International and Domestic Experiences In the Development of Vocational Training For Rural Labors in Agriculture 4.0

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Abstract:
Vocational training for rural labors is one of the important tasks to create human resources who are capable of adapting to the rapid changes of the labor market, meeting the requirements of international integration, contributing to the fast and sustainable development of the country. In Agriculture 4.0, the activity needs to be strongly developed both in scale and quality for the growth and sustainable development. Actually, the quality of Vietnamese rural labors is not high and improved slowly; the facilities and infrastructure, management staff, lecturers, programs, etc are still limited. Besides, the mechanisms, policies, information and communication, cooperation of various partners, investment have been improved recently but need upgrading to better meet the requirements of the new situation.

Key words: Vocational training, plastic products, Vietnam.

1. Introduction

In the context of international integration nowadays, Vietnam agriculture, farmers and rural areas have faced not only many new opportunities but also challenges because of some objective factors, especially climate change, Industry Revolution 4.0, competition in high quality human resources, agricultural trade, etc. Agriculture has been playing an important role in Vietnam economy, however, in the new situation, it is fundamental to develop a smart agriculture, knowledge-based agriculture with high-tech application in order to effectively use resources, improve productivity and quality with added value and sustainable development.

To develop Agriculture 4.0, it is necessary to have the convergence of many factors, in which, developing high-quality human resources is a prerequisite condition in all countries, including Vietnam. In fact, Vietnamese agricultural labor force is at an advanced age and there is a shortage of skilled labors, skilled technical workers. According to the World Bank, the quality of human resources in Vietnam is currently only 3.79/10 points, ranking 11th among 12 Asian countries participating in the ranking. Thus, developing human resources for Agriculture 4.0 is an urgent requirement for Vietnam. Success or failure, whether Vietnam makes good use of opportunities or overcomes the risks and challenges from the present Agriculture 4.0 depends much on the issue. Accordingly, rural human resources are one of the most key parts of the rural labor force, which determines rural socio-economic development processes in the general relationship of the country. Vietnam has abundant human resources who are mainly in the rural area, therefore, the development of rural human resources is vital in the overall development of the country.

In the Socio-Economic Development Strategy of our country up to 2020 approved by the 11th National Party Congress, one of the breakthrough solutions to achieve the goal of turning our country basically into an industrialized towards modernity by 2020 is to develop and improve the quality of human resources, including those receiving vocational training and job security policies for farmers. Vocational training for rural labors is one of the core strategies, contributing to the poverty reduction and social security in addition to improving the quality of rural labors, meeting the requirements of industrialization and modernization, agricultural and rural chemistry in the context of the Agricultural Revolution 4.0.

2. Literature review

2.1. Revolution of Agriculture 4.0
Agriculture, in general, is perceived as the backbone of a country’s economy with the potential to create jobs and contribute to the social-economic development (Baznet, 2015).

Klaus Schwab, Chairman of the World Economic Forum affirmed that industrial revolution 4.0 based on the Internet connecting usage has a strong impact on the world and economic sectors with the unprecedented breakthrough technology, including breakthrough in the agriculture sector (Khanh, 2019). The Agricultural Revolution 4.0 is included with the sustainability and security solutions of the value chain of agricultural production, where digital information is available to all relevant stakeholders inside and outside such as the activities of suppliers and customers whose data are transmitted, processed, analyzed and conducted automatically through the network. Agriculture 4.0 is also considered as a function of smart agriculture, smart technology, smart design and smart business. Actually, there is no complete model of Agriculture 4.0 in Vietnam (Kha, 2017).

2.2. Human resource development in the Revolution of Agriculture 4.0

Human resource development contributes to the success of the country's industrialization and modernization, in which education and training play a decisive role (Nguyen Thanh, 2001). Furthermore, human resources and human resource development play an important role in the development of a person's qualification, which is related to the salary that he or she can receive in the market (Mulligan & Sala-i-Martin (1997). With the same opinion, Mankiw (2003) and Park (1977) also stated that differences in the quality of human resources between developing countries and developed countries lead to differences in labor productivity and income. The higher the educational level is, the higher the level of the labor force will be for the labors to earn a higher income. For traditional agricultural production, there is no need to apply scientific and technological advances where labors in agriculture, labor productivity and economic value of products are low, leading to a low income of workers in the industry. Therefore, when agricultural labors have professional qualifications, they can apply the studied techniques in their production with high labor productivity, economic value products, which are the conditions to increase the income.

