# IMPACT OF SUPPLY CHAIN COLLABORATION ON AGRICULTURAL ECONOMNIC DEVELOPMENT IN THE CONTEXT OF DIGITAL TRANSFORMATION: A CASE STUDY IN VIETNAM

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***Abstract:*** *The conduction of this study aims at testing the impacts of collaboration level in the supply chain on agricultural economic development in the context of digital transformation in Vietnam. The study applies the quantitative research method, by the analysis of Sequential Equation Model (SEM), with a sample size of 517 samples, including managers in governmental departments in the field of agriculture. The research results in both theoretical and practical contributions, demonstrating the importance and direct impact of collaboration level in the supply chain to the agricultural economic development, as well as the intermediary role of information sharing risk factors in collaboration and mechanism of financial resources mobilization and use. Based on the research results, the authors propose a number of recommendations to increase the efficiency of collaboration in the supply chain, thereby contributing to the development of the agricultural economy in the current context of digital transformation in Vietnam. .*

***Keywords:*** *the supply chain collaboration; Risks of information sharing; Agricultural economic development; Digital transformation.*

## 1. Introduction

In the current context of integration and globalization, digital transformation of the agricultural sector plays a particularly important role in restructuring the agricultural sector, developing centralized and large-scale commodity agriculture towards modernity, sustainability and high added value. Digital transformation is an important solution to help manufacturing enterprises improve quality at the lowest cost but with the highest profit. This goal is also being promoted by industries, localities, enterprises and people, with the expectation of creating a breakthrough in productivity, quality and competitiveness for agricultural products.

Characterized by the requirements of the "*doimoi/reform*" process in conjunction with the context of the 4.0 technology revolution, it is necessary for rural agriculture needs to be breakthroughs, audacious but effective to ensure the rapid and sustainable economic development, and to create a goods consuming market that is diversified in terms of type, quantity, quality and services (Tran et al., 2022). In the context of integration and globalization and correspondingly a world of uncertainty, instability and trade liberalization which promotes free trade areas, supply chains are an effective solution for the partnership and survival of enterprises.

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In a global supply chain, branding and labeling are considered by world's large enterprises as important and most valuable steps, having great influence on the whole chain. Organizations increasingly want to come closer together to effectively manage supply and distribution channels to both optimize costs and increase customer satisfaction, which contribute to the improvement of competitiveness and the profitability of participating organizations (Lee, 2000). Croxton et al. (2001) argue that keeping a long-term relationship is a necessary activity to move towards efficiency in supply chain collaboration.

Environmental instability creates many risks for businesses (Davis, 1993; Simchi - Levi et al., 2003). The risk from market demand is due to volatile, complex and unstable market demand (Boyle et al., 2008). Risks in the supply chain can arise due to the impacts of the political, economic, social, and natural environment, etc., and these risks increase as the supply chain is increasingly expanded and more complex. (Khan and Burnes, 2007).

In fact, in Vietnam, digital transformation of the agricultural sector is getting more attention and being realized through many applied mechanisms and policies and gradually bearing fruit. Science and technology applied in the production and consumption of agricultural products continue to develop which create productivity and quality breakthroughs and increase the competitiveness of enterprises; the agriculture is becoming greener, cleaner, and smarter. Many key agricultural products from the provinces and localities with which science and technology are applied broadly to seed production, farming, and processing have been promoted in export and brought great success and momentum for the economy. However, despite some outstanding achievements, the process of digital transformation of the agricultural sector in Vietnam still faces with many difficulties and challenges such as: low level of mechanization, disproportional development of agricultural supporting technologies; experience-based forecasting of production of agricultural products; inconsiderable number of agricultural enterprises invested in digital transformation; the limited number of personnel highly qualified in digital agriculture; and low level of farmers' awareness and skills in applying digital technology.

On the basis of a theoretical overview, the study builds a model and tests the impact relationships of collaboration level in the supply chain on agricultural economic development in the context of digital transformation in Vietnam. Using the quantitative research method, through the analysis of the Sequential Equation Model (SEM), the research results demonstrate both direct and indirect impact of collaboration level in the supply chain on the agricultural economic development, through the intermediary factors of information sharing risks in collaboration and mechanism for financial resources mobilization and use. These results represent both the theoretical and practical

contributions of the study. Based on the research results, the authors propose a number of recommendations to increase the efficiency of collaboration in the supply chain, thereby contributing to the development of the agricultural economy in the current digital transformation context in Vietnam.

