



MINISTRY OF EDUCATION AND TRAINING
NATIONAL ECONOMICS UNIVERSITY



THE 17TH IFEAMA INTERNATIONAL CONFERENCE PROCEEDINGS ON

KNOWLEDGE TRANSFORMATION AND INNOVATION IN GLOBAL SOCIETY

FROM THE PERSPECTIVES IN A TRANSFORMING ASIA

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PROCEEDING IN VIETNAM**

**Knowledge transformation and Innovation in Global Society:
From the perspectives in a transforming Asia**

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DEVELOPING HIGH-QUALITY HUMAN RESOURCE ATTACHED WITH ESTABLISHING INNOVATION ECOSYSTEM IN NGHE AN PROVINCE, VIETNAM

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Abstract

Human resource would be the key factor connecting innovation with competitiveness and growth in the 21st century. The advantages of countries or localities are going to mainly depend on human resource based on knowledge and innovation. It should be notified that the success of any innovation completely depends on human capital. Therefore, building up and developing human resources, especially highly qualified human resource, is an important factor to promote economic development. In many countries, the issue of rapid development of human resources, especially high-quality human resources associated with building up an innovative ecosystem, is considered as a breakthrough in their economic development. Nghe An is a province located in the center of the North Central region of Vietnam, with 21 affiliated administrative units. Nghe An still has limitations and inadequacies. The quality of human resources, especially high-quality human resources, has not yet met development requirements. The lack of high-quality labor is a barrier to development in many fields, especially the promotion of industrialization and innovation. These are also the difficulties and challenges on the road to becoming a good province of the whole country by 2030. This research focuses on analyzing the current situation and proposing some solutions to develop high-quality human resources associated with the development of human resources and building the innovation ecosystem of Nghe An province.

Keywords: Human resource, innovation ecosystem, Vietnam

1. Introduction

World Economic Forum 2015 indicated that “It is not capital, but talented people, which would be the key factor connecting innovation, competitiveness and growth in the 21st century”. The transformation from industry-based economy to knowledge-based economy has brought about fundamental changes in terms of facilities, factories and financial resource, which would no longer be the most significant assets in the new economy setting. Instead, intangible resources like knowledge, skills and relationships would become leading competitive advantages within countries. As a matter of fact, specific advantages of any countries or localities largely depend on their human resource. This is because the current economy is based on knowledge and innovation, of which, the success of the latter aspect entirely depends on the human capital. Therefore, establishing and developing human resource, especially high-quality one, would play

an important role in promoting economic growth. In many countries, the rapid development of the human resource, especially high-quality one, in accompany with the establishment of an innovation system is regarded as a breakthrough for their economic improvement.

In Vietnam, the Resolution released in the 13th National Congress of the Communist Party identified *one of three strategic breakthroughs in this Congress term* as the following “It is important to develop human resource, especially high-quality one; to prioritize human resource training for leadership, management and key areas based on strongly improving, comprehensively transforming education and training quality in accompany with recruitment mechanism and policies for talented people as well as applying and greatly developing science-technology, innovation; and to inspire the desire of developing a happy and wealthy nation as well as improving cultural value, strength, unity and pride of Vietnamese people in the process of building and protecting the country”.

Following the Resolution No. 08-NQ/TU dated March 13th, by Provincial Committee of the Communist Party on “*developing and improving quality of human resource in the period of 2011- 2020*”; and Resolution 26 by the Politburo on “*Direction and duties for the development of Nghe An province towards 2020*”, the development of human resource in Nghe An has achieved great successes. However, from an objective perspective, there are still certain limitations. The quality of human resource in general, and that of high-qualified human resource in particular has not met the development demand. In reality, despite being at the priod of golden population structure, the trained workforce is still at low level (about 80%), which is impossible to satisfy the need of the development process. The shortage of high-quality labor is a big hindrance for the development of various fields in the province, especially the modernication and innovation. This has become a challenge for Nghe An to thrive as a good province in 2030. This presentation focuses on analyzing reality and providing certain solutions to develop high-quality human resource attached with the establishment of an innovation ecosystem in Nghe An province.