Improving the quality of human resources in agriculture is a condition for agricultural labors to have opportunities in improving their incomes and ensure the basic needs of lives such as eating, dressing, staying and travelling; eliminating poverty, temporary housing, lacking of clean water, improving the material and spiritual lives of laborers. When basic needs are met, the motivation for labors to be met is higher (Moorhead and Griffin, 1998).

Through increased labor productivity in the agricultural sector, comprehensive growth of the economy is promoted that leads to a relative decline of the agricultural sector in both GDP and the labor force (Timmer, 2009). According to Timmer (2012), “the underlying cause and result of the structural transformation process is the increase in agricultural labor productivity. There are three ways to increase labor productivity in agriculture, of which, the first two are often linked together: Applying technology and science to produce more agricultural goods on the same scale; allowing labors in the agricultural sector to switch to other occupations without dropping agricultural output. Lewis (1954) had the same opinion that the process of surplus labor migration in the rural-agricultural areas will accelerate the economic growth based on the development of industrial, service and intensive agricultural growth, which means the growth on the basis of increasing agricultural labor productivity.

In the Vietnam Human resource development plan for the 2011-2020 period approved by the Prime Minister, the percentage of manpower trained in agriculture, forestry and fishery sector will increase from 15.5% in 2010 to about 50% by 2020. However, by the year, human resources in this sector will lack about 3.2 million trained workers. According to the World Bank (WB), the quality of human resources in Vietnam is currently only 3.79/10 points, ranking 11th among 12 Asian countries participating in the ranking. The competitiveness index of Vietnamese human resources reaches 3.39/10 points and the competitiveness of the economy ranks 73/133 in the countries that were ranked (Lan, 2018).
It is necessary to be aware of the challenges of the quality of Vietnamese rural human resources in the context of global competition. The World Bank has pointed out that a country can only enter the Revolution 4.0 when it fully integrates 04 factors consisting of high quality human resources, information technology infrastructure, creative enterprises and appropriate institutions. It shows that in both the traditional and the digital economy, the quality of human resources remains the decisive factor for the overall development (Tien, 2018).

2.3. International experiences show that the education and training in Agricultural 4.0

4.0 is a revolution to build ecosystems such as training research, businesses, cooperation to create a research system in association with innovation and continuous operation, changing fields and farmers into institutions and researchers in order to provide data for research facilities and enterprises to create agricultural products 4.0. In Vietnam, the construction of an agricultural education system 4.0 may not be immediately implemented, however, it is fundamental to raise the awareness towards an innovative and continually innovative agricultural education and training (Lan, 2018).

Particularly, training high-quality agricultural human resources must be linked with renovating training programs towards social demand, renewing training contents and methods, conducting training and increase linkages. The training contents and programs must be connected with the process of agricultural and rural industrialization and modernization, market mechanism, the rapid application of advanced science and technology achievements in the world to develop a smart agriculture for the sustainable development. Besides, government performs a significant role in supporting new market access, product trading, finance, flexibility in policies and infrastructures (Matthew, 2018).

2.5. Vocational training for rural labors in the international integration and Agriculture 4.0

Definition of vocational training

International and domestic papers show that there are many different kinds of interpretation in the definition of “vocational”. It can be understood through some comprehension as follows:

According to Cambridge dictionary, “vocational” means providing skills and education that prepare you for a job. “Vocational” is defined as a form of activity in the social division of labor system, the whole knowledge and skills that an employee needs to perform certain social activities in a certain field of labor” (Chanh and Cau, 2008).

In other concept, it is defined that “vocational” is a form of labor division, expressed by the combination of theoretical knowledge and practical basis to complete certain tasks. The works arranged in a vocation are those that require the same general theoretical knowledge, performed on the same machines, equipment, and tools, creating products of the same type” (Uc, 2003).

Dai (2012) summarized the viewpoints of Russian scientists on describing the concept of “vocational” as a labor’s activity that requires certain training and often being the source of survival while the French scientists considered “vocational” as a kind of labor with habit of skills of a person to find the means of life. Therefore, “vocational” is regarded as an activity, a specific form of human activities. It is also a result of the division of social labor, there is social development, the vocation will change accordingly.

