Completing the green growth financial policy framework; (iii) Research and promulgate green technical norms, standards and guidelines.

Nguyen Dinh Dap's research (2022) states that green growth is an important part of sustainable development and is a development process that closely, reasonably and harmoniously combines socio-economic development and environmental protection, meeting the needs of the current generation, but not affecting future generations. Currently, Vietnam is gradually shifting its model towards green growth to address the risk of natural resource depletion, reduce pollution and environmental degradation. Although initial positive results have been achieved, it also poses some practical challenges, requiring appropriate solutions towards green growth in the coming time.

2.2. Studies related to factors affecting the level of implementation of activities towards green growth goals in enterprises

An enterprise is considered a green enterprise if it provides green products or services and/or has a green production process. Green products and services are environmentally friendly products, use resources efficiently and minimize waste. On the other hand, enterprises that improve production processes to consume less energy and materials, waste less and emit less are also considered green enterprises. In addition, green enterprises are also enterprises that create a good working environment and welfare system for employees.

Bansal and K. Roth (2000) pointed out 4 factors affecting the response of enterprises to the environment, including: Regulations; Pressure from stakeholders; Economic opportunities; Ethical motivation.

Buysse and Verbeke's (2003) study identified relevant stakeholders as: Consumers; Suppliers; Employees; Competitors; Shareholders and financial institutions; Media; Government and local representatives as the parties that influence the green growth orientation of enterprises. According to UNIDO (2011), green growth in industry is an industry-based approach, with the application of recognized methods, strategies and tools to decouple industrial production growth from increased resource use and adverse environmental impacts with the following contents: (1) Ensuring the security of natural resources by reducing pressure on scarce resources such as water, raw materials and fuels; (2) Contributing to mitigating and adapting to climate change through reducing greenhouse gas emissions; (3) Better environmental management, ensuring industrial and chemical safety in business operations through the development and use of environmental goods and services and (4) Promoting the expansion of environmental goods development.

De Jesus Pacheco D. A et al. (2016) proposed the determinants of ecological innovation in small and medium-sized manufacturing enterprises (including 23 component factors) expressed through a large group of factors, including: External factors (context); Internal factors; Learning; System structure; Operation. These factors will create the results of the transformation process through aspects such as: reputation, image and profit margin, as well as improving environmental performance.

Pham Duc Chinh et al. (2017) studied the impact of industrial parks on green growth in Long An province. The research results have shown that there are 6 factors affecting green growth in Long An Province created by industrial parks. In which, the biggest impact factors are: Economy; Employment and Environment; Then comes: Society; Policy mechanism and finally stakeholders...

Nguyen Anh Tuan (2021) conducted a study to clarify the current status of green growth activities of enterprises in industrial parks in Dong Nai province. The study has shown 7 factors affecting green growth activities of enterprises. In which, there are internal factors, such as: Pressure from leaders; Pressure from employees and external factors, such as: Pressure from shareholders; Credit institutions. In addition, factors related to the characteristics of enterprises, such as: Capital scale; Field of operation and Level of international integration of enterprises.

Le Thi Khanh Ly (2022) studied the factors affecting green growth in enterprises in Noi Bai Industrial Park. The research results showed that the factors affecting green growth in enterprises in Noi Bai Industrial Park include: Government regulations; Pressure from relevant stakeholders of enterprises; Leadership role in enterprises; Corporate cultural environment; Business operational goals.

3. RESEARCH METHOD

3.1. Data

Quantitative research method is used to test the scale and research model. The scales are evaluated through tools: Cronbach's Alpha reliability coefficient testing; exploratory factor analysis (EFA), regression analysis. The survey was created and distributed to 360 subjects who are managers and leaders of departments and divisions of 75 manufacturing and business enterprises in the Industrial Park in the North Central region. The number of collected and eligible survey forms for analysis is 347. The survey period is from August 2024 to October 2024.

Table 1. Origin of the scale of variables

Variable name	Symbol	Number of observed variables/Scale	Source
1. Independent variable			
Government regulations	GR	6	Bansal and K. Roth (2000) Pham Duc Chinh et al. (2017) Le Thi Khanh Ly (2022).
Pressure from relevant stakeholders of the enterprise	PS	5	Bansal and K. Roth (2000) Buysse and Verbeke (2003) Pham Duc Chinh et al. (2017) Nguyen Anh Tuan (2021) Le Thi Khanh Ly (2022)
Leadership role in business	LR	3	De Jesus Pacheco D. A et al. (2016), Nguyen Anh Tuan (2021), Le Thi Khanh Ly (2022).
Corporate culture environment	CE	5	De Jesus Pacheco D. A et al. (2016), Le Thi Khanh Ly (2022) Pham Duc Chinh et al. (2017).
Business operating objectives	BO	5	De Jesus Pacheco D. A et al. (2016) Nguyen Anh Tuan (2021) Le Thi Khanh Ly (2022)
2. Dependent variable			
Level of implementation of activities towards green growth goals in manufacturing and business enterprises	LIG	5	UNIDO (2011), Le Thi Khanh Ly (2022)

Source: Author's synthesis from research overview

3.2. Research model and research hypothesis

Based on theoretical research and related documents, the author proposes a research

model of factors affecting the level of implementation of activities towards green growth goals in production and business enterprises in Industrial Parks in the North Central region as shown in Figure 1.

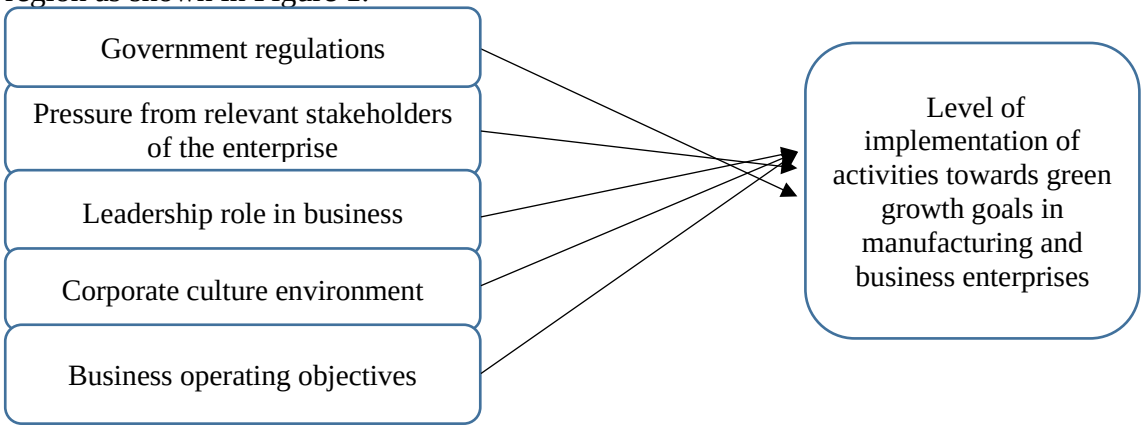

Figure 1: Research model of factors affecting the level of implementation of activities towards green growth goals in manufacturing and business enterprises in Industrial Parks in the North Central region

Source: Author's proposal based on secondary data and theoretical overview

The research hypotheses are:

H1: Government regulations have a positive impact on the level of implementation of activities towards green growth goals in manufacturing and business enterprises in Industrial Parks in the North Central region.

H2: Pressure from relevant stakeholders of enterprises has a positive impact on the level of implementation of activities towards green growth goals in manufacturing and business enterprises in Industrial Parks in the North Central region.

H3: Leadership role in enterprises has a positive impact on the level of implementation of activities towards green growth goals in manufacturing and business enterprises in Industrial Parks in the North Central region.

H4: Corporate cultural environment has a positive impact on the level of implementation of activities towards green growth goals in manufacturing and business enterprises in Industrial Parks in the North Central region.

H5: Business operating objectives have a positive impact on the level of implementation of activities towards green growth goals in manufacturing and business enterprises in Industrial Parks in the North Central region.

4. RESEARCH RESULTS

- Cronbach's Alpha test results

The test results (Table 2) show that all variables have Cronbach's Alpha coefficients > 0.6. At the same time, the observed variables of each scale have item-total correlation coefficients greater than the significant condition of 0.3. This can be concluded that the scales are all available, suitable, meaningful and ensure reliability.

Table 2: Cronbach's alpha coefficient test results

Group of factors	Cronbach's Alpha coefficient
Government Regulations (GR)	0.754
Pressure from business stakeholders (PS)	0.876

Leadership role in business (LR)	0.835
Corporate culture environment (CE)	0.891
Business operating objectives (BO)	0.849
Green Growth in Enterprises (LIG)	0.811

Source: Compiled and calculated from author's survey data

The results of the KMO and Bartlett coefficient tests (Table 3) indicate that there is a correlation between the variables in the population (Sig. = 0.000 < 0.05); at the same time, the KMO coefficient = 0.837, also proving the suitability of using EFA analysis to group these variables together. The extracted variance of 69.523% > 50% and the Eigenvalues index = 1.312 > 1, ensure the condition that the EFA analysis results are accepted.

Table 3: KMO and BARTLETT test results

KMO coefficient		0.837
Bartlett test	Chi squared approximation	3312.612
	Degrees of freedom	371
	Significance level	0.000

Source: Compiled and calculated from author's survey data

- EFA analysis

In order to analyze the relationship between variables and arrange the factors belonging to the independent variables, the study conducted EFA analysis for 24 observed variables affecting the level of implementation of activities towards green growth goals in manufacturing and business enterprises in Industrial Parks in the North Central region. After EFA analysis, the factors had changes in the number of factors and were rearranged.

- Results of regression analysis

Regression analysis between 5 independent variables to the dependent variable of the level of implementation of activities towards green growth goals in manufacturing and business enterprises in Industrial Parks in the North Central region is shown (Table 4). The analysis results show that all correlations between independent factors and the level of implementation of activities towards green growth goals in manufacturing and business enterprises in Industrial Parks in the North Central region are statistically significant. Therefore, all hypotheses are accepted.

Table 4: Results of regression model analysis

Model		**Unstandardized regression coefficients**		**Standardized regression coefficient**	**t**	**Sig.**	**Check for multicollinearity**	
		B	**Standard error**	**Beta**			**Acceptability**	**Variance magnification factor**
1	(Constant)	-0.020	0.192		-0.104	0.917		
	GR	0.334	0.031	0.353	4.810	0.000	0.981	1.131
	PS	0.326	0.026	0.347	4.782	0.000	0.889	1.000
	LR	0.274	0.034	0.293	3.864	0.000	0.901	1.121
	CE	0.237	0.034	0.258	4.329	0.000	0.899	1.052
	BO	0.376	0.024	0.395	4.417	0.000	0.902	1.031

Source: Compiled and calculated from author's survey data

The standardized regression equation is as follows:

LIG = 0.395*BO + 0.353*GR + 0.347*PS + 0.293*LR + 0.258*CE + ei

The research results show that there is a positive relationship between 5 factors affecting the level of implementation of activities towards green growth goals in manufacturing and business enterprises in Industrial Parks in the North Central region. Based on the magnitude of the standardized regression coefficient Beta, the order of influence from strong to weak of the factors on the level of implementation of activities towards green growth goals in manufacturing and business enterprises in Industrial Parks in the North Central region is: Business operation goals (0.395); Government regulations (0.353); Pressure from relevant subjects of the business (0.347); Leadership role in the business (0.293); Corporate culture environment (0.258).

5. SOME SOLUTIONS TO PROMOTE THE IMPLEMENTATION OF ACTIVITIES TOWARDS THE GOAL OF GREEN GROWTH IN MANUFACTURING AND BUSINESS ENTERPRISES IN INDUSTRIAL PARKS IN THE NORTH CENTRAL REGION

Based on the research results, the author recommends a number of solutions to promote the implementation of activities towards the goal of green growth in manufacturing and business enterprises in industrial parks in the North Central region, specifically:

Firstly, the Government and the business community must work together, share the vision and strategy for rapid, green and sustainable development. The Government needs to have development orientations suitable to the context and conditions of Vietnam to take advantage of international opportunities that the market brings; at the same time, increase access to capital for green growth for enterprises, continue to build and diversify incentive policies for enterprises to invest in the direction of using high technology, clean technology, low energy consumption, resources, low emissions and environmentally friendly. Green growth and sustainable development are certainly not easy paths, but will bring many "sweet fruits" worthy of the efforts of businesses.

The Vietnamese Government continues to strongly commit to creating all favorable conditions for businesses to develop, including cutting costs for businesses; increasing transparency and equality in accessing resources; pioneering innovation in awareness, thinking, and action in green growth; pioneering in implementing specific projects, plans, and action programs to serve green growth towards renewing traditional growth drivers, etc.

Second, the Government needs to provide orientations for developing programs to organize propaganda and disseminate knowledge about green growth to relevant subjects, such as: people, businesses, financial institutions, etc., and strengthening propaganda activities to raise businesses' awareness of cleaner production and corporate social responsibility.

Third, the Management Board of Industrial Parks in the North Central region needs to promote its role in supporting and supervising the activities of enterprises in the industrial parks. The Management Board of Industrial Parks needs to improve the effectiveness of disseminating policies and regulations on environmental protection and developing "green industry" to ensure that enterprises in the industrial parks can easily access information. At the same time, the Management Board of Industrial Parks in the North Central region should continue to develop and diversify mechanisms and policies

to encourage enterprises to invest in high technology, clean technology, low energy and resource consumption, low emissions, and environmental friendliness. Promote the improvement of the green business environment, enhance competitiveness with a focus on reforming administrative procedures, business conditions, and cutting costs for enterprises; at the same time, enhance the ability of enterprises to access capital for green growth.

Fourth, there should be policies to encourage production and business enterprises in industrial parks in the North Central region to be proactive in investing in research, technological innovation, and production of environmentally friendly organic products, contributing to minimizing the impact of climate change and conserving biodiversity. Production and business enterprises in industrial parks in the North Central region need to be more active and proactive in participating in the transformation of the growth model from "brown" to "green"; always pioneering and integrating on the global green journey; continuing to play a core role in implementing sustainable development goals.

6. CONCLUSION

The study surveyed 347 subjects from 75 manufacturing and business enterprises in industrial parks in the provinces of the North Central region to assess the level of influence of factors on the level of implementation of activities towards green growth goals in manufacturing and business enterprises. The research results show that there are 5 groups of factors affecting the level of implementation of activities towards green growth goals in manufacturing and business enterprises in industrial parks in the North Central region of Vietnam. Based on the research results, to promote the implementation of activities towards green growth goals in manufacturing and business enterprises in industrial parks in the North Central region, the Government, the Management Board of industrial parks and the business community must work together, share visions, strategies and activities for rapid, green and sustainable development.

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FACTORS AFFECTING GREEN CONSUMPTION BEHAVIOR OF PEOPLE IN THE NORTH CENTRAL REGION

***Dr. Tran Thị Thanh Thuy*[1]**

Abstract: This study aims to identify factors affecting green consumption behavior of people in the North Central region. Applying the method of exploratory factor analysis (EFA) and regression analysis on the basis of data collected from 353 consumers in the North Central region, the study identified 5 factors affecting green consumption behavior of people in the North Central region, including: Attitude towards green consumption, Social influence, Behavioral control, Risk, Trust. The research results show that these factors have a close relationship with green consumption behavior of people, at the same time providing a scientific basis for state management agencies to develop and implement policies to promote people in the North Central region to increasingly move towards green consumption behavior.

Keywords: Green consumer behavior, People, North Central Region.

1. INTRODUCTION

Green consumer behavior refers to the use of services and products that meet basic needs and bring a better quality of life without affecting the needs of future generations, that is, minimizing the use of natural resources and toxic substances as well as the generation of waste and pollutants. Simply put, humans cannot continue to exploit the planet's resources, discharge waste, cause poisoning and pollution without thinking about the future and future generations.

Green consumer behavior in Vietnam in general and the North Central region in particular is reflected in the choice to consume healthy foods, save electricity and water, limit the consumption of tobacco, alcohol, activities to increase longevity, environmentally friendly consumer behavior... has received the attention of most media and people. However, green consumption behavior is still quite unfamiliar to most Vietnamese people in general and the North Central region in particular. Green consumption content has only recently been focused on and emphasized in the Vietnam green development strategy, period 2011 - 2020. Green consumption activities that have been implemented have only stopped at raising public awareness in the use of ecological products, ecological plastic bags and are individual activities, not connected to each other, the scope of impact is only within the framework of a group of direct beneficiaries, so there is no popularity and greenness.

Most of the studies related to green consumer behavior have only been at the initial level of exploring the factors affecting green consumer attitudes and behaviors for one or some specific subjects (electricity, ecological farming products, fish, etc.) in Vietnam, and no study has created a complete picture linking factors related to individuals, the environment, etc. to explain green consumer attitudes and behaviors at a general level, especially in the North Central region. In addition, there has been no systematic and

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synchronous research on exploring factors and intentions among different consumer groups related to green consumer behavior based on psychological intention factors in the North Central region. That is the reason for conducting the study "Factors affecting green consumer behavior of people in the North Central region" with the aim of creating changes in people in the North Central region towards forming greener consumer attitudes and behaviors.

2. LITERATURE REVIEW

2.1. Studies related to green consumer behavior

Consumption is spending in a certain period of time on the use of goods and services to satisfy certain needs and desires, or a process in which the substance of a product is completely destroyed and/or combined or transformed into another form.

Consumer behavior is the interaction between environmental stimuli and human cognition and behavior through which people change their lives. In other words, consumer behavior includes the thoughts and feelings that people have and the actions they take during the consumption process. Factors such as opinions from other consumers, advertising, price information, packaging, product appearance... all have an impact on customers' feelings, thoughts, and behaviors (American Marketing Association).

Consumer behavior is the behavior that consumers display in searching for, purchasing, using, evaluating products and services that they expect will satisfy their personal needs (Peter D.Bennet, 1988).

"Green purchasing" (also known as "ecopurchasing") is a term used to refer to the purchase of environmentally friendly products and services. It is the consideration of environmental issues along with the consideration of price and efficiency criteria when making a purchase decision, so as to minimize the impact on health and the environment. This consideration can be aimed at one or all of the adverse environmental impacts throughout their entire life cycle (including production, transportation, use and recycling or disposal) (Le Hoang Lan, 2007).

The Green Consumption Conference (Oslo, Norway 1994) stated that green consumption is a way of using products effectively, saving resources, minimizing toxic substances and environmental pollution, without affecting the needs of future generations. That is, minimizing the use of natural resources and toxic substances as well as the generation of waste and pollutants.

According to NASPO (National Association of State Procurement Officials), green consumption is called by many different names such as: responsible purchasing, ecological consumption, sustainable consumption. It is a way of adding environmental issues with the criteria of price and efficiency of public procurement as well as private procurement into purchasing decisions.

It is important to understand that green consumption is not about “consuming less” but about knowing how to consume more efficiently, better and less resource-intensive. This is especially true for people living in poverty who often have an increased need to consume products and services.

Green consumption is directly linked to many other development priorities such as poverty reduction, economic growth, education and environmental protection. All of which aim to improve the quality of life. Therefore, green consumption is not about advising to consume less, but how to meet consumer needs in a smarter way. Green

consumption is now considered the consumption trend of the century when the environment has become a major concern of many countries around the world. Over the past decade, policies and programs have been implemented to successfully transform the industrial structure, making the production process cleaner and more efficient. However, businesses can only reduce the environmental impacts related to production but cannot solve the environmental impacts related to consumers' choice, use and disposal of products. Therefore, consumption plays an increasingly important role in solving environmental problems; The cooperation between producers, consumers and other stakeholders can bring about more sustainable solutions in the production - consumption system. In this context, integrating the efforts of stakeholders is a key issue to promote green consumption in the world in general and in Vietnam in particular.

Green consumption can be defined as the purchase, use and promotion of environmentally friendly products that do not pose risks to human health and do not threaten the functions or diversity of natural ecosystems. Green consumption comes from the desire to protect resources for future generations and improve the quality of human life. Currently, consumers around the world are gradually moving towards green, environmentally friendly products and consider them as a standard for high-quality products and services. Consumers are willing to pay higher prices for goods labeled as meeting sustainable production standards. With the growing global interest in green products, many companies have started producing eco-friendly green products and showing their efforts to protect the environment. Governments are also making efforts to introduce many policies to promote green consumption. Most developing countries in Asia have established environmental protection laws.

2.2. Studies related to factors affecting green consumer behavior

2.2.1. Green consumer attitude and relationship with green consumer behavior

According to Ajzen (1991), behavior is influenced by “attitude”, “subjective norms” and “perceived behavioral control”. In which, attitude is “an individual’s evaluation of the results obtained from performing a behavior”. Attitude is a state of mental readiness organized through experience, capable of adjusting or dynamically influencing individual responses towards the object and the situation it relates to. A clever extension of Schultz and Zelezny (2000) defines attitude as the action expressed by consumers' likes and dislikes and environmental concern attitude is derived from a person's self-concept and the extent to which an individual perceives himself or herself as an integral part of the natural environment, referring to consumers' purchase intention depending on their environmental attitude. Attitude toward action has a strong and positive influence on action intention, this relationship has been shown in several studies (Chan, 2001; Vermeir, & Verbeke, 2004). In the context of green consumption, attitude refers to consumers' feelings and perceptions about using green products and consumers' attitudes influence their consumption behavior.

2.2.2. Subjective norms of green consumption and their relationship with green consumption behavior

Ajzen (1991) defines subjective norms, also known as social influence, as the perception of influential people that an individual should or should not perform a behavior. Subjective norms can be described as an individual's perception of social pressures to perform or not perform a behavior.

According to TRA theory (Fishbein & Ajzen, 1975), subjective norms can be formed

through the perception of normative beliefs from people or social factors that influence consumers (such as family, friends, colleagues, media, etc.). The level of impact of subjective norm beliefs on consumer purchasing tendency depends on: (1) the level of support/opposition to consumer purchasing and (2) the motivation of consumers to follow the wishes of influential people. The level of influence of related people on consumer behavioral tendency and the motivation of consumers to follow related people are two basic factors to evaluate subjective norms. The stronger the level of intimacy of related people to consumers, the greater the influence on their purchasing decisions. The greater the consumer's trust in related people, the greater the influence on their purchasing tendency. Research by Vu Anh Dung et al. (2012a) found that social factors such as family and social influence are important sources affecting Vietnamese people's interest in green products. Next, this group of authors (2012b) built and tested a model based on TPB theory (Ajzen, 1991) with the influences of social agents (family, society, government, media) in addition to attitudes to explain sustainable consumption behavior of Vietnamese people.

2.2.3. Green consumer behavior control and its relationship with green consumer behavior

Behavioral control is defined as an individual's perception of the ease or difficulty of performing a behavior. It represents the level of control over performing the behavior rather than the outcome of the behavior. In the context of green consumption, behavioral control describes the consumer's perception of the availability of necessary resources, barriers, and ease of performing green consumption.

Ajzen (1991) suggested that behavioral control factors directly affect the tendency to perform the behavior, and if the subject accurately perceives his or her level of control, behavioral control also predicts the behavior. Some authors such as Straughan and Roberts (1999) have studied this area, arguing that environmentally concerned people only display environmental behavior if they perceive that individual actions can contribute to solving common environmental problems. Perceived consumer effectiveness is similar to perceived behavioral control (PBC) (Ellen, Wiener & Cobb-Walgren, 1991).

2.2.4. Risk towards green consumption and its relationship with green consumption behavior

The concept of perceived risk was first introduced by Bauer (1960). Perceived risk in the purchasing process, is considered as the uncertain decision of consumers when purchasing and having to accept the consequences of this decision. In the consumer's attitude, perceived risk is defined in many different ways. Perceived risk from poor performance, danger, health risk and cost. Or “perceived risk is the uncertainty or negative outcomes of purchasing a product or service” (Dowling and Staeling, 1994). Consumer risk perception is divided into six types of risk: social, psychological, time, financial, performance and non-monetary (Mitchell, 1999). Perceived risk is considered important for consumer choice evaluation and behavior (Campbell and Goodstein, 2001). Perceived risk is also found to have a positive influence on sustainable consumption behavior (e.g., Vu Anh Dung et al., 2012a; 2012b) and healthy product consumption behavior (Huynh Thi Ngoc Diep and Ho Huy Tuu, 2013). In this study, perceived risk is expected to have a positive influence on attitudes and behavior toward sustainable consumption. In this study, the risk that Consumers may encounter problems when using

green products such as products not meeting expectations, spending a lot of time and money without getting a green product, or they encounter psychological pressure when buying existing products.

2.2.5. Trust towards green consumption and its relationship with green consumption behavior

Trust can be defined as "the belief of a person or an individual in a promised outcome/outcome" (Berg et al., 2005). According to Mayer (1995), "trust is a psychological state that includes the intention to accept vulnerability based on positive expectations about the actions or behaviors of the trusted party". For example, consumers often trust experts or research institutes in risk management and technology for genetically modified foods (Chen & Li, 2007). Online trust is a customer's optimistic expectation of product quality, which is considered as "social expectation in economic exchange". The clean food consumption movement is an evidence. For example, Schneider et al. (2009) suggested that consumer trust in organic food is based on the movement of using organic products that are good for health and the environment. In Vietnam, the movement of consuming green and clean food has just begun, but has attracted a large number of consumers, for example, safe vegetable products (Scott, 2008). Trust has also been found to influence sustainable consumption behavior (Vu Anh Dung et al., 2012a; 2012b) and healthy product consumption behavior (Huynh Thi Ngoc Diep and Ho Huy Tuu, 2013). Therefore, as a specific value, trust is expected to have a positive influence on (a) attitudes and (b) behaviors towards sustainable consumption. Consumer trust is based on their belief in product quality, government efforts, consumer protection organizations, and factory responsibility.

Thus, the proposed research model includes 5 independent variables that influence green consumption behavior of people in the North Central region (Figure 1).

3. RESEARCH METHODOLOGY

3.1. Data

The research population of this topic is randomly selected individuals in the North Central region, aged 18 years and older, answering questions through their direct interviews or sending questionnaires via e-mail, social networks. The survey results (Table 1) show that in 353 valid samples collected, there are 172 males accounting for 48.73% and 181 females accounting for 51.27%.

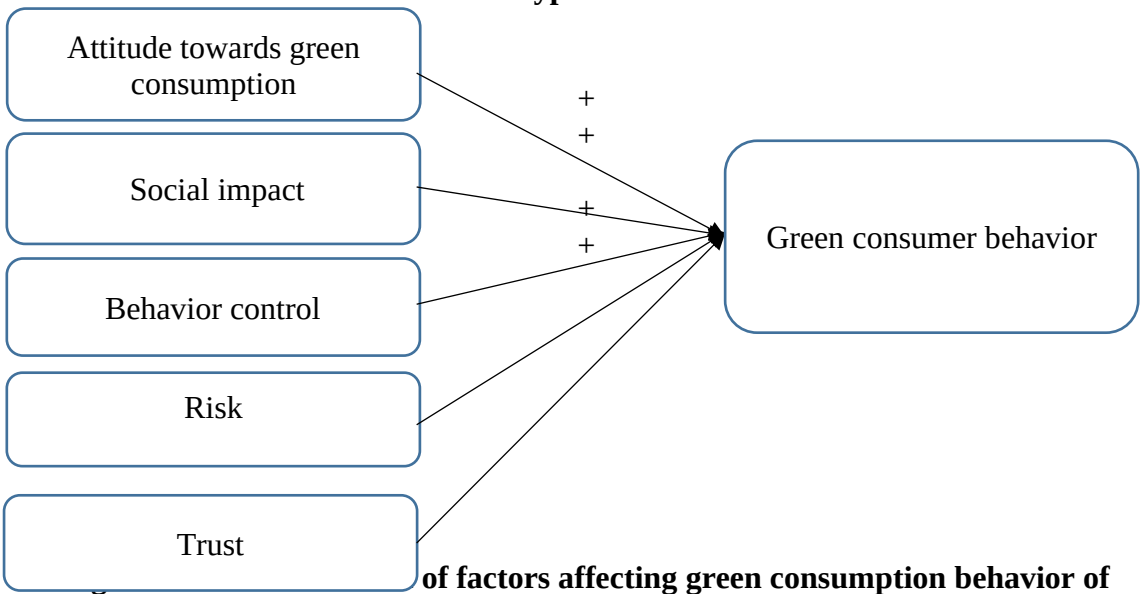
Table 1. Origin of the variable scales

Variable name	Symbol	Number of observed variables/Scale	Source
1. Independent variable			
Attitude towards green consumption	AC	6	(Chan, 2001; Vermeir, & Verbeke, 2004; Povey, Wellen & Conner, 2001). (Chan, 2001; Shepherd, 1989; Vermeir, & Verbeke, 2004).
Social impact	SI	4	(Ajzen, 1991)
Behavior control	BC	4	(Robert, 1995; Vermeir & Verbeke, 2006).

Risk	RR	6	(William & Hammit, 2001)
Trust	TT	6	(Berg et al., 2005; Chen, & Li, 2007; Huynh Thi Ngoc Diep and Ho Huy Tuu, 2013; Jokinen et al., 2011; Schneider et al., 2009).
2. Dependent variable			
Green consumer behavior	GCB	11	(Bearse et al., 2009), (Shah and Pillai, 2012; Le Hoang Lan, 2007).

Source: Author's synthesis from research overview

3.2. Research model and research hypothesis



of factors affecting green consumption behavior of people in the North Central region

Source: Author's proposal based on research overview

The research hypotheses are:

H1: Consumers' green consumption attitudes have a positive influence on green consumption behavior

H2: Social influence has a positive influence on green consumption behavior

H3: Behavioral control has a positive influence on green consumption behavior

H4: Risk has a positive influence on green consumption behavior

H5: Trust has a positive influence on green consumption behavior.

3.3. Analytical techniques

The study uses basic quantitative analysis methods such as Cronbach's alpha

coefficient, factor analysis and regression analysis. The Cronbach's alpha coefficient method is used to assess the reliability of the scale. The scale has acceptable reliability when this coefficient is in the range of 0.6 to 0.8.

Factor analysis technique is used to assess the value of the scale, thereby adjusting the research model and research hypothesis. According to Hair et al. (1998), the scale ensures value when the factor loading coefficient must be approximately equal to or greater than 0.5. At the same time, the KMO coefficient (Kaiser-Meyer-Olkin) used to consider the appropriateness of factor analysis must be in the range [0.5 - 1] and Bartlett's test is statistically significant (Sig. < 0.05).

To test research hypotheses, multiple regression analysis is used. This is a statistical method that studies the relationship between a variable (called the dependent variable or the explained variable) and one or more other variables (called the independent variables or explanatory variables). The purpose of regression analysis is to estimate the value of the dependent variable based on the values of the given independent variables and to test research hypotheses.

4. RESEARCH RESULTS

4.1. Reliability and validity of the scales

The results of the analysis of the reliability of the scales using Cronbach's alpha coefficient and the validity of the scales using factor analysis shown in Table 2 show that the scales all have quite high reliability and validity.

Table 2. Results of reliability and validity assessment of the scales

Factor	Factor loading
Green consumer behavior (GCB), Cronbach's alpha = 0.939	
Save electricity at home and in the office	0.826
Use energy-saving electrical equipment	0.819
Use environmentally friendly packaging	0.832
Reuse packaging	0.815
Use water sparingly	0.829
Reduce the use of chemical-rich products	0.829
Driving a motorbike or car in a fuel-efficient way	0.798
Throw garbage in the right place	0.813
Comply with environmental sanitation regulations	0.859
Keep the environment green, clean and beautiful	0.868
Increase the use of "green" produced foods	0.819
Attitude towards green consumption (AC), Cronbach's alpha = 0.899	
When I practice sustainable consumption behaviors, I feel useful	0.818
When I practice sustainable consumption behaviors, I feel good	0.779
When I practice sustainable consumption behaviors, I feel good inside	0.869
When I engage in sustainable consumption behaviors, I feel it is important	0.779
When I take actions towards sustainable consumption, I feel it is worth doing	0.812
When I practice sustainable consumption behaviors, I feel happy	0.889
Social impact (SI), Cronbach's alpha = 0.838	

When it comes to sustainable consumption behaviors, people who are important to me always advise me to do so	0.842
When it comes to sustainable consumption behaviors, people who are important to me always encourage me to do so	0.696
For sustainable consumption behaviors, people important to me urge me to do so	0.798
Regarding sustainable consumption behaviors, people important to me expect me to perform	0.835
Behavior control (BC), Cronbach alpha's = 0.874	
When I practice sustainable consumption behaviors, I feel very easy	0.779
When I practice sustainable consumption behaviors, I feel free from any barriers	0.799
When I engage in sustainable consumption behaviors, I feel completely in control	0.793
When I engage in sustainable consumption behaviors, I feel I have enough resources to do so	0.882
Risk (RR), Cronbach alpha's = 0,878	
The products I use do not meet my expectations	0.789
There are many risks when using existing products	0.881
Lost a lot of money without getting safe products	0.757
It takes a lot of time and effort to get clean products	0.759
Faced with a lot of psychological pressure when buying existing products	0.838
In general, life is too risky now	0.797
Trust (TT), Cronbach's alpha = 0.891	
I believe that the quality of products (including food) has improved significantly today	0.724
I believe that today's manufacturers have a responsibility to the community to produce safe products	0.781
I believe in government efforts to mandate environmentally friendly product standards	0.719
My belief in improving the quality of products produced today is high	0.798
I believe that the products that I use every day are good for my health and the community	0.841
I believe that consumer protection organizations are doing everything they can to make people's quality of life better.	0.819

Source: Synthesized and calculated from author's survey data using SPSS software

The results of the KMO and Bartlett coefficient tests (Table 3) indicate that there is a correlation between the variables in the population (Sig. = 0.000 < 0.05); at the same time, the KMO coefficient = 0.854, also proving the suitability of using EFA analysis to group these variables together. The extracted variance of 69.592% > 50% and the Eigenvalues index = 1.321 > 1, ensure the condition that the EFA analysis results are accepted.

Table 3: KMO and BARTLETT test results

KMO coefficient	0.854

Bartlett test	Chi squared approximation	3311.513
	Degrees of freedom	672
	Significance level	0.000

Source: Synthesized and calculated from author's survey data using SPSS software

4.2. EFA analysis

In order to analyze the relationship between variables and arrange the factors belonging to independent variables, the study conducted EFA analysis for 26 observed variables affecting green consumption behavior of people in the provinces in the North Central region. After EFA analysis, the factors had changes in the number of factors and were rearranged.

4.3. Model testing by regression analysis

The results of the regression analysis are presented in Table 4.

Table 4: Results of regression model analysis

Model		Unstandardized regression coefficients		Standardized regression coefficient	t	Sig.	Check for multicollinearity	
		B	Standard error	Beta			Acceptability	Variance magnification factor
1	(Constant)	-0.023	0.191		-0.107	0.911		
	AC	0.242	0.017	0.251	4.835	0.000	0.901	1.115
	SI	0.105	0.027	0.165	4.753	0.000	0.891	1.001
	BC	0.226	0.031	0.239	5.678	0.001	0.912	1.174
	RR	0.178	0.023	0.196	4.598	0.000	0.899	1.011
	TT	0.121	0.013	0.171	5.789	0.001	0.913	1.019

Source: Synthesized and calculated from author's survey data using SPSS software

The estimated standardized regression equation is as follows:

GCB = 0.251*AC + 0.239*BC + 0.196*RR + 0.171*TT + 0.165*SI + ei

The regression model has a coefficient of determination R2 adjusted to 0.636, which means that the model explains 63.6% of the variation in Green Consumer Behavior of people in the North Central region explained by independent variables (Attitude towards Green Consumption, Social Influence, Behavioral Control, Risk, Trust). The influence level of each variable decreases in the following order: Attitude towards Green Consumption (0.251), Behavioral Control (0.239), Risk (0.196), Trust (0.171), Social Influence (0.165). All independent variables have positive regression coefficients and statistically significant effects (sig. < 0.05) on the dependent variable "Green consumer behavior". Thus, all proposed hypotheses are accepted.

5. DISCUSSION OF RESEARCH RESULTS AND POLICY RECOMMENDATIONS

5.1 Discussion of research results

The results of regression analysis show that the influence of independent variables on the variable Green consumer behavior, all 5 variables have a statistically significant impact on Green consumer behavior. Specifically:

The factor that has the strongest impact on green consumer behavior is Attitude towards green consumption (Beta = 0.251). Awareness is a part of Attitude, consumers

are aware of the importance, meaningfulness, worth doing, necessity and enjoyment of environmentally friendly consumer behavior. The higher the consumer awareness, the higher the behavior implementation. On the other hand, emotion is a component of attitude according to TRA theory and TPB theory. Feelings of usefulness, benefit, comfort, excitement, joy, and pleasure have a positive impact on environmentally friendly green consumption behavior. The above results are consistent with the TRA theory and TPB theory that have been studied and proven (Ajzen, 1991).

The second factor affecting green consumption behavior of people in the North Central region is Behavioral Control (Beta = 0.239). Perceived behavioral control has a relationship with consumer behavior. Behavioral control is defined as an individual's perception of the ease or difficulty of performing a behavior, it represents the level of control over the performance of the behavior, not the outcome of the behavior. The Behavioral Control factor shows the level of control over the performance of the behavior from easy, without any barriers, within the control of the individual and with sufficient resources (finance, time, knowledge). In the context of environmentally friendly green consumption, behavioral control describes consumers' perceptions of the availability of necessary resources, barriers, and ease of implementing environmentally friendly green consumption. The above results are consistent with the TRA theory and TPB theory that have been studied and proven (Ajzen, 1991).

With Beta = 0.196, the risk of living environment affects green (environmentally friendly) consumption behavior as an affirmation that when the perception of risks related to living environment in the consumption context, the green and environmentally friendly consumption behavior related to this product will also be expanded. This result is similar to the research results of Hsin Chang and Wen Chen (2008).

The research results also show that once consumers trust (Beta = 0.171) about product quality, trust the manufacturer, trust consumer protection organizations, government agencies in controlling the production of products that are safe, good for their health and the community, they will consider consuming more. In other words, environmentally friendly green consumption behavior will be expanded when they trust the product. The above results are consistent with previous studies (Berg et al., 2005; Chen, & Li, 2007; Huynh Thi Ngoc Diep and Ho Huy Tuu, 2012; 2013; Jokinen et al., 2011; Schneider et al., 2009).

With Beta = 0.165, Social influence (or subjective norm according to TRA theory and TPB theory) indicates that social influence is described as an individual's perception of social pressures on whether or not to perform a behavior. Here, the advice, encouragement, urging, and wishes of relatives and important people have a positive impact on the environmentally friendly green consumption behavior of each individual consumer in the North Central region. The above results are consistent with TRA theory and TPB theory that have been studied and proven (Ajzen, 1991).

5.2. Policy recommendations

With the above results as a foundation, some policy recommendations can be made to develop application implications to serve effective communication strategies as well as promote green consumption behavior of people in the North Central region as follows:

First: People tend to trust manufacturers and government agencies. Therefore, government agencies should issue regulations to develop and implement clean food and organic food programs (food produced by organic methods), reduce or label GMO

products (products affected by genetic modification technology). Have strict quality control regulations, build an official legal framework for green consumption, and protect consumer rights. Support incentives and loans for businesses to increase production of green products. Using economic tools, taking advantage of FDI and ODA support sources, encouraging cooperation, joint ventures and associations with foreign countries to develop technology and techniques for projects to build and develop green networks and green supply chains. Typically, the Ministry of Agriculture and Rural Development has launched safe production programs such as "3 reductions, 3 increases" such as: reducing unnecessary seed sowing, reducing excess fertilizers, reducing pesticides; increasing productivity, increasing quality, increasing economic efficiency

Second: Strengthening public awareness through media, packaging, websites, using positive images from celebrities. Launching movements, action months, special days such as the Earth Hour program calling on households and businesses to turn off lights and electrical equipment that do not greatly affect daily life for one hour to bring green consumption closer to consumers. Encourage people to use environmentally friendly products, save and protect resources, reuse packaging, etc. Create conditions for relevant departments to organize community connection events, thereby providing a lot of useful information and bringing more diverse green consumption approaches to consumers.

Third: For businesses, it is necessary to focus on investing in research and technology development in the production of green products. Diversify, ensure quality, build a reputable business image, commit to green production activities and green products. Minimize environmental risks, factors that can cause serious consequences affecting the environment to ensure consumer trust in green products. In addition, agricultural and aquatic enterprises and households can minimize the abuse of pesticides, misuse of plant protection drugs, and growth hormones in livestock farming.

Fourth: People contribute to green consumption such as increasing the use of public transport to help reduce emissions from vehicles; stopping smoking; using medicine as prescribed by medical practitioners, not abusing antibiotics; breastfeeding; increasing physical exercise; responsible sustainable tourism, respecting local culture, landscapes and people; sorting waste, increasing product recycling to reduce household waste; economical use of electrical and water equipment, packaging, etc.

6. CONCLUSION

The study surveyed 353 consumers in the North Central region to assess the level of influence of factors on their green consumption behavior. The research results showed that there are 5 groups of factors affecting the green consumption behavior of people in the North Central region. Based on the research results, to promote green consumption behavior of people in the North Central region, the Government should issue regulations on building and implementing environmentally friendly programs; raise people's awareness through media, packaging, websites, using positive images from celebrities; and businesses should focus on investing in research and technology development in the production of green products.

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FACTORS AFFECTING THE APPLICATION OF CIRCULAR ECONOMY BY AGRICULTURAL PRODUCTION HOUSEHOLDS IN PROVINCES IN THE NORTH CENTRAL REGION

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Abstract: This study aims to identify factors affecting the application of circular economy by agricultural production households in the provinces of the North Central region. Applying the method of exploratory factor analysis (EFA) and regression analysis on the basis of data collected from 440 heads of agricultural production households in the provinces of the North Central region, the study identified 4 factors affecting the application of circular economy by agricultural production households in the provinces of the North Central region, including: Attitude towards the circular economy, Perception of behavioral control, Economic benefits, Attitude towards the environment. The research results show that these factors have a close relationship with the application of circular economy by agricultural production households, and at the same time provide a scientific basis for state management agencies to develop and implement policies to promote the application of circular economy by agricultural production households in the provinces of the North Central region.

Keywords: Circular economy, Agricultural production households, North Central Region.

1. INTRODUCTION

The traditional economic model is characterized by exploiting resources from the natural environment as inputs for the economic system, through the process of production, consumption and finally disposing into the environment, leading to increased waste, depletion of natural resources and causing pollution, environmental degradation, exceeding the carrying capacity of the environment (Tran Hong Ha, 2019). This development model threatens the survival of our planet (Hou, Liu, & Zhang, 2019). Therefore, the transition to a more sustainable development model is urgent to achieve a balance between economic growth, environmental protection and social welfare. Ngan et al. (2019) believe that the circular economy is one of the best solutions to support sustainable development (Ngan et al., 2019).

The Circular Economy model is a set of design, production and service activities that aim to extend the life of materials, eliminate negative impacts on the environment, thereby minimizing damage to the quality of life through waste recycling solutions, using recycled materials as input materials to save resources. It also includes the management and rational use of renewable resources, waste management by recycling to optimize value

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on the principle that the longer materials and resources are used, the more value is obtained from them (Nguyen Phong Lan, 2021).

As an agricultural country, Vietnam has soon recognized the role and benefits of sustainable agricultural development, this issue has been raised in socio-economic policies and concretized into action programs. At the regional and local levels, the North Central provinces have also developed their own sustainable agricultural development plans based on analysis of natural potentials, human resources, comparative advantages and difficulties and challenges. As a region heavily affected by natural disasters, the area of cultivated land is constantly shrinking, facing many complex social problems. To solve these problems, the North Central provinces must develop agriculture in a sustainable direction, considering this as one of the important breakthroughs for the socio-economic development of each province and the whole region. However, the agriculture of the North Central provinces is still mainly developing in breadth, based on exploiting the advantages of resources and the highly concentrated labor force in this region (more than 80%), land degradation, water resource pollution; ecosystem degradation and biodiversity loss... are occurring in many places. Most households and farms have not been disseminated and disseminated knowledge and understanding about sustainable agricultural development and its great benefits. The use of fertilizers and pesticides without proper techniques has left many toxic chemical residues in the soil and water environment. This will affect agricultural ecosystems and can cause genetic mutations in some crops. The crop structure is not reasonable, many concentrated livestock farming areas do not have waste collection and treatment systems, are located in residential areas, livestock production is small, fragmented, and scattered while agricultural production has low profits, unstable prices, and unstable markets. Farmers still lack investment capital, the need to increase agricultural output and the need to make a living are urging them to expand the exploitation of natural resources and benefits for agricultural development, despite the huge consequences of resource and environmental degradation. The impact of natural disasters, epidemics, climate change... is still a constant threat and causes considerable losses to agricultural development in general as well as sustainable agricultural development. However, agricultural production in the North Central region is currently mainly based on a linear economic model in which the farming method uses too many inputs (fertilizers, irrigation,...) causing the destruction of groundwater resources and soil pollution - many diseases and pests form, especially fungi and root nematodes, adversely affecting people's livelihoods, negatively affecting both environmental and social aspects. In such a context, the application of circular economy will help agricultural production households overcome the limitations of linear economy, developing sustainable agriculture.