## 2. Literature review and hypotheses

## 2.1. Literature review

Supply chain collaboration is viewed as a business process whereby two or more partners in the supply chain work together towards common goals (Mentzer et al., 2001; Stank et al., 2001; Manthou et al., 2004; Sheu et al., 2006), while supply chain collaboration is also considered as the formation of close, long-term partnerships where supply chain members work together and share information, resources, and risks to accomplish common goals (Bowersox et al., 2003; Golicic et al., 2003).

Digital agriculture refers to agricultural activities that collect, store, analyze and share data and information electronically along the agricultural value chain (Trendov et al., 2021). Digital agriculture is also referred to with different terms such as "precision agriculture", "smart agriculture", "electronic farming" or "Agriculture 4.0" (Bertoglio et al., 2021; Shen et al. ., 2010). Agricultural economic development is an economic transformation process related to the structural transformation of the economy through industrialization, increase of gross domestic product and per capita income (Nguyen, 2016). . Rostow (1960) suggested that the economic development process of a country comprises of five stages of development from low to high level, including: conventional society, take-off preparation, take-off, maturity and high consumption. The take-off phase is the turning point for changing the level of economic development and is the bullseye for developing countries. According to Kuznets (1964), the contribution of agriculture to GDP growth plays a decisive role in the early stages of industrialization, but gradually decreases in the long run.

Risk is defined in different ways depending on the field of study (Wagner & Bode, 2008). Regarding supply chains, risks are alternations or disruptions that, when they occur, affect the flow of information, raw materials and finished products from the original supplier to end customer, disrupt the supply chain, and lower the revenue of enterprises. According to Juttner et al. (2003), risks in the supply chain are those related to information, the flow of raw materials and products from suppliers to end consumers, and their ability to affect market's supply and demand disproportion.

In 1998, the term of *supply chain management* continued to be developed then be defined by the global supply chain forum (GSCF) as "the integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders". According to Lee et al. (2007), integration in the supply chain should be considered from three angles: (1) Integration with customers; (2) Integration with suppliers and (3) Integration within the enterprise. There needs to be a link between the members of the chain so that the flow of information, materials, and products is accurate and timely circulated (Lambert & Cooper, 2000).

Mechanism is the structure of a whole consisting of many different components, which are closely related to each other and the mode of operation or performance of that whole, that is, the

interaction within the components in the structure of the whole, according to defined principles and processes in order to achieve a certain result (Yun, 2005). Theo Nguyen el al. (2021), the mechanism for financial resources mobilization and use for new contryside construction are the orientations and solutions that the State develops and promulgates in order to mobilize and use financial resources to implement the program synchronously. In order to have a strong and synchronous mechanism for mobilizing and using financial resources, it is necessary to establish a legal and policy framework for the management from mobilizing to using financial resources, apparatus management and decentralization from the central to local levels, visible planning for follow-up implementation and finally the inspection and examination.

## 2.2. Research hhypotheses

### 2.2.1. Collaboration level in supply chain and agricultural economic development

From a general perspective of supply chain, Li et al. (2006) demonstrated the impact of supply chain linkages on long-term financial and marketing outcomes. Research by Vickery et al. (2003) confirmed the failure to find evidence of the impact of supply chain linkages on Return on Assets (ROA). The strengthening of collaboration with suppliers can also help businesses enjoy preferential regimes, including preferential prices for goods, thereby reducing input costs, increasing efficiency and effectiveness of business performance of organizations (Nguyen et al. 2021).

Research by Qingbo et al. (2018) and Zhongming et al. (2018) shows that by linking components of traditional supply chains, such as supply methods, production research, integrated sales through mobile Internet, IoT and big data, China has built an agricultural value chain model to create a series of value-added services for agricultural production, improve the lives of rural farmers and promote consumption patterns, thereby improving the efficiency of the agricultural supply chain. Regarding the context of digital transformation in Vietnam's agriculture, in studying the relationship between the collaboration level and agricultural economic development, the hypothesis is developed:

**H1:** The collaboration level in the supply chain positively impacts agricultural economic development in the context of digital transformation in Vietnam.