The concept of “training” is often associated with education. They share the same point that they focus on equipping knowledge and skills to develop the capacity of workers. However, education is the activity and impact on capacity practice and development (knowledge, skills, etc) and qualities (beliefs, characters, morality, etc) of humans to be able to develop their fullest personality and become positive to the society. In other words, education is a process of exploiting the potentials of each person, contributing to improving the individual competencies and qualities of both teachers and students towards a more complete approach that meets the existing and development requirements of the human society. In other aspect, “training” is aimed at specific
competencies for workers to undertake specific jobs. It is referred to the later stage when a person has reached a certain age with a certain level of qualification. “Training” is a process of equipping workers with certain knowledge and skills so that they can undertake a certain job” (Chanh & Cau, 2008).

Moreover, training refers to the teaching of practical skills, career or knowledge related to a specific field, therefore, trainees can acquire and master the knowledge, skills and vocation in a systematic way in order to adapt to their lives and take on a given job. There are many types of training consisting of basic and intensive training, professional and vocational training, self-training, retraining, distance training, etc.

Particularly, based on Karl Marx theory, “vocational training” includes the following components: intellectual training, physical training such as some activities in sport schools or military training schools and technical training in order to help trainees to master the basic principles of all production processes and the usage of the simplest production tools.

In the definition of International Labour Organization (ILO), it is stated that vocational training is to provide learners with necessary skills to perform all the tasks related to the assigned professional jobs. Activities are aimed at providing the skills, knowledge and attitudes required for employment in a particular occupation, or group of related occupations, in any field of economic activity.

Meanwhile, Workplace Testing explains that “vocational training” provides individuals with targeted instruction intended to provide them with necessary knowledge and skills to pursue a selected career. Individuals may receive vocational training either as students seeking employment or employees on the job. A person entering a vocational education program is seeking to learn about a specific trade or craft. Vocational training is available for a various number of jobs including welding, cooking, medical transcription and auto repairing. Some vocational training programs provide students with certifications or licenses demonstrating their competence following completion of the training program”.

In Vietnam, there are some kinds of definition on “vocational training” mentioned below:

“Vocational training” is the process of equipping employees with certain professional knowledge so that they can undertake certain jobs” (Chanh & Cau, 2008).

The Law on Vocational Training issued on November 29, 2006 introduces the following concept: “Vocational training is a teaching and learning activity aimed at equipping necessary vocational knowledge, skills and attitudes for trainees to find a job by themselves or create a job after completing the training course”. In other words, vocational training is a structured, purposeful process for trainees to formulate and develop systematical knowledge, skills and professional attitudes to meet the demand of society, including nation’s demands, enterprises’ demands and learners’ demands.

For many years, activities to ensure the quality of higher education, colleges and vocational school system have been popularized and implemented continuously in the world. However, the theoretical researches on vocational training quality still exist many different points of view.

There is a fact that training in rural areas remains unequal in terms of quality, accessibility and investment due to insufficient fund mobilization and equipment, lacking of collaboration of relevant ministries, agencies and partners. Training programs for rural areas are often supply driven with lacking of key topics such as production planning and modern agricultural production, value addition, business management and marketing, etc. As a result, the rural areas are losing their attractiveness and young people see the rural life as hard labors on farms (OECD, 2017).

The vocational training for rural labors in our country has not been paid adequate attention recently; many ministries and agencies, localities and society are not fully aware of vocational training, including vocational training for rural labors, considering it as a temporary task, not an ordinary and continuous work. The people
generally and farmers themselves particularly are not fully aware of the importance of vocational training; surveys and forecasts of vocational training demands still face many difficulties (Dai, 2012).

Therefore, the demand for vocational training needs coming from the reality of the people, the socio-economic development situation of the country, each locality and enterprises.

Furthermore, the system of vocational training in particular has not met the requirements with some limitation on the quality of vocational trainers' training, professional competence, weak practical teaching skills, limited pedagogical and educational skills. In addition, the training program is backward (Thang, 2017).

In 2011, the Institute of Vocational Training and Science Research published a model of "Vocational training and job creation for laborers in the land-use conversion area". This is a book compiled based on research documents, practical documents through topics, schemes of the institute and authors, domestic and foreign agencies.