2. Theoretical basis for the development of high-quality human resource attached with the establishment of an innovation ecosystem

2.1. Development of high-quality human resource attached with the establishment of an innovation ecosystem

Currently, there has not been any accurate definition about high-quality human resource. However, according to previous studies, high-quality human resource is understood as the workforce satisfying important requirements of socio-economy, which would bring about high efficiency in solving problems related to social growth and development. High-quality human resource is also regarded as the workforce equipped with knowledge and specialized skills.

Developing high-quality human resource is a natural trend for any countries, which would help in developing their competitiveness, improving integrativity and promoting adaptability to 4th industrial revolution. Modern economics theory stated that human resource, especially high-quality human resource should be an important input, which decides the speed and quality of economic growth as well as improves total factor productivity (TFP). The

development of high-quality human resource results from the integration of “different kinds of intangible capital” including *technological innovation, modernization and rationalization of production; effective leadership and management to increase knowledge and technology value of the products*. The higher the contribution of TFP to economic growth of the locality and nation is, the higher the technological innovation is. The development of high-quality human resource is reflected in the following points:

First, developing high-quality human resource means increasing the number of qualified labor in all economic fields and sectors in order to meet the requirement of digital economic growth and technological innovation. This would create potentiality for an in-depth growth with capability of making breakthrough.

Second, developing high-quality human resource refers to improving the workforce’s quality to promote local labor’s physical and mental strength, intellect, talents and characteristics. Accordingly, it is essential to guarantee the labor’s specialized knowledge and skills qualified enough to adapt to innovating, working independently and co-operatively in a multi-cultural setting as well as controlling technology. High-quality labor also means that the workforce is ready to join in both domestic and international labor market, especially that of key areas with high added value, always leading development trends and largely contributing to the empowerment of a strong country with wealthy people, fair, democratic and civilized society.

Third, developing high-quality human resource should ensure its appropriate structure in regard of age, gender, region and economic section. At the same time, it should be compatible and satisfying with economic structure and economic growth model, which have been gradually transforming towards in-depth and sustainable development.

Innovation ecosystem is not a new term because it appeared in the 1950s when a large proportion of economic growth derived from different elements related to technological changes and technological innovation. Therefore, authorities in numerous countries paid much attention to changing their policies in order to improve their innovation capability.

The definition of innovation ecosystem is introduced in order to describe the collection of impact factors, outputs, activities, institutions/organizations and relationships, including additional and alternative ones which are important to the operation of the innovation ecosystem of one factor or many factors. In this definition, outputs might be comprised of products, services, tangible and intangible resources, technological and non-technological resources as well as other inputs and systematic outputs, including the innovation itself.

Although there are different definitions of innovation ecosystem with different components, they share the same idea in referring to knowledge as the connector. This kind of knowledge comes from various educational dimensions, research and innovation. When localities aim at developing economy with higher value added, their future competitive advantage will depend on residents’ capability of creating new knowledge and developing technological applications in order to meet the socio-economic requirements. So, to serve the purpose of improving innovation capability, it is essential to build up the foundation at local level.

In current economy, knowledge appears as a fundamental factor laying foundation for other aspects like study, humans, technology and culture. Knowledge has become an integral part of different systems and ecosystems. Together with the development of the 4th industrial revolution, knowledge-based products not only make up competitive advantage but also become vital for enterprises, localities and countries to participate in global value chain, which would help in creating value added and bigger benefit. Therefore, the development of high-quality human resource attached with the establishment of innovation ecosystem is an alarming task. This is the truth for both developed economies and developing ones. However, previous experimental studies have pointed out that a basic challenge for new emerging economies relying on knowledge is their exploration of knowledge by providing a favorable environment for the educational system to compete as well as improving high-quality human resource, information technology infrastructure and innovation facility.