### 2.2.2. Collaboration level and information sharing risks in collaboration

Collaboration in the supply chain creates many breakthrough values for each member participating in the chain. Increased economic efficiency, along with reduced risks from the environment will be the benefits of collaboration because risks in the supply chain may arise due to the impact of the political, economic, social and natural environmental environment etc., and these risks increase as supply chains become more and more enlarged and complex (Khan & Burnes, 2007). When the market risk is high, it will cause the manufacturers to change products, volumes and orders frequently (Trkman & McCormack, 2009). Researching this issue and considering it in the context of digital transformation of the agricultural sector in Vietnam, the authors hypothesize:

**H2:** The collaboration level has a negative impact on the risk of information sharing in the supply chain collaboration of the agricultural sector in the context of digital transformation in Vietnam.

### 2.2.3. Information sharing risk in supply chain collaboration and agricultural economic

**development**

When market risk is high, it will cause the manufacturer to change products, volumes and orders frequently (Trkman & McCormack, 2009). Fluctuating and changing market demand will make it difficult for manufacturers to identify market needs and customer feedback, and the connection to customers becomes more challenging (Calantone et al., 2003). An agricultural information system is built to link all stakeholders in the agriculture industry to create, collect, share and use agricultural data (Lilavanichakul, 2021). By researching this content, the hypothesis is built:

**H3:** The risk of information sharing in supply chain collaboration has a negative impact on agricultural economic development in the context of digital transformation in Vietnam.

## 2.2.4. Collaboration level of supply chain and mechanism of financial resources mobilization and use

Collaboration in supply chain linkage is necessary, collaboration will lead to faster product development, reduce development costs, improve technology and increase product quality, thereby affecting financial performance of the business (Walter, 2003). With the desire to promote collaboration in the supply chain on many different aspects in terms of resources, science and technology, linkage between production and supply of products and services, organizations and enterprises need a powerful legal corridor with specific and favorable mechanisms to promote comparative advantage in the industry. Given the context of digital transformation of the agricultural sector in Vietnam, considering the level of supply chain collaboration affects the mechanism of mobilizing and using financial resources for agricultural economic development, the study sets out the hypothesis:

**H4:** The level of supply chain collaboration positively impacts the mechanism of mobilizing and using financial resources for agricultural economic development in the context of digital transformation in Vietnam.

## 2.2.5. Mechanism of financial resources mobilization and use and agricultural economic development

Studies by Tran and Nguyen (2022) show that the mechanism of mobilization and use of resources positively impacts economic development in the agricultural sector. In building, operating and completing the mechanism for mobilizing and using financial resources, organizational structure and technical facilities are considered as important factors (Ammons, 2001; Andrews & et al 2006). So the hypothesis is built:

**H5:** The mechanism of financial resources mobilization and use positively impacts agricultural economic development in the context of digital transformation in Vietnam.

## 2.2.6. Collaboration level and integration in supply chain

Currently, the establishment of an appropriate supply chain is a matter of vital importance for each enterprise because enterprises cannot exist independently in the socio-economy and must cooperate with each other to coexist and develop, together form the supply chain. Collaboration within the enterprise implies the collaboration of activities related to the value chain such as inventory management, freight, warehouse management or ordering and purchasing management (Romano, 2003). Thus the hypothesis is built:

**H6:** Collaboration level positively impacts the integration in the agricultural supply chain in the context of digital transformation in Vietnam.