Research on circular economy in Vietnam mainly focuses on theoretical basis. The world is focusing on processing companies consuming agricultural products, there is no systematic and comprehensive research on circular economy for agricultural production households. To fill this research gap, this study focuses on factors affecting the application of circular economy by agricultural production households in provinces in the North Central region.

2. LITERATURE REVIEW

2.1. Studies related to the application of circular economy in agricultural production

2.1.1. Circular economy

According to the Ellen Mac Arthur Foundation (an organization promoting global economic development), the circular economy "is a system in which materials never become waste but are regenerated. In a circular economy, products and materials are circulated through processes such as maintenance, reuse, refurbishment, remanufacturing, recycling and composting". According to Jun, H., & Xiang, H. (2011), the circular economy is "a general term for the activities of reduction, reuse, recycling in production, circulation and consumption, denying the natural economy and traditional economy".

In Vietnam, the term circular economy has been defined in Article 142 of the Law on Environmental Protection 2020. Accordingly, "Circular economy is an economic model in which design, production, consumption and service activities all aim to reduce the exploitation of raw materials and materials, extend product life cycles, limit waste generation and minimize negative impacts on the environment". Thus, it can be understood that circular economy is an economic approach in which activities related to the design, production and service processes all aim to extend the life of material resources and minimize negative impacts on the environment.

2.1.2. Circular economy in agriculture

According to Van Bodegom (Wageningen University - Senior Expert on Climate Change Adaptation and Natural Resource Management) and colleagues (2019), "Circular agriculture (or circular economy applied to food systems) is based on ideas from the circular economy, which uses theories and principles from industrial ecology".

In 2021, Juan Francisco Velasco Muñoz (University of Almería, Spain) and colleagues gave a more complete and specific definition of circular economy in agriculture, according to which, circular economy is "a set of activities that efficiently use resources in all stages of the value chain to ensure economic, renewable, biodiversity and social sustainability in agriculture and surrounding ecosystems".

In Vietnam, a number of research projects have also begun to mention and clarify the concept of circular economy in agriculture. According to Nguyen Thi Mien (Institute of Economics, Ho Chi Minh National Academy of Politics), circular economy in agriculture "is a closed-cycle agricultural production process, waste and by-products of this process are inputs for other production processes through the application of technical advances, biotechnology, and physical-chemical technology". According to Vice President of the Vietnam Gardening Association Nguyen Xuan Hong, circular agriculture "is a closed-cycle production process in which most of the waste is returned as raw materials for production. Waste and by-products of this production process are inputs for other production processes". From the above definitions, it can be understood that circular economy in agriculture is a process of using resources and managing production in the most appropriate way, aiming to minimize emissions and energy consumption in the production process. The ultimate goal of a circular economy is to create a healthy and sustainable ecosystem, while ensuring that the production and consumption of agricultural products is beneficial to both consumers and the environment.

2.2. Studies related to factors affecting the application of circular economy by agricultural production households

The theoretical models widely used in the field of circular economy include TRA by Ajzen and Fishbein (1975), TPB by Ajzen (1991). In addition, the model also inherits empirical studies on the application of circular economy that have been studied by a

number of authors at home and abroad such as: Hao et al. (2020), Herrera et al. (2023), Singh et al. (2018), Omulo et al. (2024), Manca and Fornara (2019), (Park, 2019), Ting et al. (2019), (Tran, Phan, Le, & Tran, 2022). The above studies will be a solid theoretical basis, helping to apply the model appropriately to research conditions in the provinces in the North Central region.

The study has built 5 scales with specific concepts as follows:

- *Attitude:* These are the emotions that agricultural production households express when applying circular economy. The emotions of agricultural production households are joy, pride, satisfaction.

- *Subjective assessment of circular economy:* For a new economic model, production households often have an attitude of waiting for others to use it or listening to the opinions of people around them such as family, colleagues, friends. In the theory of Ajzen (1991) and Venkatesh (2023), it is explained the level of influence of related people on consumer behavioral trends and the motivation for consumers to follow related people.

- *Perceived behavioral control:* Agricultural production households worry about whether they have enough conditions to participate in a new economic model. Conditions such as finance, understanding, other barriers such as culture, customs, farming practices.

- *Economic benefits:* When deciding to participate in any economic model, the first concern of agricultural production households is the economic benefits of the model. Will the new model help reduce costs, product prices, and will the new product have a higher selling price than the current selling price? If these concerns are answered, it will help farmers confidently apply circular economy in agricultural production activities.

- *Attitude towards the environment factor:* Measures the level of concern of agricultural production households about the environment. Demonstrated through the production process to help reduce emissions, protect the environment and at the same time consume green, environmentally friendly products.

- *Decision to be willing to participate:* demonstrates the correct assessment or strong motivation of agricultural production households to participate as well as the action of introducing others to participate.

The initial proposed research model includes 5 factors: (1) Attitude towards circular economy, (2) Subjective assessment of circular economy, (3) Perceived behavioral control, (4) Economic benefits, (5) Attitude towards environment. Specifically:

First, in this study, emotions reflect individuals' expectations when applying circular economy. Emotions influence people's choices, so people expect that the application of circular economy will be beneficial to the environment (Nicks and Carriou, 2016).

Second, subjective assessment of circular economy, according to behavioral planning theory, social influence from family members, friends and celebrities can discourage or encourage individuals to purchase and use new technology. Therefore, the attitudes of family members and people will affect each individual's intention to produce green products (Li et al., 2023).

Third, Perceived behavioral control is an important factor that strongly affects the willingness to participate in circular agricultural production (Chen, Gregoire, Arendt, & Shelley, 2011).

Fourth, Economic benefits are one of the factors that greatly affect the circular economy. Research by Agyapong and Tweneboah, (2023) has shown that financial and investment readiness affects the financial supply and investment of the circular economy.

Fifth, Attitude towards the environment in agricultural production reflects the intention of agricultural production households towards green products or products that are not harmful to the environment. Many studies have shown that the production of environmentally friendly products is one of the manifestations of the preference for circular economic application. Wang et al. (Wang, Kuo, & Liu, 2009) argued that green product production behavior is one of the evidences showing people's participation in the circular economy.

Based on the research overview combined with consulting experts, managers at agricultural production households, and state management officials on agriculture at all levels, the author has built and completed a set of criteria to evaluate factors affecting the application of circular economy of agricultural production households in the provinces in the North Central region, including 5 components summarized in Figure 1.

3. RESEARCH METHODOLOGY

3.1. Data

Qualitative and quantitative research methods are used to test the scales and research models. The scales are evaluated through the following tools: Cronbach's Alpha reliability coefficient testing; exploratory factor analysis (EFA), multivariate regression analysis. The survey was created and distributed to 450 subjects who are agricultural production household owners in the provinces in the North Central region. The number of survey forms collected and eligible for analysis is 440. The survey period is from August 2024 to October 2024. The variables in the model are measured using a 5-level Likert scale (with: 1 being completely disagree, to 5 being completely agree); data is compiled, processed and analyzed based on SPSS 22 software.

Table 1. Origin of the variable scales

Research variables	Symbol	Observed Variable/Indicator	Source
I. Independent variable			
Attitudes toward the circular economy (ACE)	ACE1	I am happy to participate in the circular economy	Manca and Fornara (2019), Hao et al. (2020)
	ACE2	I am proud to participate in the weekly economy	
	ACE3	I feel satisfied participating in the circular economy	
Subjective assessment of circular economy (SCE)	SCE1	I will participate in the circular economy if my family and loved ones agree	Singhal, Jena, et Tripathy, (2019), (Ting, Hsieh, Chang, & Chen, 2019)
	SCE2	The opinions of experts and scientists can influence the choice to participate in the circular economy.	
	SCE3	I would participate in the circular economy if my friends did too.	
Perceived behavioral	PBC1	I have enough money to participate in the circular economy.	(Omulo,

control (PBC)	PBC2	I have enough knowledge to participate in the circular economy.	Daum, Köller, and Birner, 2024)
	PBC3	I can overcome barriers and prioritize participation in the circular economy	
Economic Benefits (EB)	EB1	I would participate in the circular economy if the cost of production was lower than traditional methods.	(Singh, Chakraborty, and Roy, 2018)
	EB2	I would participate in the circular economy if I could reduce the cost of my products.	
	EB3	I would participate in the circular economy if the price of products increased.	
Attitude towards the environment (AE)	AE1	I will participate in the circular economy if it helps protect the environment.	(Hao et al., 2020), (Herrera, Kallas, Serebrennikov, Thorne, and McCarthy, 2023), (Kautish, Paul, and Sharma, 2019) (Wang et al. (2009)
	AE2	I am willing to do good things for the environment without anyone knowing or thanking me.	
	AE3	I am willing to do things that are good for the environment even when it is inconvenient.	
	AE4	I often buy environmentally friendly products.	
	AE5	I will produce in a circular economy direction if it helps reduce CO2 emissions	
	AE6	I often buy green products.	
II. Dependent variable			
Application of circular economy (AOCE)	AOCE1	I will apply circular economy	(Park, 2019), (Hao et al. (2020)
	AOCE2	I will support the development of a circular economy locally.	
	AOCE3	I will introduce others to apply circular economy locally	

Source: Author's synthesis from research overview

3.2. Research model and research hypothesis

Based on theoretical research and related documents, the author proposes a research model of factors affecting the application of circular economy of agricultural production households in the provinces in the North Central region as shown in Figure 1.

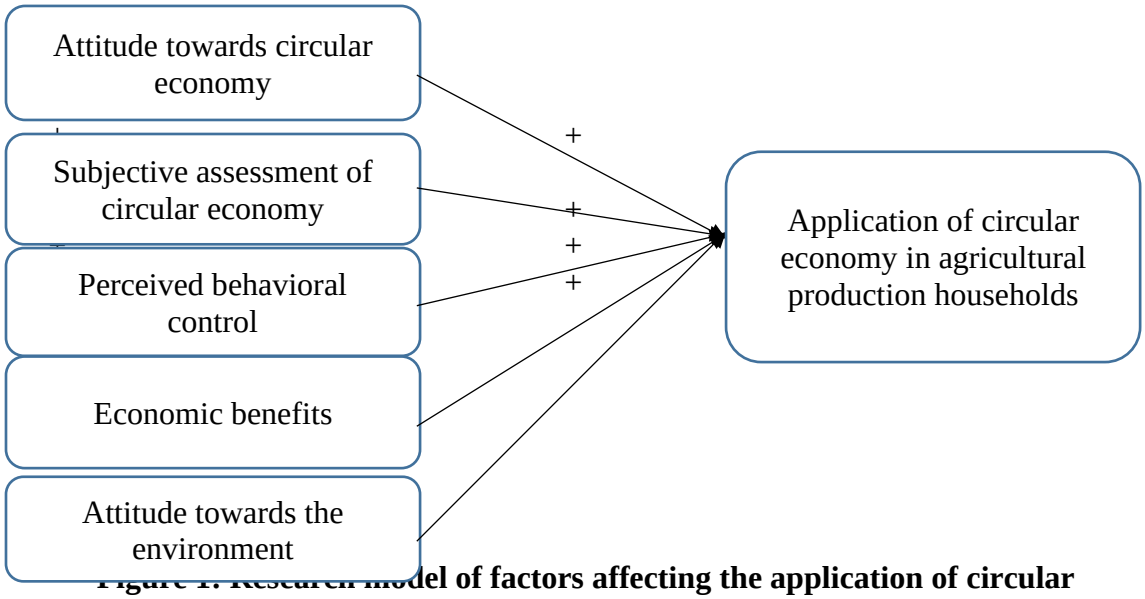

Figure 1: Research model of factors affecting the application of circular economy of agricultural production households in the provinces of the North Central region

Source: Author's proposal based on the research overview

The research hypotheses are:

H1: Attitude towards circular economy has a positive (+) impact on circular economy application.

H2: Subjective assessment of circular economy has a positive (+) impact on circular economy application.

H3: Perceived behavioral control has a positive (+) impact on circular economy application.

H4: Economic benefits have a positive (+) impact on circular economy application.

H5: Attitude towards the environment of agricultural production households has a positive (+) impact on circular economy application.

4. RESEARCH RESULTS

- Cronbach's Alpha test results

The test results (Table 2) show that all variables have Cronbach's Alpha coefficients > 0.6. At the same time, the observed variables of each scale have item-total correlation coefficients greater than the significant condition of 0.3. This can be concluded that the scales are all available, suitable, meaningful and ensure reliability.

Table 2: Cronbach's alpha coefficient test results

Group of factors	Cronbach's Alpha coefficient
Attitude towards circular economy (ACE)	0.789
Subjective assessment of circular economy (SCE)	0.673
Perceived behavioral control (PBC)	0.879
Economic Benefit (EC)	0.884
Attitude towards the environment (AE)	0.844
Application of circular economy (AOCE)	0.867

Source: Compiled and calculated from author's survey data

The results of the KMO and Bartlett coefficient tests (Table 3) indicate that there is a correlation between the variables in the population (Sig. = 0.000 < 0.05); at the same time, the KMO coefficient = 0.869, also proving the suitability of using EFA analysis to group these variables together. The extracted variance of 78.342% > 50% and the Eigenvalues index = 1.389 > 1, ensure the condition that the EFA analysis results are accepted.

Table 3: KMO and BARTLETT test results

KMO coefficient		0.869
Bartlett test	Chi squared approximation	3423.612
	Degrees of freedom	687
	Significance level	0.000

Source: Compiled and calculated from author's survey data

- EFA analysis

In order to analyze the relationship between variables and arrange the factors belonging to the independent variables, the study conducted EFA analysis for 21 observed variables affecting the application of circular economy of agricultural production households in the provinces in the North Central region. After EFA analysis, the factors had changes in the number of factors and were rearranged.

- Results of regression analysis

Regression analysis between 5 independent variables and the dependent variable of circular economy application of agricultural production households in the provinces in the North Central region (Table 4). The analysis results show that all correlations between independent variables and circular economy application of agricultural production households in the provinces in the North Central region are statistically significant except for the variable Subjective assessment of circular economy (Sig. > 0.05). Therefore, all hypotheses H1, H3, H4, H5 are accepted, H2 is rejected.

Table 4: Results of regression model analysis

Model		Unstandardized regression coefficients		Standardized regression coefficient	t	Sig.	Check for multicollinearity	
		B	Standard error	Beta			Acceptability	Variance magnification factor
1	(Constant)	-0.029	0.171		-0.127	0.508		
	ACE	0.278	0.022	0.289	4.779	0.000	0.887	1.114
	SCE	0.098	0.025	0.102	1.589	0.068	0.832	1.211
	PBC	0.389	0.035	0.402	4.675	0.000	0.892	1.189
	EB	0.392	0.031	0.421	4.439	0.000	0.895	1.291
	AE	0.197	0.022	0.215	3.972	0.001	0.879	1.145

Source: Compiled and calculated from author's survey data

The standardized regression equation is as follows:

$$AOCE = 0.421*EB + 0.402*PBC + 0.289*ACE + 0.215*AE + ei$$

The research results show that there is a positive relationship between the four factors affecting the application of circular economy of agricultural production households in the provinces of the North Central region. Based on the magnitude of the standardized regression coefficient Beta, the order of influence from strong to weak of the factors on

the application of circular economy of agricultural production households in the provinces of the North Central region is: Economic benefits (0.421); Perceived behavioral control (0.402); Attitude towards the circular economy (0.289); Attitude towards the environment (0.215).

5. DISCUSS THE RESULTS AND PROPOSE SOME SOLUTIONS TO ENCOURAGE AGRICULTURAL PRODUCTION HOUSEHOLDS TO APPLY REGIONAL ECONOMY IN PROVINCES IN THE NORTH CENTRAL REGION

Economic benefits are the factor that most strongly influences the application of circular economy by agricultural production households. Specifically, the impact level of the factor Economic benefits on the application of circular economy by agricultural production households in the multivariate regression analysis model is 0.421. This is considered a very important factor affecting the decision to apply circular economy by agricultural production households. Therefore, agencies such as agricultural extension and agricultural departments need to have projects and sample models to demonstrate to farmers the effectiveness of the circular economy model.

The results of the hypothesis testing confirm that Perception of behavioral control has a positive impact on the application of circular economy by agricultural production households. Specifically, the impact level of the factor Perception of behavioral control on the application of circular economy by agricultural production households in the multivariate regression analysis model is 0.402. However, it gives different results (opposite) to the study of Tran et al. (2022). The results suggest that it is necessary to increase the provision of more knowledge about circular economy to agricultural production households so that they understand and confidently apply circular economy with their resources. Authorities at all levels and agricultural extension agencies should integrate it so that people can better understand the circular economy. Participating in the circular economy is not really too difficult and requires many conditions.

The research results show that the factor Attitude towards the circular economy has a significant impact on the application of circular economy by agricultural production households. Specifically, the impact level of the Attitude towards the circular economy factor on the application of circular economy by agricultural production households in the multivariate regression analysis model is 0.289. This result is consistent with the initial hypothesis and similar to the studies of Tran et al. (2022), Hao et al. (2020). It is necessary to regularly propagate and mobilize people to participate in the circular economy model.

The research results show that the Attitude towards the environment factor has the weakest impact on the application of circular economy by agricultural production households. Specifically, the impact level of the Attitude towards the environment factor on the application of circular economy by agricultural production households in the multivariate regression analysis model is 0.215. The results are similar to the studies of Tran et al. (2022), Singhal et al. (2019). Agricultural production has a great impact on the environment through the use of a large amount of resources and the emission of a large amount of waste. However, for agricultural production households, environmental protection has not really been focused on. Climate change and the impacts of climate change have not received the attention of the people, especially ethnic minority households. Therefore, there is a need for policies to encourage people to understand and participate in environmental protection. In the future, it is necessary to have policies and

launch movements from the government such as mobilizing people to collect waste. Build solid waste collection bins in agricultural production.

6. CONCLUSION

The study surveyed 440 agricultural production households in the provinces of the North Central region to assess the level of influence of factors on the application of circular economy. The research results showed that there are 4 groups of factors affecting the application of circular economy by agricultural production households. Based on the research results, to improve the application of circular economy by agricultural production households, it is necessary to raise people's awareness of circular economy and the benefits of circular economy. The study was conducted in a short period of time, so the sample size was small, conducted in 03 out of 6 provinces in the North Central region. Therefore, the research results may not fully reflect the research problem. In the future, the research should expand the sample size and survey area.

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FACTORS AFFECTING THE RESULTS OF CONSTRUCTION INVESTMENT PROJECT MANAGEMENT AT PROVINCIAL PROJECT MANAGEMENT BOARDS IN THE CONTEXT OF AIMING FOR SUSTAINABLE DEVELOPMENT GOALS IN NGHE AN PROVINCE

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Doan Thi Thanh Loan, Nguyen Tien Loc[1]

Abstract: This study aims to identify factors affecting the results of construction investment project management at provincial project management boards in the context of aiming at sustainable development goals in Nghe An province. Applying the method of exploratory factor analysis (EFA) and regression analysis on the basis of data collected from 213 officials involved in construction investment project management at provincial project management boards in Nghe An province, the study identified 5 factors affecting the results of construction investment project management at provincial project management boards in the context of aiming at sustainable development goals in Nghe An province, including: Contractor, Organizational factors, Project manager, Capacity of project members, Project characteristics. The research results show that these factors have a close relationship with the results of construction investment project management, and at the same time provide a scientific basis for proposing solutions to improve the results of construction investment project management at provincial project management boards in the context of aiming at sustainable development goals in Nghe An province.

Keywords: Construction investment project management, Provincial project management board, Nghe An.

1. INTRODUCTION

Construction investment projects play an important role in the development of Nghe An's economic infrastructure. A synchronous and modern infrastructure system not only facilitates production and circulation of goods, but also contributes to improving the quality of life of the people. Infrastructure investment also helps Nghe An province achieve sustainable development goals and enhance competitiveness in the North Central region. In this context, provincial construction investment project management boards play an essential role, directly responsible for supervising and implementing important projects, contributing to promoting the socio-economic development of the locality.

However, in reality, the implementation of construction investment projects in Nghe An still faces many challenges, especially the situation of slow progress and capital increase in some projects. This raises the urgent need to improve project management results at provincial project management boards. Nghe An is in a period of strong development, attracting investment from both domestic and foreign countries, thus requiring a strict and effective project management system to ensure that projects are completed on schedule, meet the required quality and optimize resources. For the above reasons, it is necessary and

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timely to study the factors affecting the results of construction investment project management at provincial project management boards in the context of aiming for sustainable development goals in Nghe An. The study will not only provide scientific perspectives on project management but also make important practical contributions to improving management results, thereby contributing to creating momentum for sustainable and comprehensive development of Nghe An province in the future.

2. LITERATURE REVIEW

2.1. Studies related to sustainable development

In 1987, the Brundtland report first used the term "sustainable development" as an alternative to the economic system practiced in most countries in the world and, unlike that system, seeks to meet current needs without compromising the future of future generations. According to the "Brundtland Report" of the World Commission on Environment and Development (WCED) of the United Nations, sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

The United Nations Conference on Environment and Development held in Rio de Janeiro in June 1992 defined this idea in more detail and established a detailed action plan, Agenda 21, which set out three areas that global, national and local governments must work on to establish such sustainable development. The general idea is that each local government can outline its own strategy with the aim of achieving global sustainable development by the year 2000 (the 21st century). The goals of sustainable development are:

(1) *Economic growth*: To create a sustainable and well-directed economic development.

(2) *Environmental protection*: This goal focuses on the contribution of humans to the protection and improvement of the natural environment, by minimizing pollution and waste, and aiming to reduce global carbon emissions.

(3) *Social Inclusion*: This objective focuses on providing housing facilities for future generations and supporting the creation of healthy, strong and vibrant global communities.

2.2. Studies related to factors affecting the results of construction investment project management at provincial project management boards in the context of aiming at sustainable development goals

Gunduz and Almuajebh (2020) identified the priority of factors determining success in construction project management. The authors used 7 groups of factors in their study, including: project characteristics (location, scale, clarity in goals, resources), economic and working environment (economic, social, political, legal environment), customers (experience, financial capacity, etc.), management (connection efficiency, feedback mechanism from employees, effective decision making, risk identification and allocation, motivation of project members, support from senior leaders, etc.), design team (experience, complex design, design errors, etc.), contractor (financial strength, technological capacity, management experience, etc.), project manager (experience, management skills, ability to coordinate members, etc.).

Tsiga et al. (2017) built a research model of factors affecting investment project management activities in the petroleum industry. Eleven groups of factors were mentioned, including: external challenges, customer knowledge and experience, support from senior leaders, institutions, project characteristics, manager capacity, project organization, contracts, project member capacity, risk management, management requirements.

Cao Hao Thi and colleagues (2010) studied the factors that determine the success of investment project management in Vietnam. Based on the measurement scales of previous studies, the authors proposed five groups of factors affecting investment project management activities, including: stability of the external environment, manager capacity, project member capacity, organizational support and project characteristics. In which, the external environment includes macro and micro factors such as political, economic, social, legal, customer stability, etc. The manager's capacity is mentioned as the ability to coordinate, negotiate, make decisions, and delegate. The scale of project member capacity includes: problem solving, troubleshooting, technical knowledge, communication skills, and teamwork. The scale of organizational support includes: support from senior leaders, support from functional managers, etc. The scale of project characteristics includes: project value and scale, project type, financial initiative, urgency, etc.

Through an overview of related models and studies, the study has proposed a model of factors affecting the results of construction investment project management at provincial project management boards in the context of aiming at sustainable development goals in Nghe An province. The research model (Figure 1) is an inheritance of the overall project management theory of Stallworthy and Kharbanda (1983) and an expansion of the scales in the scale model proposed by Gunduz and Almuajebh (2020), Tsiga et al. (2017) and Cao Hao Thi et al. (2010). Based on previous studies, the topic identifies factors and proposes new scales to measure factors affecting the results of construction investment project management at provincial project management boards in Nghe An province. The groups of factors that are likely to affect the results of construction investment project management at provincial project management boards in Nghe An province include: (1) Macro environment, (2) Project manager, (3) Capacity of project members, (4) Organizational factors, (5) Contractor, (6) Project characteristics. Construction project management results are measured through aspects such as: project completion time, completion level according to allocated budget, project benefits for users, project results meeting quality standards according to set technical parameters.

3. RESEARCH METHODS

3.1. Data

Qualitative and quantitative research methods are used to test the scales and research models. The scales are evaluated through the following tools: Cronbach's Alpha reliability coefficient testing; exploratory factor analysis (EFA), multivariate regression analysis. The survey was created and distributed to 220 subjects who are officials related to construction investment project management at provincial project management boards in Nghe An province. The number of collected and eligible surveys for analysis is 213. The variables in the model are measured using a 5-level Likert scale (with: 1-Very unaffected, to 5-Very affected for the independent variable; with: 1-Strongly disagree, to 5-Strongly agree for the dependent variable); data are compiled, processed and analyzed based on SPSS 22 software.

Table 1. Origin of the variable scales

Research variables	Symbol	Observed Variable/Indicator	Source
I. Independent variable			
Macro environment (MT)	MT1	Economic environment	Pinto and Slevin, 1989; Jin and
	MT2	Socio-cultural environment	
	MT3	Political and legal environment	

	MT4	Science and technology environment	Ling, 2006
	MT5	Natural environment	
Project Manager (QL)	QL1	Experience relevant to the project implementation field	Pinto and Slevin, 1989; Zwikael and Globerson, 2006; Gonza´lez et al., 2013
	QL2	Project management skills	
	QL3	Ability to integrate project participants	
	QL4	Committed to meeting quality, cost and time targets	
	QL5	Ability to adapt to changes in project plans	
	QL6	Ability to delegate	
	QL7	Conflict resolution skills	
Project members' capabilities (TV)	TV1	Project expertise	Puthamont and Chareonngam, 2007; Zhang et al., 2013; Lee et al., 2013; Zhang and He, 2015; Wei et al., 2016
	TV2	Communication skills	
	TV3	Problem solving skills	
	TV4	Troubleshooting skills	
	TV5	Commitment	
	TV6	Teamwork	
Organizational factors (TC)	TC1	Project Management Board's policies and regulations on project management	Tukel and Rom, 1995; Ahmed et al., 2016; Zwikael and Globerson, 2006; Creasy and Anantatmula, 2013
	TC2	Effective communication system	
	TC3	Support from senior management	
	TC4	Planning, monitoring and control mechanisms	
	TC7	Appropriate organizational structure	
	TC8	Risk identification and management	
	TC9	Feedback mechanism from employees and related departments	
Contractor (NT)	NT1	Financial capacity	Abbasianjahromi et al., 2016; Choi and Lee, 2017; Gunduz and Yahya, 2018; Tang et al., 2018
	NT2	Technical capacity	
	NT3	Effective subcontractor coordination	
	NT4	Effective allocation and control of human resources	
	NT5	Availability of experienced managers and skilled workforce	

Project Features (DD)	DD1	Project location	Belassi and Tukel (1996), Tukel and Rom (1995), Gunduz and Almuajebh (2020)
	DD2	Complexity of project activities	
	DD3	Project Objectives	
	DD4	Bidding and procurement methods	
	DD5	Urgency	
	DD6	Project scale and value	
II. Dependent variable			
Construction investment project management results (KQ)	KQ1	The project was completed on time	Dvir et al., 2010; Cao Hao Thi and Swierczek, 2010; Carvalho et al., 2015; Zidane and Olsson, 2017
	KQ2	The project was completed within the allocated budget	
	KQ3	The project has brought direct benefits to users	
	KQ4	The project results meet quality standards according to the set specifications	

Source: Author's synthesis from research overview

3.2. Research model and research hypothesis

Based on theoretical research and related documents, the author proposes a research model of factors affecting the results of construction investment project management at provincial project management boards in the context of aiming at sustainable development goals in Nghe An province as shown in Figure 1.

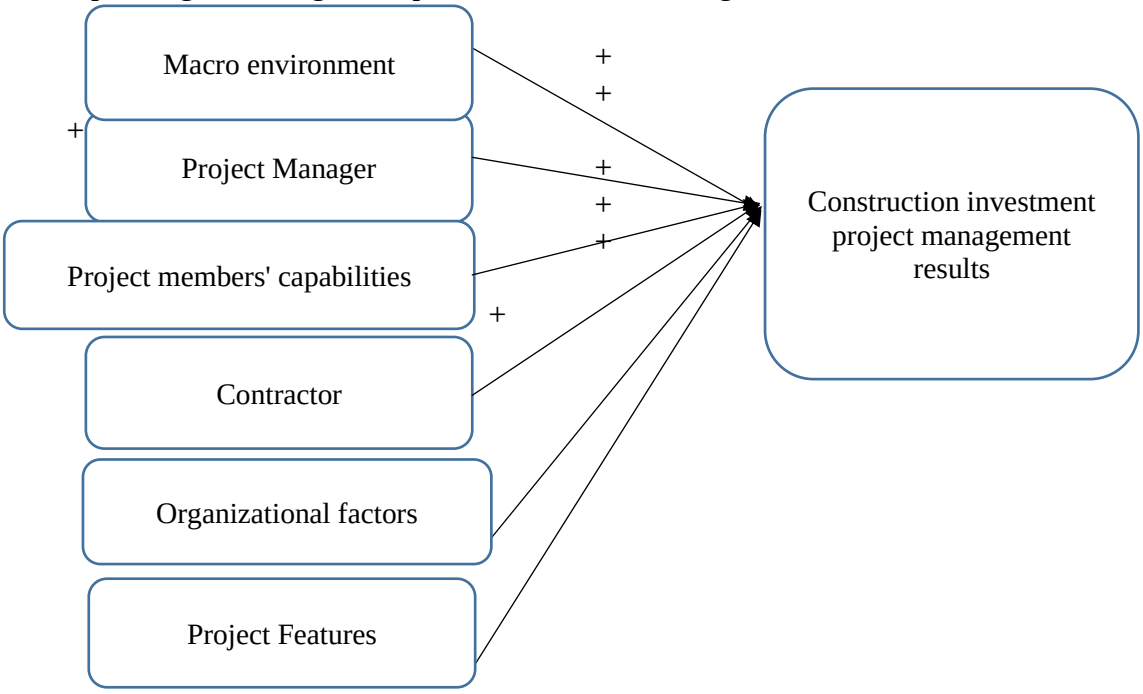

Figure 1. Research model of factors affecting the results of construction investment project management at provincial project management boards in the context of aiming at sustainable development goals in Nghe An province

Source: Author's proposal based on research overview

The research hypotheses are:

Hypothesis H1: Macro environment has a positive impact on construction project management results

Hypothesis H2: Project manager has a positive impact on construction project management results

Hypothesis H3: Project member capacity has a positive impact on construction project management results

Hypothesis H4: Organizational factors have a positive impact on construction project management results

Hypothesis H5: Contractor has a positive impact on construction project management results

Hypothesis H6: Project characteristics have a negative impact on construction project management results.

4. RESEARCH RESULTS

- Cronbach's Alpha test results

The test results (Table 2) show that all variables have Cronbach's Alpha coefficients > 0.6. At the same time, the observed variables of each scale have item-total correlation coefficients greater than the significant condition of 0.3. This can be concluded that the scales are all available, suitable, meaningful and ensure reliability.

Table 2: Cronbach's alpha coefficient test results

Group of factors	Cronbach's Alpha coefficient
Macro environment (MT)	0.867
Project Manager (QL)	0.819
Project members' capabilities (TV)	0.831
Organizational factors (TC)	0.819
Contractor (NT)	0.814
Project Features (DD)	0.825
Construction investment project management results (KQ)	0.867

Source: Compiled and calculated from author's survey data

The results of the KMO and Bartlett coefficient tests (Table 3) indicate that there is a correlation between the variables in the population (Sig. = 0.000 < 0.05); at the same time, the KMO coefficient = 0.835, also proving the suitability of using EFA analysis to group these variables together. The extracted variance of 71.839% > 50% and the Eigenvalues index = 1.387 > 1, ensure the condition that the EFA analysis results are accepted.

Table 3: KMO and BARTLETT test results

KMO coefficient		0.835
Bartlett test	Chi squared approximation	2321.514
	Degrees of freedom	471
	Significance level	0.000

Source: Compiled and calculated from author's survey data

- EFA analysis

In order to analyze the relationship between variables and arrange the factors belonging to the independent variables, the study conducted EFA analysis for 36 observed

variables affecting the results of construction investment project management at provincial project management boards in the context of aiming at sustainable development goals in Nghe An province. After EFA analysis, the factors changed in the number of factors and were rearranged.

- Regression analysis results

Regression analysis between 6 independent variables and the dependent variable of the results of construction investment project management at provincial project management boards in the context of aiming at sustainable development goals in Nghe An province (Table 4). The analysis results show that all correlations between independent variables and the results of construction investment project management at provincial project management boards in the context of aiming at sustainable development goals in Nghe An province are statistically significant except for the Macroenvironment variable (Sig. > 0.05). Therefore, all hypotheses H2, H3, H4, H5, H6 are accepted, H1 is rejected.

Table 4: Results of regression model analysis

Model		Unstandardized regression coefficients		Standardized regression coefficient	t	Sig.	Check for multicollinearity	
		B	Standard error	Beta			Acceptability	Variance magnification factor
1	(Constant)	-0.030	0.182		-0.113	0.906		
	TV	0.198	0.031	0.201	4.812	0.001	0,889	1,423
	QL	0.279	0.024	0.289	4.774	0.000	0,867	1,352
	MT	0.274	0.034	0.282	3.872	0.343	0,789	1,331
	DD	0.154	0.022	0.175	4.339	0.001	0,862	1,232
	TC	0.312	0.036	0.342	4.766	0.000	0,861	1,133
	NT	0.389	0.035	0.401	3.858	0.000	0,962	1,512

Source: Compiled and calculated from author's survey data

The standardized regression equation is as follows:

KQ = 0.401*NT + 0.342*TC + 0.289*QL + 0.201*TV - 0.175*DD + ei

The research results show that there is a positive relationship between 5 factors affecting the results of construction investment project management at provincial project management boards in the context of aiming at sustainable development goals in Nghe An province. Based on the magnitude of the standardized regression coefficient Beta, the order of influence from strong to weak of the factors on the results of construction investment project management at provincial project management boards in the context of aiming at sustainable development goals in Nghe An province is: Contractor (0.401); Factors related to the organization (0.342); Project manager (0.289); Capacity of project members (0.201); Project characteristics (-0.175).

5. DISCUSS THE RESULTS AND PROPOSE SOME SOLUTIONS TO IMPROVE THE RESULTS OF CONSTRUCTION INVESTMENT PROJECT MANAGEMENT AT PROVINCIAL PROJECT MANAGEMENT BOARDS IN THE CONTEXT OF AIMING FOR SUSTAINABLE DEVELOPMENT IN NGHE AN PROVINCE

The results of the multivariate regression analysis obtained 05 factors affecting the

dependent variable Project Management Results. Specifically as follows:

First, Contractors (NT) have a positive impact on the results of construction investment project management at provincial project management boards in Nghe An province. The analysis results show that the contractor factor is one of the factors that most strongly affects the results of construction investment project management at provincial project management boards in Nghe An province. Specifically, the impact level of NT on the results of construction investment project management in the multivariate regression analysis model is 0.401. The observed variables that make up the NT factor include: Financial capacity, technical capacity, effective coordination of subcontractors, effective allocation and control of human resources, availability of experienced managers and skilled labor force. Due to the characteristics of construction investment projects, contractors implementing bid packages are often selected through limited bidding or designated bidding to facilitate management, coordination of construction investment projects and ensure confidentiality. This result is similar to the research results of Abbasianjahromi et al. (2016), Choi and Lee (2017), Gunduz and Yahya, (2018), Tang et al. (2018), Gunduz and Almuajebh (2020). Therefore, to improve the results of construction investment project management in the coming time, provincial project management boards in Nghe An province need to implement the following solutions: Develop and manage well the package implementation plan; Implement well the self-monitoring of the package implementation; Improve financial capacity; Improve professional capacity.

Second, the factor related to Organization (TC) has a positive impact on the results of construction investment project management at provincial project management boards in Nghe An province. Specifically, the impact level of TC on the results of construction investment project management in the multivariate regression analysis model is 0.342. The observed variables that constitute the TC factor include: Policies and regulations of enterprises on project management, effective communication systems, support from senior leaders, and appropriate organizational structure. Some studies also show that organizational factors have a positive impact on the results of construction project management activities at provincial project management boards in Nghe An province (Ahmed et al., 2016; Creasy and Anantatmula, 2013). Therefore, provincial project management boards in Nghe An province need to continue restructuring their organizations in a lean direction with more investment in technology in management activities, taking it as the center to improve operational efficiency.

Third, Project Manager (QL) has a positive impact on the results of construction project management at provincial project management boards in Nghe An province. Specifically, the impact level of QL on the results of construction project management in the multivariate regression analysis model is 0.289. The observed variables that make up the PM factor include: Experience relevant to the field of project implementation, project management skills, ability to combine project participants, ability to adapt to changes in the project plan, ability to resolve conflicts. The results of the topic are similar to the results obtained by Pinto and Slevin (1989), Zwikael and Globerson (2006), Chaudhry et al. (2012), Dias et al. (2017). Zwikael and Globerson (2006) pointed out that the capacity of project managers becomes most important in the planning and closing stages. Chaudhry et al. (2012) demonstrated that the human resource planning capacity of leaders has a significant impact on project performance. Therefore, to improve the results of

construction investment project management at provincial project management boards in Nghe An province in the coming time, provincial project management boards in Nghe An province need to implement the following solutions: organize a suitable construction investment project management model with high capacity to improve the quality of construction investment project management; plan scientific and quality projects; improve the quality and progress of technical design and total cost estimates; manage project bid packages in accordance with legal regulations; manage the quality and progress of projects well; improve the quality of monitoring and evaluation of projects.

Fourth, the capacity of project members (TV) has a positive impact on the results of construction investment project management at provincial project management boards in Nghe An province. Specifically, the impact level of TV on the results of construction investment project management in the multivariate regression analysis model is 0.201. The observed variables that make up the management factor include: project expertise, communication skills, problem-solving skills, troubleshooting skills and teamwork. Some studies in the world also show that the capacity of project team members has an impact on construction investment project management throughout the project cycle (Puthamont and Chareonngam 2007; Zhang et al., 2013). Lee et al. (2013) believe that for complex and integrated projects, experience is considered an important factor. Wei et al. (2016) pointed out that inappropriate conflict handling in a project can lead to failure. Therefore, to improve the results of construction investment project management at the provincial project management board in Nghe An province in the coming time, the provincial project management boards in Nghe An province need to implement the following solutions: agencies managing construction investment projects need to prioritize the selection of staff with good moral qualities, love for the job; sufficient in number, structure of members; with qualifications, capacity, and experience in engineering. In addition, it is necessary to recruit experts in resources, environment, construction, law, etc. At the same time, it is necessary to improve the open, scientific, and favorable working environment so that staff have conditions for comprehensive and sustainable development; and successfully complete assigned tasks. In addition, it is necessary to boldly replace officers and employees who are unable to meet job requirements and do not complete assigned tasks, especially in key positions of officers and assistants.

Fifth, Project Characteristics (DD) is a factor that has an impact and is inversely related to the results of construction investment project management at provincial project management boards in Nghe An province. Specifically, the impact level of DD on the results of construction investment project management in the multivariate regression analysis model is -0.175. The observed variables that make up the project characteristics factor include: the uniqueness/complexity of project activities, project objectives, bidding and procurement methods, urgency, and project scale and value. Reality shows that the larger the scale and value of projects or the urgent projects, invested in complex terrain locations, the more difficult and complicated the management of investment projects becomes, leading to impacts on investment project management. To improve the effectiveness of investment project management, the project's objectives need to be clearly defined, close to reality; bidding and procurement methods need to ensure efficiency. The research results of the topic are similar to the results in the study of Tukel and Rom, 1995. The authors pointed out that projects with a large number of activities (over 100 activities) are often behind schedule compared to other projects. For urgent

projects such as projects implemented to overcome the consequences of natural disasters, they are often ineffective or exceed the proposed budget.

6. CONCLUSION

The study surveyed 213 officials involved in construction investment project management at provincial project management boards in Nghe An province to assess the level of influence of factors on the results of construction investment project management at provincial project management boards in the context of aiming at sustainable development goals in Nghe An province. The research results showed that there are 5 groups of factors affecting the results of construction investment project management at provincial project management boards in the context of aiming at sustainable development goals in Nghe An province (Contractors, Organizational factors, Project managers, Capacity of project members, Project characteristics). Based on the research results, the author proposed a number of solutions to improve the results of construction investment project management at provincial project management boards in the context of aiming at sustainable development goals in Nghe An province.

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CONSTRUCTION INVESTMENT PROJECT MANAGEMENT AT PROVINCIAL PROJECT MANAGEMENT BOARDS IN THE CONTEXT OF AIMING FOR SUSTAINABLE DEVELOPMENT IN NGHE AN PROVINCE

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Abstract: The construction industry is the foundation and basis for the development of the economies of every country in the world, and this is no exception in Vietnam in general and Nghe An province in particular. In recent years, many construction investment projects in different economic sectors have been implemented and completed. Many projects have been successfully implemented, contributing significantly to providing and contributing to the basis for promoting local economic development, but in reality, many projects have not met the goals or achieved the requirements, reducing the efficiency of capital use and reducing the value of the project. Therefore, it is necessary to have strict management and control to ensure the effectiveness of construction investment projects towards sustainable development goals at provincial construction investment project management boards in Nghe An province.

Keywords: Construction investment project management; Sustainable development; Nghe An.

1. INTRODUCTION

The construction industry is the foundation and basis for the development of the economies of every country in the world, this is no exception in Vietnam in general and Nghe An province in particular. In recent years, as a developing country, Vietnam in general and Nghe An province in particular have a great need for infrastructure to serve the process of industrialization and modernization of the country. Therefore, many construction investment projects, in different economic sectors, have been implemented and completed. However, the construction investment process has a very wide scope, is complex, has its own characteristics and is closely related to the Investment Law, Public Investment Law, Budget Law, Construction Law, Planning Law, Bidding Law, Environmental Protection Law, Housing Law and regulations on urban management... Therefore, strict management and control are needed to ensure the safety of construction works, people's lives and property, ensure effective capital management and use, prevent waste and loss towards sustainable development.

For the above reasons, it is necessary and timely to study the management of construction investment projects at provincial project management boards in the context of aiming for sustainable development goals in Nghe An. The study will not only provide scientific perspectives on construction investment project management but also make important practical contributions to strengthening the management of construction investment projects, thereby contributing to creating momentum for the sustainable and comprehensive development of Nghe An province in the future.

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2. THEORETICAL BASIS RELATED TO CONSTRUCTION INVESTMENT PROJECT MANAGEMENT AT PROVINCIAL PROJECT MANAGEMENT BOARDS IN THE CONTEXT OF AIMING FOR SUSTAINABLE DEVELOPMENT GOALS

2.1. Sustainable development

In 1987, the Brundtland report first used the term "sustainable development" as an alternative to the economic system practiced in most countries around the world and, unlike that system, seeks to meet the needs of the present without compromising the future of future generations. According to the "Brundtland Report" of the World Commission on Environment and Development (WCED) of the United Nations, sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

The United Nations Conference on Environment and Development held in Rio de Janeiro in June 1992 defined this idea in more detail and established a detailed action plan, Agenda 21, which sets out three areas that global, national and local governments must implement to establish that sustainable development. The general idea is that each local government can outline its own strategy with the aim of achieving global sustainable development by the year 2000 (21st century). The goals of sustainable development are:

(1) Economic growth: To create a sustainable and well-oriented economic development.