At local level, the establishment and development of innovation ecosystem should follow a frame with 6 main pillars, including (1) Physical and digital infrastructure; (2) intellectual capital, covering academic background, skills of the workforce and graduates achieved from the educational ladder and research opportunities; (3) effective transparency of local management system; (4) privileged policies on accessing to important resources for innovation; (5) interaction between components of innovation ecosystem; (6) operating moderation.

In order to develop high-quality human resource in accompany with the innovation ecosystem, local authorities should try to build up, develop and connect different components of the ecosystem together. They should consider training centers and enterprises as the key elements. It is suggested to establish supporting mechanism to speed up the application and transference of technology withing different elements of the ecosystem. The authorities should encourage enterprises to set up and develop funds for science and technology in order to strongly improve the innovation and enchance technological control. They should also support the establishment of centers for research and development in local universities in order to train human resource appropriate with development orientation of the locality and promote local firms to innovate.

2.2. The role of universities in developing high-quality human resource attached with innovation

Different studies indicate that governments in many countries highly appreciate important contribution of the educational system, especially that of universities to the improvement of innovation. Universities-Entrepreneurs, the relationship between universities and firms is the key concept in current theories about innovation. In fact, universities not only concentrate on teaching but also carry out other activities to support the development of locality such as co-operating with firms in the process of “researching – developing- transferring-commercializing technology”.

Based on experience of region with successful innovation, it is obvious that quality of training activities, research and development of universities is the key point having influence on indicators of talent and technology-the two indicators used to evaluate the rate of local and

national innovation. If universities can provide programs for high-quality human resource, they might be able to supply high quality studies and bring about more innovations. Especially, in the context of rapidly changing economy and technology, the co-operation between R&D laboratories of the firms and universities might help in improving complex products with high rate of scientific value. Also, that co-operation can result in improving the quality of human resource in accordance with developing occupational and start-up skills.

Therefore, changes in education at tertiary level due to current economy setting make universities develop an innovation ecosystem. They also play an important role in local economic development. In particular, universities own organizations functioning as trailers of developing and transferring breakthroughs based on Spinoff, Startup or partnership with high-tech firms.

So, in current context, education at tertiary level has gradually become driver for the innovation, which creates long-term economic benefits through improving quality of local labor, promoting technological transfer within industries and increasing the businessmen's interest in business environment. As a consequence, universities play a vital role in local and national innovation ecosystem. They should be active in improving the efficiency of the innovation environment they are serving. The innovation mission of these universities have expanded from their small interest in protecting and commercializing intellectual property to a greater interest in forming business and developing local economy. Universities have become facilitator for the sustainable development of the innovation ecosystem at both local and national levels. The more the innovation relies on scientific knowledge, the more important the role of universities would be, which is regarded as knowledge creator. Therefore, within the innovation ecosystem, universities, business and the government are the three main pillars.

3. Reality of developing high-quality human resource attached with establishing innovation ecosystem in Nghe An

3.1. Reality of high-quality human resource in Nghe An

Nghe An is located in the center of the North Central region of Vietnam, which is comprised of 21 administrative units. Based on its diversified natural conditions, Nghe An has great potentiality of developing agriculture, industry, tourism, trade and logistics. Applying Vietnam's policies on open economy and integration, in the past years, Nghe An has experienced comprehensive changes. The economic structure has achieved increasing proportion of industry and service. Thanks to its available competencies, advantages as well as privileged policies and appropriate investment, Nghe An has attracted a large number of projects by domestic and foreign investors.

So far, in this province, there have been more than 1,9 million labor. 256.000 residents born here have been working and living in different cities nationwide. After nearly 10 years implementing the Resolution No. 08-NQ/TU by Provincial Committee of the Communist Party, the educational background of the workforce in this province has greatly improved. This brings about labor's advantages in successful access and adaptation to advances in science and technology in manufacturing so that the workforce can meet new requirements of global labor market. The rate of labor has considerably increased in the past time. In the period of 2016 -

2020, there was 360.217 people provided with occupational skills (more than 72.000 people per year). In particular, the number of labor graduating from college was 24.882 people (6,9%); those completing intermediate school was 43.798 people (12,15%); and those finishing elementary level or training course under 03 months was 291.537 people (80,95%).