### 2.2.7. The integration in the supply chain and agricultural economic development

The result of supply chain integration is a strategic relationship that leads to a partnership between the partners within the chain, and this partnership will be the lever for the process of unlocking important information, contributing to the overall economic development (Li, 2006; Yeung, 2009; Ipek, 2011). With the requirements of digital technology for development, integration in the supply chain brings more values and opportunities to enterprises, thereby boosting the economy in general. So, how does integration in supply chains impact agricultural economic development in the context of digital transformation in Vietnam, the study hypothesizes:

**H7**: Supply chain integration has a positive impact on agricultural economic development in the context of digital transformation in Vietnam.
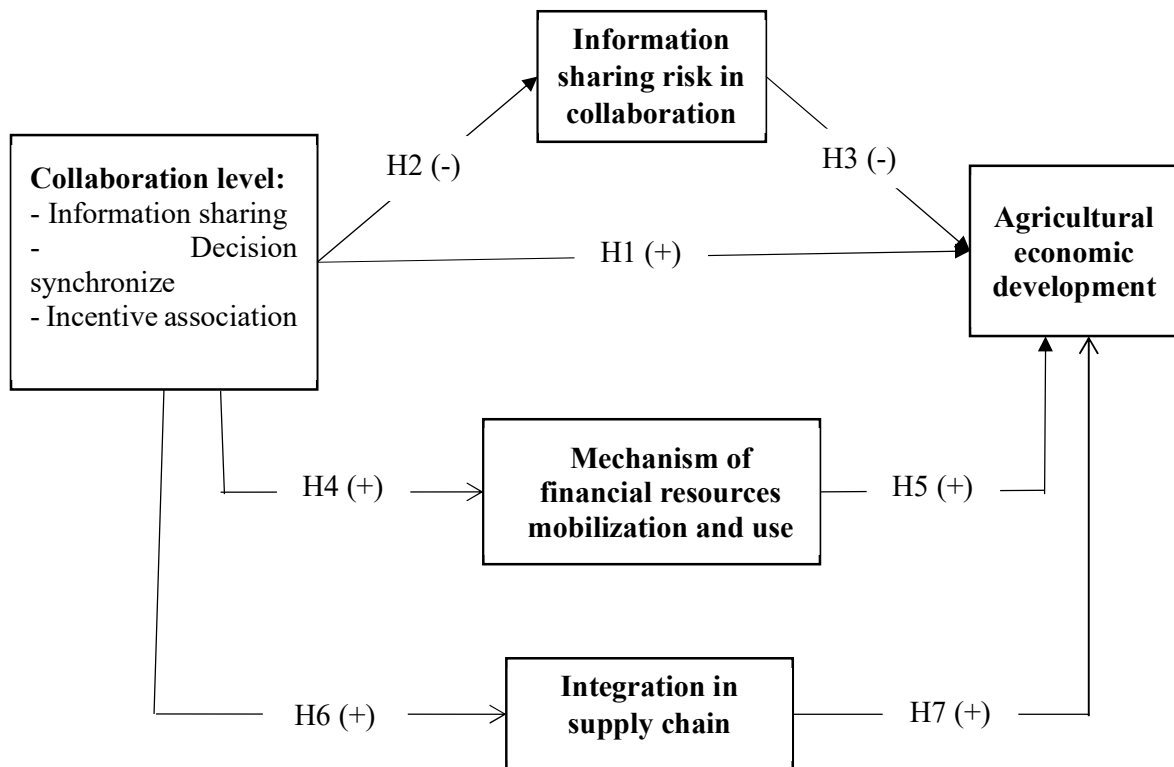


**Figure 1.** The proposed research model

## 3. Research methodology

### 3.1. Research scale

On the basis of theoretical overview and related research works, the article proposes a research model including 5 variables, in which, the independent variable is the collaboration level in the agricultural supply chain, including: information sharing; synchronized decision and incentive association. Intermediate variables included in the model include the risk of information sharing

in collaboration; mechanism of financial resources mobilization and use; integration in the supply chain. The target variable is agricultural economic development. The scale used in the study is a Likert scale with 5 levels (Strongly disagree; Disagree; Neither Disagree or Agree; Agree; Strongly agree). Indicators measuring variables are applied with adjustments in accordance with the characteristics of the research sample from previous studies.