(2) Environmental protection: This goal focuses on the contribution of people to the protection and improvement of the natural environment, by reducing pollution and waste, and aiming to reduce global carbon emissions.

(3) Social inclusion: This goal focuses on providing housing facilities for future generations and supporting the creation of healthy, strong and vibrant global communities.

2.2. Contents of construction investment project management at provincial project management boards in the context of aiming for sustainable development goals

According to Construction Law No. 50/2014/QH13, specifically in Article 66, construction investment project management at provincial project management boards includes the following main contents:

2.2.1. Project establishment process management

The contents of project establishment process management include the following tasks: Establishing a project team, determining the project organizational structure; Making an overview plan; Analyzing project work; Making a time schedule plan; Making a budget plan; Designing products and production processes; Making necessary resource plans; Making cost plans and forecasting cash flows; Applying for implementation approval.

2.2.2. Managing the appraisal process

The investor is responsible for sending the construction investment project dossier to the investment decision maker for appraisal and approval. Appraisal of architectural design or selection of architectural design options; Appraisal of investment projects; appraisal of economic and technical reports; Appraisal of technical designs, construction drawing designs, and construction estimates.

2.2.3. Managing the contractor selection process

Contractor selection in construction activities is carried out for jobs, groups of jobs or all jobs of detailed construction planning, construction investment project preparation, survey, design, construction, supervision and other construction activities. Contractor selection in construction activities must comply with the provisions of the law on bidding.

2.2.4. Construction quality management

Construction quality management is a systematic management process to ensure that the quality requirements set by customers are met. Quality management must be carried out from the survey stage, design stage, construction stage, payment and settlement stage and construction warranty stage. The organization of construction quality management is implemented according to Decree 46/2015/ND-CP dated May 12, 2015 of the Government on quality management and maintenance of construction works. Accordingly, it is necessary to pay attention to construction supervision and acceptance of works. Construction quality must be controlled from the stage of purchasing, manufacturing, and making construction products, construction materials, components and equipment used in the works to the stage of construction, testing and acceptance of completed construction items and works into use.

2.2.5. Project cost management

Cost management is implemented in accordance with Decree No. 32/2015/ND-CP dated March 25, 2015 of the Government. Management of construction investment costs must ensure the objectives and effectiveness of construction investment projects and be consistent with the construction investment sequence.

Manage construction investment costs for each project, in accordance with the stages of construction investment, design steps, types of capital sources and State regulations. Management of construction investment costs includes: total investment; construction estimates; construction norms and prices; capacity conditions; rights and responsibilities of the investment decision maker, investor, contractor in managing construction investment costs; payment and settlement of construction investment capital.

2.2.6. Construction progress management

A construction project must have a construction schedule established before implementation. The construction schedule must be consistent with the approved overall project schedule.

For large-scale construction projects with long construction periods, the construction schedule must be established for each stage: month, quarter, year. The construction contractor is obliged to establish a detailed construction schedule, arranging and combining the work to be performed, but must ensure that it is consistent with the overall project schedule.

The investor, construction contractor, construction supervision consultant and related parties are responsible for monitoring, supervising and managing the construction schedule and adjusting the schedule in case the construction schedule at some stages is extended, but must not affect the overall project schedule.

3. CURRENT STATUS OF CONSTRUCTION INVESTMENT PROJECT MANAGEMENT AT PROVINCIAL PROJECT MANAGEMENT BOARDS IN THE CONTEXT OF AIMING FOR SUSTAINABLE DEVELOPMENT IN NGHE AN PROVINCE

3.1. Achievements

In the period of 2021-2023, the investment value for works and construction items

managed by the Boards has continuously exceeded the annual plan, with an increasing trend over the years. This is a testament to the development and success of the Boards, demonstrating growth in both quantity and quality. The Boards are increasingly trusted by the Provincial People's Committee as well as related departments and branches. Nghe An Provincial People's Committee has assigned the management of major projects in Nghe An province.

Table 1. Table of bidding activities monitored by provincial construction investment project management boards in Nghe An province for the period 2021-2023

Year	Form of contractor selection	Number of packages	Package price (million VND)	Winning bid price (million VND)	Contract price (million VND)
2021	***Total 2021***	***102***	***445.915,011***	***445.463,023***	***445.463,023***
1	Open tender	81	430.332,101	429.987,103	429.987,103
2	Limited Bidding	-	-	-	-
3	Bidding	21	15.582,91	15.475,92	15.475,92
4	Competitive Bidding	-	-	-	-
2022	***Total 2022***	***110***	***628.144,614***	***616.197,639***	***616.197,639***
1	Open tender	85	607.744,131	595.889,152	595.889,152
2	Limited Bidding	-	-	-	-
3	Bidding	15	13.159,321	13.158,325	13.158,325
4	Competitive Bidding	10	7.241,162	7.150,162	7.150,162
2023	***Total 2023***	***113***	***590.874,887***	***588.775,275***	***588.775,275***
1	Open tender	82	565.858,324	563.858,378	563.858,378
2	Limited Bidding	-	-	-	-
3	Bidding	31	25.016,563	24.916,897	24.916,897
4	Competitive Bidding	-	-	-	-

Source: Author's own synthesis through the Report on the management of construction investment projects in 2021, 2022, 2023 of provincial-level construction investment project management boards in Nghe An province.

Nghe An provincial construction investment project management boards have achieved significant success in applying the Project Executive Director model. This is thanks to the solidarity and serious working spirit from all staff to the leadership level, combined with scientific and intelligent organization and implementation. This project management organization model has helped project management boards perform their work more effectively, with the equal participation of many specialized departments, while enhancing inspection, control and consulting for leaders. These remarkable achievements reflect the efforts and professionalism in project management at the Nghe An Provincial Construction Investment Project Management Boards, bringing great benefits to the sustainable development of Nghe An province. Specifically:

- Project implementation progress and completion on time

The project implementation steps were carried out by the Boards on schedule and in accordance with the process. The work was carried out in a logical order, ensuring that

successive tasks were completed before the next task was carried out. Management of parallel tasks was also carried out to ensure even completion, without causing delays in the project implementation process. This helps each stage of the project to be implemented reasonably, creating the premise for the following stage to develop smoothly.

- Project implementation quality is gradually improved

The quality of construction investment project management has been ensured by Nghe An provincial construction investment project management boards right from the investment preparation stage. Although a few projects encountered some design errors due to unforeseen factors such as geology and weather, consulting measures have been flexibly adjusted to ensure project quality. Changes to the estimate are also carefully made to ensure the feasibility and effectiveness of the project.

Table 2. Number of completed projects handed over and put into use at provincial construction investment project management boards in Nghe An province in the period 2021-2023

TT	Năm	Số dự án hoàn thành đưa vào sử dụng	Giá trị (triệu đồng)
1	2021	20	201.209,045
2	2022	24	303.037,121
3	2023	29	395.352,735
	Tổng	**73**	**899.598,901**

Source: Author's own synthesis through the Report on the management of construction investment projects in 2021, 2022, 2023 of provincial-level construction investment project management boards in Nghe An province.

- Project implementation costs are economical, effective and optimal

The investment cost management process at the Nghe An Provincial Construction Investment Project Management Boards is assessed as quite effective and professional. Below is a detailed analysis and assessment:

+ Calculating the correctness, completeness and reasonableness of costs: The costs collected for the project are determined correctly, sufficiently and reasonably, distributed according to cost items such as consulting costs, construction costs, equipment costs, compensation costs, site clearance, project management costs, other costs and contingency costs. This ensures the integrity and transparency of costs during project implementation.

+ Controlling project implementation costs: Nghe An Provincial Construction Investment Project Management Boards have strictly controlled project implementation costs, identified differences from the approved investment plan to promptly prevent incorrect and unauthorized changes. The cost management process is carried out effectively, helping to ensure savings for the project.

+ Controlling costs after inspection and audit: Costs controlled during the project management process are less likely to be excluded from the final settlement value after being inspected and audited. This demonstrates the transparency and reliability of the project cost management process. The selection of suppliers is carried out in accordance with procedures and regulations, ensuring quality and efficiency in the implementation of related project tasks.

Table 3. Table of payment status and implementation value monitoring for the period 2021-2023 at provincial construction investment project management boards in Nghe An province

Unit: Million VND

Planning year	Disbursement during the year	Value of completed volume of previous year not yet paid transferred	Unpaid Completed Volume Value carried over to next year
2021	371,40	69,77	171,15
2022	424,33	63,19	88,96
2023	467,35	16,04	71,98

Source: Author's own synthesis through the Report on the management of construction investment projects in 2021, 2022, 2023 of provincial-level construction investment project management boards in Nghe An province.

Based on the reporting data from the Nghe An provincial construction investment project management boards, table 3 on monitoring the payment status and implementation value, it can be seen that the disbursement rate has increased steadily over the years. This shows the improvement in financial management and payment planning of the project. However, the debt situation of completed works is still high. The high debt situation of completed works can cause difficulties for construction contractors and project management.

The settlement situation of completed works put into use is statistically recorded over the years through the following table:

Table 4. Number of completed projects approved for settlement in the period 2021-2023 at the Nghe An Provincial Project Management Boards

Order	Year	Number of completed projects put into use approved for settlement in the year	Value (million VND)
1	2021	26	113.615,211
2	2022	19	108.960,113
3	2023	18	96.906,321
	Total	**63**	**319.481,645**

Source: Author's own synthesis through the Report on the management of construction investment projects in 2021, 2022, 2023 of provincial-level construction investment project management boards in Nghe An province.

Through summarizing and evaluating the results of construction investment project management at Nghe An provincial construction investment project management boards with defined criteria, we can see that the project management process here has had remarkable achievements and relatively well met the set criteria. However, the issue of ensuring the overall progress of the project is still being raised and requires attention and efforts to overcome.

Nghe An provincial construction investment project management boards need to continue to improve the project management process, especially in ensuring progress and overcoming the challenges they are facing. Focusing on identifying and addressing

potential risks, improving stakeholder collaboration, and improving project management capabilities is key.

3.2. Some limitations and causes

3.2.1. Some limitations

Although the management of construction investment projects at the Nghe An provincial construction investment project management boards has achieved some achievements, there are still some unfulfilled goals due to difficulties and obstacles in the implementation process, creating some limitations affecting the management of construction investment projects, hindering the assurance of project quality. Specifically as follows:

- Limitations related to project management at the investment implementation stage

+ Planning and zoning work has not shown a long-term vision and correct forecasts, leading to some projects having to adjust the scale and total amount, prolonging the progress. Limitations in capital sources make it difficult to arrange finance for projects.

+ Project approval is still slow due to the prolonged survey and design work, this situation needs to be improved so that the project can be implemented quickly and effectively.

+ The survey quality is still limited, leading to the design plan having to be changed and not achieving optimal efficiency. The design documents are incomplete, causing unexpected problems during the construction process, which need to be improved to avoid adjusting the total estimate and total investment many times during the project implementation.

+ Supervision work must be improved to ensure project quality, with a suitable and sufficient number of supervisors.

+ Delayed settlement work needs to be resolved to ensure payment to the construction unit to ensure that future maintenance work is carried out on schedule. Below is a summary table of common errors that occur in design and estimation work.

Table 5. Summary of errors in design and forecasting at the Provincial Urban Management Boards of Nghe An in the period 2021-2023

Order	Common mistakes during implementation	Error rate (%)	Impact on construction time
1	Errors in the design process	7	1 month - 6 months late
2	Design without taking into account future planning	5	6 months - 1 year late
3	Design beyond requirements, causing waste of construction capital	9	6 months - 1 year late
4	Lack of detailed design	14,6	5 months - 1 year late
5	Estimates are inaccurate and contain errors	11,8	3 months - 1 year late
6	Asynchronous design, incompatibility between parts	9,5	2 months - 1 year late
7	Construction estimates have unit prices that do not match current market prices.	16,8	1 month - 1 year late

Source: Author's own synthesis through the Report on the management of construction investment projects in 2021, 2022, 2023 of provincial-level construction investment project management boards in Nghe An province.

During the period of 2021-2023, Nghe An Provincial Construction Investment

Project Management Boards conducted a summary of the level of errors in the design and estimation of projects. From these results, it was found that there are some common types of errors that projects often encounter. There are projects with up to 7 errors, while there are also projects with fewer errors, from 1 to 3 errors.

According to statistics, among these types of errors, errors in detailed design account for the highest rate at 14.6%. The main cause of this type of error often comes from the lack of close supervision in the design and survey process of the project. In addition, errors in construction estimates with unit prices not consistent with current market prices also account for a significant proportion of 16.8%. The main cause of this error may be due to the lack of careful survey of unit prices or the prolonged estimation process, leading to fluctuations in market prices. These are important issues that need to be improved to optimize the design and estimation process for future projects to ensure the efficiency and progress of construction investment projects.

Table 6. Statistics on error rates in design and forecasting in the period 2021-2023 at the Provincial Project Management Boards of Nghe An

Unit: Project

Order	Common mistakes during implementation	2021		2022		2023	
		Quantity	Rate (%)	Quantity	Rate (%)	Quantity	Rate (%)
1	Errors in the design process	8	8,8	7	7,3	10	8,4
2	Design without taking into account future planning	5	6,5	8	8,4	9	8,2
3	Design beyond requirements, causing waste of construction capital	7	7,9	5	5,2	13	10,9
4	Lack of detailed design	14	16,5	17	19,9	21	17,5
5	Estimates are inaccurate and contain errors	11	12,3	14	13,6	16	13
6	Asynchronous design, incompatibility between parts	9	10,2	12	12,6	12	9,7
7	Construction estimates have unit prices that do not match current market prices.	13	14,5	16	15,7	18	13,5

Source: Author's own synthesis through the Report on the management of construction investment projects in 2021, 2022, 2023 of provincial-level construction

investment project management boards in Nghe An province.

- Although the number of projects ensuring progress has increased, there are still some projects that are behind schedule.

Project Management Boards have established master plans for projects, but have not been proactive in monitoring and updating information and problems in order to promptly adjust the construction progress. This has led to a situation where some projects are behind schedule, including not handling objective and subjective causes that can be avoided.

Reality shows that many projects are facing many problems and errors, which affect the progress of the projects.

Table 7. Statistics of common problems encountered during the construction process in the period of 2021-2023 at the Project Management Boards of Nghe An province

Order	Common problems	Rate of occurrence in 1 project (%)	Impact on construction time
1	Influence of objective conditions	11	From 3 months - many years
2	Errors in previous stages	26	From 1 month - 6 months
3	Because the contractor took on too many projects	38	From 2 months - 3 years

Source: Author's own synthesis through the Report on the management of construction investment projects in 2021, 2022, 2023 of provincial-level construction investment project management boards in Nghe An province.

Based on the statistics table on the level of errors and challenges in the construction process that the Nghe An provincial construction investment project management boards have summarized in the recent period, the author found the following points:

In the period of 2021-2023, construction investment projects often face three main problems in the construction process. There are projects that face up to 3 problems, while there are also projects that only encounter 1-2 difficulties. According to statistics, in any project, the problem of the contractor taking on too many projects accounts for the highest percentage of 38%. This reflects that the contractor selection process of provincial construction investment project management boards is problematic. Difficulties in the construction process often lead to delays in progress, which can last from 01 month to many years in the most serious cases.

Table 8. Statistics on the number of projects stuck in the construction process in the period of 2021-2023 at the Nghe An Provincial Urban Development Management Boards

Unit: Project

Order	Common problems	2021		2022		2023	
		Quantity	Rate (%)	Quantity	Rate (%)	Quantity	Rate (%)
1	Influence of objective conditions	12	10,2	6	10,5	13	9,8

2	Errors in previous stages	16	16,7	10	18,7	19	17,8
3	Because the contractor took on too many projects	24	26,9	22	27,8	28	25,5

Source: Author's own synthesis through the Report on the management of construction investment projects in 2021, 2022, 2023 of provincial-level construction investment project management boards in Nghe An province.

- Although the bidding management has been implemented carefully and transparently, it is still slow

In fact, it has become common for some contractors to offer very low bids compared to the approved price to win the bid. However, this practice causes a series of consequences later on, affecting the next stages of the project. First, excessively reducing the bid price can lead to the need to increase investment capital during the project implementation process. The contractor may not be able to pursue the project with sufficient resources to ensure quality and progress, so it is necessary to find ways to increase capital to meet the project's requirements.

Not only that, the bidding and appraisal of bidding results for some packages are slow, directly affecting the construction progress of the project. In the case of transport infrastructure construction projects, slow bidding can cause serious impacts. Weather problems, especially the rainy season, will make construction difficult and unable to proceed on schedule. This not only prolongs the necessary time for the project but also affects the quality and final efficiency of the project.

- Cost management has changed positively but quality is still not guaranteed

+ The general situation in construction investment projects managed by Nghe An provincial construction investment project management boards is that the total investment and estimates have to undergo many adjustments due to changes and arising workloads, as well as fluctuations in prices and policies from the state. This creates instability and difficulties in the process of managing project finances and resources.

+ Ineffective project management is also a major problem, affecting the progress and costs of the project. This delay not only affects the application of project solutions in practice but also creates additional costs due to the extension of implementation time.

+ Overall, the continuous adjustment of total investment, design adjustment, and progress management issues lead to delays and additional costs. These problems are being gradually overcome by the Nghe An Provincial Construction Investment Project Management Boards, but caution and continuous efforts are needed to improve the management process and effectively implement the project.

Table 9. Statistics of errors in activities that increase the cost of construction investment projects in the period 2021-2023 at the Provincial Project Management Boards of Nghe An

Order	Errors in implementation	Error rate (%)	Increased costs
1	Survey - design	21	Increase by > 200 million VND
2	Land clearance	38	Increase by > 300 million

			VND
3	Bidding	15	Increase by > 300 million VND
4	Construction	26	Increase by > 400 million VND

Source: Author's own synthesis through the Report on the management of construction investment projects in 2021, 2022, 2023 of provincial-level construction investment project management boards in Nghe An province.

Based on the statistical report on errors that cause increased project costs that Nghe An Provincial Construction Investment Project Management Boards have recently summarized, the author found some important issues that need to be considered:

In the period of 2021-2023, when proposing costs for projects, 4 common types of errors occurred. Some projects faced all 4 types of errors, while some projects only encountered 1 type of error. According to statistics, among those errors, the estimation for Site Clearance work accounts for the largest proportion, up to 38%, due to the difference between the price proposed by the Site Clearance Council and the actual compensation level of the people. Errors in the design survey and construction process also account for a proportion of 21-26%. These errors have affected project management and increased costs from 200 to more than 400 million VND, of which errors in the construction process cause the largest cost.

3.2.2. Causes of limitations

a. Subjective causes:

+ Work overload at the Nghe An provincial construction investment project management boards has caused delays in checking, controlling and monitoring the progress, quality and costs of projects. Staff at the project management boards have to undertake many projects at the same time, and the project implementation locations are spread across many places, leading to the inability to concentrate and manage effectively. At the same time, some staff of the project management boards have not met the necessary professional standards to perform the work professionally.

+ The cause comes from the construction unit, the project management boards can overcome and improve the situation by strictly strengthening bidding management, selecting experienced and reputable contractors to ensure the quality and progress of the project.

+ Although project preparation and implementation have been given attention, investment supervision is still lower than necessary. Estimating time and work needs to be scientifically based to ensure accuracy and efficiency. In addition, the application of information technology and updating information on factors such as weather and terrain also need to be improved to increase efficiency in project management.

+ The issue of capital disbursement time also needs to be improved to avoid affecting project progress. Although the operating regulations of the Boards have emphasized saving and anti-waste, this needs to be done effectively and flexibly to ensure project progress and quality.

b. Objective reasons:

+ The system of administrative documents and legal documents: The State's policies and regulations on construction investment are still slow to be issued, lack consistency and are frequently changed, not only limiting implementation at all levels and sectors but

also making the construction investment process more complicated and difficult for participating units.

+ The procedures for project approval and appraisal are still very cumbersome and complicated, going through many stages of control and evaluation from many organizations and sectors.

+ The actual site clearance work encounters difficulties, especially in compensation for construction site prices because local regulations often have many shortcomings, making it difficult to negotiate and complete the process smoothly.

+ The capacity of consulting and construction contractors in Nghe An has not yet met the requirements in terms of both quantity and quality, causing risks to project implementation and not meeting general standards.

+ Natural factors such as weather and natural disasters: Traffic and irrigation projects often have long construction periods, but in the second quarter of each year, when public investment disbursement is being accelerated, these projects must be temporarily suspended due to rain, storms and other extreme weather conditions. This greatly affects the progress and quality of the project.

4. SOME SOLUTIONS TO STRENGTHEN CONSTRUCTION INVESTMENT PROJECT MANAGEMENT AT PROVINCIAL PROJECT MANAGEMENT BOARDS IN THE CONTEXT OF AIMING FOR SUSTAINABLE DEVELOPMENT GOALS IN NGHE AN PROVINCE

From the current situation of construction investment project management at provincial project management boards in the context of aiming for sustainable development goals in Nghe An province, the author proposes some solutions to strengthen construction investment project management at provincial project management boards in the context of aiming for sustainable development goals in Nghe An province:

First, organize a suitable construction investment project management model with high capacity to improve the quality of construction investment project management. For large-scale projects with complex technical characteristics, it is necessary to establish a matrix-based model for managing investment projects (mobilizing high-quality human resources in the entire board). For projects mainly purchasing technological machinery, a specialized investment project management board should be established. There should be an attractive mechanism to attract talents to participate in investment project management boards, ensuring adequate structure and composition, with good moral qualities, dedication to the profession, high professional capacity, with training certificates in managing investment projects, bidding and specialized fields, good general management level and appropriate foreign language and IT skills, meeting the requirements for managing investment projects.

Second, improve the quality and progress of technical design and total cost estimates. Technical design is the legal basis for organizing the implementation of projects and carrying out payment and settlement procedures; it greatly affects the quality of project results. To ensure the construction progress and quality of the technical design-total estimate, provincial project management boards in Nghe An province need to regularly exchange, provide information, support consulting units and give comments and feedback during the process of developing the technical design-total estimate. At the same time, investors need to choose consultants to review the technical design-total estimate with

high capacity and reputation to help investors evaluate and accept the technical design-total estimate to ensure improving the quality, accuracy and science of the technical design-total estimate.

Third, manage project bidding packages in accordance with legal regulations. For current projects, the selection of construction contractors is mainly through the form of designated bidding or limited bidding, making it difficult to select contractors with the highest experience, capacity and reputation. Therefore, it is necessary to strictly manage the bidding process of projects, comply with legal documents, limit negative stages, improve the quality and effectiveness of bidding and contribute to improving the quality of management of construction investment projects and the quality of project products.

Fourth, manage the quality and progress of projects well. Project management boards need to focus on improving survey capacity; bidding and acceptance of bidding packages and projects. Develop and manage progress plans for each bidding package and project plans; speed up the progress of bidding package acceptance, project acceptance, payment and settlement of investment capital for projects.

Fifth, improve the quality of monitoring and evaluation of projects. Provincial project management boards in Nghe An province need to hire competent supervision consultants to perform this task; need to regularly exchange information with supervision consultants on the implementation status of each bid package. From there, accurately assess the implementation status of each bid package, each contractor and propose plans and measures to accelerate progress, increase volume, control quality, and labor safety of bid packages and projects.

Sixth, Promote digital transformation in the management of construction investment projects. Provincial project management boards in Nghe An province have identified digital transformation as one of the important solutions to realize the goals and strategic orientations for the development of the boards in the period of 2025-2030, with a vision to 2040. Therefore, in the coming period, provincial project management boards in Nghe An province need to: (i) invest in promoting fields, (ii) build and consolidate sustainable digital technology platforms that can be applied and benefit many units and fields in the boards, (iii) attract and retain technology talents and build a digital culture; comprehensive digital transformation, simultaneously in all aspects and fields of the Board's activities to increase the level of positive spread.

5. CONCLUSION

In recent years, along with the economic growth rate, the construction industry has focused on investment and strong development, especially investment in technical infrastructure works, civil works, traffic works, etc. To ensure the safety and effectiveness of investment management, in recent times, the Government, the People's Committee of Nghe An province, departments and branches related to construction investment project management and especially the provincial project management boards in Nghe An province have issued strategies and policies related to construction investment project management to help the development of the construction industry be stable and sustainable.

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THE QUALITY OF GREEN CREDIT SERVICES AT COMMERCIAL BANKS IN NGHE AN PROVINCE

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Abstract: Using exploratory factor analysis (EFA) and multiple regression analysis (MRA), this study investigates data collected from 280 corporate customers utilizing green credit services at commercial banks in Nghe An province. This study aims to develop a specialized scale for evaluating the quality of green credit services, inspired by the service quality theories of Parasuraman et al. (1988) and Zeithaml et al. (1996). The results reveal that the determinants of green credit service quality at commercial banks in Nghe An are ranked in order of importance as follows: Reliability, Empathy, Assurance, Responsiveness, and Tangible Assets. These factors not only provide a comprehensive reflection of customer assessments of green credit services but also shed light on the key drivers for enhancing service quality in this domain. A distinctive feature of this study lies in its application of a service quality model developed over decades, combined with an analysis tailored to the specific characteristics of the Nghe An market. This approach establishes a novel analytical framework suited to the evolving context of green credit. The findings offer critical insights for formulating strategies to improve service quality, enhance customer satisfaction, and promote the sustainable development of the banking sector in supporting green projects. These efforts contribute to achieving the broader objectives of sustainable economic development at both provincial and national levels.

Keywords: *Quality of green credit services, Commercial bank, Linear regression*

1. Introduction

The green economy is an economic model in which market-oriented development policies are built upon traditional economic foundations, aiming for harmony between economic growth and ecological sustainability. To promote a green economy, establishing a green financial system is indispensable (Tran & Nguyen, 2020). In pursuit of sustainable economic development, Vietnam has formulated a green economy development strategy, clearly articulated in Decision No. 1658/QĐ-TTg dated October 1, 2021, by the Prime Minister. This decision approves the National Strategy for Green Growth for the 2021-2030 period, with a vision for 2050. The strategy seeks to promote economic restructuring linked with growth model innovation, achieving economic prosperity, environmental sustainability, and social equity. It also aims to build a green, carbon-neutral economy and contribute to limiting global temperature increases (Prime Minister, 2021). Within this framework, green credit and banking activities play a pivotal role in successfully implementing the strategy.

Nghe An, a province with abundant economic potential, has witnessed commercial banks introducing green credit packages focusing on organic agriculture, renewable energy, and waste management.... However, the growth rate and proportion of green credit remain modest, necessitating practical measures to foster development in the

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coming years. Despite initial efforts in developing and offering green credit products, the growth rate of green credit remains limited. Challenges include customers' limited awareness, a lack of comprehensive policy frameworks, and financial risks associated with investing in green projects.

This study focuses on analyzing the quality of green credit services provided by commercial banks in Nghe An Province through both quantitative and qualitative approaches. The SERVQUAL model is employed to evaluate the factors affecting green credit service quality. The research aims not only to identify service gaps in green credit but also to propose strategic recommendations to optimize the operational efficiency of banks in this domain. Furthermore, the findings provide policy guidance and a scientific basis for promoting sustainable financial development in Nghe An, a critical link in Vietnam's green economy development strategy.

2. Theoretical Framework and Research Methodology

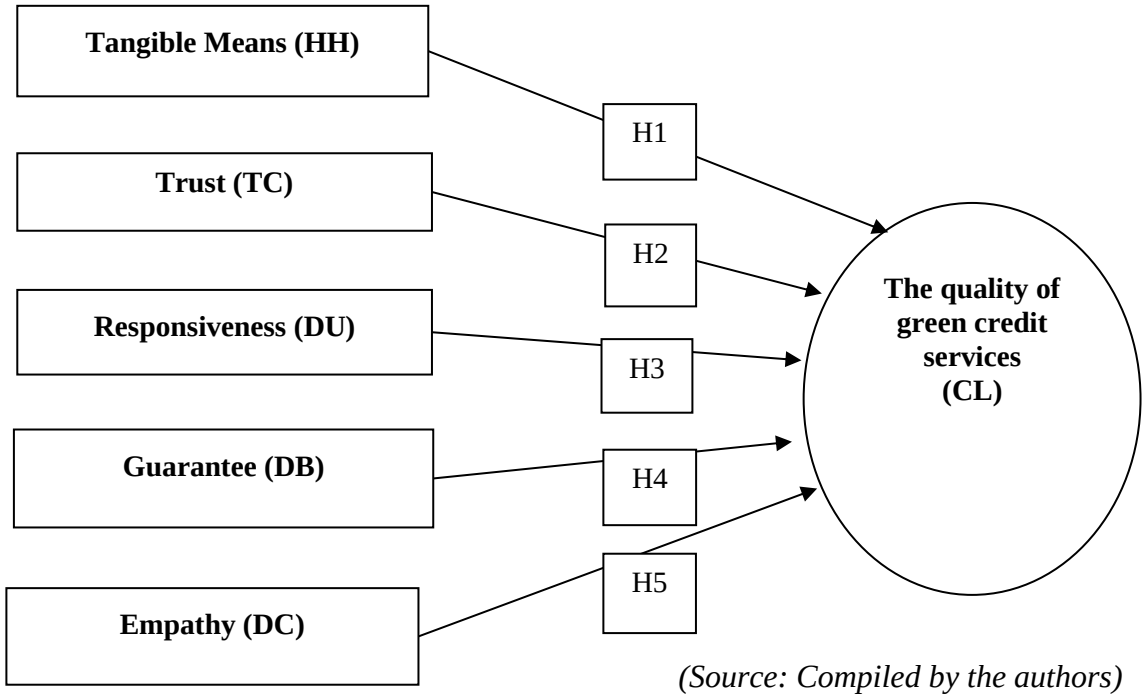
2.1 Theoretical Framework and Research Model

Service quality is conceptualized as comparing customers' expectations of service quality and their actual perceptions of the service received (Zeithaml et al., 1996). Parasuraman et al (1985, 1988), pioneers in service quality research, proposed the Five Gaps Model of Service Quality. According to Parasuraman et al. (1985), service quality is a function of the fifth gap, which depends on the preceding gaps—namely gaps 1, 2, 3, and 4. Therefore, to narrow the fifth gap and enhance service quality, service managers must endeavor to minimize these preceding gaps.

The five dimensions of service quality and the SERVQUAL scale comprehensively address the attributes that characterize service quality. However, each service industry may possess unique characteristics. Based on prior studies and practical insights into the quality of green credit services at commercial banks, the following hypotheses are proposed:

- **Hypothesis H1:** Tangible means have a positive impact on the quality of green credit services.
- **Hypothesis H2:** Trust has a positive impact on the quality of green credit services.
- **Hypothesis H3:** Responsiveness has a positive impact on the quality of green credit services.
- **Hypothesis H4:** Guarantee has a positive impact on the quality of green credit services.
- **Hypothesis H5:** Empathy has a positive impact on the quality of green credit services.

Figure 1: Research Model



(Source: Compiled by the authors)

Table 1: Factors and Observed Variables in the Model

Factors	Observed Variables	Contents
Tangible Means Parasuraman et al (1985); Zeithaml et al1996)	HH1	Headquarters and modern transaction offices
	HH2	Modern equipment and working tools
	HH3	Well-organized and convenient layout of departments and transaction areas
	HH4	Extensive network of branches and transaction offices
Trust Parasuraman et al (1985); Zeithaml et al1996)	TC1	Clear and transparent information on green credit
	TC2	Green credit operations are always accurate and reliable
	TC3	The bank provides a full range of green credit products
	TC4	The bank has timely complaint handling and inquiry channels
	TC5	The bank always fulfills its commitments when implementing green credit
Guarantee Parasuraman et al (1985); Zeithaml et al1996)	DB1	Green credit officers possess excellent professional knowledge
	DB2	Employees exhibit professional working attitudes
	DB3	Employees provide clear and comprehensive procedural guidance
	DB4	Employees demonstrate expertise in green credit operations
Empathy Parasuraman et	DC1	Bank staff show care and attention to each customer
	DC2	Employees are enthusiastic, friendly, and provide

al (1985); Zeithaml et al1996)		excellent customer care
	DC3	Employees are attentive to customers' needs and expectations
	DC4	Employees offer suitable advice on green credit to customers
	DC5	Bank staff consistently demonstrate concern for their customers
Reponsiveness Parasuraman et al (1985); Zeithaml et al1996)	DU1	Green credit application processing time is fast
	DU2	Green credit methods are appropriate
	DU3	Payment terms are quick and suitable
	DU4	Low transaction costs
The quality of green credit services Parasuraman et al (1985); Zeithaml et al1996)	CL1	Green credit services effectively meet financial needs and help customers achieve sustainable development goals
	CL2	Customers are very satisfied with the green credit services
	CL3	Customers will continue to trust and use green credit services
	CL4	Customers will recommend the bank's green credit services to their partners

(Source: Compiled by the authors)

2.2 Research Methodology

The study employs a combination of qualitative and quantitative research methods. Quantitative research was conducted by collecting primary data through a survey of 280 corporate customers in Nghe An Province using a structured questionnaire and an online sampling method. The survey was conducted from November 1, 2024, to December 15, 2024. According to Hair et al. (2006), for an EFA (Exploratory Factor Analysis) model, the sample size is determined by the formula n = k$\sum_{j=1}^{m} Pj$, where k is set to 5 or 10 depending on survey resources, Pj represents the number of observed variables in each scale, and m refers to the total number of scales (1 to m). In this study, the research model consists of 5 scales and 26 observed variables. Using k=5, the minimum sample size is n=5×26=130. However, the study selected a sample of 280 corporate customers who use green credit services at the following banks: BIDV-Nghe An Branch, VCB-Nghe An Branch, Agribank-Nghe An Branch, HBBank-Nghe An Branch, Techcombank-Nghe An Branch, Nam A Bank-Nghe An Branch, and Bac A Bank. These banks collectively account for over 80% of the total green credit outstanding loans in Nghe An Province.

3. Research Results

3.1 Assessment of Scale Reliability

The results for the Corrected Item-Total Correlation and Cronbach's Alpha coefficients for the variables are as follows:

Table 2. Results of the scale's reliability analysis

No.	Scales	Corrected Item-Total Corelation		Cronbach's Alpha
		Min	Max	
1	HH1, HH2, HH3, HH4	0.661	0.701	0.832
2	TC1, TC2, TC3, TC4, TC5	0.660	0.708	0.765
3	DU1, DU2, DU3, DU4	0.665	0.691	0.842
4	DC1, DC2, DC3, DC4, DC5	0.665	0.735	0,882
5	DB1, DB2, DB3, DB4	0.656	0.697	0.839
6	CL1, CL2, CL3, CL4	0.631	0.729	0.744

Source: Compiled from the author

In this study, all remaining observed variables have Corrected Item-Total Corelation greater than 0.3, Cronbach's Alpha coefficients of the scales are all greater than 0.6, which ensures the scale's reliability.

3.2 Exploratory Factor Analysis (EFA)

KMO coefficient =0.833 > 0.5 (Table 3). Bartlett's test has a significance level of Sig. =0.000 <0.05, showing that EFA analysis is appropriate for the data set and the observed variables are correlated in the exploratory factors.

Table 3. Results of EFA suitability test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.833
Bartlett's Test of Sphericity	Approx. Chi-Square	2714.736
	df	231
	Sig.	.000

Source: Extracted from SPSS 28

Table 4. Test of extracted variance

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.441	24.732	24.732	5.441	24.732	24.732	3.280	14.910	14.910
2	2.599	11.812	36.543	2.599	11.812	36.543	3.102	14.099	29.009
3	2.406	10.936	47.479	2.406	10.936	47.479	2.761	12.552	41.561
4	2.193	9.966	57.446	2.193	9.966	57.446	2.712	12.325	53.886
5	1.904	8.654	66.099	1.904	8.654	66.099	2.687	12.213	66.099

Extraction Method: Principal Component Analysis.

Source: Extracted from SPSS 28

Through the extracted variance test, we see that the Cumulative variance value = 66.099% > 50% and Eigenvalue = 1.904>1. This also shows that 65.78% of the variation of each factor is explained by the observed variables of the factor.

Table 5. Factor rotation matrix result

Observations	Factors				
	1	2	3	4	5
TC2	0.811				
TC5	0.808				
TC3	0.807				
TC1	0.776				
TC4	0.747				
DC5		0.829			
DC4		0.776			
DC1		0.763			
DC2		0.743			
DC3		0.718			
DU4			0.822		
DU3			0.818		
DU2			0.804		
DU1			0.792		
DB2				0.824	
DB4				0.817	
DB3				0.801	
DB1				0.748	
HH1					0.829
HH2					0.804
HH3					0.803
HH4					0.775

Source: Extracted from SPSS 28

The above table shows that the factor loading coefficient (Factor Loading, FD) has a value from 0.736-0.838. By exploratory factor analysis, the above results shows that the model is suitable for practical data including 5 scales.

3.3 Regression analysis (MRA)

$$CL = \beta_0 + \beta_1*HH + \beta_2* DB + \beta_3*DU + \beta_4* TC + \beta_5* DC + \varepsilon i$$

With β_j is regression coefficient, εi is residual

Table 6. Regression results of the model

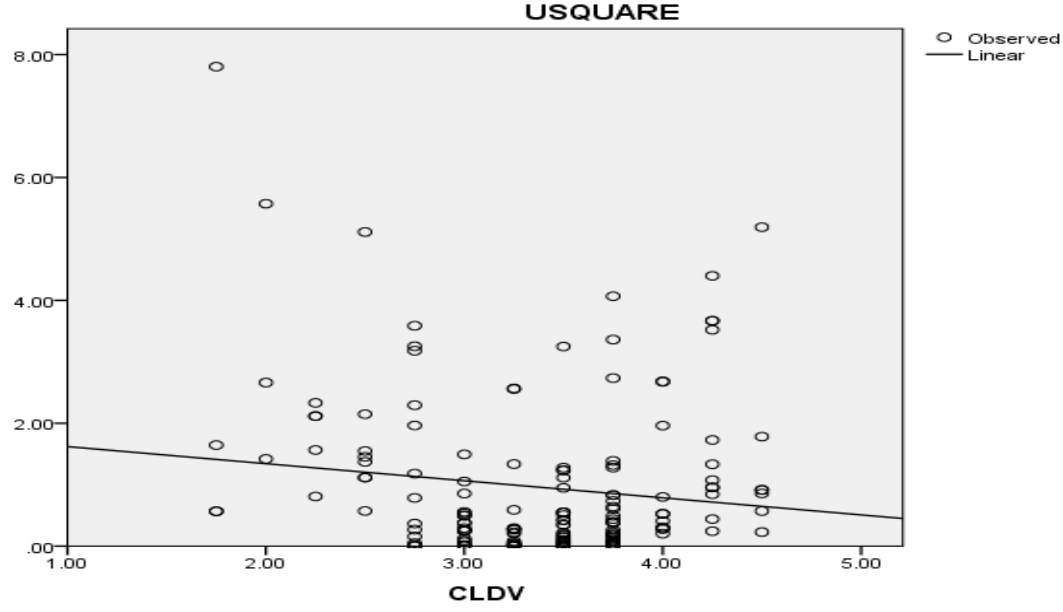
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-0.891	0.256		-3.476	0.001		
HH	0.242	0.049	0.221	4.952	0.000	0.911	1.098
TC	0.326	0.052	0.284	6.238	0.000	0.872	1.147
DU	0.243	0.050	0.219	4.875	0.000	0.895	1.117

DB	0.231	0.051	0.213	4.555	0.000	0.826	1.211
DC	0.250	0.051	0.222	4.912	0.000	0.883	1.132
Dependent variable: CL							
Adjusted R Square: 0.695							
ANOVA							
Sig.: 0.000							
Durbin-Watson: 2.214							

Source: Extracted from SPSS 28

In the table above, according to the Wald test, the independent variables HH, TC, DU, DB, DC are statistically significant with the dependent variable CL (Sig. <0.05). Thus, in general, the independent variables are linearly correlated with the dependent variable. Therefore, the linear regression model is consistent with the actual data. In the model, Adjusted R Square =0.695 (F Test, sig.<0.05). Thus, 69.5% of the change in international payment quality is explained by the independent variables of the model, which is guaranteed to be significant at the 99% confidence level. The regression model has Sig. =0.000<0.05. Thus, in general, the independent variables are linearly correlated with the dependent variable. Therefore, the linear regression model is consistent with the actual data. According to the table above (regression coefficient model), all independent variables have VIF < 3, there is no multicollinearity phenomenon. Durbin-Watson = 2.214 is in the range of 1-3, there is no autocorrelation phenomenon.

Figure 2. Park test results for autocorrelation phenomenon



Source: Extracted from SPSS 28

The correlation curve between USQUARE and CL is a straight line (linear correlation), with no residual change.

4. Conclusion and Policy Implications

Quantitative analysis results show that the quality of green credit at commercial banks in Nghe An province is affected by all 5 factors but with different levels of impact, specifically:

Table 7. Research results of the model

Scale	Regression coefficient	%	Level of influence
Tangible means (HH)	0.221	17.71%	5
Trust (TC)	0.284	22.76%	1
Responsiveness (DU)	0.232	18.59%	4
Guarantee (DB)	0.249	19.95%	3
Empathy (DC)	0.262	20.99%	2
Total	**1.25**	**100%**	

Source: Compiled from the author

The table above shows the impact level of Trust (TC), Empathy (DC), Guarantee (DB), Responsiveness (DU) and Tangibles means (HH) on the dependent variable. Based on the results of this study, commercial banks in Nghe An province need to focus on the following solutions:

(1) Enhance trust

Enhancing transparency in green credit information by applying digital technology to publicly disclose information about green credit products and processes online, making it easier for customers to access. Additionally, annual evaluation reports on the effectiveness of green credit will be developed to build community trust. The commercial bank needs to strengthen control and ensure service quality by planning periodic inspections of green credit implementation to ensure policies are executed as committed and expanding customer communication channels, especially through a fast and transparent online feedback system. It is necessary to diversify green credit products by developing flexible credit packages tailored to different customer groups such as farmers, and small and medium-sized enterprises in Nghe An, and collaborating with international organizations to mobilize preferential funding to support green credit products.

(2) Increase empathy

The commercial bank needs to train employees with a customer-centric vision by organizing courses to enhance skills in listening, consulting, and proactively and effectively caring for customers, enabling staff to engage with real customer cases to better understand their challenges and needs. It is necessary to personalize service experiences by building detailed customer profiles, allowing the bank to recommend green credit products that truly align with each customer's needs and financial capabilities, and applying AI technology to automatically suggest products to customers. Moreover, the commercial bank needs to develop sustainable relationships with customers by expanding long-term customer care programs, such as offering incentives for loyal customers and strengthening customer engagement through events like seminars on the benefits of green credit.

(3) Enhance assurance

A team of green credit professionals is developed by planning the recruitment and training of sustainable finance experts to serve as the bank's core workforce. Regular assessments and upskilling initiatives will ensure employees have a solid understanding of socio-economic conditions and regulations related to green credit. The commercial bank needs to build a professional and trustworthy image by designing uniforms, business

cards, and communication materials that convey professionalism, thereby leaving a positive impression on customers. Additionally, performance evaluation criteria will be implemented to ensure customers consistently receive effective support. The commercial bank should expand collaboration with external partners by partnering with non-governmental organizations and sustainable enterprises to achieve international recognition for the bank's green credit capabilities. Moreover, employee training programs will be developed with the involvement of international financial experts.

(3) Improve responsiveness

The commercial bank should optimize the document processing workflow by leveraging software technology to automate steps such as document evaluation, approval, and disbursement while simplifying procedures without compromising legal and regulatory compliance. The commercial bank also enhances customer support by establishing 24/7 online consulting channels or chatbot applications to promptly address customer inquiries and setting up green credit customer care centers in rural areas. Additionally, the commercial bank needs to reduce transaction costs by implementing fee-reduction policies for transactions conducted via electronic banking or at branches offering green credit. Furthermore, it provides low-interest rates and reduced fees for customers utilizing long-term credit packages to support sustainable agricultural development.

(4) Enhance tangible media

The commercial bank should invest in modern infrastructure by upgrading equipment at its branches to ensure a modern and convenient transaction environment while using eco-friendly materials in the construction and renovation of transaction offices. It is also advancing information technology by launching a dedicated mobile application for green credit, which allows customers to register and track their applications online, and by enhancing the security of its transaction systems to protect customer information. Furthermore, the commercial bank should expand its transaction network by planning the establishment of additional branches in rural and remote areas to improve customer accessibility, as well as developing flexible transaction points at markets and residential areas to better support local customers.