Table 1. Number of trained labor in Nghe An province

Contents	Unit	Year				
		2016	2017	2018	2019	2020
Labor	People	1,916,760	1,911,570	1,990,560	1,926,090	1,926,960
Total number of trained labor	People	1,092,553	1,127,826	1,164,831	1,213,437	1,252,524
Total number of trained labor	%	57	59	61	63	65
Rate of certified labor	%	21.2	22.3	23.3	24.3	25.3

Source: Department of Labor, Invalids and Social Affairs, Nghe An province

In the past time, the provincial politburo system has always considered the improvement of human resource, especially that of high-quality resource as huge objective and a breakthrough duty not only in the short-term period but also in the long-term vision so that Nghe An can make optimal use of its advantages as the socio-economic center of the North Central region. Human resource development is regarded as the mutual responsibility of the whole society. All policies on human resources aim at training high-quality workforce, which should meet the requirements of the market, be compatible with typical features of socio-economic setting and habitat, provide chance to access to regional and international concept and structure of human resource as well as concentrate on vocational training and higher education.

3.2. Reality of developing innovation ecosystem in Nghe An province

First, after nearly 10 years implementing the Resolution 26 by the Politburo Bureau, Nghe An has become an ideal place to inditify and incubate projects of innovation. By 2022, Nghe An had been one of 5 provinces nationwide leading in terms of support for innovation. Vinh city is regarded as the center of innovation in this province. At the same time, in other districts and towns, there have been clubs of innovation. So the impact of innovation has been expanded to the whole province.

In the past time, this province has made great efforts and taken strong actions to motivate more applications of research findings to both daily life and manufacturing process. This would contribute to the increase in manufacturing productivity, product competitiveness and socio-economic efficiency of different activities in all fields of the area. For the purpose of gradually establishing the innovation ecosystem, in 2017, Nghe An Department of science and technology consulted the Provincial People's Committee to issue the Decision No. 2171/QĐ-UBND on May 24, 2017 regarding a strategic plan to support innovation in the province within the period of 2017-2020. This Decision made it possible to mobilize budget from all public and private sources to encourage and support the development of business with rapid growth based on intellectual property, advanced technology and new business category. These efforts received cooperation

and expansion within business community, the youth and all residents, which played an important role to the success in socio-economic development of Nghe An province in the past years. Also, those activities and policies gradually integrated technology and innovation to the business, which helped in motivating scientific and technological advances in business. Consequently, the rate of investment in science and technology based on national budget reduced from 70% to 52%, while that number based on socialization increased from 30% to 48%.

Second, the province has achieved great successes in developing entrepreneurs, innovative business and start-ups. In fact, in order to build up a start-up nation, the first priority should be forming the generation of entrepreneurs, who are competent in creating and providing real values for the society. This generation can only be established and develop under the context of the start-up ideology. It is stated that although there is only 2 – 3 % of students having the idea of start-up, the necessity of providing start-up course should be appreciated for all students-who make up high-quality human resource for the society in the future. In the period of 2016 – 2021, there were many startups in Nghe An, which became a noticing point in national start-up map.

Third, there are centers of knowledge transfer, which helps in encouraging research and technological transfer. So far, in Nghe An, there have been 71 units working as scientific and technological organizations, among them, there are 5 universities, 11 colleges; 6 agencies of central departments and ministries located in the province; 4 provincial departments of science and technology with scientific activities within the region. The number of scientific and technological staff is 11,87 people/ten thousand residents. By the end of 2021, the speed of technological innovation of the province had been 15%, which was rather high nationwide; the value of high-tech products and application had been 20%. At the same time, there are universities and colleges which have been developing an ecosystem of innovation skills to connect students and help them participate in innovation activities to obtain first-hand experiences so that they can get knowledge and skills of start-up based on their relationships with provincial and other businesses. Especially, thanks to the investment by the Province's People's Committee into modern facilities, many laboratories have been upgraded, which are capable of supporting the testing and piloting stages prior to commercialize products and services to the market. Therefore, the co-operation among universities, research centers and business has been established based on contracts and partnerships. Then, their relationships can be developed and strengthened to serve the province's purpose of innovation.