The contents of the work deal with the major issues of urbanization and its implications for rural Vietnam; labors’ vocational training needs and job creation models for various rural labor groups. However, in the work of introducing a new model at the general level, there have not been thorough reviews, so there have been no assertions about the effectiveness and the level of application (Vuong, 2011).

From above papers, the research is needed to review the vocational training for rural labors to meet the requirements of Agriculture 4.0 and propose some solutions, especially roles of relevant stakeholders for the development of the issue as the previous papers lack in-depth contents.

3. Agriculture 4.0 and its requirements on vocational training for rural labors

3.1. Concepts of Agriculture 4.0

Agriculture 4.0 is a term for the next big trends facing the industry, including a greater focus on precision agriculture, the Internet of things (IoT) and the use of big data to drive greater business efficiencies in the face of rising population and climate change. The four main development placing pressures on agriculture in the near future are Demographics, Scarcity of natural resources, Climate change, and Food waste (Proagrica, 2018).

Based on the concept of European Agricultural Machinery (2017), agriculture was formed in five stages in the development process as follows:

The first is Agriculture 1.0, appearing in the early 20th century, was a labor-intensive system of agriculture with low productivity;

The second is Agriculture 2.0, widely remembered as the Green Revolution, which began in the late 1950s when agronomic management practices like supplemental nitrogen and new tools like synthetic pesticides, fertilizers and more efficient specialized machines allowed to take advantages of relatively cheap inputs, therefore, dramatically increasing yield potential and growing returns to scale at all levels;

The third is Agriculture 3.0 with its focus moving from pure efficiency in terms of cutting costs to profitability which can be seen as objective and creative ways to reduce costs and enhance the quality or develop differentiated products;

The forth is the evolution of Agriculture 4.0, occurring in parallel with similar evolutions in the industrial world where it is marked as Industry 4.0. Accordingly, the term Agriculture 4.0 is often used in farming. In terms of definitions, Agriculture 4.0, in analogy to Industry 4.0, stands for the integrated internal and external networking of farming operations. This means that information in digital form exists for all farm sectors and processes and the communication with external partners such as suppliers and final customers is likewise carried out electronically. Also, data transmission, processing and analysis are automated.
Agriculture 4.0 paves the way for the next evolution, consists of the present operation without direct human and system-based devices that can support to automatically make decisions.

The fifth is Agriculture 5.0, which will be based on robotics and some forms of artificial intelligence.

To sum up, the major components of Agriculture 4.0 generally include: IoT sensors - from soil fertility to connectivity, critical parts of modern agriculture; LED's - the rise in indoor farming driven by advances in LED technology, indoor farming is particularly demanding of LED precision because of the requirements on providing optimal growth and yields; Robotics as some robots doing what farmers used to do in their farms, which also consist of analytics like software systems that assist in analyzing and making sense of trends in farms; Solar Cells - most devices in farms are powered by solar and solar panels are important; Drones and satellites, used for data collection of farming; Indoor Farming/Aquaponics/Hydroponics, making use of a wealth of experiences and resources in LED lighting; Farm Fintech, new increasingly financial solutions designed for farms and agriculture, which are captured as farm financial technology, include payment, lending, insurance etc. which are done digitally for farming.

Agriculture 4.0 implies connotations of both crops, livestock and possibly broader understanding of fisheries and forestry, for study, transfer and production. In the modern agriculture, solutions are paid attention to sustainability and safety. Techniques in farming are implemented such as tillage, sowing, pruning, crop rotation, tending, harvesting in order to get higher productivity, better protect the environment based on progress of digital technology.

Thus, Agriculture in Industry 4.0 opens the path for a new technology era, fundamentally changing the value chain and business model in industrial production. In the manufacturing process, machines are operated based on intelligent information and communication technology, systems and networks capable of independently exchanging and responding to information to manage public production processes (Anh, 2018).

It is the foundation for innovation of all industries and fields to form this fourth industrial revolution. The Industrial Revolution 4.0 includes innovation and organic integration, no boundaries in the technology of Industry 4.0 and operating technology, physical technology and biotechnology.

As other industries, Industry 4.0 has been taken place in agriculture. Agriculture that takes advantage of the industrial revolution 4.0 is called "Agriculture 4.0". The core element of Agriculture 4.0 is information technology, digital technology and artificial intelligence.