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DETERMINANTS OF CORPORATE SOCIAL RESPONSIBILITY DISCLOSURE IN VIETNAM'S BANKING SECTOR

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Abstract: Corporate social responsibility (CSR) disclosure has emerged as a crucial aspect of corporate transparency, reflecting the growing global emphasis on environmental and social accountability. This practice not only enhances corporate reputation but also builds trust among stakeholders, including customers, investors, and regulators. However, the level of CSR disclosure varies significantly across countries and industries due to differences in regulatory frameworks, cultural norms, and institutional practices. In Vietnam, where the banking sector plays a pivotal role in economic and social development, understanding the determinants of CSR disclosure is particularly critical. This study focuses on internal determinants specific to the Vietnamese banking sector, investigating the influence of financial characteristics and corporate governance on CSR disclosure practices. Drawing on empirical data from 30 commercial banks over the period 2019 - 2022, the research identifies key factors driving CSR disclosure. The findings reveal that bank size, state ownership, and profitability significantly and positively impact the extent of CSR disclosure, highlighting their role in shaping transparency and accountability. By shedding light on these factors, this study provides actionable insights for policymakers and bank management aiming to enhance CSR practices and align with global standards.

Keywords: *Disclosure, corporate social responsibility, financial characteristics, corporate governance, Vietnam*

JEL codes: M40, G21, Q56

(1) Introduction

Corporate Social Responsibility (CSR) has emerged as a critical aspect of business strategy, particularly in the banking sector, where trust and transparency play pivotal roles. Beyond enhancing corporate reputation, CSR practices enable banks to address the needs and expectations of diverse stakeholders, including customers, investors, employees, and regulators. Given the banking sector's profound impact on economic and social development, transparent CSR practices are not merely an ethical choice but a strategic imperative for sustainable growth.

In the context of Vietnam, the banking sector has recognized the importance of CSR and made efforts to integrate it into their operational and strategic frameworks. However, the level of CSR disclosure across banks remains uneven, reflecting significant gaps in adherence to international standards. These inconsistencies stem from various challenges, including underdeveloped regulatory frameworks, limited enforcement mechanisms, and a lack of widespread understanding of the long-term benefits of CSR. As a result, many Vietnamese banks have yet to fully harness the potential of CSR in building their

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corporate image, enhancing competitiveness, and creating sustainable value for shareholders.

This study seeks to address these gaps by analyzing the internal factors influencing CSR disclosure levels in Vietnamese commercial banks during the period 2019-2022. Specifically, it investigates the impact of financial characteristics and corporate governance features on disclosure practices. By identifying key determinants and proposing actionable solutions to improve transparency, this research aims to contribute to the advancement of CSR practices in Vietnam's banking sector, aligning them with global sustainability standards and fostering long-term development.

2. Theoretical Foundations and Research Overview

Corporate Social Responsibility (CSR) is a significant concept in the sustainable development of businesses, particularly in the banking sector. Previous global studies, such as those in Libya and Indonesia, have highlighted the relationship between factors like firm size, state ownership, and financial leverage with CSR disclosure levels. These studies demonstrate a positive correlation between these factors, transparency of information, and sustainable development.

CSR research has predominantly focused on listed companies, with limited attention to the banking sector. This study fills this gap by analyzing the factors influencing CSR disclosure levels in banks, grounded in agency theory and information asymmetry theory.

Firm Size: Larger firms tend to disclose more information than smaller firms (Khan et al., 2013; Alsaeed, 2006). This can be explained by the fact that as a company grows, its stakeholders become more numerous and complex, and the institutional and legal requirements increase as well.

Profitability: Most previous studies show a significant relationship between profitability and disclosure levels. Profitable firms are more likely to disclose extensive information and signal positive performance to attract investment and build shareholder trust (Khan, A., Muttakin, M. B., & Siddiqui, J., 2013; Alsaeed, 2006). This aligns with information asymmetry theory.

Financial Leverage**:** Some studies suggest that firms with lower debt levels face less pressure from creditors and thus tend to focus more on voluntary information disclosure, such as CSR reporting. In contrast, highly leveraged firms disclose less information, primarily sharing it with creditors (Gao, L. S., & Connors, E., 2021; Alsaeed, 2006). This suggests an inverse relationship between financial leverage and information disclosure.

State Ownership: As the proportion of state ownership increases, corporate representation becomes less distinct, leading to less incentive to disclose information. Luo, S., Courtenay, S. M., & Hossain, M. (2006) argue that state ownership weakens voluntary disclosure in Singaporean firms. On the other hand, some theories posit that firms with state ownership face greater pressures and thus disclose more information, as argued by Amran, A., & Susela Devi, S. (2008) and Ahmed Haji (2013). Research by Khan, A., Muttakin, M. B., & Siddiqui, J. (2013) also found a positive relationship between foreign ownership and CSR disclosure.

Independent Board Member Ratio: According to Khan, A., Muttakin, M. B., & Siddiqui, J. (2013), the proportion of independent board members positively influences the implementation of CSR in firms, based on agency and legitimacy theories.

Research by Dang Ngoc Hung et al. analyzing 289 listed companies on HOSE shows that profitability, firm size, and independent auditing have a positive impact on CSR

disclosure, while financial leverage and the dual role of the chairman of the board do not significantly affect it. Based on these findings, the authors recommend strengthening managerial responsibility to reduce information asymmetry.

In the banking sector, Nguyen Cong Phuong and Nguyen Huu Phu conducted a study on Vietnamese commercial banks from 2015-2018, using statistical and regression methods to assess the level of voluntary information disclosure. The study provides recommendations to enhance the quality of annual report disclosures.

Le Thi Nhung's research on listed construction material companies found that larger size, higher profitability, significant foreign ownership, and the use of Big4 auditing firms positively influence CSR disclosure. These studies underscore the importance of firm size, financial performance, and governance structure in improving information transparency and promoting sustainable development.

3. Research Model and Methodology

Based on the literature review and theoretical foundations, the research team has formulated the following hypotheses and research model:

H1**:** Bank size positively influences CSR disclosure by banks in Vietnam.

H2: The level of state ownership has a positive relationship with CSR disclosure in the annual reports of commercial banks in Vietnam.

H3**:** The proportion of independent board members positively influences CSR disclosure in the annual reports of commercial banks in Vietnam.

H4**:** Financial leverage has a negative impact on CSR disclosure by banks in Vietnam.

H5: Profitability positively affects CSR disclosure levels in the annual reports of commercial banks in Vietnam.

$$CSR = \alpha + \beta 1SIZE + \beta 2SEO + \beta 3ROA + \beta 4LEV + \beta 5IND + \varepsilon i$$

Where:

- **CSR:** Social Responsibility Disclosure Index (Chỉ số CBTTTNXH);
- **SIZE:** Firm Size (Quy mô doanh nghiệp);
- **LEV:** Financial Leverage (Đòn bẩy tài chính);
- **ROA:** Return on Assets (Tỷ suất sinh lời trên tài sản);
- **SEO:** State Ownership (Sở hữu nhà nước);
- **IND:** Proportion of Independent Board Members (Tỷ lệ thành viên hội đồng quản trị độc lập);
- **α:** Intercept coefficient (Hệ số chặn, tung độ gốc);
- **β1, β2, β3, β4, β5:** Slope coefficients, representing the relationship between the independent variables and the dependent variable in the model;
- **εi:** Random error term, representing other factors influencing the dependent variable but not included in the model.

The Corporate Social Responsibility (CSR) disclosure index, representing the dependent variable in this study, is measured based on 60 indicators related to social responsibility (as per the "Sustainable Development Reporting Guidelines" issued by the State Securities Commission (SSI) and the International Finance Corporation (IFC)). These 60 indicators are divided into 4 main categories and disclosed in the annual reports. Each indicator disclosed by the company in the annual report is assigned "1 point," while

if the indicator is not disclosed, it is assigned "0 points." After scoring all the indicators, the total score for each company is calculated.

- The model for measuring the total CSR disclosure score for a bank is as follows: CSRDI = Σdi / nj, where di is 1 if indicator di is disclosed and 0 if it is not disclosed, and nj is the maximum number of indicators for company j (with nj ≤ 60).
- The score for each company is then converted to a percentage by dividing the total points achieved by the company by the total number of relevant indicators for that company, and multiplying by 100.

Table 1. Dependent Variable

Variable	Code	Description
Economics	EC1	Direct economic values created and distributed, including revenue, operating costs, employee compensation, contributions and investments in the community, retained profits, and payments to funding agencies and government.
	EC2	Financial impacts as well as other risk and opportunity factors related to the organization's activities caused by climate change.
	EC3	The scope of the organization's responsibility for pension funds.
	EC4	Significant government financial assistance.
	EC5	Comparison ratio between standard entry-level salaries and local minimum wages at key operational sites.
	EC6	Policies, practices, and expenditure ratios for local suppliers at key operational sites.
	EC7	Local hiring policies and the proportion of senior management hired from the local community at key operational sites.
	EC8	Development and impact of infrastructure investment and services for the common benefit of the community through activities.
	EC9	Understanding and describing the significant indirect economic impacts, including the extent of influence.
Environment	EN1	Percentage of materials used that are recycled input materials.
	EN2	Direct energy consumption from the main energy sources.
	EN3	Energy savings through storage and performance improvements.
	EN4	Initiatives offering energy-efficient products and services or using renewable energy, and the results of these initiatives in reducing energy demand.
	EN5	Percentage and total volume of recycled and reused water.
	EN6	Total wastewater flow by quality and destination.
	EN7	Location and area of land owned, leased, or managed within or adjacent to protected areas and areas of high biodiversity outside protected areas.
	EN8	Description of the significant impacts of activities, products, and services on biodiversity in protected areas and areas of high biodiversity outside protected areas.

	EN9	Initiatives to reduce greenhouse gas emissions and the level of reductions achieved.
	EN10	Types, sizes, conservation status, and biodiversity value of water areas and habitats significantly affected by the organization's wastewater discharge and surface water runoff.
	EN11	Initiatives to reduce environmental impacts from products and services, and the level of impact reduction achieved.
	EN12	Percentage of products sold and packaging materials that are recovered by type.
	EN13	Total monetary value of significant fines and the number of non-financial sanctions for non-compliance with environmental laws and regulations.
	EN14	Significant environmental impacts of transporting products, goods, and materials used in the organization’s activities, and transporting employees.
	EN15	Total expenditures and investments for environmental protection, categorized by type.
Social	LA1	Total workforce by type of employment, employment contract, and region.
	LA2	Benefits provided to full-time employees that are not provided to temporary or part-time workers, by major operations.
	LA3	Minimum notice periods related to major operational changes, even if this is not specifically regulated in collective bargaining agreements.
	LA4	Organization of educational, training, counseling, preventive, and risk management programs to support the workforce, their families, or community members in responding to hazardous diseases.
	LA5	Health and safety issues covered in formal agreements with trade unions.
	LA6	Percentage of employees receiving regular performance and career development reviews.
	LA7	Composition of management and workforce, categorized by gender, age group, ethnic minority group, and other diversity indicators.
	LA8	Percentage and total number of major investment agreements that include human rights clauses or have been screened for human rights issues.
	LA9	Identify activities where the rights to freedom of association and collective bargaining are at risk and actions taken to support those rights.
	LA10	Identify activities at risk for forced or compulsory labor, and measures taken to eliminate forced or compulsory labor.
	LA11	Percentage of security personnel trained on the organization’s human rights policies or procedures related to activities.

	LA12	Nature, scope, and effectiveness of any programs and activities to assess and manage the impacts of activities on communities, including from initiation, implementation, and completion.
	LA13	Percentage of employees trained on the organization's anti-corruption policies and procedures.
	LA14	Public policy positioning and participation in public policy development and lobbying.
	LA15	Total monetary value of significant fines and the number of non-financial sanctions for non-compliance with laws and regulations.
	LA16	Total number of incidents of non-compliance with voluntary codes and regulations related to product and service health and safety throughout their life cycle, categorized by outcome.
	LA17	Types of product and service information required by process and the percentage of significant products and services requiring such information.
	LA18	Practices related to customer satisfaction, including the results of customer satisfaction surveys.
	LA19	Compliance programs, standards, and voluntary codes related to marketing communications, including promotions, advertising, and sponsorship.
	LA20	Total number of significant complaints related to customer privacy violations and customer data breaches.
	LA21	Total monetary value of significant fines for non-compliance with laws and regulations related to the provision and use of products and services.
Governance	GI1	The organization's governance structure, including committees within the highest governance body responsible for specific tasks such as strategy development or organizational oversight.
	GI2	Indicate whether the Chair of the highest governance body also serves as the executive leader.
	GI3	For organizations with a unitary leadership structure, specify the number of members of the highest governance body who are independent members and/or non-executive members.
	GI4	Mechanisms for shareholders and employees to provide recommendations or directions to the highest governance body.
	GI5	The relationship between compensation for members of the highest governance body, management, and senior executives.
	GI6	Processes for the highest governance body to ensure that conflicts of interest are avoided.
	GI7	The process for determining the qualifications and expertise of members of the highest governance body to guide the organization's strategy on economic, environmental, and social matters.

	GI8	Internal statement of the mission or values, code of conduct, and principles related to economic, environmental, and social activities, and the status of implementing those principles and codes.
	GI9	Steps taken by the highest governance body to ensure the organization identifies and manages its economic, environmental, and social activities, including related risks and opportunities, and compliance with internationally agreed standards, codes of conduct, and principles.
	GI10	The process for evaluating the performance of the highest governance body, particularly in relation to economic, environmental, and social performance.
	GI11	Charters, principles, or initiatives on economic, environmental, and social matters that are endorsed or supported by the organization outside of its operations.
	GI12	List of stakeholder groups involved.
	GI13	Approach to stakeholder engagement, including the frequency of engagement, categorized by stakeholder group and type.
	GI14	Criteria used to identify and select stakeholders for engagement.
	GI15	Key topics and concerns raised during stakeholder engagement and how the organization has responded to these concerns, including feedback through the reporting process.

Table 2. Independent Variables

Code	**Description**	Expectation	Reference Source
SIZE	Natural logarithm of total assets	+	(Khan, A., Muttakin, M. B., & Siddiqui, J, 2013) (Alsaeed, 2006)
ROA	Net profit after tax divided by total assets	+	(Khan, A., Muttakin, M. B., & Siddiqui, J, 2013)(Alsaeed, 2006)
LEV	Total liabilities divided by total equity	-	(Gao, L. S., & Connors, E, 2021) (Alsaeed, 2006)
IND	Number of independent board members divided by total number of board members	+	(Khan, A., Muttakin, M. B., & Siddiqui, J, 2013)
SEO	Use a dummy variable, assigning a value of 1 if there is state ownership, and 0 if there is no state ownership.	+	(Ahmed Haji, 2013); (Amran, A., & Susela Devi, S, 2008)(Ahmed Haji, 2013)

4. Research Results

4.1 Descriptive Statistics

Table 3. Descriptive Statistics

Variable	Observations	Mean	Standard Deviation	Minimum Value	Maximum Value
CSR	120	0.4665278	0.1516713	0.1833333	0.75
SIZE	120	8.327554	0.5181123	6.859916	9.326474
SEO	120	0.1333333	0.3413599	0	1
ROA	120	0.0373273	0.1157031	8.90e-08	0.8652
LEV	120	0.5510790	1.730007	0.78768	9.320007
IND	120	0.1523333	.0809528	0	0.333

(Source: Results from Stata data analysis by the research team)

Based on the statistical results, the study of 30 commercial banks in Vietnam over a 4-year period shows that the average bank size is 8.32. This indicates that the banks have a significant influence on the market, with bank sizes ranging from medium to large. The average return on assets (ROA) for these banks is 3.73%. The state ownership structure shows that, on average, 13.3% of the businesses are state-owned, with 86.7% being privately owned. The average proportion of independent members in the board of directors is 15.2%, and the average financial leverage ratio is 55.1%.

• **Correlation Analysis**

Table 4. Correlation Analysis Data from STATA14

	CSR	SIZE	SEO	ROA	LEV	IND
CSR	1.0000					
SIZE	0.5163	1.0000				
	0.0000					
SEO	0.4278	0.6570	1.0000			
	0.0000	0.0000				
ROA	0.1912	0.2998	0.4387	1.0000		
	0.0365	0.0009	0.0000			
LEV	0.0331	0.3536	0.4347	0.2217	1.0000	
	0.7197	0.0001	0.0000	0.0150		
IND	-0.0519	-0.0427	-0.4006	-0.1735	-0.1750	1.0000
	0.5735	0.6431	0.0000	0.0581	0.0560	

(Source: Results from Stata data analysis by the research team)

The correlation between the dependent variable CSR and the independent variables SIZE, SEO, ROA, LEV, and IND is reflected through correlation coefficients of 0.5163, 0.4278, 0.1912, 0.0331, and -0.0519, respectively. Regarding the probability (Prob) of the independent variables to assess their statistical significance in the model, we observe that the variables LEV and IND have Prob values of 0.7197 and 0.5735, both greater than 0.05. Therefore, these two independent variables are not statistically significant for the CSR variable, and we proceed to eliminate them.

Model Fit Test

Table 5. Multicollinearity Data from STATA 14

Variable	VIF	1/VIF
SEO	1.98	0.504170
SIZE	1.76	0.568227
ROA	1.24	0.807311
Mean VIF	1.66	

(Source: Results from Stata data analysis by the research team)

The results of the VIF test show that all VIF values for the independent variables are less than 2, and the Mean VIF is less than 2. This indicates that multicollinearity does not occur in this model.

OLS Regression

Table 6. Multicollinearity Data from STATA 14

CSR	Coef.	Std.Err.	t	P>|t|	Beta
SIZE	.1211954	0.0305869	3.96	0.000	0.414006
SEO	0.0695215	0.0492856	1.41	0.161	0.1564689
ROA	-0.0020584	0.1149095	-0.02	0.986	-0.0015702
_cons	-0.5519261	0.2509472	-2.20	0.030	

(Source: Results from Stata data analysis by the research team)

The OLS (Ordinary Least Squares) method is a parameter estimation technique used in linear regression models. The **Prob (P-value)** coefficient from the regression analysis indicates the impact of the independent variables on the dependent variable. Commonly used significance levels are 1%, 5%, and 10% (corresponding to 99%, 95%, and 90% confidence levels). The **R^2 (R-squared)** coefficient or **adjusted R^2** indicates the proportion of the variation in the dependent variable that is explained by the independent variables in the regression model.

FEM

Table 7. Statistical Data for FEM Test from STATA 14

CSR	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
SIZE	0.1138776	0.0390916	2.91	0.005	0.0361912	0.191564
SEO	0	(omitted)				
ROA	0.0797331	0.1698429	0.47	0.640	-0.257794	0.4172601
_cons	-0.4847705	0.3255054	-1.49	0.140	-1.131644	0.1621032

(Source: Results from Stata data analysis by the research team)

REM

Table 8. Statistical Data for REM Test from STATA 14

CSR	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
SIZE	0.1161058	0.0330575	3.51	0.000	0.0513142	0.1808974
SEO	0.0668799	0.0789122	0.85	0.397	-0.0877851	0.2215449
ROA	0.049837	0.1368438	0.36	0.716	-0.218372	0.318046
_cons	-0.5111273	0.2720256	-1.88	0.060	-1.044288	0.022033

(Source: Results from Stata data analysis by the research team)

Comparison Between REM and OLS Models

The Breusch and Pagan Lagrangian Multiplier (LM test) is used to choose between the Ordinary Least Squares (OLS) estimation method and the Random Effects Model (REM).

Steps for conducting the test in Stata:

- Run the REM model
- Use the command "xttest0" to perform the LM test

We set the hypothesis as follows:

- **H_0**: The Ordinary Least Squares (OLS) model is appropriate
- **H_1**: The Random Effects Model (REM) is appropriate

Table 9. Statistical Data for LM Test from STATA 14

	Var	sd = sqrt(Var)
CSR	0.0230042	0.1516713
e	0.0025843	0.050836
u	0.0161016	0.1268922

(Source: Results from Stata data analysis by the research team)

Test: Var(u) = 0

chibar2(01) = 128.71

Prob > chibar2 = 0.0000

Based on the results obtained, we see that Prob = 0.000 < 0.05, so we accept the choice of the REM model as appropriate in this case.

Comparison Between FEM and REM Models

The Hausman test is used to choose between the Fixed Effects Model (FEM) and the Random Effects Model (REM).

Steps for conducting the test in Stata:

- Run both REM and FEM models
- Use the command "hausman fe re" to perform the Hausman test

We set the hypothesis as follows:

- H_0: The Random Effects Model (REM) is appropriate
- H_1: The Fixed Effects Model (FEM) is appropriate

Table 10. Statistical Data for Hausman Test from STATA 14

Coefficients				
Biến	FEM	REM	Difference	S.E.
SIZE	0.1138776	0.1161058	-0.0022282	0.0208651
ROA	0.0797331	0.049837	0.0298961	0.1006001

(Source: Results from Stata data analysis by the research team)

Prob>chi2 = 0.9520

Based on the obtained results, we observe that Prob = 0.5592 > 0.05, therefore we accept the null hypothesis (H0). Hence, the Random Effects Model (REM) is appropriate in this case.

Autocorrelation Test

Wooldridge Test for Autocorrelation in Panel Data

H0: No first-order autocorrelation

F(1, 29) = 25.316

Prob > F = 0.0000

To test the validity of the hypothesis and check for autocorrelation in the research model at a 5% significance level (equivalent to a 95% confidence level), based on the results obtained from the STATA14 system, we observe that the p-value = 0.000 < 0.05. Therefore, we reject the null hypothesis (H0) and conclude that autocorrelation exists in the model.

Test for Heteroskedasticity: White's Test

White's test is used to assess the null hypothesis (H_0) of homoskedasticity against the alternative hypothesis (H_1) of unrestricted heteroskedasticity. The test statistic follows a chi-squared distribution with 19 degrees of freedom:

- **$Chi^2(19) = 76.01$**
- **P-value = 0.0000**

In order to evaluate the validity of the hypothesis and to test for heteroskedasticity in the model, we employ White's test at the 5% significance level. The null hypothesis (H_0) posits that the model exhibits homoskedasticity (constant error variance), while the alternative hypothesis (H_1) suggests that the model suffers from heteroskedasticity (variable error variance).

Given the p-value of 0.000, which is less than the significance level of 0.05, we reject the null hypothesis (H_0) and conclude that the model exhibits heteroskedasticity, indicating that the error variance is not constant.

Proposed Model for Error Correction: FGLS

We use the Feasible Generalized Least Squares (FGLS) model to address the issue of heteroskedasticity, which causes bias in the OLS coefficient estimates, and the problem of autocorrelation. The FGLS model helps correct these issues by producing consistent and unbiased estimates, even when heteroskedasticity is present in the model. Additionally, the FGLS model accounts for the presence of heteroskedasticity (variable error variance) while providing correct standard errors. Furthermore, the model transforms the original regression model in such a way that autocorrelation is no longer an issue in the transformed model.

Since the model is affected by both types of defects (heteroskedasticity and autocorrelation), the authors' approach includes using the commands: Corr(ar1) to address autocorrelation and Panels(h**)** to correct heteroskedasticity. The dataset provided below has been adjusted to overcome the defects mentioned.

Table 11: FGLS Statistical Data in STATA 14

CSR	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
SIZE	0.0780687	0.0205555	3.80	0.000	0.0377807	0.1183566
SEO	0.1346491	0.0283966	4.74	0.000	0.0789928	0.1903054
ROA	0.0225412	0.0252326	-0.89	0.037	-0.0719962	0.0269139
_cons	-0.2079185	0.1652733	-1.26	0.208	-0.5318481	0.1160111

(Source: Results from Stata data analysis by the research team)

Wald chi2(5) = 336.52

Prob > chi2 = 0.0000

Empirical results indicate that **bank size (SIZE)** has the most positive and significant impact on the level of corporate social responsibility (CSR) disclosure. This suggests that larger banks tend to face greater pressure from stakeholders regarding transparency and social responsibility, while also having more resources to invest in these activities. The **state ownership ratio (SEO)** also has a positive influence, indicating that state-owned banks are more likely to disclose CSR information in order to comply with regulatory requirements and enhance public trust. However, the **ratio of independent board members (IND)** and **financial leverage (LEV)** do not have a significant impact, suggesting that these factors may not yet be prioritized in promoting CSR within Vietnamese commercial banks.

5. Conclusion

This study explored the factors influencing the level of corporate social responsibility (CSR) disclosure in the annual reports of commercial banks in Vietnam, including: bank size (SIZE), state ownership ratio (SEO), ratio of independent board members (IND), return on assets (ROA), and financial leverage (LEV). The findings show that most independent variables, such as bank size (SIZE), state ownership ratio

(SEO), and return on assets (ROA), are statistically significant at the 1%, 5%, and 10% levels and have a positive impact on the dependent variable, except for financial leverage (LEV) and the ratio of independent board members (IND).

Therefore, when studying CSR disclosure in listed banks, several factors need to be considered, particularly those related to the characteristics of the banks, such as the state ownership ratio, bank size, profitability, and board composition. Analysts should focus on a diverse set of information that aligns with the research objectives. If CSR disclosure is not mandatory, then internal factors within the bank should be given more attention. To enhance CSR disclosure in the banking sector, banks should develop strategies for increasing transparency, with a special focus on improving the quality of annual reports.

Regulatory authorities should issue more specific regulations on CSR disclosure, along with periodic assessments and public rankings of banks' transparency. At the same time, they should encourage the adoption of international standards in CSR reporting to improve the competitiveness and integration of Vietnamese commercial banks in the global market.

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ANALYSIS OF POLICIES AND REGULATIONS FOR FINTECH COMPANIES IN LEADING COUNTRIES: LESSONS FOR VIETNAM

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Abstract: This paper analyzes the policies and regulations governing Fintech companies across different countries, aiming to elucidate the variations in regulatory frameworks and the impact of these regulations on the development of the Fintech sector. Special attention is given to countries with highly developed Fintech industries, including the United States, China, the European Union (EU), and Southeast Asian nations such as Singapore and Indonesia. The study highlights the challenges Fintech companies face in adapting to evolving regulatory landscapes and proposes directions for improving policies to foster the sustainable development of this industry in Vietnam.

Keywords: Fintech companies, regulations and policies

1. Introduction

In recent years, financial technology (Fintech) has emerged as a critical factor in reshaping the global economy, driving profound changes in the delivery and accessibility of financial services. The rapid growth of Fintech is not confined to developed nations but has also extended to developing economies, presenting significant opportunities and challenges for traditional financial institutions and regulatory bodies. Fintech encompasses a wide range of applications, from online payment systems to digital lending, insurtech, digital banking, blockchain technologies, and cryptocurrencies. These innovations have transformed how individuals and organizations interact with financial services, promoting creativity, cost savings, and enhanced efficiency within the global financial system.

However, the rapid and promising development of Fintech also poses significant regulatory and legal challenges. Operating in a technology-driven, highly flexible environment that easily transcends national borders, Fintech creates substantial pressure on nations and regulatory bodies to establish appropriate policies and regulations. These frameworks must ensure financial system stability without stifling innovation. Developing a balanced legal framework that protects consumers, ensures financial stability, and encourages innovation is a complex task. Each country has distinct economic environments, financial system structures, cultural contexts, and levels of technological development, leading to considerable differences in financial regulations and policies for Fintech companies.

Fintech is not merely a new industry but also a critical driver of change in the global financial system. Therefore, understanding the financial policies and regulations governing Fintech companies is essential to optimizing the opportunities Fintech presents while addressing challenges related to security, consumer rights, and financial system stability.

The objective of this paper is to analyze the policies and regulations applied to

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Fintech companies in various countries, clarifying differences in regulatory approaches and their impact on the development of the Fintech sector. Focus is given to countries with robust Fintech sectors, including the United States, China, the European Union (EU), Singapore, and Indonesia, to provide an overview of regulatory trends.

Vietnam, an emerging leader in financial technology with significant market potential and rapid digital transformation in recent years, is gradually becoming a prominent Fintech hub in Southeast Asia. However, building a stable and transparent legal and policy environment for Fintech is a critical determinant of the sector's future success. Consequently, this paper will analyze international models and propose solutions for Vietnam to adopt lessons from exemplary countries to promote the domestic Fintech sector's development.

By providing in-depth insights into policies and regulations in the Fintech industry, this paper aims to contribute to the establishment of an appropriate legal framework that fosters a conducive environment for Fintech companies to thrive, thereby promoting innovation and sustainable economic growth in Vietnam in the coming years.

2. Fintech and Regulatory Policies for the Fintech Industry

2.1. Concepts and Characteristics of Fintech

Fintech (Financial Technology) refers to the use of technology to enhance or transform traditional financial services. It encompasses a broad spectrum of applications, including mobile payments, peer-to-peer (P2P) lending, online banking, digital insurance (Insurtech), cryptocurrencies, and blockchain technology.

Types of Fintech:

- Digital Banking: Provides entirely online banking services without the need for physical branches.
- Mobile Payments and E-Wallets: Companies like PayPal and Apple Pay enable fast transactions through mobile devices.
- Peer-to-Peer Lending and Investing: Platforms such as LendingClub and Prosper facilitate direct borrowing and lending between individuals, bypassing traditional banks.
- Blockchain and Cryptocurrencies: Technologies like blockchain and cryptocurrencies (e.g., Bitcoin, Ethereum) are revolutionizing the storage and transfer of assets.

2.2. Regulatory Policies for Fintech Companies

Definition:

Regulatory policies for Fintech companies encompass rules, laws, and guidelines issued by authorities to govern, monitor, and regulate the activities of Fintech enterprises. These regulations aim to protect consumer rights, maintain financial system stability, and foster the sustainable growth of the Fintech industry.

Key Areas of Regulatory Policies:

(i) Financial and Banking Regulations

Fintech companies, especially those offering payment, remittance, online lending, or digital banking services, must comply with banking-related regulations. These may include:

- Licenses for banking or related operations.
- Minimum capital, capital adequacy, and reserve requirements.
- Risk control and financial safety regulations.

(ii) Data Protection and Privacy

Given their handling of sensitive financial information, Fintech companies must adhere to data protection and privacy regulations, including:

- Compliance with personal data protection laws (e.g., GDPR in Europe).
- Requirements for user information security.
- Rules on data processing, breach notifications, and secure data storage or sharing.

(iii) Anti-Money Laundering and Counter-Terrorism Financing (AML/CFT)

Fintech firms are obligated to follow AML and CFT regulations, which include:

- Customer identity verification (KYC - Know Your Customer).
- Reporting suspicious transactions.
- Transaction monitoring and auditing requirements.

(iv) Risk Management and Consumer Protection

Fintech companies must comply with regulations to protect consumer rights and manage risks, including:

- Transparency and disclosure of service information.
- Contractual and service usage requirements.
- Guidelines for complaint handling and consumer protection.

(v) Securities and Investments

Fintech companies offering investment or securities services, such as online trading platforms or crowdfunding, must adhere to securities-related regulations, including:

- Licensing for securities transactions.
- Disclosure and investor protection requirements.
- Rules on capital raising and securities issuance.

(vi) Payments and Remittances

Fintech firms providing payment and remittance services must comply with monetary, payment service, and international transaction regulations, such as:

- Licensing for payment services.
- Safe payment processing and transaction handling requirements.
- Foreign exchange and international remittance management.

(vii) Decentralized Finance (DeFi) and Emerging Technologies

Fintech companies operating in DeFi or employing blockchain technology face unique regulatory challenges, including:

- Rules for smart contracts.
- Cryptocurrency and token regulations.
- Oversight of blockchain transactions and ensuring transparency.

(viii) Taxation

Fintech firms must comply with tax regulations, including income reporting, value-added tax (VAT), corporate income tax, and other applicable taxes based on their business models.

Purpose and Considerations of Regulatory Policies

The primary objectives of regulatory policies are to protect consumers, ensure the stability of financial systems, and prevent fraud or financial crimes. However, designing appropriate regulations for Fintech requires balancing protection and innovation.

Key Considerations in Policy Development:

- Cybersecurity and Data Protection: Fintech companies handle vast amounts of sensitive data, necessitating stringent data protection and security measures.
- Innovation and Creativity: Regulations must ensure they do not hinder innovation

and creativity in the Fintech industry.

- Fairness and Competition: Policies should maintain a healthy competitive environment between Fintech companies and traditional financial institutions.

3. Factors Affecting Regulations for Fintech

The formulation of financial policies and regulations for Fintech companies is influenced not only by internal factors within the financial sector but also by broader economic, social, and technological elements. Regulatory bodies must carefully consider various factors when designing and implementing these policies to ensure the sustainable growth of the Fintech industry while protecting consumer rights and maintaining the stability of the national financial system. The primary factors influencing financial policies and regulations for Fintech can be analyzed through the following aspects:

3.1. Technological Flexibility and the Pace of Innovation in Fintech

A defining feature of the Fintech industry is the flexibility and rapid evolution of its technology. Fintech companies, especially startups, can develop and deploy new products swiftly, leveraging cutting-edge technologies such as Artificial Intelligence (AI), blockchain, and big data. This rapid pace of change presents challenges for regulators attempting to keep up.

- **Challenges in Developing Regulations:**

The fast-changing nature of technology poses difficulties for regulators in creating rules that comprehensively address emerging trends without stifling innovation. Inflexible regulations may hinder creativity within the Fintech sector. Thus, the ability to craft adaptable policies that can evolve alongside technological advancements is a critical consideration.

- **Sandbox Models:**

To address these challenges, some countries have implemented regulatory "sandboxes," controlled environments where Fintech companies can test new products under flexible legal frameworks. This approach allows regulators to assess new Fintech innovations without immediately enacting formal regulations.

3.2. Macroeconomic Factors and National Financial Policies

Macroeconomic factors, such as the level of economic development, growth rates, inflation, and financial stability, directly influence the establishment of financial policies and regulations for Fintech. A stable economy fosters a favorable environment for Fintech development, whereas economic instability may prompt regulators to adopt more cautious approaches.

- **Financial Stability:**

One of the key objectives of financial policies for Fintech is ensuring the stability of the national financial system. Regulatory bodies must implement measures to mitigate risks posed by Fintech products and services, such as systemic risks from P2P lending platforms or cryptocurrencies.

- **Encouraging Investment and Innovation:**

Financial policies should create an environment that encourages innovation and creativity in Fintech while safeguarding economic stability. This includes offering incentives for innovative Fintech companies while ensuring compliance with consumer protection and anti-fraud regulations.

3.3. Legal and Political Environments of Individual Countries

The legal and political environments of individual countries significantly impact

financial policies and regulations for Fintech. Each nation's legal and political systems influence the level of support or constraints imposed on Fintech companies.

- **Legal Systems and Regulatory Frameworks:**

Countries with clear, transparent, and consistent legal systems are better equipped to design effective and equitable financial regulations for Fintech companies. Conversely, nations with inconsistent or unclear legal frameworks face challenges in creating reliable regulations for the Fintech sector.

- **Technology and Startup Support Policies:**

Some nations implement policies to support technology development and startups, including tax incentives, financial support, or collaboration opportunities with government agencies. Such policies foster a favorable regulatory environment for Fintech growth.

3.4. Social Factors and Consumer Behavior

Social factors and consumer behavior significantly influence the formulation of financial regulations and policies for Fintech. These policies must protect consumer rights while promoting innovation and access to financial technology.

- **Consumer Protection:**

Fintech companies often handle vast amounts of personal consumer data. Ensuring the security of personal information and safeguarding consumer rights is a key policy consideration. Regulations must prevent misuse of user data and provide robust measures against fraud and cyberattacks.

- **Consumer Adoption of Technology:**

In some countries, consumers may be slow to adopt new financial technologies, particularly those unfamiliar with online financial services. This can affect the success and prevalence of Fintech services, influencing regulatory strategies aimed at fostering consumer acceptance.

3.5. International Factors and Cross-Border Cooperation

Given the global growth of Fintech, financial regulations for Fintech are shaped not only by domestic considerations but also by international factors. Countries increasingly collaborate to establish cross-border financial regulations for managing global financial services.

- **International Cooperation:**

Regulatory authorities across nations can collaborate to develop harmonized financial regulations, fostering a fair competitive environment for cross-border Fintech companies. This is crucial as Fintech operates globally, allowing firms to expand beyond national boundaries with ease.

- **International Agreements:**

Nations need to participate in international agreements and organizations such as the G20 or the United Nations to establish common regulations and global standards for Fintech. These measures ensure transparency and security for both consumers and financial institutions.

4. Analysis of Financial Regulations in Leading Countries

To foster and sustain a robust Fintech industry, countries must establish a comprehensive system of financial policies and regulations that ensures national financial stability and protects consumer interests. Given the diversity in economic environments, financial system structures, and technological advancement levels, financial policies and

regulations for Fintech vary across nations. Analyzing exemplary countries can provide Vietnam with valuable lessons for formulating policies and regulations for its Fintech sector.

4.1. United States: Decentralized Legal Framework and Multi-Tiered Oversight

The United States is a pioneer in Fintech development, supported by a flexible legal framework and significant venture capital backing. However, its financial regulatory system for Fintech is highly fragmented, involving multiple oversight agencies and varying federal and state-level regulations. Key institutions overseeing Fintech include the U.S. Securities and Exchange Commission (SEC), the Federal Reserve (Fed), and state financial regulators.

Cryptocurrency and Blockchain Policies:

The U.S. has one of the most stringent regulatory systems for cryptocurrency-related activities. Both the Fed and SEC provide clear guidelines for managing cryptocurrencies and blockchain products. The SEC classifies cryptocurrencies as "securities" in certain cases, requiring compliance with securities regulations to ensure investor protection and prevent fraud.

Peer-to-Peer (P2P) Lending Policies:

Fintech companies in the P2P lending space must adhere to federal regulations, including the Securities Act and the Investment Company Act. These companies are required to register with the SEC and may need to register bonds or securities they issue.

Flexible Oversight Mechanisms:

Despite fragmented oversight, the U.S. employs supportive measures such as regulatory sandboxes and initiatives like "RegTech" (regulatory technology) to ease compliance burdens for small Fintech firms. This approach allows Fintech companies to innovate and grow without facing excessive regulatory obstacles.

4.2. Singapore: Regulatory Sandbox and Fintech-Friendly Policies

Singapore is recognized as a model for creating a regulatory environment conducive to Fintech growth. The government has implemented clear policies and regulations while fostering an innovative and flexible legal environment that encourages advancements in financial technology. The Monetary Authority of Singapore (MAS) plays a pivotal role in developing and overseeing Fintech activities in the country.

Regulatory Sandbox Model:

One of Singapore's standout initiatives is its regulatory sandbox, which allows Fintech companies to test new financial products and services in a safe and closely monitored environment. Firms can experiment without the risk of violating existing regulations, provided their products do not pose significant risks to consumers or the financial system. This policy minimizes legal risks during the trial phase and fosters innovation.

Innovation-Incentive Policies:

Singapore promotes innovation in Fintech through financial support packages, opportunities to collaborate with traditional financial institutions, and international partnership initiatives. These policies facilitate product development and market expansion for Fintech firms.

Consumer Protection and Data Security Regulations:

Singapore enforces strict consumer protection rules, including rigorous requirements for data security and personal information handling. Fintech companies must comply with

regulations to ensure the safety of consumer financial data.

4.3. European Union: Comprehensive and Harmonized Financial Management

The European Union (EU) has established a relatively harmonized and comprehensive financial regulatory system, aiming to create an integrated financial market for Fintech companies and other financial services. EU policies prioritize consumer protection, market transparency, and the promotion of technological innovation in finance.

Payment Services Directive 2 (PSD2):

A landmark regulation in EU Fintech, PSD2 fosters competition and innovation in the payment sector. It requires banks to allow third-party providers, including Fintech firms, access to consumer account data (with user consent) to offer payment and financial management services. This regulation enhances competition and service quality in Fintech.

Consumer Protection Policies:

The EU enforces strict consumer protection regulations, including rights in online financial transactions, ensuring that Fintech services remain transparent and fair. The General Data Protection Regulation (GDPR) imposes stringent data privacy requirements, compelling Fintech companies to implement robust data security measures.

4.4. China: Tightened Regulations and Rigorous Oversight

China boasts a highly developed Fintech market, particularly in mobile payments and online lending. However, the government imposes stringent regulations and tight oversight on Fintech firms, especially when systemic risks to the economy are evident.

Cryptocurrency and Online Financial Services Regulations:

The Chinese government has enacted strict rules on cryptocurrency activities, halting cryptocurrency trading and Initial Coin Offering (ICO) platforms since 2017. Fintech firms must adhere to rigorous financial audits, particularly in the P2P lending sector, to mitigate financial risks and protect investors.

Systemic Risk Control:

China prioritizes managing risks associated with rapid Fintech development, which could disrupt the national financial system. The government mandates that Fintech firms maintain sufficient capital reserves and implement stringent risk prevention measures.

4.5. Indonesia: Promoting Fintech Development through Support and Investment Incentives

Indonesia, one of Southeast Asia's largest economies, is rapidly advancing in Fintech, particularly in payment systems and online lending. The government and national financial regulators have introduced policies to encourage Fintech growth while addressing regulatory challenges.

P2P Lending Framework:

Indonesia has established a dedicated legal framework for P2P lending, requiring companies to register with financial regulatory authorities and implement risk mitigation measures to protect investors and borrowers.

By studying these diverse approaches, Vietnam can derive valuable insights to develop a balanced regulatory environment that fosters Fintech innovation while safeguarding economic stability and consumer rights.

5. Lessons Learned for Vietnam

5.1. Establishing a Flexible and Innovative Regulatory Environment (lesson from

Singapore and the US)

One critical lesson for Vietnam is the development of a regulatory environment that is both flexible and innovative, enabling the growth of Fintech innovation without hindering the emergence of new companies. Singapore serves as a notable example with its legal "sandbox" model, allowing Fintech firms to test new products and services in a controlled regulatory environment. This approach minimizes risks and provides opportunities for innovation to thrive without being immediately subjected to strict regulations.

Vietnam can adopt this model by implementing a legal sandbox to create experimental opportunities for Fintech companies, exempting them from immediately adhering to comprehensive regulations. This would foster innovation while enabling regulators to evaluate new products and adjust policies in a timely manner. The establishment of a legal sandbox would also instill confidence among investors in Vietnam's stable and adaptive regulatory environment.

5.2. Developing a Harmonized and Transparent Legal Framework (Lessons from the EU)

The European Union (EU) has established a harmonized, transparent, and robust financial regulatory framework that promotes the growth of Fintech while safeguarding consumer rights. The Second Payment Services Directive (PSD2) exemplifies this by encouraging innovation in payments, fostering fair competition, and ensuring consumer protection.

Vietnam can learn from this approach by building a more synchronized financial regulatory system, particularly in payment services and digital financial solutions. Transparency and fairness in regulations are crucial, helping Fintech firms understand legal requirements and achieve compliance more easily. Vietnam should develop detailed policies governing data usage, personal information security, and consumer rights protection while ensuring that such regulations do not hinder innovation.

5.3. Promoting Investment and Supporting Startups (Lessons from the US and Singapore)

Both the US and Singapore have implemented policies that encourage investment and support startup Fintech companies, accelerating the development of the financial technology sector. The US boasts a strong venture capital ecosystem, while Singapore offers financial incentives to support startups.

Vietnam can replicate these efforts by developing financial support policies for Fintech startups, including the establishment of investment funds, tax reductions, or collaborative programs between Fintech firms and traditional financial institutions. Building a robust startup ecosystem will not only attract domestic Fintech companies but also create an appealing environment for international investors. This will, in turn, drive innovation and the creation of financial products tailored to the needs of Vietnamese consumers.

5.4. Ensuring Data Security and Consumer Protection (Lessons from the EU and Singapore)

Data security and consumer protection are among the most critical aspects of financial regulations for Fintech. The EU's General Data Protection Regulation (GDPR) and Singapore's personal data protection regulations set strong examples of safeguarding consumers' financial information.

Vietnam can adopt stringent data protection regulations similar to those of the EU and Singapore, requiring Fintech companies to implement robust measures for safeguarding personal and financial data. Such measures not only protect consumer rights but also build trust in Fintech services, fostering the industry's development. Regulations must be strictly enforced, requiring Fintech firms to comply with international data protection and cybersecurity standards.