4. An evaluation on the reality of developing high-quality human resource attached with establishing innovation ecosystem in Nghe An, Vietnam

4.1. Achievements

Nghe An People's Committee has always paid great attention and proposed different strategies to train and develop high-quality human resource. It has also applied various solutions in appropriate with specific context and period in order to enhance the capacity, quality and efficiency of vocational institutions. In the past time, educational background of the workforce has obviously improve. This is one of huge advantages for the labor to get access to technological advances in manufacturing process.

High-quality human resource in Nghe An in all industries has followed the right direction, suitable with the province's economic transformation, which is reducing the proportion of agriculture, aquaculture, forestry labor and increasing the proportion of industry, construction and service labor. The right direction of the human resource has resulted in breakthroughs in the economy of the province. The labor in Nghe An is categorized by young age, which is advantageous for the improvement of technical skills. The labor can easily access to new technological advances in manufacturing process.

In accompany with its solutions to develop high-quality human resource attached with the innovation ecosystem, Nghe An has strongly supported many start-ups to call for investment and connect with different organizations, funds nationwide as well as to expand their network to international scale. There have been numerous training courses co-organized by Nghe An Department of Science-Technology and relevant authorities to build up skills of forming and completing start-up business model. Then, youngsters can understand important foundation for the start-up.

The People's Committee of the province has carried out different activities to socialize supports for the innovation. There are numerous policies and favorable conditions for the innovation innovation, which have always been improved in the last years. The formation of start-up support zone is the foundation providing reliable addresses for business to be successful. This place supplies services of consultancy, technological transfer and other initial requirements; it runs as the key to connect organizations and individuals supporting start-up; and it helps business to complete ideas, enhance competency, seek for investors. As a result, this support zone can contribute to the objective of Nghe An province and surrounding areas in developing their socio-economic conditions.

4.2. Limitations and reasons

In reality, the workforce receiving training courses is still at low level. The number of untrained labor is still high. This is not compatible with the province's potentiality, causing big hindrance for its integration into high-quality labor market in the period of modernization. Although the labor structure here is categorized by industries, which has been going on the right direction; the transformation is still slow. The percentage of agriculture-based labor has slightly decreased whereas that number of industry and service has slowly increased.

In general, the human resource's ability of accessing and adapting to new requirements of modernization and industrialization is still weak. This is reflected in regards of the labor's limitations in knowledge, equipment, method and operation. The facilities and technology of the economy are outdated, the human resource training activity is weak. In the context of intensive digital transformation, there have been more challenges for Nghe An to develop high-quality human resource. Especially, despite its golden population age and highest rate of labor export, majority of the workforce focuses on unskilled labor. Therefore, labor income is low and working time for foreign business is short. Also, skills of working in multi-cultural contexts and huge production line have not met the requirements of businesses, making them resistant to employ Nghe An's labor.

Regarding start-up, province's policies on being companion and supporting this model are inconsistent and carried out at small scale, which is impossible to expand the development of Startup and the application of start-up products into real manufacturing process. There have not been specific policies for the establishment and development of innovation start-up network. The identification of the role of institutions (especially big and key universities) and research centers is incomplete. Therefore, there are not suitable policies to motivate the development, application and transference of technology within the provincial innovation ecosystem.