**Table 1.** Origin of the scale of variables

| No. | Variable | Code | Number of observations | Origin of the scale |
|---|---|---|---|---|
| 1 | Collaboration level | COL | 19 | Togar and Ramaswami (2005 |
| - | Information sharing | INS | 5 | Togar and Ramaswami (2005 |
| - | Decision Synchronize | DES | 7 | Togar and Ramaswami (2005 |
| - | Incentive association | INA | 7 | Togar and Ramaswami (2005 |
| 2 | Information sharing risk in collaboration | RIC | 6 | Wagner & Bode (2008); Zhao et al. (2013) |
| 3 | Mechanism of financial resources mobilization and use | MR | 5 | Doan (2017); Hoang (2018) |
| 4 | Integration in supply chain | INT | 5 | Kim (2009); Ipek (2011) |
| 5 | Agricultural economic development | ED | 6 | Scoones (1998) |

## 3.2. Research samples

The research sample was selected by the non-probability sampling method, which is a convenience sample with relative stratification according to provinces and localities in different regions of Vietnam. The investigation unit in the study was identified as managers at governmental departments in the field of agriculture. The sample size used in the analysis was 534 samples which were collected directly by hand-out and indirectly by online survey tool. The number of online sheets collected is 315 of which 308 is the usable ones. The number of hand-outs distributed is 450, the number of hand-outs collected is 238 of which 226 is the usable ones. The total number of valid sheets used for analysis is 534. Based on the study of Hair et al. (1998) for the reference of expected sample size, the minimum sample size is 5 times the total number of observed variables. With the number of observations in the article is 41, the research scale includes 534 samples which meets the analysis requirements. The survey time ranges from April 2022 to August 2022.

## 3.3. Data processing

Research uses quantitative methods. Data after collection and cleaning are processed through the program SPSS and AMOS version 22.0. First, the study assesses the reliability of the scale with the required Cronbach's Alpha value > 0.7; correlation coefficient of total variables >= 0.3; At the same time, when the Cronbach's Alpha If Item Deleted value of an indicator is greater than the Cronbach's Alpha coefficient of the variable, this type of indicator should be considered. After

that, research on exploratory factor analysis (EFA) to determine the "convergent validity" and "discriminant validity" of the scale and with the required factor loading coefficient (Factor loading) > 0.5; KMO coefficient >= 0.5 and <=1; Sig value. < 0.05; and the percentage of variance extracted > 50%. The factor extraction method used is the Varimax factor rotation method. Next, the study uses AMOS software to assess the suitability of the research model through confirmatory factor analysis (CFA) and finally test the research hypotheses by analyzing the structural Equation Model (SEM) with the following requirements: chi–square/df index < 5 (Hair et al., 2010); GFI > 0.8; TLI, CFI > 0.9 (Segars & Grover, 1993); RMSEA < 0.08 (Taylor et al., 1993).

## 4. Research results and discussions

### 4.1. Research results

### 4.1.1. Testing the reliability of the scale

To evaluate the reliability of the scale, the study conducted Cronbach's Alpha analysis for each group of variables. The test results show the reliability of the scale used in the analysis when all the Cronbach's Alpha values of the variables included in the model are > 0.7 and the total correlation coefficient is >= 0.3. However, the RIC6 indicator has a Cronbach's Alpha If Item Deleted value of 0.932 which is larger than the Cronbach's Alpha coefficient of the RIC variable (0.918) and the ED6 indicator has a Cronbach's Alpha If Item Deleted value of 0.883 which is larger than the Cronbach's Alpha coefficient of the variable ED (0.817). Therefore, in order to increase the relevance of the scale, the study removed these two indicators.

**Table 2.** Rating the reliability of the scale through Cronbach's Alpha coefficient

| No. | Variable | Code | Cronbach's Alpha |
|---|---|---|---|
| 1 | Information sharing | INS | 0.917 |
| | Decision synchronize | DES | 0.952 |
| | Incentive Association | INA | 0.900 |
| 2 | Information sharing risk in collaboration | RIC | 0.932 |
| 3 | Mechanism of financial resources mobilization and use | MR | 0.934 |
| 4 | Integration in supply chain | INT | 0.912 |
| 5 | Agriculture economic development | ED | 0.883 |

### 4.1.2. Exploratory factor analysis (EFA)

After testing the appropriateness of the scale, the study conducted an exploratory factor analysis (EFA) for independent variables, intermediate variables and dependent variables. The results in all analysis showed that the data met the analysis requirements with the factor loading coefficients in the analysis all had values >0.5, showing the appropriate correlation between the observed variables. (indicators) and selection factors in the model; KMO coefficient >= 0.5 and <=1; Sig value. < 0.05; extracted variance percentage > 50%. At the same time, the requirements of "convergent validity" and "discriminant validity" of the scale are ensured.