5.5. Managing Systemic Risks (Lessons from China)

China, with its stringent regulations on the Fintech sector particularly in peer-to-peer (P2P) lending has focused heavily on controlling systemic risks. Chinese authorities mandate clear risk prevention measures and require Fintech firms to maintain sufficient capital to protect consumers and prevent large-scale financial risks.

Vietnam should develop a regulatory framework to manage potential risks in Fintech, particularly in areas such as P2P lending, electronic payments, and online investment products. Fintech firms must comply with minimum capital requirements and implement financial risk prevention measures. Additionally, periodic monitoring and evaluation mechanisms should be established to ensure that Fintech companies maintain high levels of financial safety and do not pose significant risks to consumers or the national financial system.

5.6. Promoting International Collaboration (Lessons from Singapore and the EU)

Both Singapore and the EU emphasize international collaboration in establishing common regulations and creating a cross-border financial environment for Fintech companies. These regions have initiated cooperative efforts to establish common standards in Fintech, fostering industry growth and enabling Fintech firms to expand into international markets.

Vietnam can adopt similar initiatives to enhance international collaboration in the Fintech sector, particularly in setting shared standards and regulations for data security, electronic payments, and cryptocurrencies. International agreements will help Vietnamese Fintech firms access global markets more easily while ensuring that foreign Fintech companies operating in Vietnam comply with domestic regulations.

Conclusion

Drawing on lessons from exemplary countries such as the US, Singapore, the EU, China, and Indonesia, Vietnam can develop an effective financial policy and regulatory system that promotes Fintech growth. These policies must ensure the sector's sustainable development, protect consumer rights, and maintain national financial stability. In the context of rapidly advancing financial technology, building flexible and innovative policies will enable Vietnam to fully capitalize on the potential of the Fintech industry in the future.

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PROPOSE RESEARCH MODEL TO EVALUATE THE TOURISTS' SATISFACTION ON VIETNAMESE DESTINATIONS

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Abstract: The research focuses on analyzing the factors influencing tourist satisfaction with travel destinations, emphasizing the role of tourism in promoting economic and cultural development and enhancing the national image. Using theoretical frameworks such as the "Expectancy-Disconfirmation" model, the American Customer Satisfaction Index (ACSI), and the European Customer Satisfaction Index (ECSI), the article evaluates satisfaction through the interplay of expectations, perceived experiences, and perceived value. Additionally, the HOLSAT model is employed to provide a detailed assessment of tourists' perceptions, capturing both positive and negative facets of their experiences. A theoritical evaluation model tailored to Vietnam's tourism destinations is introduced, incorporating key elements like destination image, service quality, perceived value, and overall satisfaction. This model not only acts as a robust research tool but also offers practical applications for improving service quality and enhancing visitor satisfaction. By addressing these critical factors, it seeks to boost tourist loyalty and encourage repeat visits. The proposed model is particularly relevant for Vietnam, enabling stakeholders to refine their strategies in destination marketing, service delivery, and infrastructure development. It lays the groundwork for sustainable tourism growth while helping Vietnam strengthen its competitive edge in the global tourism market.

Keywords: satisfaction evaluation, tourists' satisfaction, Vietnamese destination

JEL code: L83, Z32, M31, R11

1. Introduction

Tourism is one of the most prominent economic sectors globally, making significant contributions to the GDP of numerous countries and creating hundreds of millions of jobs each year. According to the World Tourism Organization (UNWTO, 2021), tourism not only generates considerable revenue but also serves as a powerful driver for trade, investment, and infrastructure development. Furthermore, tourism acts as a cultural bridge, fostering understanding among nations and communities. In the era of globalization, tourism plays a dual role in stimulating economic growth and strengthening national branding, contributing to a more interconnected and diverse global community.

In Vietnam, tourism has been recognized as a strategic economic pillar, significantly contributing to the nation's GDP and providing employment opportunities for millions of workers. Beyond its economic contributions, tourism plays a pivotal role in the development of related service industries such as accommodation, transportation, and gastronomy. It has been a key driver in promoting Vietnam's unique cultural heritage, rich history, and breathtaking natural landscapes to international audiences (UNWTO, 2021).

Moreover, tourism has proven to be an effective catalyst for regional development.

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It stimulates economic growth in remote and underdeveloped areas, unlocking local potential, creating jobs, improving living standards, and helping to preserve traditional cultural values. By focusing on these regions, Vietnam can leverage tourism as a tool to promote equitable development and reduce regional disparities.

As global competition in the tourism industry intensifies, ensuring tourist satisfaction has become a vital factor in securing the sector's sustainable development. Meeting and exceeding the expectations of tourists is essential to maintaining a competitive edge. Efforts to improve service quality, invest in infrastructure, and develop unique and attractive tourism products are crucial for enhancing Vietnam's position on the global tourism map. These initiatives not only help attract new visitors but also ensure repeat visits, fostering a cycle of sustainable growth.

Tourist satisfaction lies at the heart of tourism activities, influencing both short-term and long-term success in the industry. According to research by Chi and Qu (2008), satisfied tourists are more likely to return to a destination and to promote it positively through word-of-mouth. In the age of digital connectivity and social media, such positive reviews can have a significant ripple effect, amplifying the destination's appeal and enhancing its reputation. This makes satisfaction a critical component of destination marketing strategies.

On a national scale, the satisfaction of international tourists enhances a country's image and status on the global tourism map. Tourists who are satisfied with their experiences tend to spend more, extend their stays, and recommend the destination to others, thereby contributing to increased revenue and economic growth (UNWTO, 2021). Domestically, ensuring the satisfaction of local tourists is equally important for promoting regional tourism, particularly in economically disadvantaged areas. This not only supports local economies but also helps preserve and celebrate cultural and natural heritage.

Tourist satisfaction also creates a direct impact on the behaviors of consumers. Satisfied tourists are more likely to make repeat visits, demonstrate loyalty, and share their positive experiences, creating a virtuous cycle of promotion and growth. According to Zeithaml and Bitner (2000), satisfaction is a multifaceted concept, reflecting the psychological state of individuals when their expectations are met or exceeded. This underscores the importance of understanding and managing tourist expectations as a central aspect of tourism management.

Tourist satisfaction is often defined as a positive response to experiences at a destination, measured against pre-trip expectations and post-trip perceptions (Oliver, 1980). This comparison determines whether the experience met, exceeded, or fell short of expectations. Satisfaction is thus deeply influenced by both psychological and behavioral factors. Psychologically, it reflects the extent to which expectations are fulfilled, while behaviorally, it manifests in actions such as repeat visits, word-of-mouth promotion, and post-trip evaluations (Cronin & Taylor, 1992).

The Expectancy-Disconfirmation model categorizes satisfaction into three levels: over-satisfaction when experiences surpass expectations, neutral satisfaction when experiences meet expectations, and dissatisfaction when experiences fail to meet expectations (Oliver, 1980). This model highlights the need for tourism providers to manage both the quality of their offerings and the expectations set for tourists. Failing to align these aspects can result in dissatisfaction, which could harm the destination's reputation and future growth prospects.

To address these challenges, this study proposes a comprehensive evaluation model tailored to Vietnam's tourism context. The model draws from established frameworks, including the American Customer Satisfaction Index (ACSI) (Fornell, 1992), the Expectancy-Disconfirmation model (Cronin & Taylor, 1992), and the HOLSAT model (Tribe & Snaith, 1998). These frameworks emphasize the interrelationship between expectations, perceived value, service quality, and satisfaction.

The proposed model incorporates several key components that influence tourist satisfaction, including destination image, quality of services provided, cultural richness, accessibility, and environmental factors. By addressing these components, the model aims to provide a holistic view of the factors that drive satisfaction. This approach enables tourism stakeholders to identify gaps in service delivery and prioritize improvements that have the greatest impact on visitor experiences. This foundation allows for further quantitative studies to comprehensively evaluate the factors affecting tourist satisfaction with destinations in Vietnam.

2. Related definitions

2.1. Tourism and tourism destination

Tourism is a dynamic activity that involves travel to a specific location, designed to fulfill individual needs and purposes such as leisure, cultural exploration, or business. A tourism destination, while understood differently by various researchers and organizations, is commonly defined as a place that combines resources, services, and attractions to satisfy the diverse needs of visitors.

The World Tourism Organization (UNWTO, 2005) defines a tourism destination as a geographic area where visitors can stay for at least one night, with products and services managed within clear administrative boundaries. Beyond its physical space, a destination must also possess a unique identity to distinguish itself in a competitive market. UNWTO (2019) further expands this definition, describing a destination as a cluster of products, services, and experiences, often interconnected with other destinations. This definition highlights the intangible aspects of a destination, such as its image, identity, and the emotions it evokes among visitors.

Scholars such as Pearce (1992) and Hu & Ritchie (1993) describe a tourism destination as an integrated "package" of products and services that include both natural and artificial elements. These could range from scenic landscapes and favorable climates to infrastructure such as accommodations and transport systems. Van Raaij (1986) categorizes destinations into two components: the "available" part, including natural elements like weather and geography, and the "man-made" part, encompassing hotels, attractions, and other infrastructure. This dual composition underscores the complexity of destinations as products that must balance natural assets with human-made enhancements.

Tourism destinations are not just physical locations; they are also brands with identities and reputations that heavily influence their appeal. Beerli and Martin (2004) argue that a destination's image and reputation play crucial roles in attracting tourists. A strong, positive destination image can differentiate a location from its competitors, providing it with a competitive edge. This branding aspect of destinations has gained importance as tourism markets have become increasingly global and competitive.

In Vietnam, tourism destinations are categorized by scale, as outlined in the Tourism Law (2017). These include continental destinations (e.g., Southeast Asia), national

destinations (e.g., Vietnam as a whole), and local destinations such as provinces, districts, or even specific towns and villages. Each scale of destination has unique attributes and challenges. For example, continental destinations rely on cross-border cooperation, while local destinations focus on leveraging niche attractions and community-based tourism

Research has identified several essential components that define a tourism destination. Kozak (2002) and Yoon & Uysal (2005) consider destinations as branded products shaped by factors such as weather, culture, infrastructure, and landscapes. Building on this, Mike and Caster (2007) outline six key components:

(1) Attractions: These are the core elements that motivate tourists to visit a destination. Attractions can be natural, such as beaches and mountains, or cultural, such as historical sites and festivals. Unique and distinctive attractions play a significant role in establishing a destination's identity.

(2) Amenities: Amenities include facilities and services such as hotels, restaurants, and retail outlets that enhance the visitor experience.

(3) Accessibility: This involves the ease with which tourists can reach and navigate a destination, including transportation options and connectivity.

(4) Human Resources: The quality and hospitality of the workforce in the tourism sector are critical to delivering satisfying experiences.

(5) Image: A destination's image, shaped by marketing efforts and visitor perceptions, influences its appeal and competitiveness.

(6) Price: The affordability of a destination, relative to the quality of experiences offered, is a significant determinant of its attractiveness.

Among these components, attractions are often the centerpiece of a destination's appeal. However, the supporting elements—such as amenities, accessibility, and human resources—are equally important in creating a seamless and memorable experience for visitors.

The concept of destination image is closely linked to the overall appeal of a tourism destination. Destination image refers to the impressions, perceptions, and expectations that tourists associate with a particular location. Hunt (1971) defines destination image as the psychological state of an individual concerning a place they have not visited or experienced. Markin (1974) further emphasizes that destination image is a highly personalized construct, influenced by individual beliefs, perceptions, and emotions.

Beerli and Martin (2004) provide a detailed analysis of the attributes that shape destination image, categorizing them into nine groups (table 1).

Table 1: Characteristics that define the destination image

National resources	**General infrastructure**	**Tourism infrastructure**
- Weather (Temperature; rainfall, etc.) - Beaches (Water quality; sandy or rocky, etc.) - Scenic Richness (Nature reserves; lakes, mountains, deserts, etc.)	- Transportation Development - Development of Healthcare Services, Telecommunications, and Commercial Facilities	- Hotels and Restaurants (Number of beds, types, etc.) - Bars, Nightclubs, and Clubs - Accessibility
Leisure and entertainment	**Culture, history and arts**	**Political and economics**

- Recreational and Sports Activities	- Museums, Monuments, Festivals, Religions, and Customs	- Political Stability - Economic Development
Natural environment	**Social environment**	**Atmosphere**
- Scenic Beauty; Urban Appeal; Cleanliness; Crowdedness; Pollution; Traffic Congestion...	- Hospitality; Difficult Circumstances; Language Barriers	- Luxury; Fame; Exoticness; Mystery

Nguồn: Beerli & Martín (2004)

These attributes collectively shape tourists' decisions and their overall satisfaction with the destination. Communication channels, including media, advertisements, and social networks, play a critical role in forming and influencing destination image. For instance, a well-executed marketing campaign can enhance the perceived attractiveness of a destination, while user-generated content on social media can significantly affect potential visitors' perceptions.

Managing a tourism destination involves balancing multiple aspects to ensure sustainable growth. While natural attractions form the foundation of many destinations, over-reliance on these resources can lead to challenges such as overcrowding, environmental degradation, and loss of cultural authenticity. This underscores the need for strategic planning and management that incorporates sustainability principles.

Infrastructure development is another critical challenge. Ensuring adequate transportation, accommodations, and services requires significant investment and coordination among stakeholders. Furthermore, destinations must remain adaptable to changing tourist preferences, such as the growing demand for eco-tourism, adventure tourism, and cultural immersion.

Finally, maintaining a positive destination image is an ongoing effort that requires collaboration between public and private sectors. Destinations must actively manage their reputation, addressing negative feedback and continuously improving their offerings to meet evolving expectations.

Tourism destinations are complex entities that blend natural and artificial elements to create memorable experiences for visitors. From their tangible attractions to their intangible image and reputation, destinations must carefully manage a variety of factors to remain competitive.

From a management perspective, a tourism destination is a place that meets the needs of tourists through a combination of natural resources, man-made elements, and marketing strategies. It must be attractive, align with visitor demands, and provide memorable experiences. Simultaneously, destinations are closely tied to sustainable development, requiring effective capacity management to ensure the long-term preservation of resources.

In summary, a tourism destination is a multidimensional concept, integrating tangible elements (such as landscapes and facilities) and intangible aspects (such as branding and reputation). It is not merely a location where tourism activities take place but also a marketed product designed to attract visitors. The development of a destination and its image significantly influence tourists' decisions and its competitive position in the market.

2.2. Tourism satisfaction

Tourist satisfaction with tourism services is a crucial factor in determining the success and sustainability of the tourism industry. It reflects the degree of contentment that customers experience after engaging with tourism products and services. Satisfaction serves as a vital benchmark for evaluating the quality of a destination's offerings and plays a key role in influencing tourists' decisions and behaviors.

Hunt (1977) emphasizes that satisfaction stems from tourists' evaluation of the actual outcomes of their experiences compared to their initial expectations. This evaluation is inherently subjective, as it varies based on individual preferences, prior experiences, and perceived value. Churchill and Surprenant (1982) provide a structured understanding of satisfaction, identifying three primary factors that contribute to its formation:

(1) Customer Expectations: These are preconceived notions tourists have before their visit, influenced by marketing, word-of-mouth, past experiences, and personal desires.

(2) Service Performance: This reflects the actual quality of the services provided by the destination, including hospitality, facilities, and activities.

(3) Disconfirmation: This is the gap between expectations and actual performance. A positive disconfirmation occurs when service exceeds expectations, while a negative disconfirmation happens when expectations are not met.

These factors establish satisfaction as a dynamic state influenced by both the tangible and intangible aspects of the tourism experience.

Oliver (1980) adds depth to the concept by explaining that satisfaction is not merely a rational evaluation but also an emotional response to experiences that meet or exceed tourists' needs. In tourism, this emotional aspect is critical because vacations and travel are often tied to expectations of joy, relaxation, and personal fulfillment.

Pizam, Neumann, and Reichel (1978) further elaborate that satisfaction arises from the comparison between tourists' actual experiences at a destination and their initial expectations. This comparative evaluation can result in three distinct outcomes:

(1) Dissatisfaction: When the actual experience falls short of expectations, leading to disappointment and negative feelings.

(2) Neutral Satisfaction: When the experience meets expectations, resulting in a sense of adequacy but not delight.

(3) Delight: When the experience significantly exceeds expectations, evoking strong positive emotions and loyalty.

Parasuraman et al. (1988) affirm that these outcomes not only determine tourists' immediate feelings about a destination but also influence their future behaviors, including revisits and recommendations.

Service quality is a fundamental driver of tourist satisfaction and a cornerstone of the tourism industry. Gronroos (1984) defines service quality as the comparison between what customers expect and what they actually receive. In this context, high-quality services are those that align closely with or exceed tourists' expectations.

Parasuraman et al. (1985) introduced the service quality gap model, which highlights gaps that may arise between expected and delivered service. These gaps can significantly impact tourist satisfaction. For instance, a disconnect between promised services and actual offerings can lead to dissatisfaction, while services that exceed expectations can result in delight.

Fornell et al. (1996) emphasize the role of perceived value in satisfaction. Perceived

value is the balance tourists perceive between the benefits they receive (such as enjoyable experiences, convenience, or exclusivity) and the costs incurred (monetary expenses, time, and effort). When the perceived value is high, satisfaction levels are likely to increase, fostering positive behaviors such as loyalty and repeat visits.

Destination service quality plays a pivotal role in enhancing tourist satisfaction. Frochot (2004) asserts that the alignment between the services provided and the needs of tourists determines the perceived quality of a destination. For example, clean accommodations, efficient transportation, and well-organized activities contribute to positive perceptions of quality.

High-quality tourism services not only meet but often exceed tourists' expectations. When tourists feel that their needs have been anticipated and fulfilled, they are more likely to become loyal visitors. Tian, Cole, and Crompton (2003) highlight that superior service quality fosters loyalty and increases the likelihood of revisits, further solidifying a destination's reputation and economic viability.

The UNWTO, as cited in Akroush et al. (2016), underscores the importance of safety, hygiene, accessibility, and transparency in service delivery. These factors significantly enhance the overall tourist experience and contribute to higher satisfaction levels. For instance, tourists prioritize destinations where they feel safe, find clean environments, and can access services and attractions with ease.

Tourist satisfaction extends beyond the immediate feeling of contentment and has a profound impact on post-trip behaviors. These behaviors include:

(1) Service Reuse: Satisfied tourists are more likely to revisit the same destination, particularly if they have formed a strong emotional connection or experienced exceptional service.

(2) Word-of-Mouth Promotion: Positive experiences encourage tourists to recommend the destination to others, either directly through personal conversations or indirectly via reviews on digital platforms.

(3) Brand Loyalty: When satisfaction leads to trust and emotional attachment, tourists are more inclined to remain loyal to a destination, choosing it over competitors in the future.

Alves and Raposo (2007) describe satisfaction as a combination of psychological and behavioral factors. Psychologically, it is associated with positive emotions such as happiness, relaxation, and excitement. Behaviorally, it manifests in actions such as repeat visits, referrals, and positive feedback.

In the tourism industry, satisfaction encompasses more than just the experience at a destination. It also includes associated services such as transportation, accommodations, infrastructure, and supplementary offerings. A cohesive and high-quality service chain ensures that every aspect of the tourist journey contributes positively to satisfaction.

For instance, seamless transportation to a destination, comfortable accommodations, and engaging local activities collectively create a memorable experience. Conversely, dissatisfaction with any component of this chain can tarnish the overall perception of the destination.

Overall, tourist satisfaction goes beyond simple contentment and has a direct impact on post-trip behaviors, including service reuse, word-of-mouth promotion of the destination, and brand loyalty. According to Alves and Raposo (2007), satisfaction is a combination of psychological factors (positive emotions when expectations are met) and

behavioral factors (actions taken after the experience). This is particularly true in tourism, where satisfaction encompasses not just experiences at the destination but also all associated services, from transportation and accommodations to infrastructure and supplementary service.

2.3. The relationship between destination image and tourist satisfaction with tourism destinations

The relationship between tourism destinations and tourist satisfaction is a critical area of interest, particularly as the tourism sector grows in complexity and importance. A tourism destination is not merely a geographical location offering resources and services; it is a multifaceted system encompassing natural landscapes, infrastructure, cultural assets, and supplementary services. These elements work in tandem to deliver a holistic experience for tourists, making the alignment of services with tourist needs a key determinant of satisfaction (Frochot, 2004).

Tourist satisfaction is shaped by the disparity between initial expectations and actual experiences at a destination, as outlined by Pizam, Neumann, and Reichel (1978). This process of evaluation highlights the role of expectations as a baseline against which service performance is assessed. Parasuraman et al. (1988) emphasize that when service performance exceeds expectations, satisfaction increases, fostering positive outcomes. Essential elements of destination service quality, such as accommodations, transportation, and guide services, play a significant role in determining tourist satisfaction levels. Cronin and Taylor (1992) further assert that service quality acts as a precursor to satisfaction, which in turn encourages repeat visits, loyalty, and destination advocacy through word-of-mouth recommendations.

However, satisfaction is not solely dependent on service quality. Zeithaml and Bitner (2000) argue that other factors, including pricing, situational dynamics, and individual preferences, also influence tourist satisfaction. In the context of tourism, these additional factors may involve the overall atmosphere of the destination, the hospitality of local residents, and the perceived safety of the environment. These attributes collectively shape a visitor’s perception of the destination and impact their level of satisfaction.

Destination service quality is fundamental to shaping tourists' experiences and fostering satisfaction. High-quality services, which align with and surpass tourists’ expectations, play a pivotal role in ensuring positive perceptions. For example, well-maintained infrastructure, efficient transport networks, and courteous staff contribute to creating memorable experiences that visitors value. On the other hand, shortcomings in any of these areas can detract from the overall experience, leading to dissatisfaction.

Furthermore, satisfaction extends beyond immediate experiences and has long-term implications for tourist behavior. Satisfied tourists are more likely to revisit a destination, recommend it to others, and share positive reviews. These behaviors amplify a destination's appeal and contribute to its competitiveness in the global tourism market. Consequently, tourist satisfaction is not only an indicator of success but also a driver of future growth.

In conclusion, the causal relationship between destination service quality and tourist satisfaction underscores the importance of meeting and exceeding visitor expectations. Service quality serves as a foundational element of satisfaction, but complementary factors such as pricing, safety, and local hospitality also play influential roles. To enhance satisfaction, destination managers must adopt a comprehensive approach, continuously

refining service quality while addressing the diverse needs and expectations of tourists. This proactive management ensures the sustainability and competitiveness of tourism destinations in an evolving global landscape.

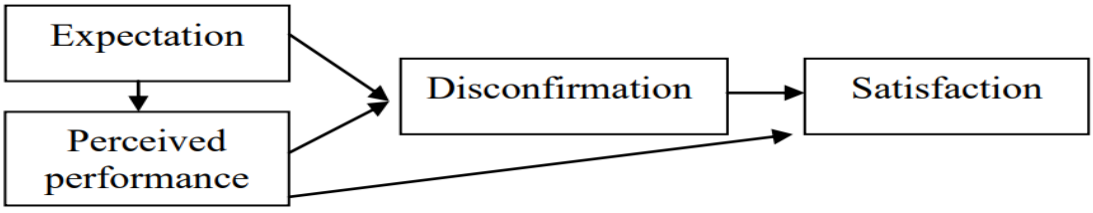
3. Theoritical basic to evaluate tourist satisfaction to destinations

In customer satisfaction research, the "Expectancy-Disconfirmation" model proposed by Oliver (1980) is one of the most foundational frameworks for analyzing and evaluating satisfaction. According to this model, customer satisfaction is determined through two key stages: initial expectations and actual perceptions. Before experiencing a product or service, customers form expectations based on information, advertisements, or past experiences. After engaging with the product or service, they evaluate their actual perceptions. Satisfaction is at its peak when the actual experience surpasses expectations (positive disconfirmation). Conversely, if the experience fails to meet expectations (negative disconfirmation), customers are likely to feel disappointed (Oliver, 1980).

This model underscores the dynamic interplay between customer expectations and real-world experiences. Expectations, shaped by external influences such as marketing or personal knowledge, serve as a benchmark for evaluating satisfaction. Post-experience evaluation becomes a critical moment where customers compare their perceptions to these initial benchmarks.

Positive disconfirmation, where the experience exceeds expectations, fosters high satisfaction and loyalty. On the other hand, negative disconfirmation can damage satisfaction and trust. In industries like tourism, where subjective experiences heavily influence customer satisfaction, the model provides essential insights. For managers, this means not only aligning services with customer expectations but also seeking to exceed them through exceptional service, accurate marketing, and consistent delivery, ensuring positive experiences that enhance loyalty and reputation.

Figure 1: Expectancy-Disconfirmation model



Source: Oliver (1980)

The American Customer Satisfaction Index (ACSI) model, developed by Fornell (1992), is a widely recognized tool for measuring customer satisfaction and has been applied extensively across industries globally. This model provides a comprehensive framework that evaluates the interconnected factors influencing customer satisfaction, including customer expectations, perceived quality, perceived value, and their causal relationships.

The ACSI model emphasizes the critical role of perceived quality and perceived value in shaping customer satisfaction. Perceived quality refers to the customer's assessment of the overall standard of the product or service provided, while perceived value reflects the trade-off between the benefits received and the cost incurred by the customer. These two factors directly influence customer satisfaction, which in turn impacts outcomes such as customer loyalty and complaint behavior.

Expectations serve as the benchmark against which customers evaluate their

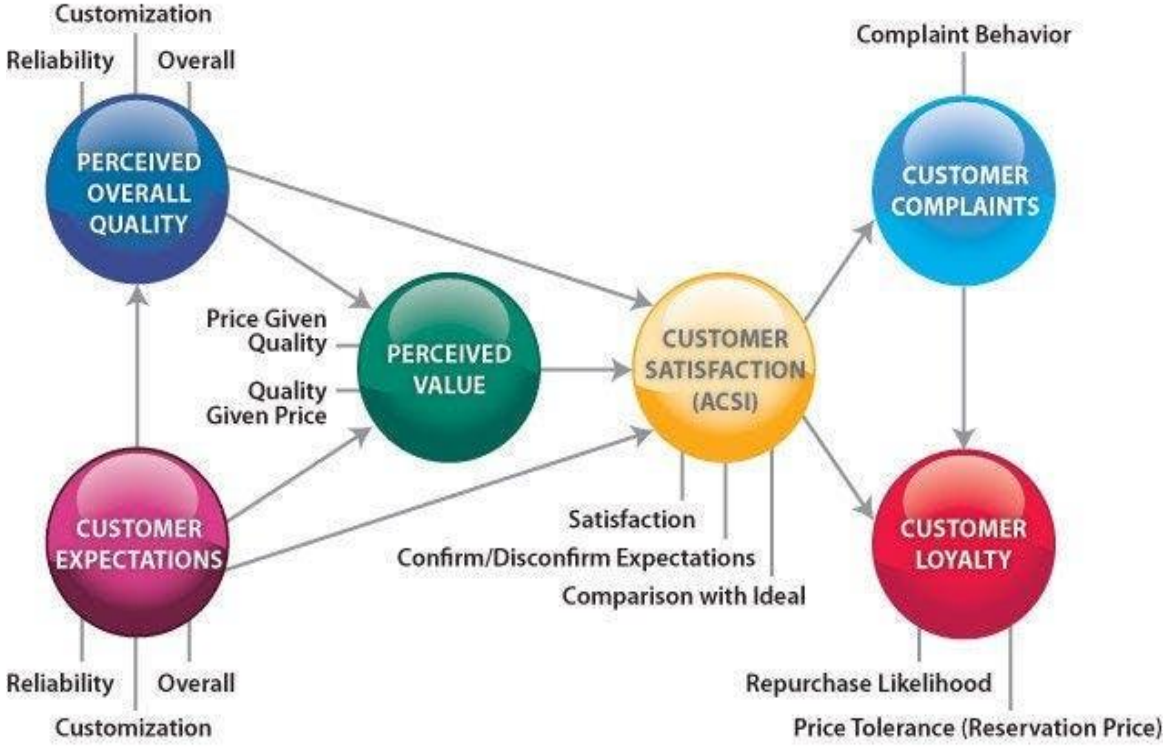
experiences. When the quality of a product or service and its perceived value exceed customer expectations, a high level of satisfaction is achieved, often resulting in increased customer loyalty. Loyal customers are more likely to make repeat purchases, recommend the product or service to others, and remain less sensitive to competitive offerings, thereby contributing to long-term business success.

Conversely, when a product or service fails to meet customer expectations, dissatisfaction arises. This dissatisfaction may prompt complaints, negative reviews, or a shift in customer preferences toward competitors. Complaints not only affect the immediate customer experience but also pose risks to the brand's image and reputation. Thus, managing customer expectations and consistently delivering high-quality and valuable offerings are essential for minimizing dissatisfaction and fostering customer loyalty.

A key strength of the ACSI model lies in its ability to identify and quantify the drivers of satisfaction and their outcomes, offering actionable insights for businesses. By analyzing the relationships between expectations, perceived quality, perceived value, and satisfaction, organizations can pinpoint areas for improvement, enhance their offerings, and align their strategies with customer needs.

In summary, the ACSI model highlights the importance of exceeding customer expectations to build satisfaction and loyalty while minimizing dissatisfaction and complaints. Its structured approach provides organizations with a valuable tool for understanding and improving customer experiences, ultimately contributing to sustained growth and competitive advantage.

Figure 2: ACSI model



Source: Fornell (1992)

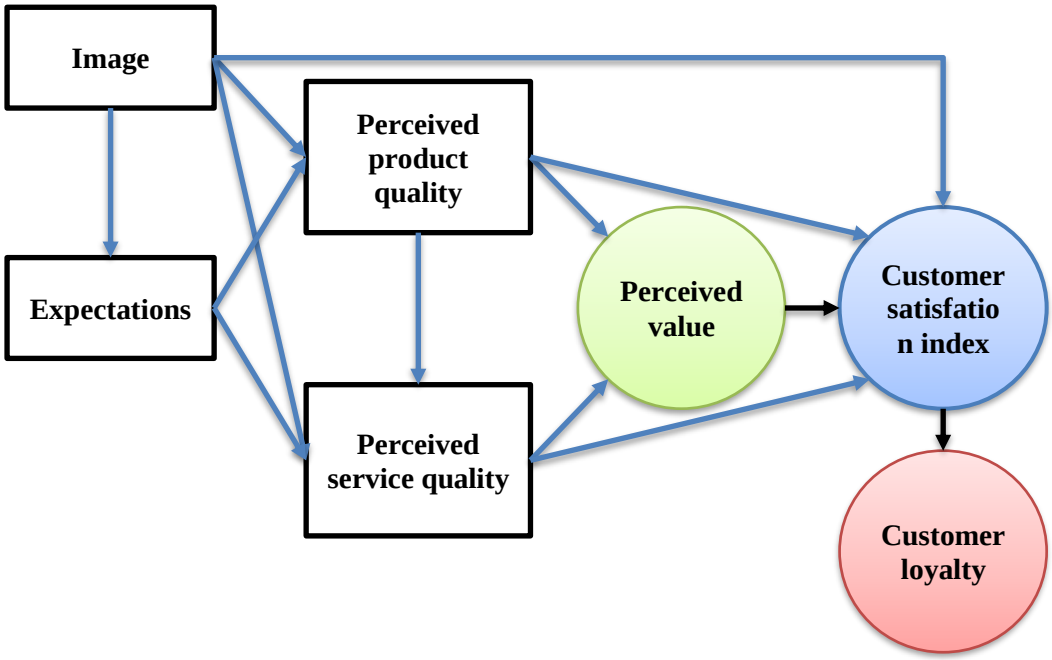
A similar model developed in Europe is the European Customer Satisfaction Index (ECSI). Compared to the ACSI, the ECSI places greater emphasis on the crucial role of brand image in shaping customer expectations and satisfaction. This model is particularly well-suited to service industries, where brand image often plays a significant role in attracting and retaining customers (Dotchin & Oakland, 1994).

ECSI not only measures customer satisfaction but also clearly explains the relationship between satisfaction and loyalty. The model acknowledges that brand image acts as a powerful influencer, not only setting the stage for customer expectations but also shaping their perceptions of the overall experience. In service sectors, where tangible attributes may be less prominent, the intangible aspects of a brand's image can significantly impact customer decision-making processes and long-term loyalty.

By incorporating brand image as a core component, ECSI provides a nuanced understanding of how customers perceive value and quality within the context of their expectations. This focus allows organizations to better manage the intangible factors that drive customer behavior, ensuring that their brand resonates positively with the target audience. Through its comprehensive framework, ECSI facilitates an understanding of not only what satisfies customers but also the conditions under which satisfaction translates into loyalty.

And ECSI complements the ACSI by integrating the influence of brand image, particularly in service-oriented industries, and offers valuable insights into the dynamic interplay between satisfaction, loyalty, and customer retention.

Figure 3: ECSI model



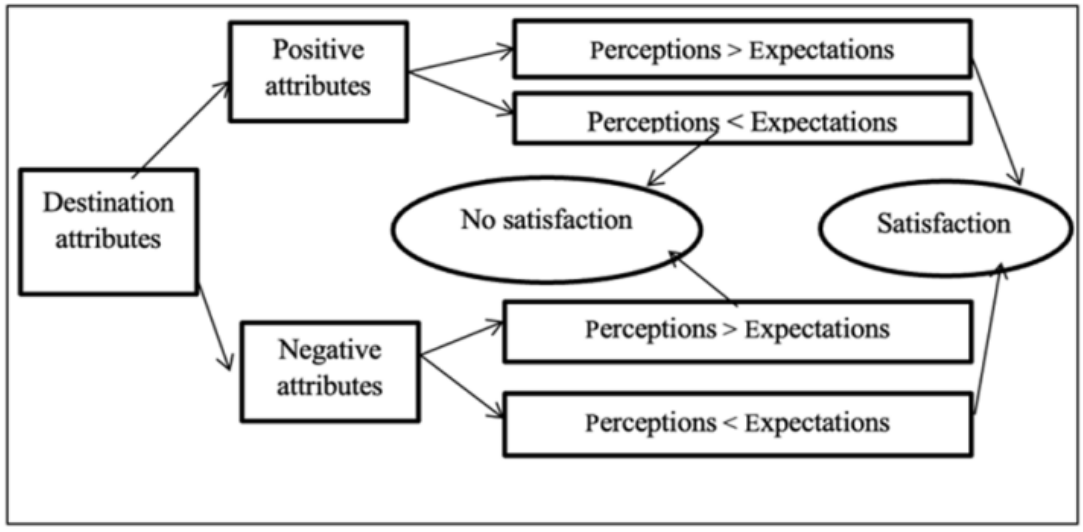
Source: Dotchin & Oakland (1994)

In the tourism industry, Grönroos's technical/functional quality model (1984) is widely used to evaluate service quality. This model focuses on three key elements:

technical quality (related to the actual product or service), functional quality (related to how the service is delivered), and the organization's image. According to Grönroos (1984), a positive image of an organization or destination can compensate for minor shortcomings in service delivery, thereby enhancing customer satisfaction. This model offers a holistic approach, not only measuring service quality but also emphasizing the role of brand image in influencing customer perceptions and satisfaction.

Another notable contribution to the tourism sector is the HOLSAT model by Tribe and Snaith (1998), specifically designed to assess satisfaction with destination experiences rather than individual services. What sets HOLSAT apart is its ability to incorporate both positive and negative attributes, enabling a more comprehensive evaluation of travelers' experiences. The model uses a Likert scale to measure the gap between initial expectations and actual perceptions after the trip. The results are presented in matrices, which help identify the levels of satisfaction or dissatisfaction with specific attributes of the destination.

Figure 4: HOLSAT model



Source: Tribe & Snaith (1998)

These models together provide robust frameworks for understanding and improving customer satisfaction in tourism. Grönroos's model emphasizes the interplay between technical quality, functional quality, and image, highlighting the compensatory role of a strong brand image. Meanwhile, the HOLSAT model delves deeper into destination-specific experiences, offering a granular perspective on traveler satisfaction by focusing on expectation gaps and attribute-level evaluations.

Both models underscore the importance of aligning service delivery with customer expectations and leveraging organizational or destination image to create positive perceptions. They are valuable tools for tourism managers aiming to enhance customer experiences, address service gaps, and build loyalty in a competitive marketplace.

Additionally, the antecedent and mediator model by Dabholkar et al. (2000) expanded the study of service quality and customer satisfaction by examining both antecedent and mediating factors. This model does not merely focus on satisfaction as an outcome but also explores the causal relationships between service quality, satisfaction, and customers' post-purchase behavior. Dabholkar et al. emphasize that service quality is

a key determinant of satisfaction, which in turn influences customer loyalty and their intention to return.

The model highlights that the relationship between service quality and satisfaction is not linear but interconnected, with satisfaction acting as a mediator between service quality and customer behaviors such as repeat visits, word-of-mouth recommendations, and overall loyalty. By examining these dynamics, the model provides a deeper understanding of the factors that drive customer decisions in service-based industries.

Overall, the models discussed share common themes that emphasize the multidimensional nature of customer satisfaction, particularly in the tourism sector. Satisfaction is not solely dependent on service quality but is also influenced by factors such as expectations, perceived value, and brand image. For example, while Grönroos's model underscores the role of technical and functional quality alongside organizational image, the HOLSAT model provides a detailed assessment of customer satisfaction based on destination-specific attributes. Meanwhile, the ACSI and ECSI models incorporate broader considerations like expectations and perceived value, as well as the pivotal role of brand image.

These frameworks collectively demonstrate that achieving and sustaining high levels of customer satisfaction requires a holistic approach. Service providers must not only deliver superior quality but also manage customer expectations, create perceived value, and build a strong brand image. By understanding the interplay of these factors, businesses, especially in the tourism industry, can design strategies to enhance customer experiences, foster loyalty, and drive long-term success..

4. Proposed Model for Assessing Tourist Satisfaction with Destinations in Vietnam

The theoretical foundations analyzed reveal that customer satisfaction research models, such as the American Customer Satisfaction Index (ACSI), the European Customer Satisfaction Index (ECSI), and HOLSAT, are all rooted in the Customer Satisfaction Index (CSI) model developed by Fornell (1992). The CSI model, which builds upon Oliver's (1980) "Expectation-Disconfirmation" theory, has become a crucial framework for measuring and analyzing satisfaction through the relationship between expectations, actual perceptions, and satisfaction. Oliver's model emphasizes that satisfaction is achieved when actual perceptions exceed expectations, while dissatisfaction occurs when perceptions fall short of initial expectations.

Among these models, HOLSAT (Tribe & Snaith, 1998) is specifically designed for the tourism sector, focusing on evaluating satisfaction derived from destination experiences. HOLSAT measures both positive and negative aspects of the experience, enabling a comprehensive assessment of tourist satisfaction. This model is particularly well-suited for tourism research due to its ability to identify specific attributes that influence tourists' perceptions.

By integrating elements from the CSI framework and tailoring it to the unique dynamics of tourism, HOLSAT provides a nuanced approach for assessing satisfaction. Its ability to capture a broad range of experiences, from tangible features like infrastructure to intangible factors such as cultural engagement, makes it an invaluable tool for understanding and enhancing tourist satisfaction at destinations.

The ACSI model (Fornell, 1992) and the ECSI model (Dotchin & Oakland, 1994) are both based on a causal structure, where perceived quality, perceived value, and brand

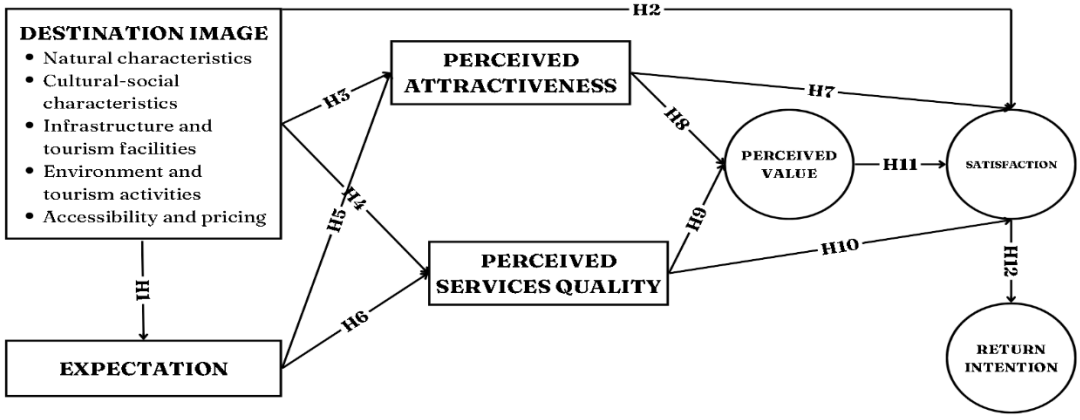
image are core factors influencing satisfaction. The distinctive feature of ECSI lies in its emphasis on the role of brand image in shaping expectations and fostering satisfaction, which is particularly significant in the context of tourism destinations. ECSI also highlights the linkage between satisfaction and loyalty, thereby encouraging customers' intention to return.

Building on the strengths of these models, this study proposes a new model tailored to the tourism context in Nghe An province. The proposed model integrates key elements from HOLSAT, ACSI, and ECSI while drawing insights from both domestic and international studies, including Bigne et al. (2001), Um et al. (2006), Sun et al. (2013), and Phan & Dao (2017). Additionally, expert opinions were consulted to adjust the model to the unique characteristics of the local tourism industry.

The proposed research model focuses on the attributes of the tourism destination, collectively referred to as "destination image." These attributes include natural features, cultural-social characteristics, infrastructure and tourism facilities, the environment and tourism activities, as well as accessibility and pricing. These factors play a critical role in influencing initial expectations, actual perceptions, and tourists' satisfaction. Furthermore, the model examines intermediary factors such as perceived attractiveness, perceived service quality, and perceived value, thereby identifying the causal relationships leading to satisfaction and the intention to return.

Thus, the proposed research model is designed to comprehensively evaluate tourist satisfaction at destinations in Vietnam. It represents a flexible combination of classical theories and practical applications, ensuring the model's relevance and effectiveness in measuring and enhancing the tourism experience (Figure 5).

Fifgure 5: Proposed model



Source: Authors proposed

The hypotheses of the model include:

H1. Destination image positively affects tourists' expectations of the destination.

H2. Destination image positively affects tourists' satisfaction with the destination.

H3. Destination image positively affects tourists' perceptions of the destination's attractiveness.

H4. Destination image positively affects tourists' perceptions of service quality at the destination.

H5. Expectations positively affect tourists' perceptions of the destination's attractiveness.

H6. Expectations positively affect tourists' perceptions of service quality at the destination.

H7. Perceived attractiveness positively affects tourists' satisfaction with the destination.

H8. Perceived attractiveness positively affects tourists' perceived value of the destination.

H9. Perceived service quality positively affects tourists' perceived value of the destination.

H10. Perceived service quality positively affects tourists' satisfaction with the destination.

H11. Perceived value positively affects tourists' satisfaction with the destination.

H12. Satisfaction positively affects tourists' intention to revisit the destination.

5. Conclusion

In the study, the authors highlighted the importance of tourist satisfaction in promoting sustainable tourism development, particularly in Vietnam. Based on theoretical models such as "Expectation-Disconfirmation," ACSI, ECSI, and HOLSAT, the research identifies the relationships between expectations, actual perceptions, service quality, perceived value, and tourists' intention to return.

The findings reveal that destination image and service quality are key factors influencing tourist satisfaction and loyalty. The proposed evaluation model aims to enhance service quality, build a strong destination image, and attract tourists, aligning with the specific context of Vietnam's tourism industry.

The study recommends that managers focus on improving service quality, infrastructure, and the development of unique tourism products to increase competitiveness and foster sustainable tourism growth..

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MOBILIZING INVESTMENT CAPITAL FOR TOURISM DEVELOPMENT IN NGHE AN PROVINCE FROM BUSINESSES AND INDIVIDUALS

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Abstract: The article asserts that businesses and individuals are crucial factors in the development of tourism in Nghe An province. The study analyzes the current state of investment capital mobilization for tourism development in Nghe An from businesses and individuals. Based on the findings, it proposes solutions for mobilizing investment capital from businesses and individuals to advance tourism development in Nghe An in the coming period.

Keywords: Investment capital mobilization, businesses and individuals, tourism development, Nghe An.