5. Solutions to develop high-quality human resource attached with the establishment of innovation ecosystem in Nghe An province

5.1. Perspective of developing high-quality human resource attached with establishing innovation ecosystem

The 13th Party Congress demonstrated that by 2045, Vietnam would have become a developed country with high income. In order to achieve that objective, the growth rate should be at average of 8%/year. Regarding the case of Nghe An province, the Resolution by the 19th Provincial Congress of the Communist Party in Nghe An stated the target of “By 2025, Nghe An will have become a good province in the North region of the country and by 2030, it will have become a good province nationwide”. However, average income per head in this place is currently lower than the general rate of the country (it is estimated that the average income of the country is about 1,5 times higher than that of Nghe An). Being a populated province at golden age and high rate of export labor, common business type here is small and super small with small number of innovation. Therefore, in order to increase the speed of sustainable development, it is essential for Nghe An to change its growth model. In order to achieve those objectives, under the context of 4.0 industrial revolution, the development of high-quality human resource should be in accompany with the establishment of innovation ecosystem. This is also a common option for many countries, which requires the consistent participation of 3 parties: *supplier* (training institutions), *demanders* (employers), *local authorities* (policies, moderation, related supports for both suppliers and demanders). In order to ensure the implementation of the Resolution by the 19th Provincial Congress of the Communist Party in Nghe An with the aims of developing high-quality human resource for the locality and the region, creating policies and mechanism for improvement of advanced science and technology, and achieving high rate of technology transfer at 35 - 38%, in general, the province should take the following points into consideration during the development of high-quality human resource attached with the establishment of innovation ecosystem:

First, innovation should closely be linked with the policy by 19th National Congress of the Communist Party, which implied innovation's contribution to people's wealthiness and happiness; the country's area safety and completeness as well as Vietnamese' creativity and intellect.

That direction by the Prime Minister at TECHFEST 2021 became the guideline and foundation for the design and establishment of the ecosystem. It was also followed up and specified by series of activities in TECHFEST 2022, which put an emphasis on the role of

innovation and application of science and technology together with the philosophy "of people, by people and for people ". This contributed to the recovery and development of the economy at post-epidemic period.

The access based on every people and at a comprehensive scale is the meaning of “open” innovation. The “open” model brings about participation of not only research centers, universities, business; but also that of students, residents and the whole community in order to generate ideas serving the whole nation.

Then, innovation would create socio-economic effect attached with community benefit. This will become a driver for all people to think of new ideas.

It is suggested to enhance the management of the Communist Party and the leadership of local authorities towards the development and employment of high-quality human resource, as well as the attraction of talented people. Authorities of the Communist Party at all levels should be direct in managing, controlling and investigating the mechanism of duties and solutions to develop high-quality human resource in accompnay with the formation of innovation ecosystem so that all policies, regulations and mechanism can be applied in the whole province.

Second, it should be notified that the development of high-quality human resource is the motivation for the enhancement of science, technology and innovation, which meets the requirement of transforming economic model under the green orientation in digital era and digital economy. It is essential to consider high-quality human resource as a special resource of creativity. Especially, it is the decisive factor for the strong modernization, industrialization and integration of the country as well as the development of knowledge-based economy at local level. Developing high-quality human resource contributes to high competitiveness of not only local labor and business, but also that of the Communist Party at all levels, which shows that operating quality of the whole political system in order to serve sustainable development of Nghe An province in the future. This province should pay attention to the development of technological staff and high-quality human resource for the management and leadership of key areas. This requires improvement and comprehensive changes in education and training, which is linked with appropriate recruitment mechanism, policies for talented staff, stronger technological transfer and innovation. The development of high-quality human resource attached with innovation should assure adequate quantity, suitable mechanism, high quality and compatible with local economic structure’s transformation. This would satisfy national requirements for the purpose of thriving as a country with the same labor level as other advanced countries in the region and worldwide.

Third, the attachment between developing high-quality human resource with innovation ecosystem would help Nghe An to quickly become one of centers for start-up and innovation in the country. It is essential to identify that Nghe An is in the first period of economic development process, which is based on innovation. So, the development of innovation ecosystem should follow the frame with six main components (1) Physical and digital infrastructure; (2) intellectual capital, covering academic background, skills of the workforce and graduates achieved from the educational ladder and research opportunities; (3) effective transparency of local management

system; (4) privileged policies on accessing to important resources for innovation; (5) interaction between components of innovation ecosystem; (6) operating moderation.