**Table 3.** Exploratory factor analysis (EFA)

| Exploratory factor analysis | KMO coefficient | P-value | Average Variance Extracted (%) | Loading Factor | Conclusion |
|---|---|---|---|---|---|
| Independent variables and intermediate variables | 0.949 | 0.000 | 74.889 | All of them > 0.5 | Ensure the analysis requests |
| Dependent variable | 0.866 | 0.000 | 68.260 | All of them > 0.5 | Ensure the analysis requests |

### 4.1.3. Confirmatory Factor Analysis (CFA)

Confirmatory factor analysis (CFA) is the next step of exploratory factor analysis (EFA) with the aim of assessing the appropriateness of the model with the research data. The analysis results show that the measurement model fits well with the Chi–square indexes = 2197,474; df = 681; P= 0.000 (< 0.05); Chi-quare/df = 3.227 (< 5); GFI = 0.837 (> 0.8); TLI = 0.910 (> 0.9); CFI = 0.917 (> 0.9); RMSEA = 0.065 (< 0.08).
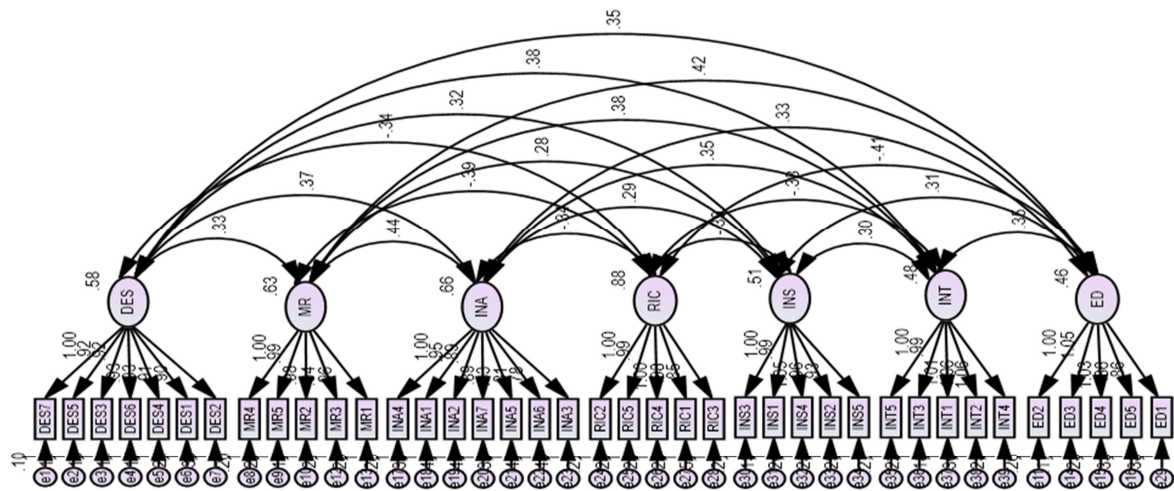