1. Current status of mobilizing investment capital for tourism development in Nghe An province from businesses and individuals

Identifying this as an urgent investment capital source for tourism development, the authorities of Nghe An province have followed the general regulations of the State and issued additional incentive and support policies to effectively mobilize non-state budget investment capital from businesses and citizens. Investment incentive and support policies implemented in Nghe An province over the past period are reflected in several documents. Specifically:

In 2014, the People's Committee of Nghe An province issued the Project "Focusing on effectively attracting investment into Nghe An province until 2020 and solutions to improve the investment environment and enhance the Provincial Competitiveness Index." This project mentioned several policies to attract capital from businesses to develop the province's socio-economic aspects, including tourism development.

Resolution No. 26/2016/NQ-HĐND issued on August 4, 2016, by the People's Council of Nghe An province regarding several incentive and support policies for investment projects in the province.

Resolution No. 05/2021/NQ-HĐND dated August 13, 2021, by the People's Council of Nghe An province on certain incentive and support policies for investment projects in the province.

The Provincial People's Committee issued Decision No. 72/2017/QĐ-UBND on November 28, 2017, regarding the procedures for investment projects using land in the area.

Decision No. 66/2016/QĐ-UBND dated November 9, 2016, on deposit requirements to ensure the implementation of investment projects using land in Nghe An province.

Decision No. 235/QĐ-UBND dated January 24, 2022, by the People's Committee of Nghe An province approved the Project "Improving the investment and business environment, enhancing the effectiveness of investment attraction in Nghe An province for the period 2021-2025."

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Regarding investment forms, the State issued Decision No. 71/2010/QĐ-TTg and Decree No. 15/2015/NĐ-CP on public-private partnership (PPP) investment. For many years, in the Government's resolutions at the beginning of each year, the Government has directed as follows: "Investment capital mobilization and investment forms must be diversified; public-private partnership (PPP) cooperation should be promoted along with other investment forms that do not use the state budget to maximize resources for socio-economic development investment."

In the legal documents issued by the State and Nghe An province, several policies have been outlined to encourage tourism development, notably tax policies, credit policies, support for advertising and image promotion, information provision, investment procedures during the preparation phase, and labor training support.

Overall, the implementation of policies to encourage economic sectors to invest in tourism development in Nghe An province during the period 2016-2022 has helped reduce the burden on the state budget for tourism development. On the other hand, the diverse and large-scale external capital sources have significantly enhanced the tourism landscape in Nghe An. The results of mobilizing non-state investment capital from businesses and citizens are as follows:

First, investment in tourism projects.

During the period 2016-2022, Nghe An attracted 24 projects from businesses investing in the tourism sector, with a total registered capital of VND 45,523.216 billion. These investment projects mobilized capital from businesses within and outside the province, including several large-scale projects from major investors such as FLC Group, Vingroup, Tan A Dai Thanh Group, Vietravel Tourism and Transport Marketing Joint Stock Company, and the Vietnam-Laos Economic Cooperation Corporation, among others.

The tourism investment projects are mainly concentrated in coastal areas to exploit products related to resort tourism, entertainment, and marine sports. Once fully operational, these projects are expected to promote tourism development in Nghe An. This demonstrates that recent investment attraction activities and policies have yielded positive results. During the 2016-2022 period, businesses implemented VND 10,983.834 billion in tourism projects, achieving a 24.12% execution rate compared to the total registered investment capital. This is a relatively low rate, significantly impacting tourism development in Nghe An province. Notably, three major projects with substantial registered capital—the 5-star hotel project by Vietravel in Quan Bau Ward, Vinh City, the eco-resort and entertainment complex in Nghi Tien, Nghi Yen Commune, Nghi Loc District, and the Cau Cau tourism project—have not yet been implemented, affecting the overall rate. According to a survey of tourism businesses, 64.9% of enterprises indicated a high level of commitment when investing in Nghe An.

Secondly, investment in the development of tourism services and products.

Nghe An provincial authorities recognize that the participation of the community and businesses helps create diverse products and services, enhancing the destination's appeal with distinct local cultural features. Conversely, tourism provides job opportunities, increases income for local people, and generates economic benefits for businesses and the locality.

In some destinations, the community has played a key role in promoting the local cultural and natural values of tourism, creating attractive tourism product chains that draw

both domestic and international visitors, contributing to the development of the local tourism brand.

Therefore, tourism development and the participation of the community and businesses have a mutually reinforcing relationship, driving positive impacts. This is especially significant as Nghe An seeks to mobilize all potential resources to attract both domestic and international tourists, regaining growth momentum after the Covid-19 pandemic.

In recent years, Nghe An has begun to focus on and achieve positive results in attracting community and private sector participation in tourism development.

During this period, there has been a positive shift in awareness among businesses and residents about developing tourism products. Businesses and local people have invested in developing services and tourism products at various tourist sites in Nghe An. They have invested in entertainment centers for tourists and developed high-end eco-resort areas. Businesses and residents have collaborated with provincial authorities to develop Nghe An's tourism products, including coastal resort tourism, cultural and historical tourism linked to spiritual tourism, eco-tourism, and community-based tourism. During the period, the total investment capital from businesses and the local community for tourism service development reached VND 4,256.93 billion, of which: Investment from businesses amounted to VND 4,126.19 billion, accounting for 96.93% of the total investment from businesses and the community in tourism services. The local community contributed VND 130.74 billion.

From 2016 to 2022, businesses invested VND 4,126.19 billion in tourism service development, including accommodation services, travel agencies, tourist transportation, dining, and entertainment services.

Table 1. Investment capital of businesses for development tourism services in Nghe An from 2016-2022

Unit: Billion VND

Type of Business	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Accommodation services	386,4	422,1	491,3	581,5	480,8	402,9	483,1
Travel services Passenger	13,6	16,8	17,5	19,3	11,08	9,83	15,9
Transportation service	13,22	16,46	17,08	20,59	14,6	10,1	18,7
Catering services	75,72	89,4	94,6	100,03	79,2	64,5	93,9
Entertainment and entertainment services	6,56	8,09	10,47	13,78	10,68	7,34	9,06
Total	495,5	552,85	630,95	735,2	596,36	494,67	620,66

(Source: Nghe An Provincial Department of Tourism)

Looking at Table 1, during the period 2016-2022, the investment capital from businesses varied across the years. From 2016 to 2019, there was steady growth—while the investment was VND 495.5 billion in 2016, it rose to VND 735.2 billion in 2019, with an average annual growth rate of 16.12%. However, in 2020 and 2021, the tourism sector faced significant challenges due to the severe impact of the Covid-19 pandemic, leading to a sharp decline in investment from businesses and tourism service providers. Investment capital in 2020 and 2021 decreased to only 81.11% and 67.28% of the 2019 level, respectively. This greatly affected the province's tourism products. Nevertheless, by 2022, investment capital rebounded, reaching VND 620.66 billion, an increase of 38.9% compared to 2021.Regarding the structure of investment capital by type of tourism

business, business investments were mainly concentrated in accommodation and food services.

During the period 2016-2022, Investment in accommodation services amounted to VND 3,248.1 billion, accounting for 78.72%. Food service investments reached VND 597.35 billion, making up 14.48%. Transportation services received VND 110.75 billion, accounting for 2.68%. Travel agency services attracted VND 104.01 billion, representing only 2.52%. Entertainment services saw investments of VND 65.98 billion, accounting for 1.6%.

During this period, the community invested VND 130.74 billion in developing tourism services. This capital was used to develop services in accommodation, dining, and entertainment.

Thirdly, investment in promotion, branding, and marketing.

Recently, tourism businesses in Nghe An have actively invested directly in promotional, advertising, and branding activities to enhance the image of Nghe An tourism among domestic and international tourists. The total investment for these activities amounted to VND 32,291.18 million.

From 2016 to 2022, businesses collaborated with state agencies to organize tourism promotion and introduce Nghe An as a destination both domestically and internationally. They engaged in various promotional activities, including: Advertising Nghe An tourism through media platforms and large billboards. Organizing Nghe An tourism booths at domestic and international trade fairs. Welcoming and collaborating with tourism promotion delegations, travel companies, and domestic and international media teams to survey destinations, services, and tourism products. Participating in conferences and seminars on tourism investment promotion and enhancing electronic marketing to attract tourism investments. Collaborating and partnering domestically and internationally for tourism promotion.

According to a survey, 100% of businesses allocated investment capital for promotional and branding activities. The investment capital for promotional activities grew unevenly from 2016 to 2022. From 2016 to 2019, investment increased steadily, from VND 4,515.91 million in 2016 to VND 5,693.57 million in 2019, with an average annual growth rate of 14.27%. However, the impact of Covid-19 in 2020 and 2021 significantly affected the tourism industry, leading to a sharp decline in investment for promotional activities, with capital dropping to VND 4,338.82 million in 2020 and VND 2,408.68 million in 2021. Nonetheless, in 2022, investment rebounded to VND 5,327.19 million, more than doubling compared to 2021.

The survey also revealed that 100% of businesses allocated less than 10% of their investment capital for promotional activities.

Among the various promotional methods, the most significant investment was in publishing tourism materials in various forms and materials, totaling VND 13,100.6 million, accounting for 40.57% of total promotional investment. Other methods had lower investment proportions.

Investment in tourism promotion largely depends on the provincial government's promotional activities and external factors such as disease outbreaks and natural disasters.

Fourth, investment in tourism human resource (HR) training.

In addition to state budget investments for tourism HR training and development, the province encourages businesses to organize training programs on professional skills,

foreign languages, and other competencies for their employees.

Businesses can either conduct on-site training or send employees to participate in professional training courses at tourism training institutions or attend workshops organized by the Department of Tourism.

During the period 2016-2022, non-state budget capital for tourism HR training and development reached VND 58,790.7 million, with a decline observed in the later years. From 2016 to 2019, investment capital grew steadily at an average annual rate of 12.7%, increasing from VND 8,055.6 million in 2016 to nearly VND 11,123.5 million in 2019. Investment in 2019 was 1.38 times higher than in 2016, reflecting the growth of Nghe An's tourism industry during this period.

However, in 2020 and 2021, the tourism sector experienced a severe workforce decline due to the impact of the Covid-19 pandemic, leading to a significant reduction in HR training investment. In 2020 and 2021, investment capital was only 57.7% and 52% of the 2019 level, respectively. Nevertheless, in 2022, investment in tourism HR training increased sharply as the industry recovered strongly from the pandemic.

Regarding the form of HR training, the breakdown of investment capital was as follows: On-site training: VND 39,724.8 million, accounting for 67.56% of total investment. Participation in training courses at tourism training institutions: VND 16,025.3 million (27.27%). Participation in training sessions organized by the Department of Tourism: VND 3,040.6 million (5.17%). According to a survey, 100% of businesses invested in tourism HR development. Of these, 82.58% opted for on-site training, including hands-on training at the business premises, while only 9.6% and 7.82% chose to attend training courses at tourism training institutions or sessions organized by the Department of Tourism, respectively. On-site training involves employees acquiring necessary knowledge and skills through real work experience under the guidance of more skilled colleagues. This form of training typically includes on-the-job mentoring by direct supervisors, mentors, or experienced colleagues. In the tourism sector, businesses often choose on-the-job mentoring by more experienced employees, who receive additional monthly allowances for this role.

Tourism businesses also closely collaborate with training institutions for new training and retraining to ensure quality and cost efficiency for both parties. Additionally, some employees are sent to participate in training sessions organized by the Department of Tourism.

Despite this, 100% of businesses allocated less than 10% of their investment capital to tourism HR development, indicating limited attention and modest investment in this area. Most of this investment capital came from the businesses' operational profits, making their financial performance a decisive factor in the scale of HR investment.

During 2016-2022, Nghe An authorities made efforts to mobilize investment for tourism development through public-private partnerships (PPP). However, no tourism infrastructure projects were implemented under the PPP model, leading to continued pressure on the state budget for infrastructure projects impacting tourism. This highlights the need to expand the PPP model to all sectors and projects where private investors can participate. Nonetheless, some initial PPP activities were undertaken in areas such as tourism promotion, product development, and HR training.

For example, on March 17, 2017, the Nghe An Tourism Information and Promotion Center signed a cooperation agreement with Chau Vinh Trading and Services Co., Ltd

(Vinh Guru Tours) to enhance tourism development, particularly in marketing and promotion. They collaborated on advertising, website linkage for Nghe An tourism tours, participation in domestic and international tourism fairs, and organizing Famtrip and Prestrip tours. Vinh Guru Tours also provided specialized English communication training for the center's staff.

In 2019, Saigontourist signed a cooperation agreement with the Nghe An provincial government to strengthen ties and leverage both parties' strengths to boost tourism development. This partnership, set for 2019-2025, covers product development, marketing, brand promotion, HR training, and mutual use of services.

From 2016 to 2022, non-state capital mobilized for tourism development in Nghe An totaled VND 15,331.85 billion. Of this: Investment from local communities: VND 130.74 billion (0.85%). Investment from businesses: VND 15,161.11 billion (99.15%).

The investment structure was as follows: Tourism projects: VND 10,983.834 billion. Tourism product development: VND 4,256.93 billion. Promotion, branding, and marketing: VND 32.291 billion. HR training: VND 58.790 billion.

Investment in tourism projects accounted for the largest proportion. However, compared to the total non-state investment demand of VND 49,871.227 billion for the 2016-2022 period, only 30.74% was achieved.

Looking at the sources of investment for tourism development in Nghe An, non-state capital accounted for 96.76%, while state budget investment made up only 3.24%. This significant disparity shows a heavy reliance on non-state capital (almost 97%), reflecting a cautious approach to state budget investment in tourism development. Despite the large share of non-state investment, it has yet to attract many major investors or meet the overall demand for tourism development in Nghe An.

2. General evaluation on mobilization of investment capital for tourism development in Nghe An province from businesses period 2016 - 2022

2.1. Results achieved

During the period 2016-2022, efforts to mobilize investment capital for tourism development in Nghe An focused significantly on attracting non-state budget (NSNN) investment. Non-state capital for tourism development reached VND 15,331.85 billion, accounting for a very high proportion compared to state budget investment (96.76%).

This is a considerable achievement for Nghe An's authorities, as it reduced dependence on state budget funds and successfully attracted investment from businesses and local communities for tourism development. Many large-scale tourism investment projects were implemented across different areas of the province. Some projects began to combine resort tourism with entertainment and commercial services, enhancing the appeal to tourists, extending their stay, and increasing revenue for the local tourism industry. This success is due to the provincial government's proactive efforts to attract investment from major economic groups such as Vingroup, Tan A Dai Thanh Group, and Muong Thanh Group. Moreover, tourism product development, promotion and branding, and tourism HR training received substantial investment from businesses and local communities, resulting in greater diversity compared to the previous period.

2.2. Limit

2.2.1. The mobilization of non-state budget (NSNN) capital for tourism development in Nghe An remains limited and has not met the local tourism development needs.

During the period 2016-2022, non-state capital from businesses and local communities reached VND 15,331.85 billion, covering only 65.24% of the required non-state capital for tourism development.

- *Investment Mobilization from Businesses*

During this period, VND 15,161.11 billion was mobilized from businesses, accounting for 98.89% of total non-state capital from businesses and local communities and 95.68% of total investment for tourism development in Nghe An. However, several limitations remain: The mobilized capital is still relatively low, insufficient to meet the development demands of Nghe An's tourism sector, especially given the limitations of state budget funding. The number of tourism investment projects in Nghe An is relatively low compared to other North Central provinces. The implementation rate of registered investment capital is also quite low, at only 24.12%. Most projects that are operational or under construction are concentrated in Cua Lo Town, Vinh City, and nearby areas, with very few projects in mountainous areas. Investment projects in Nghe An's tourism sector vary significantly in scale and stability, with most being small-scale. Several large-scale projects with high registered capital have yet to be implemented, significantly impacting tourism development, such as the Cau Cau tourism project. Investment from businesses and individuals is mainly focused on accommodation and dining services, with limited attention to travel agencies, passenger transport, and entertainment services. This has resulted in a lack of diversity and reduced appeal for Nghe An's tourism industry.

Overall, the effectiveness of non-state capital from businesses for tourism development in Nghe An remains low. The amount of mobilized capital is modest, and investment in tourism development activities is still cautious and lacks diversity.

- *Investment Mobilization from Local Communities*

Investment from local communities accounted for only 0.85% of the total non-state capital for tourism development. This investment primarily focused on tourism product development, especially in accommodation services. The mobilization of investment capital from local communities has been ineffective, as residents are not yet willing to invest in tourism. Provincial authorities have not fully leveraged community investment resources, despite the high demand for tourism development. A portion of the population still relies on state investment rather than proactively contributing to tourism development.

2.2.2. The mobilization of capital from non-state budget sources remains limited and has not met the local tourism development needs.

Non-state budget capital from enterprises and the community during the 2016-2022 period reached VND 15,331.85 billion, accounting for 65.24% of the non-state budget capital needed for tourism development.

- For capital mobilized from enterprises:

During the 2016-2022 period, the province mobilized VND 15,161.11 billion, achieving 98.89% of the total non-state budget capital from enterprises and the community, and accounting for 95.68% of the total investment capital for tourism development in Nghe An province. However, capital mobilization from enterprises still faces many limitations:

The mobilized capital scale remains quite low, failing to meet the development requirements of Nghe An's tourism sector, especially when the state budget is limited.

Investment projects in Nghe An's tourism sector are fewer compared to other North

Central provinces, with a low implementation rate of only 24.12% of the total registered capital. Most projects that are operational or under construction are concentrated in Cua Lo town, Vinh city, and neighboring areas, with very few in mountainous regions.

Projects attracted to the tourism sector in Nghe An have inconsistent and unstable capital scales, with most being small-scale. Many large-scale projects with significant registered capital have yet to be implemented, severely impacting the province's tourism, such as the Cau Cau tourism area project.

Investment capital from enterprises and individuals is mainly focused on accommodation and dining services, with little attention given to travel agencies, passenger transportation, and entertainment services. This lack of diversity makes Nghe An's tourism less attractive to visitors.

It can be seen that the effectiveness of non-state budget capital from enterprises for tourism development in Nghe An province remains low. The mobilized capital is not substantial, and investments in tourism development are still cautious and lack diversity.

- For capital mobilized from the community:

Capital from the local community accounts for 0.85% of the total non-state budget capital for tourism development. This source is mainly focused on developing tourism products, particularly in the accommodation service sector.

The mobilization of capital from the community has not been effective, as residents are not yet willing to invest in tourism. The provincial government has not effectively tapped into investment potential within the community, despite the high demand for tourism development investment. Additionally, some residents still rely on state investment, leading to a lack of proactive participation in tourism development.

2.3. Cause of limitation

2.3.1 The management and administration capacity of local authorities, as well as the awareness of enterprises and residents about investing in tourism development, remain limited.

The quality of local governance has not kept pace with the rapid growth of the economy. The adoption of new management methods, information technology, data integration, and coordination in socio-economic development and construction management is still lacking. Leadership and direction from some party committees and local authorities are not decisive enough. Coordination between different levels and sectors is sometimes untimely and lacks cohesion.

Some local party committees, authorities, officials, enterprises, and residents have not fully recognized the role, significance, and content of tourism development in the local economy. They lack initiative and creativity in implementation and underestimate the importance of capital mobilization for tourism development.

Public awareness campaigns, assignment of responsibilities for implementing tourism development projects, resource mobilization planning, capital demand registration, and reporting on project progress are not conducted rigorously and are still formalistic.

A portion of the community believes that investing in tourism development is the responsibility of the State and local authorities, failing to see the direct and practical benefits of sustainable tourism development for the locality and the nation. As a result,

some localities pay little attention to mobilizing internal resources for tourism investment, and businesses show limited interest in investing.

The initiative of businesses and business establishments is low, with some enterprises and residents relying on State support rather than proactively investing in tourism development.

2.3.2. Incentive and support policies for business investment in tourism development have not been adequately prioritized by the province.

Nghe An province's policies to attract investment capital from businesses are limited, insufficient, and lack the necessary incentives for development. Support policies for land clearance are not effectively targeted.

Moreover, most tourism businesses are small-scale with limited capital, making it difficult for them to meet the requirements for incentive policies. The province has yet to establish a more detailed and comprehensive policy system to attract business investment in tourism, aligning with tourism development planning and local potential advantages.

Some investment incentive policies have not been effectively implemented, such as support for business workforce training and advertising.

2.4. Solutions for mobilizing investment capital for tourism development in Nghe An province from businesses and individuals

The demand for tourism development investment in Nghe An province until 2030 is substantial, while state budget resources are limited. Therefore, to achieve the tourism development goals and gradually make it a key economic sector, Nghe An needs to enhance capital mobilization from enterprises and community contributions within the province.

a) *Solutions for mobilizing investment capital for tourism development in Nghe An province from businesses*

In the coming period, Nghe An provincial authorities have identified five key tasks to mobilize capital from enterprises for socio-economic development, known as the "5 Readiness" strategy: readiness in investment land, essential infrastructure, human resources, reform and substantial improvement of the investment and business environment, and support readiness. For tourism development, the specific solutions are as follows:

- T**horoughly preparing essential infrastructure.**

The province should continue to improve tourism infrastructure by not only investing in new infrastructure but also upgrading and gradually modernizing existing systems, such as transportation networks, electricity, water supply and drainage systems, and environmental improvements. These are crucial prerequisites for attracting tourism investors.

The province needs to establish mechanisms and policies to effectively attract and utilize different social capital sources for infrastructure development, with state budget capital still playing a leading role.

- **To maximize capital mobilization from enterprises for tourism development, the provincial government must innovate, reform, and substantially improve the investment and business environment to make it attractive, safe, and efficient, creating favorable conditions for investors.**

Establishing a safe, healthy, fair, and favorable business environment for enterprises is both a task and a necessity for current socio-economic development. This is especially

true in the tourism sector, as it has been identified as a key economic driver for the province. This is the most important solution to attract maximum resources from enterprises, particularly from large domestic companies.

Maintain political and socio-economic stability, ensuring security for tourists and investors both within and outside the province when doing tourism business in Nghe An.

It is necessary to review, amend, and supplement mechanisms and policies to improve the investment and business environment, particularly by accelerating administrative procedure reforms. Continuously simplify administrative procedures by eliminating cumbersome and unnecessary steps that cause inconvenience for investors.

Effectively implement the "One-stop, One-door" mechanism to maximize administrative convenience for investors by: Clearly defining the main point of contact in the administrative transaction process, where all necessary procedures are received and where the final results are delivered after completing the required steps. Clearly outlining the stages and steps within the administrative process, including the sequence, timelines, corresponding tasks at each stage, intermediate results achieved by each team member, and the relationships between team members.

b) Solutions for mobilizing investment capital for tourism development in Nghe An province from individuals

The local community is identified as the center of tourism development. By participating in this activity, they benefit directly and, as a result, become more responsible for preserving resources, cultural identity, protecting the environment, and maintaining security and order.

Therefore, to maximize capital mobilization from the community in the coming period, Nghe An provincial authorities need to:

First, local authorities should clearly identify the strengths of each region and area within the province in developing tourism products to effectively leverage their potential and advantages. From this, they can create specific plans to mobilize investment capital from the community.

Secondly, to maximize the mobilization of potential capital from the community, it is first necessary to improve the basic tourism infrastructure, such as roads, electricity, and water supply. The province should review and prioritize the completion of essential public works that significantly impact residents' lives, such as transportation infrastructure affecting tourism development, electricity systems, cultural facilities, waste management, and environmental sanitation. The use of these facilities will help locals clearly see the benefits they receive and understand their role in contributing to local tourism development.

Thirdly**,** raising public awareness about tourism is crucial. People need to understand that community-based tourism development is a sustainable economic growth path that enhances livelihoods, reduces dependence on finite resources, and promotes local cultural heritage.

Local authorities should create favorable conditions and remove legal and psychological barriers for the community. They should encourage financially capable individuals in tourist areas to organize or collaborate in mobilizing investment capital, with community-based tourism as a typical model.

Fourth, local authorities need policies that encourage community participation and allow residents to leverage cultural values, arts, and traditional crafts to serve tourists.

When locals participate in tourism, they not only increase their income but also help preserve cultural heritage. Therefore, it is essential to help them understand the role of tourism development in their locality and learn how to engage in tourism effectively, leading to voluntary participation. This approach is key to achieving sustainable tourism development.

Fifth, focus on extensive communication about the province's and local authorities' resolutions and plans for tourism development, as well as investment mobilization strategies for tourism programs or projects that significantly impact local tourism growth. Deep, focused communication should emphasize the importance of tourism development. Local party committees and grassroots authorities must coordinate and direct political-social organizations in the area to organize extensive communication about the Party's and State's policies, as well as tourism development plans, to encourage public participation and investment contributions.

4. Conclusion

In conclusion, enterprises and the community are crucial factors for tourism development. Therefore, solutions to mobilize investment and develop tourism human resources in Nghe An province from businesses and the public need to be implemented swiftly and comprehensively to help create a new brand for the province's tourism in the upcoming period.

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THE RELATIONSHIP BETWEEN SUSTAINABLE DEVELOPMENT AND GREEN ECONOMY

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Abstract: This study is conducted to analyze the theories of sustainable development and green economy both globally and in Vietnam, evaluating the relationship between these two sets of theories. By conducting the desk review of secondary data, the results reveal that the green economy is a crucial tool for achieving sustainable development in the context of climate change and environmental resource degradation. The green economy does not replace sustainable development but serves as a means to achieve sustainability, with a focus on protecting environmental resources and addressing climate change. Green policy instruments need to be developed to ensure a balance between economic growth and environmental protection.

Keywords: Green economy; Sustainable development; Green economic development policies.

1. Introduction

In the context of increasing climate change, resource depletion, and ecological imbalances, the concepts of sustainable development and green economy are becoming critical theoretical and practical frameworks for achieving a balance between economic growth and environmental protection.

Since the 1980s, sustainable development has been recognized as a development model aiming to harmonize economic growth, social development, and environmental protection. However, this model has faced numerous challenges in implementation, particularly the overexploitation of natural resources, environmental pollution, and social inequality. These issues have led to an urgent need for new solutions, with the green economy emerging as a viable option, especially as countries face environmental crises and the necessity of transitioning to more sustainable economic models.

Currently, the theories of sustainable development and the green economy are gaining significant attention from nations, businesses, and international organizations. The green economy focuses on minimizing negative environmental impacts, promoting the development of environmentally friendly industries, and using resources efficiently. However, the relationship between these two concepts is not always clear. To develop appropriate policies and strategies, further research is needed to explore how they can complement and support each other, as well as to identify potential conflicts or contradictions.

2. Analysis of sustainable development theories

Globally, the Rio de Janeiro Earth Summit in May 1992 established 27 fundamental principles of sustainable development. The 8 Millennium Development Goals (MDGs), outlined in the Millennium Declaration at the United Nations Millennium Summit

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(September 2000, New York, USA), achieved significant progress over 15 years of implementation. In 2016, these were replaced by 17 Sustainable Development Goals (SDGs) for the next 15 years (2016-2030), forming the 2030 Agenda for Sustainable Development. However, after 15 years of implementing the MDGs, the Earth still faces significant challenges that threaten the survival and continued development of humanity, such as poverty, inequality, unemployment, violence, and especially the degradation, depletion, and exhaustion of environmental resources, coupled with the impact of climate change.

The United Nations defines sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs: "Development that satisfies the needs of the present generation without harming the ability to meet the needs of future generations" (UNEP, 2011). This concept of development must maintain a balanced and harmonious combination of three pillars: economic, social, and ecological/resource/environmental development (Rogall, 2009). The theory and practice of sustainable development have been studied in two key areas: (i) Theoretically, It is objectively necessary to fully consider development factors, particularly resources and the environment, which are often overlooked or minimally considered in development management decisions. Sometimes, resources and the environment are treated as free natural gifts, leading to distorted calculations of the value of goods, services, and development effectiveness; (ii) Practically, Prioritizing economic growth while neglecting resources and the environment, and giving little attention to social development, particularly the resource and environmental pillar, has adversely affected the development process. This can even hinder further development. Social issues such as conflict, poverty, income inequality, unemployment, and environmental issues like pollution, environmental degradation, and resource depletion have escalated to the point where they are no longer localized problems but affect overall sustainable development (Do, 2017).

Thus, the most fundamental and widely adopted approach to sustainable development includes interdisciplinary, multi-sectoral, integrated, and intergenerational equity approaches; and along with the focus on green-oriented development, the ecosystem-based approach has also gained prominence recently. The essence of sustainable development lies in linking development activities into a system that achieves long-term balance and harmony for future generations (World Bank, 2006, 2010). Development activities take place in all areas of production and social life, and they have mutually reinforcing impacts. For centuries, the science and practice of development management have predominantly followed the path of sectoral specialization, with weak connections and linkages between various development fields (World Bank, 2010). It is only in recent decades, with clear warnings about the dramatic degradation and weakening of the development foundation—natural resources and the environment—that both science and development management practices have started to pay more attention to the connections and linkages between sectors and development fields. The emergence of sustainable development stems from the negative consequences of weak linkages in development management. Its initial declaration focused on The Human Environment (Stockholm Declaration on the Human Environment, 1972), followed by the Environment and Development (Rio Declaration on Environment and Development, 1992), and 20 years later, the focus shifted to Sustainable Development (Johannesburg Declaration on

Sustainable Development, 2002). The Johannesburg Declaration on Sustainable Development affirmed that the integration of the three fundamental pillars of sustainable development (economy, society, and environment) represents a new approach to development in the modern context. The interdisciplinary and multi-sectoral approach enables the connection and integration of development activities across various sectors and fields at all levels and scales to achieve sustainable development goals (Vu, 2015).

The initial approach to sustainable development began by identifying and addressing environmental issues, integrating them into development decisions. However, as environmental problems rapidly increased, it quickly became evident that limited and slow integration yielded few positive results. This was due in part to the fact that such integration was often vague and, in many cases, influenced by economic and political interests. Consequently, the integration approach was gradually replaced by a more comprehensive and unified approach. In the Rio+20 United Nations Summit Declaration in June 2012, titled "The Future We Want," it was stated: “We call for a holistic and integrated approach to sustainable development” (Paragraph 40). The summary report of national reports on sustainable development from the Rio+20 United Nations Summit noted that “Countries continue to focus on economic growth and poverty reduction... while the integration of environmental considerations remains neglected” (UN-DESA, 2015).

The new understanding of sustainable development within the context of market-driven development mechanisms in countries worldwide is seen as the dominant development method of the 21st century. In this framework, the market economy, characterized by market relations and value relations with profit as the primary motivator of all economic activities, views the environment and natural resources as assets and capital for development (Ministry of Planning and Investment, 2015). This means that the environment and natural resources must be assessed and valued (or capitalized) as a form of development capital to be incorporated into calculations and development decisions within a market economy framework.

Theories and practices of market economy development globally have shown that, despite its clear strengths and advantages, the market economy also has significant shortcomings and failures in ensuring the maintenance of a long-term supply of a basic and important "input" for the production of goods, which is resources and energy (Vu Tuan Anh, 2015). The value of environmental resources is often overlooked or minimally considered in economic growth decisions by many countries. Calculations of environmental resource losses relative to Gross Domestic Product (GDP) have revealed substantial figures, ranging from a few percent to over 10%. For instance, World Bank experts estimate the loss at 3-5% of GDP for Vietnam, while the Ministry of Natural Resources and Environment suggests that for every 1% increase in GDP, environmental pollution results in a 3% loss of GDP (Ministry of Natural Resources and Environment, 2012). This implies that continuing with the old growth model will exacerbate environmental damage as economic growth (GDP) increases, leading to more unsustainable development. Environmental degradation directly impacts human life, including essential aspects such as air quality, clean water, food, and health, as well as livelihoods. Specific calculations have demonstrated a direct correlation between human quality of life and environmental quality. People must spend more from their household budgets on medical care due to pollution-related health issues. Moreover, in economic

and social management, there is increasing recognition of social problems arising from environmental degradation, such as poverty, health issues, and livelihoods (World Bank, 2006). For the poor, especially those whose livelihoods heavily depend on natural resources, such as agriculture, forestry, and fisheries,... this direct relationship becomes even more apparent. Consequently, a significant portion of the population that is already poor becomes even poorer due to environmental decline. Thus, vulnerable groups like the poor, disabled, and children,... are disproportionately affected by environmental degradation, clearly indicating that environmental issues exacerbate social development challenges.

In the context of Vietnam, the concept of sustainable development has been clarified in the documents of the IX, X, and particularly the XI Party Congress. To successfully implement the Socio-Economic Development Strategy 2011-2020, the Party has outlined five development perspectives, with the first being: "Rapid development is linked with sustainable development, and sustainable development is a continuous requirement in the Strategy." The distinction in Vietnam's approach to sustainable development is its focus on achieving both rapid and sustainable development, whereas the global perspective emphasizes satisfying the needs of the present generation without compromising the ability of future generations to meet their own needs (Ministry of Natural Resources and Environment, 2012, 2015).

3. Analysis of green economic theories

Green economy is a relatively new term that gained international recognition at the United Nations Conference on Sustainable Development held in June 2012 in Rio de Janeiro, Brazil (referred to as Rio+20). Green economy was one of the main topics discussed at this conference. On World Environment Day, June 5, 2012, with the theme "Green Economy: Does it include you?", the focus was on promoting sustainable production practices, such as green production, green consumption, green lifestyles, and green products, with the implication of being "environmentally friendly". In 1999, the World Bank published "Greening Industry: New Roles for Communities, Markets, and Governments" (World Bank, 2006), introducing a new model for pollution control in industry known as industrial greening. Today, most development activities are required to incorporate green practices, including the greening of the economy. In 2015, the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) published a series of reports titled "Greening of Economic Growth", which introduced methods for greening economic growth and formally established a new direction for economic growth, calling on Asia-Pacific countries to abandon the "grow first, clean up later" approach.

Green economy is characterized by activities aimed at preserving natural resources and protecting the environment, in contrast to brown economy, which is resource-intensive and inefficient, leading to environmental degradation. Brown economy is defined as "an old economic development model primarily applied in developing countries. Its characteristics include focusing on GDP growth and per capita income. Brown economy growth relies on available natural resources, where economic development means exploiting and depleting these resources, resulting in severe environmental damage and resource depletion".

The transition from a brown to a green production technology requires significant investment in costly green technologies, while the capacity and ability for such investment are often limited, and the potential return on this investment may not be

convincing to investors. International estimates suggest that the annual financial demand to green the global economy ranges from $1.05 to $2.59 trillion, or approximately 2% of global GDP (UNEP, 2011). For Vietnam, according to estimates by the Ministry of Planning and Investment, around $30 billion will be needed by 2020 to implement the National Green Growth Strategy (Ministry of Planning and Investment, 2015).

The trend of transitioning from "brown" to "green" growth remains dominant in the economic development of all countries (Vu, 2015). This shift is driven not only by the burden and pressure of addressing the severe consequences of brown growth on the future development of nations and the world but also by the benefits that green growth brings for the future. The inevitable transition to green growth requires time for both awareness and action, but it will be much shorter because green growth is essentially sustainable development, or more precisely, a method for achieving sustainable development in the context of climate change.

The transition to a green economy is supported and promoted by the international community, with each country currently undergoing restructuring to adapt to changes in the context of increasingly deep economic integration and responses to the impacts of climate change. Thus, greening the brown economy is the only viable path for countries to continue development and achieve the Sustainable Development Goals (SDGs) in the 21st century, as no alternative paths have yet been identified.

The main benefits of a green economy include: The value and role of investing in natural capital; Reducing poverty; Job creation and improving social equity; Use of renewable energy and low-carbon technology; Encouraging efficient resource and energy use; Promoting sustainable urban lifestyles and low-carbon transportation; and green economies also tend to grow faster than brown economies in the long term while maintaining and restoring natural capital.

The emergence of the green economy is closely linked to the need to address climate change, which increasingly poses significant negative impacts on the progress of sustainable development (Nguyen, 2014). In fact, it has become a growing risk that threatens to disrupt the process of sustainable development. Contrary to the common goal of achieving greater sustainability, development in many countries is not only failing to become more sustainable but is even becoming less so due to crises, conflicts, and social consequences such as poverty, social inequality, and crime, alongside environmental issues like pollution, degradation, depletion, and climate change. The publication "Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication" by the United Nations Environment Programme (UNEP) for the Rio+20 Summit highlights the significant threat to the survival and development prospects of nearly 7 billion people, with projections indicating a rise to 9 billion by 2050. The concept of a green economy has gained traction partly due to widespread dissatisfaction with the current economic model, compounded by fatigue from facing multiple crises and market failures in the early years of the new millennium, including the 2008 financial and economic crisis (World Bank, 2006). This also reflects the emergence of a new model where material wealth is created with consideration for environmental risks, ecological scarcity, and worsening social injustices. Transitioning to green production, business practices, consumption, and lifestyles is essential for creating a greener environment and society, as nations seek to address these pressing challenges.

Due to the adverse effects of environmentally unfriendly development and climate

change threatening and even destroying achieved development outcomes, there is an urgent need to seek new policy tools and transition the current development model to address issues in sustainable development. The economic model that countries around the world, including Vietnam, are converging on is the green economy.

Many definitions of the Green Economy reflect efforts to characterize this new concept, ranging from broad to narrow interpretations of the term (Nguyen & Tran, 2014). In 2012, the Department of Environment, Ministry of Natural Resources and Environment, in its introductory report at the workshop "Green Economy and Sustainable Development," observed that "most opinions agree that in the definition of a green economy, clean energy is the core issue" (Ministry of Natural Resources and Environment, 2012). To date, the concept of the green economy has been further expanded, with numerous definitions, and the following definition from the United Nations Environment Programme (UNEP) in the book "Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication" has been cited extensively in Vietnam: "A green economy is one that enhances human well-being and social equity while significantly reducing environmental risks and ecological scarcities. In simpler terms, a green economy is characterized by low emissions, efficient resource use, and social equity".

In the practical context of public policy and strategy development, there is also the concept of "green growth," which currently accompanies the concept of "green economy." Green growth is defined in various ways (Tran, 2016), and according to the explanations found in scientific literature, the core content of green growth, in simple terms, is "growth that is friendly to the natural environment," achieving both economic growth and environmental protection goals simultaneously. According to the Organisation for Economic Co-operation and Development (OECD), "Green growth is about fostering economic growth while ensuring that natural resources continue to provide the resources and environmental services on which our well-being relies." In even simpler terms, it is about making economic growth greener. Thus, green economy and green growth are two similar but not equivalent concepts. Clearly, according to development economics, growth is a component of the economy, while the green economy has a broader and richer content compared to green growth.

4. The relationship between sustainable development theories and green economy

Sustainable development and the green economy are closely related to climate change mitigation. Considering the concept of the green economy, it is evident that the green economy encompasses not only economic goals but also extends to include social, environmental, and ecological objectives. Therefore, some views suggest that, in essence, the green economy is synonymous with sustainable development or a new method for achieving sustainable development in the context of climate change. The significant and increasingly prominent impact of climate change has highlighted the need for economic and social growth while ensuring the foundation and capacity to provide resources for growth, development, and maintaining human living environments. The green approach or greening national development decisions is a notable feature when discussing green growth and the green economy. However, green growth and the green economy do not replace the concept of sustainable development but rather serve as tools for implementing sustainable development in the context of climate change, with a greater emphasis on

environmental resources.

Discussing environmental resources in the green economy, these resources are viewed as critical factors for economic growth, improving value chains, and providing long-term stability and prosperity. However, when talking about the green economy, instead of emphasizing the harmonious combination of the three pillars of sustainable development (economics, society, and the environment), the focus is on the efficient and intelligent use of environmental resources, with a central emphasis on human-centric approaches and climate change mitigation. This implies that sustainability in environmental resources and climate change response is considered the focal point of the green economy. The green economy does not replace the concept of sustainable development but rather serves as a new tool for achieving it. As Nguyen (2014) states, "Sustainability is a crucial long-term goal, but greening the economy is the means to reach it." Consequently, our National Strategy for Green Growth also defines that "Green growth is an important component of sustainable development".

Thus, the green economy does not replace sustainable development but represents a way of implementing it, with a greater emphasis on protecting environmental resources and addressing climate change. The theory of the green economy is also based on the theoretical foundations of sustainable development. The fundamental difference in the theory of the green economy compared to sustainable development theory is that, in the green economy, the protection of environmental resources and climate change response are positioned centrally, whereas sustainable development theory emphasizes the harmony between environmental protection, economic growth, and social progress as the three pillars of sustainable development.

The production function is commonly used in classical and neoclassical economic theory to examine the relationships between growth and development factors and generally takes the form: $Y = f(xi)$, where *Y* represents economic growth, and xi are the growth factors. Specifically, in classical economic theory, the production function $Y = f(L, K)$ primarily relies on labor *(L)* and capital *(K)*. Later, in neoclassical economic theory, the production function was augmented with the technology factor *(T)*, resulting in $Y = f(L, K, T)$, which was widely used in development management across many countries for several centuries. The Cobb-Douglas production function, $Y = AL\alpha K\beta T\gamma$, where *Y* is economic growth (often GDP); *A* is Total Factor Productivity (TFP), representing everything else that contributes to growth apart from *L*, *K*, *T*; and α, β, γ are coefficients satisfying $\alpha + \beta + \gamma = 1$. It can be observed that in this production function, environmental resources are not explicitly included as a factor contributing to economic growth but are instead implicitly part of *A*. In practical economic analysis, the contribution of environmental resources is often overlooked. Subsequent efforts in modern economic theory have attempted to include environmental and resource factors *(E)*, modifying the production function to $Y = f(L, K, T, E)$. The complexity with the production function $Y = f(L, K, T, E)$ is that for *E* to be a variable in the production function, it must first be quantified. While neoclassical economic tools can easily quantify factors *L*, *K*, and *T*, quantifying *E* is not as straightforward. Environmental and resource economics, emerging since the mid-1970s, has not yet developed sufficient tools to quantify (value) the environmental and resource factor *(E)*.

Natural resources have characteristics that are very different from other conventional economic assets, such as their origin, limitation, and depreciation. These differences

make it challenging to value resources and the environment, especially since current economic theories have not yet addressed issues related to non-renewable resources like coal, oil, and other metal ores. The theories of valuation are still unable to answer questions about the trade-offs between immediate extraction and conservation. The Net Present Value (NPV) and adjusted return (R) bring the benefits and costs of extracting and using natural resources in the future to their present value equivalent in economic calculations. However, there is still much debate about this conversion factor due to difficulties in reaching a consensus. Moreover, the value of natural resource commodities is much more complex than that of conventional goods because there are many types of value that need to be considered. The value of environmental resources is something that traditional economic growth models have historically ignored or inadequately accounted for, both at the macro (national), meso (local, regional), and micro (business) levels, leading to distorted data for public policy decisions.

In the Vietnam Development Report 2010 (VDR 2010) titled "Natural Resource Management," it is warned that “if economic growth sets ‘zero cost’ for environmental impacts, then the market and decision-makers will receive false signals, thus undermining the benefits of the development process.” It suggests that one of the necessary steps to achieve environmental sustainability in Vietnam is to “assign values to the environment” (UN-DESA, 2015).

Traditional economic theory views environmental resources as unlimited, considering them as a crucial input (natural resources) that is always available. In contrast, green economics sees environmental resources as limited and argues that all growth and development decisions must consider them in the long term. Green economics places environmental resources and climate change response at the center of development decisions. This means that decisions about economic and social growth must be adjusted to ensure sustainable protection of environmental resources and effective climate change adaptation. In the context of sustainable and green economics, the approach is no longer “economy first, environment later”; rather, the environment, natural resources, and climate change adaptation should be a central focus of the economy, rather than solely profit. This is a fundamental argument in the theory of green economics.

Green economics considers environmental resources as the foundation for economic growth, development, and the improvement of human quality of life. Unlike traditional and neoclassical economic theories, which limit economic growth and development by the capacity of environmental resources, green economics introduces the concept of a “growth threshold.” This “threshold” refers to a specific point, level, or value above which certain changes may occur, and below which no such changes will happen.

Thus, although green economics theory is still in the process of development, it is grounded in the theory of sustainable development and sustainable economics. It emphasizes the protection of nature and the environment as the foundation for economic activities and improving human quality of life, especially in the context of climate change adaptation. The author argues that the current development model essentially reflects the theory of green economics, which aims to "green" the brown economy. This approach seeks to address the significant and severe consequences of past practices and to restore, protect, and maintain the natural foundation for continued development while meeting the needs of future generations.