The core elements of the development of innovation ecosystem in Nghe An in the next period should aim at forming and improving a network with institutions (especially big and key universities) and business as the center, promoting and applying technological transfer within components of the ecosystem. It is suggested to encourage setting up and developing fund for science and technology in business in order to motivate innovation and control of new technology; establishing centers for research and development in big and leading universities as well as promoting science-technology business and start-up business. It is essential to attach policies on human resource development with innovation ecosystem development. This should be regarded as the key duty to promote rapid transformation of economy structure, and improve total factor productivity.

Forth, it is recommended to link 3 stages in the development of high-quality human resource, including training, using and treating. In particular, the training stage should be based on tendency and demand of local economic development so that it can be compatible with the employment and receive lessons learnt from useful approaches of other localities in the country and in the world. It is essential to prioritize the role of human-talented people for any business and organization. In this case, there are 2 elements for consideration, including human resource (this refers to harmony between humans and organization, salary and other incomes, training and career development, opportunities for the implementation of challenging tasks) and organization (this refers to behavior of managers, relationship within the organization, culture and policies of the organization as well as working environment).

Fifth, the province should enhance administrative reform, organizational reform and administrative procedure of the public sector, especially that of management mechanism, financial support for high-quality human resource development, establishment of innovation ecosystem, development of technological activities as well as scientific management. All of these aspects should be simple, flexible, quick and suitable with international practice. It is essential to emphasize the role of state authorities in creating, developing and supporting. There should be more activities to support, promote and develop labor market and technological market at local level.

5.2. Solutions to develop high-quality human resource attached with the establishment of innovation ecosystem

First, it is suggested to continue completing the mechanism and policies on training, prioritizing and appreciating high quality human resource, which should be closely linked with the development of innovation ecosystem. Those policies and mechanism should be public, and transparent to bring about favorable conditions for the high-quality staff to develop their talents, values and believe that their devotion would serve the community, locality and the country. It is essential to review, supplement and issue new mechanism and policies to guarantee high-quality human resource get all mental and physical benefits from their creativity. Noticeably, there should be review and completion of policies on appraising lecturers and educational

managers, especially those working at higher education and vocational training. There should also be policies related to vocational training, vocational colleges and business joining this field. It is advisable to complete mechanism and policies on categorizing students into vocational colleges and gradually popularizing vocational training for the youngsters. Also, the province should attract learners to key industries and occupations. It is suggested to encourage the development of private vocational colleges with foreign investment as well as vocational centers inside business. There should be stronger scientific research cooperation among universities, research centers and business based on contract and partnership. More research centers should be formed so that technology transfer can be successfully carried out within locality and region. There should be more high-quality training centers and vocational centers, which access to high level of developed countries in G20 and ASEAN-4. It is necessary to enhance the autonomy of the institutions and research centers in supporting and developing high-quality human resource for innovation purpose of the province.

Second, there should be appropriate salary policies, especially, there must be mechanism to keep the talented people, who build up high-quality workforce. A fund so-called “Talented people” should be formed to encourage the talented staff to develop, devote, create and contribute to the socio-economic setting of any organization, locality and the country. In addition, it is essential to pay attention to the construction and development of a modern environment appreciating fairness, regulation, morality and legislation. There should be a cultural environment leading the development of the human resource. Appraising high-quality human resource should depend on precise assessment of the labor’s quality, competencies and devotion. There should be special policies for the talented people. Also, it is crucial to raise the awareness of the talented labor about civil responsibilities and social responsibilities in order to serve mutual development objectives of the country.

Third, it is suggested to motivate appropriate transformation of labor structure, which should focus on the core content of transforming industries to be compatible with the market’s demands, integration process and open economy in the region and worldwide. Rapid and sustainable economic structure transformation in accompany with regional and international integration requires precise identification and development of the key industries. The purpose of economic structure transformation is changing current structure, targeting at a more appropriate structure which has diversified industries. In particular, there should be 27 key industries linked with sustainable development in order to explore all resources, participate well in labor assignment and international cooperation, reduce the proportion of labor for agriculture, aquaculture and forestry, increase the proportion of labor for industry, construction and service, contribute to the balance between supply and demand in the labor market as well as expand job opportunities for the labor.