**Figure 2.** Confirmatory Factor Analysis (CFA)

### 4.1.4. Structural Equation Modeling Analysis(SEM)

The results of the analysis of the Structural Equation Model (SEM) show that the composite indexes are satisfactory. Specifically, the Chi–square index = 2294,853; df = 692; P= 0.000 (< 0.05); Chi-quare/df = 3.316 (< 5); GFI = 0.831 (> 0.8); TLI = 0.907 (> 0.9); CFI = 0.913 (> 0.9); RMSEA = 0.066 (< 0.08).
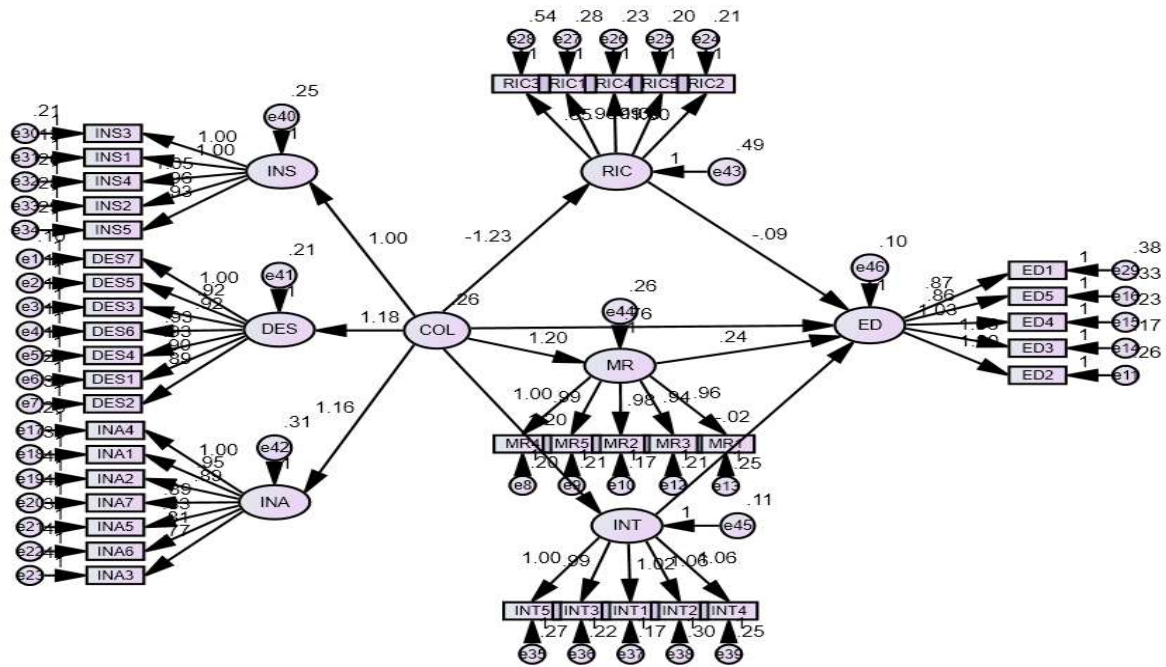
**Figure 3.** Structural Equation Modeling Analysis(SEM)

The results of the estimation of the relationships in the model show that the research model is appropriate. Except for hypothesis H7, all other hypotheses with significance level $p < 0.05$ are accepted.

Specifically, hypothesis H1 is accepted with significance in the test of 0.000 (< 0.005) and regression weight of 0.760 (> 0). Thus, it can be concluded that the level of collaboration in the supply chain positively impacts agricultural economic development in the context of digital transformation in Vietnam. This result corresponds to the work of Li et al (2006); Vickery et al (2003); Nguyen et al. (2021); Qingbo et al. (2018); and Zhongming et al. (2018).

Hypotheses H2 and H3 are accepted with both significance < 0.05, and regression weights < 0 (-1.225 and -0.089). This means that the level of collaboration in the supply chain has a negative impact on the risk of information sharing in collaboration and the risk of information sharing in collaboration has a negative impact on the development of agricultural economy in the digital transformation context in Vietnam. These results also correspond to the works of Khan and Burnes (2007); Trkman and McCormack (2009); Calantone et al (2003); and Lilavanichakul (2021).

Similarly, hypotheses H4 and H5 are accepted with significance < 0.05 and have positive regression weights (1.200 and 0.240). Therefore, the study concludes that the level of collaboration in the supply chain positively impacts the mechanism of financial resources mobilization and use. At the same time, the mechanism for financial resources mobilization and use has a negative impact on agricultural economic development in the context of digital transformation in Vietnam. These results also correspond to the works of Walter (2003); Tran and Nguyen (2022); Ammons (2001); and Andrews et al. (2006).

With the hypothesis H6 and H7, while the test results show that the hypothesis H6 is accepted with the significance level $P < 0.05$ and the regression weight is positive (1,198), the study rejects

the hypothesis H7 because the significance in the test is 0.850 (> 0.05). Thus, the study has demonstrated that the level of collaboration in the supply chain positively impacts the integration in the supply chain of the agricultural sector. However, integration in the supply chain has no impact on agricultural economic development in the context of digital transformation in Vietnam.