Therefore, Agriculture 4.0 can also be called intelligent agriculture or digital agriculture. The basic feature of Agriculture 4.0 is the digitization of production and business activities from the farm to processing, marketing and trading through a system of IoT, combining operating systems and collective operations, middle, automation and intelligence between physical technology, biotechnology and operation technology, which ensure that the production of joint process is continuous, efficient and sustainable.

3.2. Characteristics and roles of Agriculture 4.0 in Vietnam

To the early 21st century, agriculture has been considered a lower technology application area compared to other fields. However, with the creation of Industry 4.0, agriculture will be the most fertile field for creation, testing, entrepreneurship and investment in the 4.0 revolutionary application (Lan, Huyen & Long, 2018).

Agriculture 4.0 brings the benefits of creating high-quality, high-yield of agricultural products even under unfavorable conditions; better working conditions for workers through mobile connection where they can work from home but they still understand crop plots in the field and each barn, each animal to make right and effective decision on their orientation of farming.

Because of these benefits, Agriculture 4.0 has been developed in many typical countries and territories all over the world such as Israel, the United State, the Netherlands, Germany, Japan, Taiwan, China, etc. In Israel, the
United States, for instance, desert agriculture is developed with closed agricultural areas with the value of each hectare up to 120,000 to 150,000 USD per year. Japan and Taiwan are the centers providing agriculture 4.0 technologies such as sensors, connecting everything, robots, solar cells, unmanned devices and LED lights.

The Industrial Revolution 4.0 has enabled developed countries to produce food by their own land area equal to only 1/100 or 1/1000 of developing countries with much higher productivity. This is an opportunity and a challenge for Vietnam agriculture. Currently, Vietnam has only applied a number of 4.0 technologies, not yet implemented the full 4.0 agriculture system as developed countries. Some models are applied with smart solution, some others are both applied with solutions and smart devices while some are just examples of hi-tech agriculture and not connected throughout the agricultural value chain. Vietnamese farmers have begun to participate in the process of developing Agriculture 4.0 based on its experiences and technology acquisition, giving the country an expectation for the near era of Agriculture 4.0.

As Vietnam is a latecomer country, the Revolution of Agriculture 4.0 is a good chance for the country's agriculture to capture new technologies taking place around the world. However, to seize the opportunities, labor quality is the most important factor to both apply technology but also create your own technologies.

3.2. Requirements of Agriculture 4.0 on vocational training for rural labors

Before the beginning of Industrial Revolution 4.0, the agriculture industry faced with the requirements of innovation to replace abandon, old and backward production methods. Instead, the timely and selective application of advanced techniques of the 4.0 revolution in agricultural production will contribute to increasing the efficiency of the production chain and product commercialization. However, it is necessary to select practical and effective technologies. This is a decisive factor for the success of high-tech agriculture and especially in the 4.0 period, the output of the product is focused (Mai, 2019).

In order to adapt to the rapid development of Agriculture 4.0, vocational training for rural labors is required with a drastic change in training models, programs and methods to assist rural labors to get access to science and technology and apply them into their production and business.

Based on the development of Agriculture 4.0 in the world, it can be considered that it is a revolution to digitize the whole cycle and related factors in agricultural production. In the whole system, the focus is on the farmers' fields where each farm is a laboratory and every citizen is a scientist. The final products that enterprises provide to people are not only seeds, fertilizers, production tools but also solutions to support the management and decision making of smart agricultural production (VNUA, 2018).

Agriculture 4.0 has appeared with a clear message that the demand in the near future for unskilled agricultural labors will decline, which is a big challenge for the developing countries, however, it re-opens great opportunities for dynamic and powerful countries to innovate in training high-quality, creative and entrepreneurial human resources.

Notably, the state management agencies have to grasp what the market needs are in order to provide information to farmers with a comprehensive view.

On that basis, farmers will decide by themselves whether to produce or do suitable jobs. When farmers have skills, capture and understand the needs of the market, they will be able to provide appropriate services and products, limit the situation of crop depreciation and price loss. When applying 4.0 technology in vocational training for rural labors, it is necessary to associate it with practice and start by studying on the demand of agricultural labors. From future job needs, they continue to be farmers or become servants of the agricultural industry (Dinh, 2018).
A numerous studies have shown that besides opportunities, Vietnam also faces new challenges in training and developing human resources quality. Some requirements on vocational training for Vietnamese rural labors are as follows:

Firstly, Agriculture 4.0 requires restructuring labor in economic sectors where traditional occupations that are more labor-intensive will gradually disappear. Industry 4.0 has introduced automation systems and intelligent robots. These systems will gradually replace manual labors in the whole economy, putting much pressure on the labor market. Developing countries will face labor surplus and rising unemployment.