New thinking, concepts, and approaches naturally come with new policy tools for

implementation. In green economics, policy tools are also being "greened." This greening process typically occurs in two directions: (i) Current tools are strengthened with a focus on protecting environmental resources in a rational, intelligent, and sustainable manner in the context of climate change; and (ii) New policy tools are developed and implemented to further protect environmental resources, often referred to as "green tools". For the enhancement of existing green policy tools, there are two notable points: Firstly, Green tools for environmental protection are strengthened both in terms of political-legal frameworks and organizational implementation to cover a broader and more comprehensive range of environmental protection aspects; Secondly, Some economic and financial policy tools are modified to include the term "green" to emphasize increased attention to environmental protection. Examples include green taxes, green finance, and green credits,... In recent years, the development of green policy tools has been evident globally and in Vietnam, particularly in the context of climate change. Examples include carbon credits and carbon trading markets, Payment for Ecosystem Services (PES), and biodiversity compensation programs.

Green economics measurement has also evolved to accurately reflect its green nature. New development indicators have been introduced to manage the process of greening the economy, including: Green GDP, Environmental sustainability index, Energy consumption per unit of GDP, Greenhouse gas emissions per unit of GDP. These indicators help in monitoring and managing the transition towards a greener economy (Government, 2012).

Thus, sustainable development and green economics are closely related. Green economics is the means or method to achieve sustainable development in the context of environmental degradation, depletion, and climate change. Therefore, the approach to sustainable development is also the approach of green economics, with the central focus being the preservation of the natural foundation for human activities and the improvement of human quality of life on earth.

Rapid and sustainable development in our country, with the three major pillars of sustainable development's mechanical combination of their components: economic, social, and environmental, has not yet achieved true integration. The holistic and unified nature of integration requires that all components be fully included, with their connections, interactions, and mutual influences directed towards the common goal of sustainable development. In policy planning and development, achieving sustainable development may require "greening" the economy, which could involve reducing the rate of economic growth, adjusting or changing economic and product structures. This would help reduce pressure on natural resources, lower greenhouse gas emissions, and promote sustainability. In practical development management, rejecting investments or technologies that, although economically beneficial, cause pollution, emit large amounts of greenhouse gases, or heavily rely on fossil fuels, is essential to ensure sustainable development.

The essence of sustainable development and green economics, as mentioned earlier, is development that improves the quality of life for both the present and future generations. Therefore, intergenerational equity is a fundamental requirement of managing sustainable development and green economics. This concept of fairness across generations means that development decisions and actions must ensure equal opportunities for growth for both current and future generations. The World Bank, in its

report Equity and Development, argues that inequality in development is caused by markets and institutions that strip development opportunities away from many social groups in the current and future generations (World Bank, 2010). The market's "invisible hand" often fails to promote fairness in development, necessitating intervention by the "visible hand" of the state. If the state's intervention unintentionally or deliberately neglects the inequalities created by the market, or if it makes policy errors by overlooking the green values of environmental resources, this will place a greater burden on future generations. Such an approach is not aligned with sustainable development. According to the World Bank, unfair development refers to the unjust use of environmental resources, which are meant to be shared by all people and all generations. These resources are not only depleting in general, but a significant portion of the population, particularly the poor, is being deprived of them in the process of industrialization, urbanization, and globalization.

Green economics, like sustainable development, must place humans at the center. This means not only serving humanity but, more importantly and comprehensively, ensuring that all people and all generations have the opportunity to develop and access the benefits of that development. The win-win approach, currently adopted by many countries in development management, is a concrete expression of intergenerational equity. It ensures that development benefits everyone, without compromising the opportunities for future generations to thrive.

In recent years, with the increasing impact of climate change in Vietnam and the shift towards green growth, development, and building a low-carbon, green economy both globally and in Vietnam, researchers have paid more attention to the ecosystem-based approach. This approach is a strategy proposed by the Convention on Biological Diversity (1992, with Vietnam joining in 1994), initially aimed at integrated management of land, water, and biological resources to enhance the protection and equitable, sustainable use of these resources.

For sustainable development and green economics, the "development ecosystem" approach focusing on the equitable and sustainable protection and maintenance of the natural foundation is the environmental resources for future generations. As a result, it is embraced as a key approach in managing sustainable development and green economics. In 2013, the Ministry of Natural Resources and Environment issued technical guidelines titled "Building and Implementing Ecosystem-based Climate Change Adaptation Solutions in Vietnam." The Minister remarked that the ecosystem-based approach had been successfully tested in many countries and "has the potential to help Vietnam proactively and effectively respond to the impacts of climate change". Greening the economy, in essence, is the method of achieving sustainable development in the context of climate change adaptation. It aligns with sustainable development principles and involves the smart and efficient use of environmental resources while addressing climate change.

5. Conclusion and policy implications

Green economics is a vital tool for achieving sustainable development in the context of climate change and environmental resource degradation. It does not replace sustainable development but serves as a means to achieve its goals, with a focus on environmental protection and climate change adaptation. Green policy tools need to be developed to ensure a balance between economic growth and environmental protection, helping to

maintain sustainability while addressing the pressing challenges of resource depletion and climate change.

To ensure a balance between economic growth and environmental protection, green policy tools need to be developed and implemented effectively. Below are some recommendations:

Environmental tax and pricing policies:

Carbon tax: This is a crucial tool to reduce greenhouse gas emissions by directly taxing the amount of CO2 emitted. A carbon tax incentivizes businesses and individuals to switch to cleaner energy sources and reduce dependence on fossil fuels.

Resource tax: Resource taxes encourage the sustainable use of natural resources while discouraging overexploitation. It ensures that businesses and industries take resource depletion into account, promoting responsible consumption.

Environmental pricing: This regulation requires polluters to pay the costs associated with pollution management and mitigation. It creates an incentive for reducing pollution, as companies must bear the financial burden of the environmental damage they cause.

Green subsidy policies:

Subsidies for renewable energy: These subsidies encourage industries to invest in renewable energy sources such as wind, solar, and biomass. Governments can provide grants or tax breaks for renewable energy projects, reducing initial investment costs and enhancing the competitiveness of clean energy sources.

Subsidies for clean technologies: Support businesses and industries in investing in clean technologies that help reduce energy consumption, lower emissions, and improve resource efficiency.

Regulatory and environmental standards tools:

Emission standards: Establish clear and stringent regulations for greenhouse gas emissions, hazardous substances, and other types of pollution. Businesses must adhere to these standards to ensure their operations do not negatively impact the environment.

Green product regulations: Implement green standards for products and production processes. This can include criteria for recycled content, energy efficiency, and emission reductions throughout the product lifecycle.

Carbon markets and carbon credit mechanisms:

Carbon markets: These allow businesses to trade emission allowances through systems like the EU Emissions Trading System (EU ETS). Companies that emit less than their allocated allowance can sell their excess allowances to other companies. This creates a competitive market that encourages emission reductions.

Clean development mechanism (CDM): CDM, established under the Kyoto Protocol, enables developed countries to invest in emission reduction projects in developing countries and receive carbon credits in return.

Investment in green infrastructure:

Green transportation infrastructure: The government can invest in green public transportation projects, such as electric vehicles, high-speed trains, and electric buses. This helps reduce emissions from transportation while creating a sustainable transportation system.

Renewable energy infrastructure: Develop and expand networks for renewable energy sources like solar power, wind energy, and energy storage systems. This is crucial for establishing a green economy and ensuring a sustainable energy future.

Policies to encourage a circular economy:

Promote recycling and reuse: Support the circular economy model where resources are reused and recycled multiple times to minimize waste and reduce the need for new resource extraction. The government can aid businesses in developing technologies and production processes that align with this model.

Encourage sustainable product design: Promote policies that incentivize businesses to design products with longer lifespans, ease of repair, and recyclability. This approach helps reduce resource consumption and waste generation.

Education and awareness policies:

Green education programs: Enhance environmental education and awareness throughout all levels of schooling, from primary to higher education. This helps cultivate sustainable consumption and production habits from a young age.

Business training programs: Offer training courses on green technologies, resource management, and sustainable solutions for businesses, especially small and medium-sized enterprises.

International environmental cooperation policies:

Participate in international climate agreements: Countries should actively engage in international agreements like the Paris Agreement to collaboratively address climate change and develop effective green policies.

Technical and financial cooperation: Strengthen collaboration with other countries, international organizations, and the private sector to share technology, knowledge, and financial resources for implementing green solutions.

Green financial policies:

Green credit: Encourage banks and financial institutions to offer preferential loans and funding for projects and businesses with high sustainability, such as renewable energy, organic agriculture, or energy-efficient technologies.

Green bonds: Raise capital by issuing green bonds to finance projects that develop environmentally friendly infrastructure and technology.

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MAIN TECHNOLOGICAL TRENDS AND THEIR ROLE IN TOURISM BUSINESS IN VIET NAM

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Abstract: In the context of the Industrial Revolution 4.0, the application of digital technology to the development of economic and social sectors in Viet Nam is an urgent requirement, including the field of tourism. Digital transformation is identified as an inevitable trend for Viet Nam's tourism industry, as it offers opportunities to enhance competitiveness and more sustainable development in the current context. This article will present the main technological trends that have been, are being, and will be applied in the field of tourism, travel, and hospitality. At the same time, the article also highlights the role of using these technologies in tourism business. Additionally, opportunities and challenges in digital transformation within tourism enterprises in Viet Nam will also be addressed in the article's content. Based on this, the author proposes some solutions for applying digital technology in the development of tourism in Viet Nam.

Key words: *Trends, digital technology, digital transformation, tourism.*

1. INTRODUCTION

Tourism is one of the major economic sectors of the world. It is the third largest export commodity (following fuel and chemicals) and constituted 7% of global trade in 2019. In some countries, the tourism industry may account for more than 20% of their GDP.

Tourism is crucial to the success of many economies in various countries, including Viet Nam. In Viet Nam, tourism is a composite economic sector and is increasingly becoming essential to the nation's economic and social development. Therefore, the Party and the State have prioritized developing tourism into a spearhead economic sector, clearly reflected in Resolution No. 08-NQ/TW dated January 16, 2017, on developing tourism into Viet Nam's spearhead economic sector (2). Tourism development will significantly foster the growth of related industries and sectors such as manufacturing, commerce, agriculture, and other service sectors.

The essence of the Fourth Industrial Revolution relies on the digital revolution. Thus, the digital economy is both a feature and an inevitable trend of development for nations. In recent years, the digital economy has become an increasingly vital part of the global economy. In this context, the digital economy has become a strategic development orientation for Viet Nam. The development of the digital economy is occurring rapidly and robustly, encompassing various sectors of the Vietnamese economy, including the tourism industry, identified as one of the three spearhead economic sectors of our country. Therefore, the application of digital technology in the development of the tourism sector is recognized as an inevitable trend for nations worldwide, and specifically Viet Nam. Consequently, digital transformation has become an urgent requirement in the tourism business.

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Stemming from this requirement, Vietnamese tourism enterprises are competing in the endeavor to research and implement technology into their business operations to survive; otherwise, they will be eliminated in this new context. This article will provide information about the main technological trends and their role in the tourism business in Viet Nam. Additionally, the article will address the opportunities and challenges when applying these technologies to enterprises. From there, it proposes some solutions for the application of digital technology in the development of tourism in Viet Nam.

2. LITERATURE REVIEW AND METHODOLOGY

2.1. Literature review

Currently, there are many understandings of the concept of tourism around the world, among which one concept that has attracted the attention and acceptance of many scholars is the definition by the World Tourism Organization (UNWTO): "Tourism is a social, cultural, and economic phenomenon which entails the movement of people to countries or places outside their usual environment for personal or business/professional purposes. These people are called visitors (which may be either tourists or excursionists; residents or non-residents) and tourism has to do with their activities, some of which involve tourism expenditure" (1). Meanwhile, Information Technology (IT), according to Daintith, John (2009), is defined as a term that encompasses software, internet networks, computer systems used for the distribution and processing of data, exchange, storage, and utilization of information. In one way or another, information technology has, is, and will continue to exert profound influences on us from various aspects of life. The digital transformation has also become more urgent for the development of many countries. According to UNWTO, "Tourism was one of the first sectors to digitalize business processes on a global scale, bringing flight and hotel booking online to become a digital pioneer. As information and communications technology (ICT) became a global phenomenon, tourism was a consistent early adopter of new technologies and platforms. A digitalized tourism sector must innovate and generate new business opportunities to ensure the continued competitiveness, growth, and sustainable development of the sector. The ultimate goal is to make a solid contribution to achieving the Sustainable Development Goals of the United Nations and the global development community" (2). Up to now, both globally and in Viet Nam, there have been numerous studies related to the application of digital technology in tourism activities and digital transformation within tourism businesses. Included among these are several pieces of literature related to the research issue that the author has consulted.

First to mention is "Trends in Information Technology and Tourism" by Dimitrios Buhalis (2000) (3), which covers topics such as the "Factors of Change: Synergies between
IT and Tourism," including "The eras of IT development," "The evolution of hardware, software, and networking," "Applications of information technology in tourism," "New wave of technological evolution," "Empowering Consumers and Suppliers through IT: Demand and Supply," "The Future: Developing Electronic Commerce for Tourism," and lastly "Framework of Change and Implications for Tourism Management and Marketing," including "Implications for the tourism consumer of the future," "Implications for tourism suppliers and small and medium-sized tourism enterprises," "Implications for tourism destinations and the public sector," and "Implications for travel intermediaries: travel agencies and tour operators." Pierre J Benckendorff, Zheng Xiang,

Pauline J Sheldon (2019) authored "Tourism Information Technology, 3rd Edition" (4), encompassing basicissues about tourism information technology, looking and booking, traveling, staying and playing, issues, and trends. Following is the article "Information Technology in Tourism & Hospitality Industry: A Review of Ten Years' Publications" by Ishwar Khatri (2019). This study reviews previous research related to IT in the tourism and hospitality industry with the aim of assessing recent changes and applications of IT in the industry. The study showed that IT in tourism and hospitality industry is most commonly used in fulfilling information needs, studying behavior & performance, managing operation processes, and the innovation process. The use of IT in promotion & marketing, customer management processes, and value creation & competitive advantage is yet to be explored.

In Viet Nam, the author has researched some articles such as "Solutions for Developing Digital Technology Applications in Viet Nam's Tourism Ecosystem" by Le Thi Van Anh (2022)(2). The article presents the reality of applying digital technology to Viet Nam's tourism ecosystem, the constraints hindering the process of applying digital technology to the tourism ecosystem, thereby proposing solutions to develop technology applications in tourism in Viet Nam. A publication by Duong Thi Hong Nhung (2022) on "Application of Digital Technology in Hanoi Tourism Development" (3) in the Journal of Industry and Trade - No. 4, March 2022, offers an overview of the status, successes, and limitations of applying digital technology in tourism development in Hanoi, proposing directions to promote the application of digital technology in Hanoi's tourism development in the coming time. The author Nguyen Thi Hong Cam (2022) presented "Application of Information Technology in Developing Smart Tourism in Khanh Hoa Province" (4), depicting the application of information technology in smart tourism development in Khanh Hoa Province, and thereby offering solutions to develop Khanh Hoa as a smart tourism destination. The investigation and study of these materials help the author compare and analyze the trends of technology applications in tourism from the past to the present, thereby gaining a more comprehensive view of the research issue..

2.2. Methodology

In this study, we utilize the document analysis method with tools that include collecting, comparing, and analyzing information. The author has conducted a comprehensive search of academic journals, reports, and online resources to gather information related to thepotential of technology to support tourism activities. We have focused on peer-reviewed published articles and reports from reputable organizations, such as the United Nations World Tourism Organization (UNWTO) and the Viet Nam National Administration of Tourism (VNAT). We have analyzed the gathered documents to identify trends related to the application of technology in tourism activities, the challenges and opportunities of using technology, as well as the best methods from around the world.

3. RESEARCH CONTENT

3.1. Main technology trends in tourism business

The application of technology in the tourism industry is an essential requirement in the process of integration and development, not only increasing the amenities for tourists and managers but also enhancing the competitiveness with the tourism sectors in the region and around the world. Through understanding and research, the author summarizes some of the main technology trends that are commonly used and will rise to become the

future technology for the tourism industry, playing a positive role in the development of global tourism in general and in Viet Nam in particular.

Artificial Intelligence (AI) and Chatbot

Artificial Intelligence (AI) has affirmed its position in the trend of the digital market, and the tourism field is no exception. Chatbot is a computer program, divided into two types according to how they interact with humans, auditory (sound) and text (text), and the use of these chatbots is increasingly common on tourism business websites. The advantage of Chatbot is the ability to work continuously 24/7 and provide quick customer service response time, offer suitable suggestions based on AI, and readily answer various requests from tourists such as processing reservation requests, reporting weather, displaying ATM locations, etc. Available everywhere, at all times, in any language.

Internet of Things (IoT)

IoT in tourism and travel can create personalized experiences in two main ways. One is to allow tourists to control more devices or services through a centralized device, such as a tablet or mobile application. For example, IoT technology can be used in hotel rooms to provide customers with a device connected to everything from lights to heaters and air conditioners, allowing all to be controlled from a single device. Meanwhile, at airports, luggage can be installed with sensors and will alert passengers as they pass by. The second is for companies to store data collected from IoT-enabled devices to create targeted or personalized marketing campaigns, remembering their preferences for return visits. For example, a tourist may return to the same hotel every winter. The hotel company, using a smart thermostat, can set the heating system at the customer's preferred temperaturewhen they return, remembered from the previous year. Additionally, customers can quickly and conveniently share their opinions via the Internet, especially on social media platforms designed specifically for the tourism and travel industry such as Facebook, Yelp, TripAdvisor, Traveloka, etc…

Virtual Reality (VR)

With the rapid development of high technology based on the Internet, the terms Virtual Tour or Interactive Tour emerged in 1994, and over time, it has become more popular with tourists in many countries around the world. To meet the demand for information search and experience of tourist destinations on the Internet before and during the trip, many tourist destinations or travel service providers have constructed virtual tours or interactive tours as part of the digital transformation process in the trend of simulating tourist destinations. The factor that makes virtual tours attractive to tourists is the new technologies applied as the core of that system, such as 360° photos, 360° videos, Panorama photos, Flycam photos, etc. Through the recreation of images, videos, and other multimedia elements like sound effects, music, or narration, description, text, tourists can better understand the visiting spots and ignite their travel inspiration.

Augmented Reality (AR)

In recent times, augmented reality (AR) has become increasingly popular in the tourism industry. This is mainly because it allows hotels and tourism businesses operating in this field to enhance the physical environment they are genuinely trying to encourage customers to visit, including local sightseeing spots and hotel rooms. For example, applications can allow the enhancement of photos through filters and effects. Detailed information about local destinations can also be displayed when customers point their smartphones at these locations, providing information at the most precise

and relevant moment. Through graphic overlays, businesses in the tourism industry can significantly enhance the customer experience, providing valuable information or even pure entertainment.

Voice Control & Voice Search

In the modern era, voice search is extensively used in the fields of tourism, travel, and hospitality. It is a prevalent method for finding and booking hotels, flights, meals, allinclusive vacations, and more. The investments from tech giants like Amazon, Google, Microsoft, and Apple have drastically enhanced voice recognition technology. Voice control is playing an increasingly vital role in enhancing travel experiences, such as in hotel rooms, where voice-controlled devices can manage lighting and heating systems, or provide travel information without human interaction.

Robotics

Robotic technology is swiftly becoming common in the tourism sector, driven partly by the evolving consumer habits in travel. Robots appear in various forms, ranging from text-based chatbots and receptionist assistants to security robots and mobility robots. They offer 24/7 service, consistency, and play a crucial role in responding to the challenges posed by COVID-19, such as minimizing human-to-human contact.

Big Data

In modern tourism management, Big Data is a reality of life. Almost all successful companies employ their data collection techniques. Big Data provides a vast repository to enhance the quality of services and helps in precisely identifying marketing campaigns, providing packages that align with visitor preferences, and identifying potential target customer groups. For travelers, the effective utilization of Big Data can translate into personalized offers that suit their preferences and needs.

These technologies are significantly aiding both travelers and businesses in the tourism industry. Voice control and search are making information access and bookings more convenient. Robotics is enhancing service efficiency and safety. Contactless payments are enabling smoother transactions, while recognition technology is providing higher security and efficiency. Big Data is empowering businesses to make intelligent decisions and offer customized services.

3.2. The Role of digital technology in tourism activities

The application of digital technology to tourism activities plays an extraordinarily crucial role for three principal stakeholders: tourism management (administration); tourism business enterprises, and tourists themselves. For tourism administrators, the use of digital technology aids in enhancing efficiency and modernizing state management at all levels concerning tourism, ensuring connectivity, interoperability, and synchronization in management tasks. All tasks will be transparently deployed, limiting corruption. Digital transformation supports the maximization of infrastructure orientation specifically for different departments, sectors, and localities. In the process of digital transition, each department, sector, and locality will integrate a datasharing platform. Accordingly, this data serves as a connecting link between departments, sectors, and localities, and is shared through the National Data Portal data.gov.vn. For tourism businesses, digital transformation enhances the efficiency of business operations, increasing the ability to expand and access diverse markets, heighten advertising and marketing effectiveness, boost product sales, improve business management efficiency, and create competitive advantages over other enterprises. Digital transition contributes to

helping businesses understand customer needs, personalizing tourism products through consumer behavior, thereby developing tourism products suitable for each target customer. Marketing and customer care activities are also carried out optimally through the collection, analysis of customer and market data, and the deployment of effective marketing campaigns. Additionally, employees will take better care of customers thanks to customer preference information brought by Big Data. Electronic transactions occur swiftly, conveniently, saving time and minimizing risks and costs when using cash and paper documents and vouchers. The application saves labor costs, while tourists quickly, accurately, and timely receive information. Moreover, digital transformation helps tourism managers quickly grasp the situation of tourist spots and accommodation facilities, enabling timely intervention and support to protect and exploit tourism resources reasonably. As for tourists, digital transformation enhances convenience for tourists in accessing information and using tourism services, strengthening their experiences in specific tourism activities. Digital technology's application within the tourism industry significantly enhances the quality of tourists' experiences and their overall satisfaction. Machine translation is the combination of language, translation, and computer science, automatically translating one language into one or more target languages. Text-to-speech technology has supported developers in integrating into intelligent tourism applications, such as automatic narration at tourist spots through articles, history, and culture about the tourist destination.

3.3. Opportunities and challenges in digital transformation in the tourism industry

3.3.1. Opportunities

Digital transformation policy

The Party and the State are highly interested in the national digital transformation as well as in the Tourism industry, as manifested in the timely issuance of numerous policies, updating to the development trends of the times. The Prime Minister has issued Decision No. 1671/QĐ-TTg approving the overall project on information technology application in the field of tourism for the period 2018-2020, directed towards 2025, and Decision No. 749/QĐ-TTg on the approval of the National Digital Transformation Program to 2025, with an orientation to 2030. Along with that, Decision No. 172/QĐ-BVHTTDL dated 25/01/2022 of the Minister of Culture, Sports, and Tourism has been issued on the Digital Tourism Development Plan for the period 2021-2025. Accordingly, implementing the policy of digital transformation, the General Department of Tourism has constructed digital platforms to support tourism activities. This illustrates that the Vietnamese Government and the State Management Agency of the Tourism industry have paid considerable attention to digital transformation, having built the roadmap and planning for tourism development. This is one of the significant advantages that assist Vietnamese tourism enterprises in having a comprehensive policy system, serving the digital transformation process in the future.

Gradual recovery of tourism activities after the Covid-19 pandemic

According to UNWTO statistics, international visitor numbers in Q1/2023 have reached 80% compared to pre-pandemic levels. An estimated 235 million international tourists in the first three months, more than doubling compared to the same period in 2022. The forecasted international visitors in 2023 will recover from 80 to 95% compared to pre-Covid-19 pandemic levels. According to the General Statistics Office, in the first

seven months of 2023, revenue from accommodation, catering, and travel services reached 395.8 thousand billion dong, an increase of 17.7% compared to the same period last year, in which accommodation and catering services increased 16.3% and travel tourism increased 53.6%. International guests to our country are estimated to be over 6.6 million people, 6.9 times higher (1). The above data show the promising recovery of the tourism industry globally and specifically in Viet Nam compared to the Covid-19 pandemic. This aids Vietnamese tourism enterprises in having the opportunity to revive their business situation. Digital transformation at this stage aligns with the real context of the industry.

Viet Nam Becoming a Potential Tourism Market

According to the World Tourism Organization, by 2023, the number of tourists will reach about 1.5 - 1.6 billion trips, by 2030 about 1.8 billion trips, and by then, Northeast Asia will be the region attracting the most international tourists with 293 million trips, surpassing Southern Europe, the Mediterranean (264 million trips), and Western Europe (222 million trips). In this context, Southeast Asia will become the world's fourth-largest region attracting international tourists with 187 million trips (2). Thus, in the future, Asian countries, including Viet Nam, will become potential destinations for international tourists. With its rich natural landscape and long-standing historical-cultural tradition, Viet Nam is fully capable of striving to become one of the top destinations in Southeast Asia in particular and Asia in general.

3.3.2. Challenges

Digital infrastructure and data systems

During the digital transformation process, digital infrastructure is an essential foundation, being the most urgent breakthrough solution to promote national digital transformation. Although the Government emphasizes development, Viet Nam's technology infrastructure system has not yet been developed synchronously. There are differences in localities in the way they implement digital technology applications, leading to a lack of unity, synchronization, and connectivity. The development of scienceand technology is almost exclusively concentrated in big cities and carried out by large technology groups. In remote and isolated areas, the application of information technology is still very limited.

Tourism human resources and information technology skills

The World Bank (WB) assesses the quality of Vietnamese human resources at only 3.39/10 points, and the competitive capacity of the Vietnamese economy ranks 73rd out of 133 countries rated. According to survey results, currently in our country, 63% of university graduates are unemployed, and many agencies and businesses take one to two years to retrain new employees. Of the 37% of employed graduates, they are also basically not meeting job requirements (1). These figures indicate that tourism human resources in Viet Nam are both lacking and weak in both professional expertise, job skills, and technology level. Therefore, the development process of smart tourism in Viet Nam faces many difficulties due to the lack of human resources with technological expertise for operations when deploying smart tourism applications, software, utilities.

Competition issues and falling behind in technology

In the context of profound international integration, the rapid pace of digital transformation, and continuous technological changes over time, the application of modern technical technology becomes an intense competitive pressure. Meanwhile, Viet

Nam's competitive capability compared to other countries in the region and globally is still low, and the adaptability of domestic enterprises in international integration is not yet high. Viet Nam is currently a developing country, and digital transformation and digital technology are being oriented and planned to move towards investment and application.

Therefore, the investment funds and experience for Viet Nam's scientific and technological development are not yet substantial. This presents a significant challenge, a gap that is difficult to narrow in a short time frame. Thus, a substantial effort is needed not only in the tourism industry but also in all economic sectors in Viet Nam.

3.4. Some solutions for applying digital technology in the development of tourism in Viet Nam

Firstly, there must be a continuous refinement of mechanisms and policies for tourism development based on the application of digital technology. This is aimed at creating a legal framework and a favorable environment for tourism businesses to operate and manage tourism activities through digital transformation.

Secondly, continued investment in national infrastructure is necessary, especially in the digital infrastructure that is synchronized between the central and local governments, as well as between urban and rural areas. This process facilitates the uniform and equitable digital transformation for the tourism industry across the country.

Thirdly, the construction of a national database is required. This must be implemented cohesively and sequentially, encompassing many steps, and involves smooth coordination from state management agencies in tourism; the management boards of tourist areas and spots; tourism enterprises; to tourists and even local residents. Only in this way can a comprehensive, useful, and reliable digital data system be created.

Lastly, emphasis must be placed on developing human resources with Information and Communication Technology (ICT) skills and strengthening international cooperation in science and technology. Localities, including tourism businesses, need to focus on training, fostering, and developing high-quality tourism human resources that are both professionally skilled and capable of meeting the requirements for using advanced technology in the industry.

4. CONCLUSION

The Covid-19 pandemic has changed consumer behavior as well as the way tourists approach tourism, especially the trends and demands for IT application products and services. This forces tourism enterprises in various countries, including Viet Nam, to change from traditional service provision to modern methods. The research results show that many technological trends will emerge and profoundly influence the development process of Vietnamese tourism. Vietnamese tourism enterprises also have many opportunities and advantages in implementing digital transformation as supported by the Party and the State's policies, tourism activities gradually recovering after the pandemic, and the positive potential of the Vietnamese tourism market. However, Viet Nam will also face several difficulties and challenges in applying digital technology, such as a lack of synchronization in digital infrastructure and data systems, weak and lacking human resources in tourism, and IT skills, fierce competition, and technological backwardness. Based on the research results, the article has proposed five specific solutions: (1) continue to refine mechanisms and policies for digital transformation; (2) continue to invest in national infrastructure, especially digital infrastructure; (3) build a national database; (4)

continuously update digital technology applications to avoid falling behind; (5) emphasize the development of human resources with ICT skills and promote international cooperation in science and technology. From these, the Vietnamese tourism industry can implement the digital transformation quickly, affirm its position, and enhance its competitiveness with other countries in the region.

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RESEARCH ON APPLYING ARTIFICIAL INTELLIGENCE (AI) IN CLASSIFYING AND EVALUATING CUSTOMER COMMENTS ABOUT BOOK PRODUCTS ON THE AMAZON E-COMMERCE PLATFORM

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Abstract: This study utilises the Bidirectional Encoder Representations from Transformers (BERT) model to classify and evaluate customer comments on the Amazon e-commerce platform from Q2 1996 to Q3 2023. Data were collected from the Amazon review website and processed using the Google Colaboratory platform. The findings indicate that the BERT model is effective in classifying comment sentiments and extracting valuable information from text data. Businesses can leverage this tool for forecasting and strategic planning.

Keywords: *Artificial Intelligence, Amazon, BERT, Text Data, Sentiment Classification.*

1. INTRODUCTION

With the rapid growth in popularity and accessibility of opinion-rich resources, such as online review platforms and personal blogs, new opportunities and challenges have emerged. In the modern era, individuals are increasingly proactive in leveraging information technology to explore and access diverse, multi-dimensional perspectives. The strong development of the field of opinion mining and sentiment analysis, which focuses on processing the elements of opinions, emotions, and subjectivity in text, is driven by the increasing demand for modern systems. These systems focus on opinion research as a key factor, contributing to the formation of a new approach to data analysis and social interaction (Pang & Lee, 2008). Collecting customer comments related to marketing campaigns and product preferences is attracting increasing attention from businesses due to its prominent marketing benefits and potential prediction in financial markets (Cambria et al., 2013). In particular, the rapid development of e-commerce has led to a significant increase in the volume of textual data, which is customer comments on products and services. However, processing this large volume of data through manual methods is difficult in terms of accuracy, cost and time, or it cannot capture implicitly expressed opinions or emotions (Cambria et al., 2017). In this context, artificial intelligence (AI), especially natural language processing (NLP) models, has emerged as a powerful solution to automate the analysis of textual data. Advanced models such as BERT (Bidirectional Encoder Representations from Transformers) have been demonstrated by Devlin (2018) to be highly effective in sentiment classification, topic extraction, and user satisfaction assessment. These advances pave the way for the application of AI to big data analysis from e-commerce platforms.

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This study focuses on the application of the BERT model to classify and evaluate customer comments about book products on the Amazon e-commerce platform. The system is designed to automate the process of sentiment analysis (positive, negative), identify key topics and measure satisfaction from text data, with the goal of providing detailed information to support businesses in reputation management and product/service improvement. The expectation from the study is not only to contribute to improving the efficiency of customer data analysis but also to bring important practical value to the field of e-commerce. In addition, the research results also contribute to the development of artificial intelligence applications in the field of unstructured data analysis, towards data-driven business solutions.

2. OVERVIEW

2.1. AI (Artificial Intelligence)

Artificial intelligence (AI) is a field of computer science that focuses on simulating human intelligence through functions such as learning, reasoning, natural language processing, and automated decision-making (Kumar et al., 2020). AI has become the foundation for many advanced applications, with the ability to analyze big data, supporting more accurate business decision-making. Especially in e-commerce, AI improves user experience, predicts product demand, and manages inventory efficiently (Kumar et al., 2020; Chen, 2023; Nguyen Tu Thanh Duy et al., 2023).

The large volume of customer comment data poses a major challenge to manual analysis due to its time-consuming and inaccurate nature. AI has proven to play an important role in automating the analysis of textual data, from sentiment classification to information extraction. Many studies have confirmed the important and effective role of artificial intelligence (AI) in analyzing textual data, especially in the fields of opinion mining and sentiment analysis. Gupta et al., (2017) deployed machine learning models to classify sentiments in comments on the social networking platform Twitter, thereby demonstrating the ability of AI to process and analyze unstructured data. Similarly, Iftikhar et al., (2023) applied machine learning, deep learning, and BERT models to analyze product reviews on Amazon.

2.2. Big Data

Big Data is a term used to describe large-scale and complex data sets that exceed the processing capabilities of traditional tools, requiring modern technologies and frameworks to extract useful information (Snijders et al., 2012; Chen et al., 2014). According to Chen et al. (2014), Big Data is divided into three types: Structured data (organized in relational databases), unstructured data (such as text, images, videos), and semi-structured data (classifiable but not completely structured). The characteristics of Big Data were initially described by the 3V model, including large volume, fast processing speed, and variety. Later, Gandomi & Haider (2015) expanded it to the 5V model, adding accuracy and value. The rapid growth of data volume, the instant processing speed supporting many fields, and the diversity of formats help solve complex problems. Accuracy ensures the elimination of noisy data, while value is the economic and social potential that data brings. Machine learning and deep learning technologies have revolutionized Big Data analysis, allowing for the identification of complex patterns and supporting faster, more accurate decision making. Big Data has opened up opportunities for businesses to grow by improving productivity and creating competitive advantages.

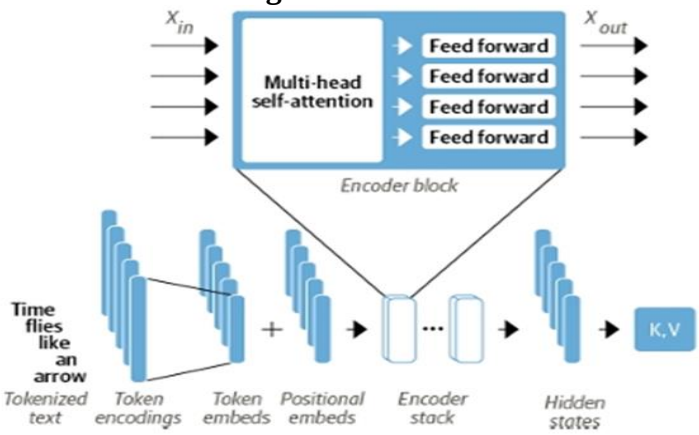
2.3. Natural Language Processing NLP - Text Classification

Natural language processing (NLP) is a key area in many modern technology applications, from machine translation and speech recognition to sentiment analysis (Song et al., 2019). In particular, text classification is considered a popular application of NLP, widely deployed in classifying text documents, including emails, articles, and online comments. Razno (2019) built a model to classify user comments on the Amazon e-commerce platform and evaluate the star rating from 1 to 5. The dataset used in this study was collected from the Amazon Review 2023 source. The data processing and model building process is based on prominent Python libraries such as Pandas, Scikit-learn, Numpy, and NLTK. Pandas is used for efficient data storage and processing, while NLTK provides specialized NLP tools for text normalization, including stop word removal and stemming. Scikit-learn, with its powerful machine learning algorithms, is used to build and optimize text classification models (Berko, 2019). To support the implementation process, Python has shown its role in developing powerful machine learning models and processing natural language efficiently. Libraries such as Pandas, Scikit-learn, Numpy, and NLTK have proven to be comprehensive in providing the necessary tools for text classification tasks and NLP applications (Puzik, 2019). It can be affirmed that the potential of open-source tools in NLP research and practice is huge.

2.4. BERT (Bidirectional Encoder Representations from Transformers)

Transformer Architecture Transformer is a well-known deep neural network model that has revolutionized the field of artificial intelligence (AI) (Lentzen et al., 2024). It is a major breakthrough in the field of AI, as it provides an efficient and flexible approach to processing sequential data such as text, audio, or images. With the ability to encode input data into powerful features through the attention mechanism, Transformer allows parallel processing of data and focuses on the most important information, providing superior contextual understanding (Han et al., 2021). As a result, Transformer has quickly become the gold standard for modern NLP models, laying the foundation for the emergence of more powerful tools. Prominent in this architecture are two core components: Encoder and Decoder, which play a key role in converting and reproducing information efficiently. The encoder in the Transformer model was introduced by Vaswani et al. (2017). This encoder uses a multi-head attention mechanism so that the model can learn the relationships between words in the input sequence without sequentially, which is superior to RNN or LSTM models. It also incorporates position-wise feed-forward networks, which process positions in the sequence independently, thereby enhancing the ability to represent complex semantics. To maintain the order of information of words in the sequence, the encoder uses positional encoding. This is important because the Transformer does not use sequential mechanisms such as recurrence or convolution. In subsequent studies, Shaw et al. (2017) also confirmed that the Transformer model processes data in parallel and learns long-term dependencies more effectively than traditional models.

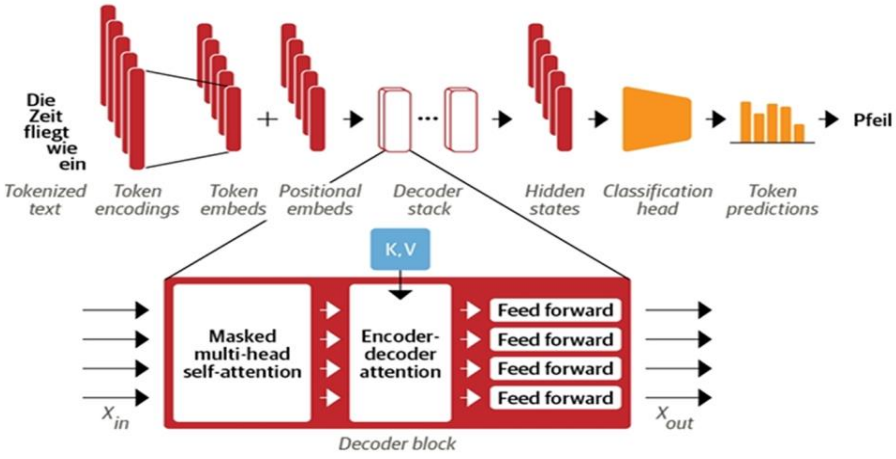
Fig. 1. Encode structure



(Source: Tunstall et al., 2022)

The decoder in the Transformer model has a similar structure to the Encoder but differs in using two attention layers to generate sequential output sequences, using information from the Encoder. Vaswani et al. (2017) introduced the multi-head attention and masked self-attention mechanisms, which help generate accurate sequences. Gehring et al. (2017) improved the decoder by using convolutional neural networks, which help the model learn more effectively from long sequences. Shaw et al. (2018) proposed using position-relative representations in the attention mechanism, improving the ability to maintain relationships between words in the sequence. These improvements help the Transformer handle natural language tasks such as machine translation and text generation well.

Fig. 2. Decoder structure



(Source: Tunstall et al., 2022)

- **BERT and BERT's mission**

BERT (Bidirectional Encoder Representations from Transformers) is an advanced natural language processing (NLP) model developed by Google in 2018. It leverages a deep learning approach based on the Transformer architecture to enhance performance across various NLP tasks, including text classification, sentiment analysis, and question-answering. This model has brought great improvements in understanding the semantics of sentences through two main training tasks: Masked Language Model (MLM) and Next

Sentence Prediction (NSP) (Devlin et al., 2019). BERT works effectively thanks to its ability to learn semantics from words in context in both directions (left to right and right to left), which previous models could not do. However, some recent studies have shown that the NSP task in BERT is not optimal, leading to the emergence of improved models such as RoBERTa (Liu et al., 2019) and ALBERT (Lan et al., 2019), in which NSP is removed or replaced by new techniques such as sentence order prediction (SOP). BERT is primarily trained on English data, but to expand its applicability to many different languages, the Multilingual BERT model was developed, and trained on Wikipedia pages of 104 languages, including Dutch (Devlin et al., 2019). However, monolingual models often perform better when performing tasks in specific language contexts. In addition, studies by Wu et al. (2020) and Petroni et al. (2019) showed that BERT is capable of approaching some grammatical phenomena, although it still has limitations when dealing with complex grammatical knowledge. Currently, BERT has two main versions, BERT-Base and BERT-Large, as recognized in the study of Devlin et al. (2019). The BERT-Base version includes 12 encoder layers, while BERT-Large has 24 encoder layers. BERT-Base uses 12 self-attention heads and a total of 110 million parameters, while BERT-Large uses 16 self-attention heads and up to 340 million parameters. The studies of Devlin et al. (2019), Liu et al. (2019), and Lan et al. (2019) agree that BERT-Base and BERT-Large were developed to optimize for different NLP tasks, with BERT-Large providing higher performance in tasks that require high complexity. One of the most prominent versions is RoBERTa (Robustly Optimized BERT Pre-training Approach). RoBERTa, developed by Liu, is an improved version of BERT. This model abandons the NSP task and uses larger data, which improves performance in NLP tasks such as text classification. Studies show that RoBERTa outperforms BERT in performance on many tests (Clark et al., 2020; Liu, 2019). Among the versions of BERT, ALBERT (A Lite BERT) is a lightweight version, introduced by Lan et al. (2019), Sanh et al. (2019). ALBERT reduces the number of parameters by sharing parameters between layers and reducing the network size, which optimizes performance while maintaining high accuracy in NLP tasks. Finally, DistilBERT is a smaller and faster version of BERT, introduced by Sanh et al., (2019) which uses a Knowledge distillation method to reduce the model size by half while maintaining about 97% of BERT's performance on NLP tasks. This makes DistilBERT effective in tasks such as text classification and entity recognition, balancing speed and accuracy. Thus, BERT and its variants such as RoBERTa, ALBERT, and DeBERTa… continue to be important models in the field of NLP, contributing to major advances in many practical applications such as machine translation, sentiment analysis, and information extraction.

2.5. AMAZON E-Commerce

Amazon, founded by Jeff Bezos in 1994 as an online bookstore, has rapidly grown into one of the world's leading multinational technology companies. Throughout its development, Amazon has continuously innovated and applied advanced technologies, including robots, drones, and especially artificial intelligence (AI), to optimize operational efficiency and improve customer experience. According to Bawack et al., (2022), Amazon's strong investment in advanced technology solutions not only helps improve competitiveness but also lays the foundation for new technology trends in the fields of e-commerce and logistics. In addition to the online store, Amazon provides many other services such as Amazon Prime, Kindle, Amazon Pay, Amazon Web Services

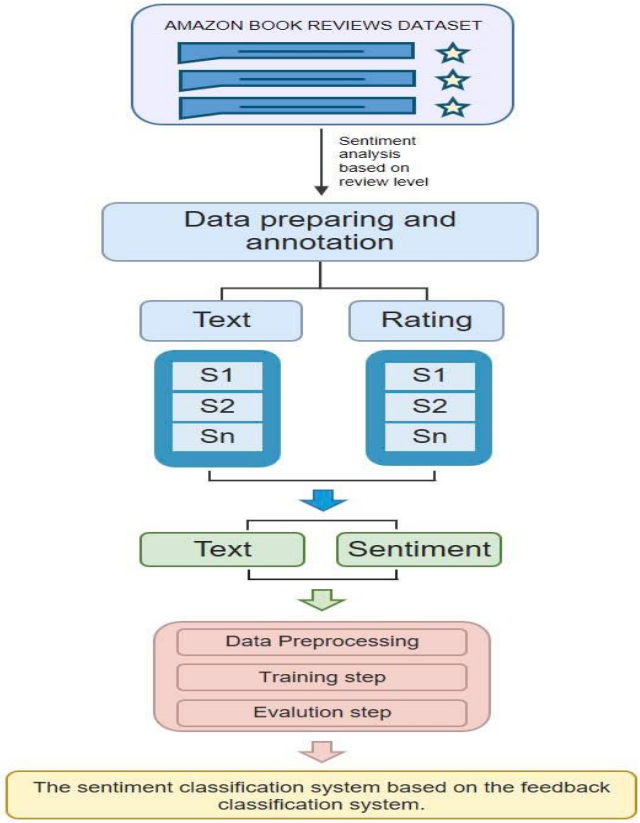
(AWS), and Alexa. Amazon's online store is its core business, offering more than 12 million products from many different brands. User-friendly interface, detailed product information, along attractive promotions such as Prime membership and special discounts, have attracted millions of customers worldwide. AI applications help personalize the shopping experience, suggesting products that suit each customer's preferences (Sharma, 2023). Overall, Amazon has revolutionized the way of online shopping, becoming one of the world's leading e-commerce platforms. This success is partly due to the effective application of AI in business operations, especially in the field of customer data analysis and processing (Lari et al., 2022). With continuous investment in technology and innovation, Amazon promises to continue to grow strongly in the future, while opening up new directions for the application of AI in the field of E-commerce.