Forth, it is necessary to put higher education, vocational training and business at the center point of the innovation ecosystem. These parties would be important factors for the development of high-quality human resource in Nghe An province, which meet the requirement of the labor market and business. Those parties should also be the center in the policies on building up and developing innovation ecosystem of the province. Appreciating the role of higher

education, vocational training and business is an important mission, which needs long-term and suitable strategy. Universities and vocational institutions should be regarded as the bridge in filling the gap on the start-up ecosystem. The connection between the institutions and business would help in making plan to commercialize research findings in order to propose legislation for new ideas. Local authorities should focus on building up mechanism to connect components of the innovation ecosystem within and outbound the province. There should be a support network for innovation in the province and region. It is vital to promote linkages between components of the ecosystem with the key of connecting business, institutions and research centers as well as carrying out technological transfer based on order. It is recommended to converge all resources to the province, which would bring about favorable conditions to attract investment for sustainable socio-economic development.

The province should keep developing the role of Nghe An Center for innovation and start-up in connecting components of innovation ecosystem, which are within and outbound the province. This center also helps in connecting different resources and leading the innovation in the province and the North Central region. It is essential to concentrate of constructing and developing business incubation, start-up environment, especially innovation area within big universities. There should be activities to motivate scientific research and innovation supporting start-up. There should be funds for innovation investment, especially those based on socialized capital in order to assist the province's innovation projects.

Fifth, the province should complete legislative regulations and policies on start-up support in Nghe An. It is essential to continue strengthening the construction and completion of policies linked with improving efficiency and performance of law on the basis of consistency, feasibility, publicity, transparency and easy-to-access with low cost, high competitiveness within the region and worldwide, people's benefits, innovation target as well as guarantee of sustainable socio-economic development. It is suggested support and create favorable conditions for strong development of science and technology. The province should build up mechanism and policies which are outstanding, typical and competitive to increase the usage of technology and improve research competence nghiên cứu và phát triển. It is suggested to establish institutions for national innovation system and innovation ecosystem, which considers business, universities and vocational colleges as the center for research development and technological transfer. The province should improve training activities for local staff, youngsters and entrepreneurs and provide them with knowledge about start-up and innovation. There should be more programs and projects directly supporting start-ups. Patents and useful solutions are certified so that they can be commercialized to produce. There should be regular fairs on technology and equipment to connect demand and supply within locality, region and inter-region. Those fairs would improve the commercialization of research findings and consider shorter time to confer degree for intellectual property so that individuals and organizations can actively participate in research and innovation activities.

Sixth, Vietnam in general and Nghe An in particular are confronting advantages and challenges of the 4th Industrial Revolution, which are related to training and retraining the human resource in order to make use of technological advance as well as to identify and strengthen new

competitive advantages of the economy. COVID-19 pandemic has sped up the digital transformation. Businesses have digitalized their operation, which requires upgrading the workforce so that the labor can adapt to the digital economy and “new norm” period.

Policies by the province and institutions should cover young labor, who neither have got any opportunities to access to training program at the universities nor pursued courses on STEM. Support for expanding basic programs on digital skills both online and onsite out of big urban areas boundary would minimize gender inequality and the gap between urban and rural area. It is necessary to build up a training market to improve diversified skills, comply with demands and promote the relationship between business and training institutions. This would assure that the training content is closely linked with the market demand and the course is suitable for anyone expecting to upgrade and develop essential skills in the era of 4th industrial revolution. The participants in those courses are comprised of technological students pursuing certificate of technique, especially labor seeking for promotion. Two important components to develop sustainable skills cover (a) compatibility with employers’ demand for “well-paid” skills, onsite training programs on digitalization and courses on human resource; and (b) periodical update of demand and forecast about labor shortage in order to provide data about 4.0 labor market, which would help young labor easily access to this market and make effective career plan.

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