**Table 4.** SEM analysis results for relationships in the model

| *Hypothesis* | *Relationship* | *Weightage* | *S. E.* | *C. R.* | *P* | *Conclusion* |
|---|---|---|---|---|---|---|
| **H1** | ED <--- COL | 0.760 | 0.183 | 4.154 | 0.000 | Accepted |
| **H2** | RIC <--- COL | -1.225 | 0.099 | -12.405 | 0.000 | Accepted |
| **H3** | ED <--- RIC | -0.089 | 0.031 | -2.867 | 0.004 | Accepted |
| **H4** | MR <--- COL | 1.200 | 0.088 | 13.571 | 0.000 | Accepted |
| **H5** | ED <--- MR | 0.240 | 0.048 | 5.027 | 0.000 | Accepted |
| **H6** | INT <--- COL | 1.198 | 0.086 | 13.976 | 0.000 | Accepted |
| **H7** | ED <--- INT | -0.017 | 0.092 | -0.189 | 0.850 | Rejected |

## 4.2. Discussions

Thus, hypothesis H7 is rejected while all remaining hypotheses from H1 to H6 are accepted. The research results have demonstrated that the level of collaboration in the supply chain has both direct and positive impacts, as well as indirect impacts on agricultural economic development in the context of digital transformation in Vietnam through the intermediary factors which are the risk of information sharing in collaboration and the mechanism of financial resources mobilization and use. These conclusions represent the contribution of the study both theoretically and practically.

Theoretically, the study has shown the importance and the direct and positive impact of the collaboration level in the supply chain to agricultural economic development in the context of digital transformation. Secondly, the research results also prove the intermediary role of two factors, namely the risk of information sharing in collaboration and the mechanism of financial resources mobilization and use in relationship of impact between the collaboration level in the supply chain and agricultural economic development.

Practically, the results of this study will be valuable documents for policy makers and business managers in finding effective orientations and solutions to increase the effectiveness of collaboration in the supply chain, thereby contributes to the development of the agricultural economy in the current context of digital transformation in Vietnam.

## 5. Conclusions and recommendations

The purposes of this study are to build a model and test the relationships of direct and indirect impacts of the collaboration level in the supply chain on agricultural economic development in the context of digital transformation in Vietnam. The research results show both theoretical and practical contributions, proving the importance and the direct impact of the collaboration level in the supply chain to agricultural economic development, as well as the intermediary role of the sharing information risks in cooperation and mechanism for mobilizing and using financial resources. Based on the research results, the authors propose a number of recommendations to improve the efficiency of collaboration in the supply chain, thereby contributes to the development of the agricultural economy in the current digital transformation context in Vietnam.

*Firstly*, regarding the collaboration level in the supply chain, Vietnam's agricultural industry needs to have a plan to synchronously deploy innovative solutions that link product value chains, continuously promote public communication towards farmers on the chain that links production to consumption of agricultural products; to plan the production areas, to develop and complete documents on planting areas, areas and locations, and conditions of the product import market.

*Secondly,* regarding the risk of information sharing in collaboration, the State and functional agencies, policy makers and business managers need to study and come up with solutions to detect and prevent thoroughly risks arising from the sharing of information relating to the management and business activities. It is necessary to ensure the confidentiality of information, strengthen the periodic inspection and supervision, inspection of agricultural production and business establishments, in which focus on monitoring and post-inspection of the safe- certified food supply chain.

*Thirdly,* regarding the mechanism for financial resources mobilization and use, besides identifying the state budget as the main source of capital, the agricultural sector needs mechanisms and policies to mobilize capital from various sources such as private enterprises, agricultural cooperatives, local development funds, and farmers' own capital. In addition, the Government needs to study and apply various measures to call for investment and sponsor from other governments, and international organizations and businesses. At the same time, it is necessary to have a reasonable protectionism policy for agricultural products on the basis of compliance with international and regional regulations and commitments, and to prioritize investment in scientific research and technology transfer in agricultural production.

Apart from its contributions, the study also has certain limitations, first of all, the convenience sampling method would have reduced the representativeness of the sample, as well as increase the sampling error. Secondly, the study is also limited to the agricultural sector in Vietnam. Therefore, with the results drawn, the article orients development in research in different fields and industries in Vietnam and in the region, as well as in the world.

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