3. METHODS AND RESULTS

3.1. Methods

In this study, the authors used a book dataset collected from the website https://amazon-reviews-2023.github.io/. This website provides detailed data sets related to products and customer reviews on the Amazon e-commerce platform, organized in a compressed jsonl.gz format, effectively supporting large-scale data analysis and processing. At the time of collection, the research data included a total of 60,000 rows in the dataset collected between the second quarter of 1996 and the third quarter of 2023. This is a rich source of information with detailed user comments on book products, including data fields such as star rating (from 1 to 5), comment content, comment posting date, and product category. With the collected big data, to analyze the data effectively, the authors used Google Colaboratory - a cloud-based analysis tool developed by Google Research. Google Colaboratory allows performing big data analysis and processing tasks without installing or upgrading personal computer hardware. This tool is especially useful in handling heavy computing tasks and supports many libraries needed for data analysis. Next, with Google Colab, the authors trained the model based on 60,000 rows of text data labelled by rating ratio, creating a 'sentiment' column consisting of positive comments with a rating of 4-5 stars, the rest are negative comments with a star rating of 1-3. The process is carried out as shown below **(Figure 3)**

Fig. 3. BERT model deployment process



(Source: Synthesis of the authors)

The process of sentiment analysis from review data includes steps from data preparation, preprocessing, training to model evaluation, in order to build an accurate and efficient sentiment classification system. The input data is carefully prepared, combining text, star ratings and sentiment labels, ensuring diversity and completeness for the training process. Data preprocessing plays an important role in removing noise, standardizing information and improving the quality of input to the model. As a result, the best-performing model is selected to deploy the sentiment classification system, helping to automate feedback analysis effectively.

3.2. Results

Initially, the research team used 60,000 rows of data to prepare and train the model, but during the experimental run, the authors only randomly selected 12,000 rows (equivalent to 20%). This follows a common process in machine learning, where the data is divided into a training set and a test set to ensure effective evaluation of the model. Using 12,000 rows saves computational resources while still ensuring the reliability of the results, because this dataset is large enough and representative enough to accurately evaluate the performance of the model. This approach is reasonable, balancing performance, computational cost, and representativeness of the test data. The process of training and evaluating the BERT model on a sample dataset with a training set and test set split ratio of 80-20 has yielded positive results. The model was trained in 3 epochs, with the following specific indicators:

Table 1. Classification report table

Predicted Labels

Classification Report:

	precision	recall	f1-score	support
Negative	0.92	0.89	0.90	6091
Positive	0.89	0.92	0.91	5909
accuracy			0.91	12000
macro avg	0.91	0.91	0.91	12000
weighted avg	0.91	0.91	0.91	12000

(Source: Synthesis of the authors)

Based on the classification report of the BERT model, the overall performance is high with an accuracy of 91%. The average precision, recall, and f1-score (macro average and weighted average) are all 0.91, demonstrating balance and efficiency in classification. For the "Negative" class, the precision is 0.92 and the recall is 0.89, resulting in an f1-score of 0.90, indicating that the model recognizes samples in this class well. Similarly, the "Positive" class has a precision of 0.89 and recall is 0.92, with an f1-score of 0.91, reflecting reliable prediction ability. The number of samples between the two classes is quite balanced (6091 Negative samples and 5909 Positive samples), helping the model maintain stability. This shows the ability to accurately balance the positive and negative labels. This result confirms the effectiveness of BERT in automatic sentiment analysis.

- **Emotion classification with BERT model**

The BERT model uses a transformer-based training method to process the relationships between words in a sentence. Each word in the sentence is transformed into a numeric vector (embedding), and through multiple layers of self-attention, BERT learns the semantic relationships between words and understands the sentiment conveyed. For comments like "this book is a waste of time", the model recognizes negative words like "waste" and "save your money", thereby classifying the text as "negative". Similarly, for comments like "this is a darling calendar", words like "darling", "adorable", and "perfect gift" will help the model recognize this as a "positive" comment. Using labelled data (sentiment labels) during training has optimized the classification ability, helping the model become more and more accurate in classifying unlabeled comments. As a result, BERT can accurately identify positive and negative reviews even though the comments may be very different in grammar and vocabulary. To evaluate the effectiveness of the model, the authors analyzed some sample comments. Table 2 below shows the detailed analysis results.

Table 2. Analysis of comment classification results

Comment	Analysis	Classification results

“This book is a waste of time. it's just a bunch of quotes most of them not even bitchy. save your money.”	The model identifies negative words and phrases: "*waste of time*", "*just a bunch of quotes*", and "*save your money*". The phrases carry strong negative connotations, the writer is dissatisfied with the product.	“***Negative***” - The model relies on the overall context of the sentence to determine negative sentiment, thanks to BERT's self-attention capabilities.
“This is a darling calendar that i order every year for my daughter who has several corgis. it is packaged well, with adorable daily pictures. it's a perfect gift for any corgi lover with a surprise new picture for every day.”	The model identifies positive words and phrases: "*darling*", "*adorable*", “*perfect gift*” and "*surprise new picture*". The phrases create a strong impression of the writer's satisfaction and liking.	“***Positive***” - BERT processes the relationship between words in context to recognize distinct positive sentiments.

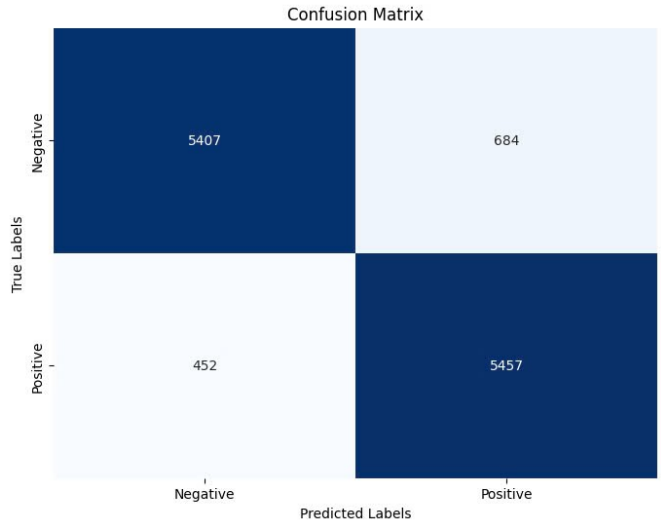
(Source: Synthesis of the authors)

- **Confusion Matrix**

The confusion matrix provides details on how the model classifies labels as Negative and Positive:

Fig.4. Confusion matrix

(Source: Synthesis of the authors)

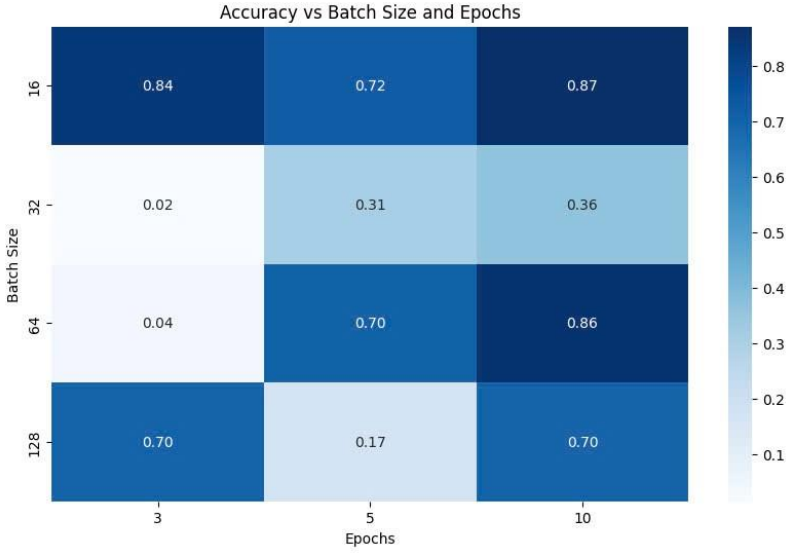


Based on the confusion matrix, the customer sentiment classification model achieved remarkable performance in analyzing responses with a total sample of 12,000. Of these, 5,407 negative responses were correctly predicted, accounting for the majority of cases under this label. However, 684 negative responses were mistakenly assigned as false positives, which may lead to an overly optimistic assessment of the customer experience when they are actually dissatisfied. On the contrary, the model correctly predicted 5,457 positive responses, reflecting its good ability to recognize positive emotions. However,

there were still 452 cases of positive responses being mistaken as false negatives, resulting in the omission of positive feedback that should have been recorded and exploited. This number of errors is within an acceptable level and does not significantly affect the overall accuracy. This error rate shows that the model tends to be slightly biased towards the Positive label as it incorrectly predicts Negative class samples as Positive. However, the error rate is not too large and the model still maintains high accuracy.

- **Hyperparameter Tuning**

Fig. 5. Hyperparameter Tuning



(Source: Synthesis of the authors)

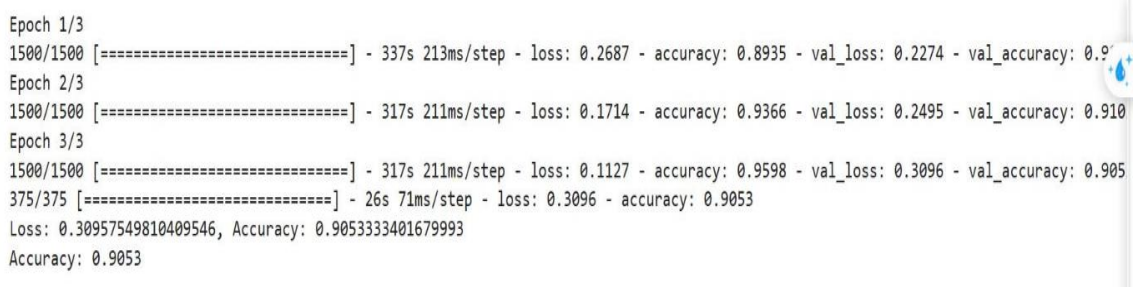
Through the chart above, we can see some specific main issues as follows: First: The effect of Batch Size on Accuracy: At batch size 16, the accuracy reaches the highest level with values of 0.84, 0.72, and 0.87 for epochs 3, 5, and 10, respectively. This shows that the model can achieve high accuracy when the batch size is small, helping the model learn details from the data. However, when the batch size increases to 32, the accuracy drops sharply, especially at epoch 3 with a value of only 0.02. At epochs 5 and 10, the accuracy increases but is still relatively low, 0.31 and 0.36, respectively. This result shows that batch size 32 is not optimal for achieving high accuracy in these epochs. With batch size 64, the accuracy is stable and gradually improves, reaching 0.70 at epoch 5 and up to 0.86 at epoch 10. This shows that batch size 64 can be a good choice if the model is trained for a longer time. Batch size 128 gives relatively high accuracy at epoch 3 (0.70), but drops significantly at epoch 5 (0.17). By epoch 10, the accuracy returns to 0.70. This shows that with large batch size, the model can learn effectively initially but cannot maintain stability throughout the entire training process. Second: Effect of Epochs on Accuracy: At batch sizes 16 and 64, the accuracy increases over time (increasing the number of epochs), indicating that the model improves with longer training. However, at batch sizes 32 and 128, the accuracy fluctuates greatly between epochs. This may be due to the batch size being too large (or too small in the case of batch size 32) for the model to be able to optimize consistently over each epoch. Finding the Optimal Settings:With this result, the optimal settings for the highest accuracy seem to be batch size 16 and epoch 10 (accuracy 0.87), or batch size 64 with epoch 10 (accuracy 0.86). If a trade-off

between training time and accuracy is needed, batch size 64 with epoch 5 may be a viable option with an accuracy of 0.70. The above results indicate that a small batch size can help the model achieve higher accuracy, but it will require more training time. Too large a batch size can cause instability and will not help the model achieve high accuracy in the initial epochs. Therefore, choosing a batch size of 16 or 64 and epoch of 10 is a reasonable setting to achieve optimal accuracy in this model.

- **Epochs in the model**

The process of training and evaluating the BERT model on the sample dataset with a training and testing set split ratio of 80-20 has brought about positive results. The model was trained in 3 epochs, with the following specific indicators: (1) Epoch 1: In the first iteration, the model achieved an accuracy of 89.35% on the training set with a loss value of 0.2687, showing the model's ability to learn early training patterns. On the testing set, the model achieved an accuracy of 90.82% and a loss value of 0.2274, reflecting initial stability and high generalization ability in the first training. (2) Epoch 2: In the second iteration, the model continued to improve its training set accuracy, increasing to 93.66%, and the loss value decreased to 0.1714, indicating that the optimization continued to progress effectively. On the testing set, the accuracy reached 91.03% and the loss value was 0.2495, only a slight increase from the previous iteration. This shows that the model has learned many important features in the data, but the slight increase in the loss value may be an early sign of overfitting. (3) Epoch 3: In the final iteration, the training set accuracy reached 95.98% with the loss value decreasing to 0.1127, indicating maximum learning from the data. However, on the test set, the accuracy drops to 90.53% and the loss value increases to 0.3096, indicating that the model may have overfitted the training data. The details are shown in Figure 6.

Fig 6. BERT model training performance over each Epoch



Source: Synthesis of the authors)

Thus, the training and evaluation of the BERT model have achieved positive results, demonstrated by its ability to learn data features well and high performance on the test set. However, signs of overfitting appear at the final stage, requiring further adjustment of the training parameters to balance learning and generalization. However, this also emphasizes the potential of BERT in processing comment data and the necessity of optimization to achieve the best performance.

4. CONCLUSION

This study confirms the exceptional potential of the BERT model in classifying and evaluating sentiments from customer comments on the Amazon e-commerce platform. Leveraging its bidirectional semantic learning capability and effectiveness in processing unstructured text data, BERT has demonstrated itself as a robust tool for automating sentiment analysis, delivering high performance and strong generalization ability. The

research findings demonstrate that this model can be effectively applied to enable businesses to quickly understand customer feedback. This capability facilitates the optimization of product strategies, improvement of services, and enhancement of the shopping experience, thereby making significant contributions to reputation management and data-driven strategic planning. Policymakers and businesses can leverage this tool for forecasting and strategic planning. By employing the BERT model, businesses can gain deeper insights into customer sentiments, preferences, and emerging trends, facilitating data-driven decision-making. This approach enhances the accuracy of market predictions and supports the development of targeted and effective strategies, ensuring competitiveness in the dynamic e-commerce landscape.

However, the study has certain limitations that need to be addressed. First, the exclusive use of the BERT model without comparisons to other advanced natural language processing models, such as GPT (Generative Pre-trained Transformer), XLNet, ERNIE (Enhanced Representation through Knowledge Integration), ELECTRA (Efficiently Learning an Encoder that Classifies Token Replacements Accurately), and T5 (Text-to-Text Transfer Transformer), limits the ability to evaluate its performance comprehensively. This limitation is the premise for further research in the future, focusing on comparing different models and adjusting parameters to optimize performance. At the same time, implementing preprocessing techniques and using more diverse datasets will also help improve the results and expand the applicability of the model to other fields besides e-commerce. These developments promise not only to enhance the practical value of the research but also contribute to promoting the development of artificial intelligence in big data analysis.

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FROM WORK MOTIVATION TO EMPLOYEE INNOVATION BEHAVIOR - THE MEDIATING ROLE OF PSYCHOLOGICAL CAPITAL AND TRANSFORMATIONAL LEADERSHIP STYLE IN ENTERPRISE IN THE CONTEXT OF DIGITAL TRANSFORMATION

Huy Cong Nguyen[1], Thi Minh Phuong Nguyen[2], Quang Bach Tran[3], Thi My Huong Nguyen[4], Hung Cuong Pham[5], Hung Xuan Dinh[6]

Abstract: Individual creativity is the ability to generate and implement creative ideas in an organization (Hu et al., 2009). In the context of digital transformation becoming an inevitable trend today, promoting innovation efficiency is considered an important competitive tool for every organization. This study aims to examine the impact of work motivation on employee innovation behavior in Vietnamese enterprises in the context of digital transformation. Using quantitative research methods through structural equation modeling (SEM) analysis. Research data was collected through a survey of 476 employees working in enterprises that have applied digital transformation, including both state-owned and private enterprises. The research results show that work motivation not only has a direct and positive impact but also an indirect impact on employees' innovative behavior through the mediating factors of psychological capital and transformational leadership style. At the same time, transformational leadership style is also proven to have an impact on employees' psychological capital. These findings represent important contributions to the research. On that basis, the study proposes a number of recommendations to promote employees' innovative behavior in enterprises in the context of digital transformation.

Keywords: Work motivation; Innovative behavior; Psychological capital; Transformational leadership style; Digital transformation.

1. Introduction

In the context of international integration and globalization, the business market is constantly changing, innovation in enterprises becomes extremely important, especially when enterprises need to create new competitive advantages to counter the continuous rise of competitors in the same industry. According to Hu et al. (2009), individual creativity is the ability to create and implement creative ideas in the organization. Research by Patterson et al. (2009); Hu et al. (2009) shows the important role of individual creativity in the success of organizations. Individual creativity can help increase the competitive advantage of enterprises (Palangkaraya et al.,, 2010).

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Creativity shows more initiative in work, stimulates creativity to contribute to creating an effective working environment, minimizing risks at work as well as unwanted behaviors (Zaccaro, 2007). Many studies in the world show the important role of individual creativity in the success of organizations (Patterson et al., 2009; Hu et al., 2009). Research by Ortt and Duin (2008) shows that innovation reduces competitiveness in a dynamic business environment. Today, companies need to innovate to develop and are encouraged to develop their innovation activities through behavioral models (Sweetman et al., 2010). Most creative ideas are generated from the workplace of individuals (Carmeli et al., 2006).

In studies related to innovative behavior, many works have mentioned and demonstrated the impact of factors on innovative behavior, including employees' work motivation. Knippenberg and Hogg (2003) said that readiness to change is considered a scale to evaluate leadership results in addition to the motivation and work results of subordinates, their compliance and obedience or the perception of the leader's personal prestige. Readiness or innovative thinking is also assessed through testing and implementing creative ideas, searching for new approaches... (Koene et al., 2002). According to Daus and Ashkanasy (2005), employees' creative capacity at work is related to the leader's emotional capacity, interdependence at work.

In fact, in Vietnam today, digital transformation has become an inevitable trend in most industries and fields of operation. Digital transformation is taking place strongly with the rapid development of science and technology, creating major changes for businesses of all types and fields. Businesses can easily access many different resources in business, the connection between businesses, suppliers, and customers becomes more convenient thanks to the use of digital technology platforms. However, digital transformation activities in businesses today still face many obstacles because most Vietnamese businesses are small and medium-sized, have limited technological capacity, not many businesses and individuals own technology patents, mainly use available foreign technologies; the State's policy and legal corridor on e-government, transactions, and administrative procedures on digital platforms are still in the process of completion, so there are still many shortcomings in the operation process. At the same time, a factor considered an essential foundation for successful digital transformation is that innovation in organizations still has many limitations. Many businesses seem to be struggling with the problem of promoting employee behavior and creativity to suit the current global digital transformation context.

This study aims to examine the impact of work motivation on employees' innovative behavior in Vietnamese enterprises in the context of digital transformation. The findings of the study have made valuable contributions by showing that work motivation not only has a direct and positive impact but also an indirect impact on employees' innovative behavior through the mediating factors of psychological capital and transformational leadership style. At the same time, transformational leadership style is also proven to have an impact on employees' psychological capital. These findings represent important contributions in the study. On that basis, the study proposes a number of recommendations to promote employees' innovative behavior in enterprises in the context of digital transformation.

2. Literature review and hypotheses

2.1. Literature review

** Innovative behavior:*

Individual creativity is the ability to generate and implement creative ideas in an organization (Hu et al., 2009). Organizations depend on their employees for the creative

ideas generated in the areas of products and services (Patterson et al., 2009). In addition, the ability to implement individual innovation is also an important aspect of individual creativity (Carmeli et al., 2006; Xerri and Brunetto, 2011). When an organization faces fierce competition, the innovation factor in the organization is a key factor to help the organization best meet customer requirements and satisfy customers the most (Hu et al., 2009). Individual creativity is also the ability to motivate innovation and creativity in the organization (Hu et al., 2009; Kheng and Mahmood, 2013).

According to Kheng and Mahmood (2013), individual creativity plays a central role in the long-term survival and development of organizations in the economy. Similarly, the study of Shalley et al. (2004) suggests that creativity at work is the development of new ideas for product and service applications or the process of creating a high-value, potential platform for the organization. Employee creativity in the organization is understood as the creation of new, valuable ideas and creating benefits for the organization by employees (Shalley et al., 2004).

According to the OECD concept (2005), innovation includes: Product innovation; Process innovation; Marketing innovation and organizational innovation. Each form of innovation has an impact on the performance of businesses. Innovation is the decisive factor in competitiveness, growth, profitability and creating sustainable values for businesses (Ramadani & colleagues, 2016; Wahyono, 2020).

** Motivation to work:*

Kinman (2001) suggested that intrinsic motivation has both cognitive and affective elements. They suggested that there is a drive for mastery (cognitive) and curiosity (affective) in individuals, and the main elements are associated with self-determination. In contrast, they proposed that extrinsic motivation is linked to an evaluation of a predicted outcome. Hackman and Oldham (1980) expressed the state in which workers strive to perform effectively and create job satisfaction as an intrinsic motivator.

Understanding the factors that can influence the motivation of employees is important for organizations today (Uruthirapathy and Grant, 2015). The research results of Buble et al. (2014) showed that the dominant factor on work motivation is their participation in decision making, making them feel responsible, and in addition, they find material rewards as a significant motivator. Cianci and Bierstaker (2009) studied and pointed out the impact of recognition, satisfaction with leadership, nature of work and working environment on the motivation of employees.

** Psychological capital:*

Psychological capital is human nature and is a positive psychological state in the development of an individual (Avey et al., 2009). Luthans et al. (2007) define psychological capital as the positive psychological development of an individual, psychological capital includes four factors: self-confidence, hope, optimism, and adaptability. In other words, psychological capital is a concept that refers to the level of positivity in an individual's thinking and psychology and is related to the development of that individual. Psychological capital is described by: (i) the confidence to take on and perform challenging tasks with the effort required to achieve success; (ii) an optimistic attitude about current and future success; (iii) perseverance towards goals and when necessary, being able to change goals to achieve success; and (iv) when faced with adverse issues, they maintain, adapt and overcome obstacles to achieve success (Luthans & Youssef, 2007). According to Luthans et al. (2005), psychological capital is a concept with key points: (i) based on the positive psychology model, (ii) including

psychological states based on positive organizational behavior or criteria of positive organizational behavior, (iii) going beyond human capital and psychological capital to determine "who you are", (iv) related to investment and development to achieve benefits that bring about improved work efficiency and create competitive advantage. The concept of overall psychological capital including the above 4 components has also been studied by many empirical studies, typically the studies of Larson and Luthans (2006); Luthans et al. (2008).

In the stages of development, organizational capital has been of interest to many studies, research works show that capital has been transformed from traditional economic capital into human capital, second social capital and finally psychological capital (Jafri, 2012). In which, psychological capital is human nature and is a positive psychological state in the development of individuals (Avey et al., 2009). Many studies refer to psychological capital, the results show that psychological capital promotes innovation within organizations through creating a suitable environment (Abbas & Raja, 2011; Luthans & Avey 2011; Jafri, 2012; Rego et al., 2012). Identifying the drivers and factors that generate individual creativity is considered essential for improving individual creativity as well as organizational creativity and success (Xerri & Brunetto, 2011).

** Transformational leadership style:*

According to Dvir et al. (2002), transformational leadership is a leadership style that creates engaging behaviors, inspires motivation, stimulates intellectual development and creativity at work. Transformational leadership creates initiative, builds solidarity, and positive working psychology of employees.

Transformational leadership theory was proposed by Burns (1978). Burn (1978) stated that transformational leadership is the one who clarifies the vision of the future and shares it with employees, stimulates employee intelligence and cares about individual differences among employees. According to Dvir et al. (2002), transformational leadership is a leadership style that creates attractive behaviors, inspires motivation, provides intellectual stimulation and considers each individual when dealing with employees,... these behaviors change employees, help them maximize their potential and achieve the highest level of efficiency in work.

The success of a leader is evidenced by their management styles at work (Tran et al., 2022). The ability of employees to perform a particular task is a key role of a transformational leader following the impression management strategies used by employees (Aggarwal & Krishnan, 2013). Transformational leaders have an incredible knack for creating organizational engagement and performance outcomes that go beyond the desired plan to surprise all stakeholders with efforts that would not be possible in a normal situation (Ahmad et al., 2017).

2.2. Hypothesis

2.2.1. Work motivation and innovative behavior

Motivation is an important factor of innovation, Oliver & Kandadi (2006) study suggests that the effectiveness of policies based on employee motivation and creating initiative in work has an impact on knowledge sharing and developing a knowledge-oriented organizational culture. Syed-Ikhsan and Rowland (2004) argue that organizational performance associated with innovative behavior based on knowledge sharing will be highly effective when information is easily circulated throughout the company, with a simple organizational structure, few levels and boundaries between departments. So how does work motivation relate to innovative behavior in Vietnamese enterprises in the context of digital transformation, the study hypothesizes:

H1: Work motivation positively affects employees' innovative behavior at Vietnamese enterprises in the context of digital transformation.

2.2.2. Work motivation and psychological capital

Psychological capital is the nature of human beings and is a positive psychological state in the development of individuals (Avey et al., 2009). Psychological capital is considered an important factor and has a significant impact on almost all employee activities in the enterprise. Chiu (1999) determined the relationship between positive psychological state and work motivation with the indirect impact of perceptions of organizational justice in salary payment, salary satisfaction and job satisfaction. In order to assess the impact of work motivation on employees' psychological capital in Vietnamese enterprises in the context of digital transformation, the study conducted a hypothesis building:

H2: Work motivation positively affects employees' psychological capital at Vietnamese enterprises in the context of digital transformation.

2.2.3. Psychological capital and innovative behavior

Zhong's (2007) study found that employees' psychological capital can effectively promote work attitudes and work performance. Employees' optimism helps them believe in themselves, courageously overcome difficulties, create satisfaction and aim for success in all jobs (Icekson et al., 2020; Zhang et al., 2020). People with optimism and high levels of hope tend to view difficult problems at work as challenges and learning opportunities to improve their own abilities and are completely able to solve them (Youssef & Luthans, 2007).

The creation and establishment of innovation depends on changes in the organization and the size of the capital of that organization (Mohanty, 2009). According to Thun (2009), good leadership will make subordinates have a good psychological state when working such as better concentration, feeling like a useful part of the organization, participating in the decision-making process, facing and overcoming difficulties more easily, rarely feeling pressured, unhappy, losing confidence in themselves.

Researching the impact of psychological capital on employees' innovative behavior in enterprises in the current context of digital transformation, the hypothesis is put forward in the study:

H3: Psychological capital positively affects employees' innovation behavior in Vietnamese enterprises in the context of digital transformation.

2.2.4. Employee motivation and transformational leadership

Leadership is an art and leadership style is a tool that determines the effectiveness of management activities. Buble et al. (2014) pointed out the relationship between leadership style and employee motivation. Similarly, McCrie's (2016) study also mentioned the support and encouragement of supervisors and employees in labor through human resource policies and job satisfaction with the role of leadership style. With transformational leadership style, most previous studies have shown the positive impact of leadership style on employee motivation. However, the opposite relationship has not been mentioned in studies. Therefore, with the purpose of testing the impact of employee motivation and transformational leadership style in enterprises, the study builds the hypothesis:

H4: Employee work motivation positively affects transformational leadership style in Vietnamese enterprises in the context of digital transformation.

2.2.5. Transformational leadership and innovative behavior

To date, many studies have mentioned the relationship between transformational leadership style and work performance, many of which show contradictory results such

as studies by Dvir et al., 2002; Katsikeas et al. (2009); Chalkiti (2012)... Research by Araz et al. (2018) shows that transformational leadership style has a positive relationship with employees' creative work behavior. Similarly, Patterson et al. (2009) in their study also demonstrated that leadership style has an impact on employees' creativity. Meanwhile, Yesil and Sozbilir (2013) argued that only the open-minded factor has a positive impact on employees' creativity at work. So, in the context of digital transformation in Vietnamese enterprises, does transformational leadership style have an impact on employees' innovative behavior? The hypothesis is posed:

H5: Transformational leadership style positively affects employees' innovative behavior in Vietnamese enterprises in the context of digital transformation.

2.2.6. Transformational leadership and psychological capital

Leadership is an art, Arshad et al. (2016) argued that managers focus on listening, building relationships, working in teams, inspiring, motivating and persuading employees. The research results of Hoxha and Heimerer (2019) showed that transformational leadership style has a positive impact on employee performance. The research of Lei et al. (2020) found the important role of practicing transformational leadership style to nurture and promote both positive psychological resources of employees and the ability to innovate and create in the enterprise. Therefore, the hypothesis is put forward:

H6: Transformational leadership style positively impacts employees' psychological capital in Vietnamese enterprises in the context of digital transformation.

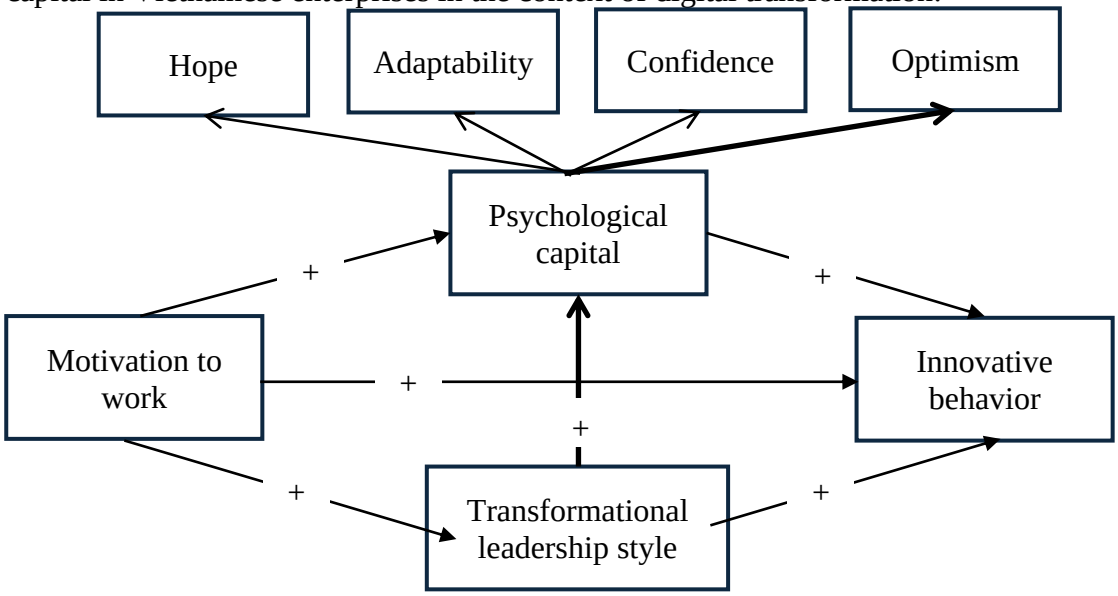

Figure 1. The proposed research model

3. Research methodology

3.1. Research scale

Based on the theoretical overview and related works, the study proposes a model with 4 variables. In which, the independent variable is employee work motivation with 5 indicators; The dependent variable is innovative behavior with 5 indicators; The intermediate variables are psychological capital including hope (5 indicators), adaptability (4 indicators), confidence (4 indicators), optimism (4 indicators) and

transformational leadership style with 6 indicators. The study uses a Likert scale with 5 rating levels corresponding to scores from 1 to 5 (1- Strongly disagree; 2 - Disagree; 3 - Neutral; 4 - Agree; 5 - Strongly agree). The indicators measuring the applied variables are adjusted to suit the characteristics of the research sample from previous studies.

Table 1. Origin of the scale of variables

No.	*Variable*	*Symbol*	*Number of observations*	*Origin of scale*
1	Work Motivation	MOT	5	Stee and Porter (1983)
2	Psychological Capital	PSY	17	Luthans et al. (2005)
	Hope	HOP	5	
	Adaptability	ADA	4	
	Confidence	CON	4	
	Optimism	OPT	4	
3	Transformational Leadership	TRL	6	Burns (1978)
4	Innovative Behavior	TNN	5	Hu et al. (2009); Kheng and Mahmood (2013)

3.2. Research samples

The context of the study is determined to be enterprises that have been deploying and applying digital transformation technologies in production, business and business operations, including both state-owned and private enterprises. Due to the uneven distribution of the sample between different regions and areas and for convenience in the sampling process, the study selected samples using the non-probability sampling method, which is convenience sampling. Data were collected through relatively stratified sampling according to different localities distributed across the three regions of North, Central and South of Vietnam.

The survey unit in the study was determined to be employees working at enterprises. The data collection process was conducted in both ways including direct distribution of questionnaires and online survey through Google Form survey tool. In terms of direct distribution, the number of questionnaires distributed was 300, the number of questionnaires collected was 269, the number of usable questionnaires was 221. In terms of online survey, the total number of questionnaires sent was 300, the number of questionnaires collected was 272, the number of usable questionnaires was 255. The total number of valid questionnaires used for analysis was 476. Based on the study of Hair et al. (2010) for reference on the expected sample size, the minimum sample size is 5 times the total number of observed variables. With the number of observations in the article being 33, the research scale includes 476 samples to ensure the analysis requirements. The data collection period for this study is from February 2024 to November 2024.

Of the total 476 samples collected, 257 were collected from male employees (53.99%), 219 were collected from female employees (46.01%). The number of employees working in state-owned enterprises was 109, accounting for 22.90%, and the number of employees working in private enterprises was 367, accounting for 77.10%

Table 2. Sample characteristics

Characteristic	*Quantity*	*Percentage (%)*
Gender		
Male	257	53.99
Female	219	46.01
Business type		
State-owned Enterprises	109	22.90
Private Enterprises	367	77.10

3.3. Data processing

Using quantitative research methods, the data after collection and cleaning were processed through SPSS 22.0 and AMOS 22.0 software. The data processing process was carried out through the following steps:

First, the study assessed the reliability of the scale using SPSS software with the requirement of Cronbach's Alpha value > 0.7; total item correlation coefficient > 0.3. At the same time, if the Cronbach's Alpha If Item Deleted value is greater than the Cronbach's Alpha coefficient of a variable, it is necessary to consider this type of observed variable (Hair et al., 2010).

Second, the study conducted exploratory factor analysis (EFA) to determine the convergent value and discriminant value of the scale and with the requirement of factor loading coefficient (Factor loading) > 0.5; KMO coefficient >= 0.5 and <=1; Sig. value < 0.05; percentage of variance extracted > 50% (Hair et al., 2010). At the same time, if any indicator is eliminated, the study will re-evaluate the reliability of the variable containing that indicator to ensure the reliability of the scale.

Third, the study conducted confirmatory factor analysis (CFA) using AMOS software to assess the suitability of the research model, while providing accurate assessment indicators of the suitability of the model as well as providing convincing evidence of the convergent and discriminant validity of the theoretical structure.

Finally, the study will conduct hypothesis testing using structural equation modeling (SEM).

The requirements of CFA and SEM testing include: chi-square/df index < 3 (Hair et al., 2010); P < 0.05; GFI, TLI, CFI > 0.8 (Segars & Grover, 1993); RMSEA < 0.05 (Taylor et al., 1993).

4. Research results and discussion

4.1. Testing the reliability of the scale

The results of the reliability assessment of the scale for the variables in the model show that the Cronbach's Alpha coefficient of all variables is > 0.7, the total correlation coefficient of all observed variables is also > 0.3. At the same time, the Cronbach's Alpha coefficient If Item Deleted if the observations are removed is smaller than the Cronbach's Alpha coefficient of the variables. These results demonstrate the reliability of the scale and the data values included in the analysis in the research model.

Table 3. Evaluate the reliability of the scale through Cronbach's alpha coefficient

No.	*Variable*	*Symbol*	*Cronbach's alpha*
1	Work Motivation	MOT	0.909
2	Psychological Capital	PSY	
	Hope	HOP	0.868
	Adaptability	ADA	0.802

	Confidence	CON	0.911
	Optimism	OPT	0.916
3	Transformational Leadership	TRL	0.922
4	Innovative Behavior	TNN	0.941

4.2. Exploratory factor analysis (EFA)

After assessing the reliability of the scales and giving results on the suitability and reliability of the scales used, the study conducted exploratory factor analysis (EFA). The EFA analysis process was conducted twice, the first time was applied to all independent and mediating variables; the second time was applied to the dependent variable.

The analysis results in both times showed that the data met the requirements, ensuring suitability and eligibility for analysis due to the factor loading coefficients (Factor loading) > 0.5; KMO coefficient >= 0.5 and <=1; Sig. value < 0.05; percentage of variance extracted > 50% and satisfying both conditions of "Convergent validity" (observed variables converge to the same factor) and "Discriminant validity" (observed variables belonging to this factor are distinct from other factors).

Table 4. Exploratory Factor Analysis Results

EFA analysis	*KMO coefficient*	*P-value*	Variance extracted	*Factor loading*	*Conclusion*
Independent and mediating variables	0.920	0.000	72.698	All coefficients > 0.5	Meet requirements
Dependent variable	0.905	0.000	81.108	All coefficients > 0.5	Meet requirements

4.3. Confirm factor analysis (CFA)

After assessing the reliability of the scale as well as exploratory factor analysis (EFA), the study used AMOS software to conduct confirmatory factor analysis (CFA) to test the reliability and validity of the measurement model with observed data, and at the same time provide accurate assessment indicators of the model's suitability and establish measurement models.

The results of CFA analysis in this study showed the suitability of the measurement model with the observed data, specifically the Chi-square index = 997.032; df = 474; P = 0.000 (< 0.05); Chi-square/df = 2.103 (< 3); GFI = 0.883 (> 0.8); TLI = 0.950 (> 0.8); CFI = 0.955 (> 0.8); RMSEA = 0.048 (< 0.05)

4.4. Structural equation modeling analysis (SEM)

To test the hypotheses, the study conducted a structural equation model analysis using SEM. The analysis results showed that the composite indexes all met the requirements. Specifically, the Chi-square index = 1033.017; df = 485; P = 0.000 (< 0.05); Chi-square/df = 2.130 (< 3); GFI = 0.880 (> 0.8); TLI = 0.949 (> 0.8); CFI = 0.953 (> 0.8); RMSEA = 0.049 (< 0.05).

Figure 2. SEM model analysis

The results of estimating the relationships in the model show that the research model is suitable, all hypotheses from H1 to H6 are accepted with a significance level in the test P < 0.05 and have positive regression coefficients.

Specifically, hypothesis H1 is accepted with a significance level of P < 0.05 and the regression weight in the test is 0.183 (> 0). Therefore, it can be concluded that work motivation has a positive impact on the innovation behavior of employees at Vietnamese enterprises in the context of digital transformation. This result is similar to the studies of

Oliver & Kandadi (2006).

Hypotheses H2 and H3 were accepted with the significance level P < 0.05 and had regression weights in the test of 0.216 and 1.241 (> 0), respectively. Thus, work motivation has a positive impact on employees' psychological capital and psychological capital also has a positive impact on employees' innovative behavior at Vietnamese enterprises in the context of digital transformation. In other words, psychological capital plays a mediating role in the relationship between work motivation and innovative behavior. These conclusions support the results in previous studies of McCrie's (2016).

Similarly, hypotheses H4 and H5 were accepted with significance level P < 0.05 and had positive regression weights in the test. This shows that transformational leadership style is also proven to play a mediating role in the relationship between work motivation and innovation behavior. This is a conclusion that represents a significant contribution to the research, because most previous studies have shown the impact of transformational leadership style on employee work motivation, with few cases of the opposite.

In addition, by accepting hypothesis H6, the research results also show that transformational leadership style has a positive impact on the psychological capital of employees in Vietnamese enterprises in the context of digital transformation. This result is similar to the conclusion in previous studies of Lei et al. (2020).

Table 5. Results of SEM analysis for relationships in the model

Hypothesis	*Relationship*	*Weightage*	*S.E.*	*C.R.*	*P*	*Conclusion*
H1	TNN <--- MOT	0.183	0.047	3.871	0.000	Accepted
H2	PSY <--- MOT	0.216	0.035	6.106	0.000	Accepted
H3	TNN <--- PSY	1.241	0.144	8.650	0.000	Accepted
H4	TRL <--- MOT	0.564	0.039	14.657	0.000	Accepted
H5	TNN <--- TRL	0.185	0.051	3.661	0.000	Accepted
H6	PSY <--- TRL	0.176	0.039	4.499	0.000	Accepted

Thus, by accepting all 6 hypotheses included in the initial proposed model, the results of the study have shown significant contributions in both theory and practice. Scientifically, the study not only shows the direct and positive impact of work motivation on employees' innovative behavior in enterprises but also proves the mediating role of both psychological capital and transformational leadership style in this relationship. Practically, the results of the study will be very useful documents for policy makers and business managers to see the importance of factors that have a significant impact on changing employees' innovative behavior in a positive direction, thereby having the most appropriate orientations and solutions in each specific context in the enterprise.

5. Conclusions and recommendations

5.1. Conclusions

Based on the theoretical overview and related research works, this article proposes a model and conducts a test of the impact of work motivation on employees' innovative behavior in Vietnamese enterprises in the context of digital transformation. The test results have shown the important contributions of this study when proving that work motivation not only has a direct and positive impact but also an indirect impact on employees' innovative behavior through the mediating factors of psychological capital and transformational leadership style. At the same time, transformational leadership style is also proven to have an impact on employees' psychological capital.

5.2. Recommendations

Based on the research results, the article proposes some recommendations to promote

innovative behavior of employees in enterprises in the context of digital transformation:

Firstly, with the motivation of employees, businesses need to have policies to motivate employees on the basis of creating fairness in both processes, results and attitudes, management policies need to be built on the basis of regular concerns and in accordance with the legitimate needs of employees. At the same time, businesses need to create long-term employee attachment to the business, build a working environment that encourages innovation so that employees can maximize their abilities at work, creating attraction and meaning of work for employees.

Second, with the psychological capital of employees, businesses need to have policies to support employees in the process of performing their work, increase their ability to adapt to work, create confidence, optimistic and enthusiastic working spirit for employees; encourage employees to develop professional capacity and professional skills through reasonable job evaluation activities, create opportunities for employees to be trained and develop professional skills. It is necessary to avoid discrimination in all management activities and labor policies from recruitment, labor relations, allowances... Care and look after the material and spiritual life of employees, create a safe, healthy and effective working environment.

Third, with transformational leadership style, managers in enterprises need to proactively build for themselves appropriate management styles in each specific context, encourage employees to promote innovation and creativity in work, proactively propose new ideas and feasible solutions. At the same time, enterprises need to provide resources such as finance, time and appropriate tools to help employees implement their ideas.

5.3. Limitations and future research

In addition to the valuable conclusions drawn, the study also has certain limitations. Firstly, due to the uneven distribution of the sample between different regions and areas, and for convenience in the sampling process, the study selected the sample using a non-probability sampling method, which is convenience sampling. This is a method in which the representativeness and overall quality of the research sample is not high. Secondly, in addition to the two mediating factors mentioned in the model, which are psychological capital and transformational leadership style, it is necessary to consider the impact of work motivation on employees' innovative behavior through other mediating or moderating factors. In addition, the context of the study is also limited to enterprises in Vietnam. With the trend of digital transformation taking place more and more rapidly, strongly and globally as it is today, the study opens up directions for similar studies conducted for enterprises of different sizes in countries in the region and around the world.

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