Currently, Vietnamese labor forces are relatively abundant but mainly low-skilled so they are easily replaced by machines. The simple, repetitive jobs that most untrained Vietnamese workers are undertaking will gradually be replaced by machines in the future.

Secondly, the labor market is strongly separated and cheap labors are no longer a competitive advantage of countries in the world. A series of old occupations will be lost and the international labor market will be strongly divided into low-skilled and high-skilled labor. Along with that, the introduction of artificial intelligence also reduces the need for low-skilled labor usage. In particular, it will not only threaten the employment of low-level workers, but even intermediate-skilled workers will be affected if they are not equipped with new skills. With rapid technological development in the future, the demand for highly qualified and skilled labor is an indispensable requirement. By improving the requirements of the quality of human resources, the Industrial Revolution 4.0 also changes the requirements and methods of human resources training. Training high quality human resources to prepare for Agriculture 4.0 has become an urgent issue that many countries around the world have been concerned about.

Thirdly, the requirements for high quality human resources are increasingly urgent. According to calculations of experts, the demand for information technology human resources increases by 47% per year, while the number of information technology graduates only increases by 8% per year. Among them, not all of them are high quality, meeting the requirements of employers. A recent study shows that up to 72% of information technology students have no practical experiences, 42% of students lacks teamwork skills.

Last but not least, fierce competition in human resources will occur in many technology fields that start to be widely applied in practice, creating pressure on recruiting and developing related human resources. The large number of employees is no longer a competitive advantage. With technology, companies can coordinate and deploy works that was previously only possible by large companies, primarily focusing on technology adoption of new business models to generate power.

When applying technology 4.0 in vocational training for rural labors, it should be linked to the reality and begin with researching farmers’ needs. From the future career needs, they can continue to be farmers or they become servicers to the agricultural industry, therefore, the training program should be personalized for each person, online training should be enhanced.

4. International and domestic experiences in the development of vocational training for rural labors in Agriculture 4.0

4.1. Experiences of Germany

Germany has been well known for its human resource training on basic knowledge of proficient occupational techniques of the first top in the world. For university level, the differentiation is evident in two types called general universities (Universitaten) and specialized universities (Fachhochschulen or Universities of Applied Science). In agriculture sector, the top universities include Hohenheim, Munich, Bonn, Gottingen, Giessen, Kiel and Kassel. The practice rate in universities is very high, accounting for 40%.
In addition to the university system, German vocational training schools are regarded to be the best in the world because of their motto of vocational training. The system of training schools is clearly divided and differentiated in every school in order to train highly skilled human resources. With adequate and synchronous infrastructure, which is closely associated with enterprises, learners have opportunities to have practical works with machines and equipment, so when they graduate, learners can be proficient at work.

Germany’s dual system of apprenticeship and vocational school training has brought high-quality technical human resources to the country. Germany has built a learning environment that harmonizes the reality of enterprises and academic nature of the school for learners. Companies focus on providing practical knowledge and skills, especially those are suitable for the production technology of the enterprises while training facilities provide basic and academic knowledge. 70 percent of training time in a course is spent on field and the rest 30% is for learning at the vocational school. Training facilities are places that provide organized practical training in a realistic working environment (trainers come from the field with modern equipment ...), where learners are paid with a salary of the apprentice. Meanwhile, vocational schools organize free lessons in subjects related to professional and basic subjects, where the state government provides funding for public schools (factories, teachers ...). To 2018, more than 56% of learners have chosen this form of dual training.

Having the foundation of a country with a developed technology industry, almost all industries and fields that are necessary for the development of German Agriculture 4.0 are in the world leading group. In the context of Agriculture 4.0 with required high quality and specialized human resources, training professions such as biology, life sciences, information technology, machine technology, automation technology chemistry and mechatronics are all classified in the basic industries and prioritized for training. Therefore, trained human resources are completely suitable and meet the needs of society in terms of quality.

However, in the current situation, human resources in Germany are in shortage, therefore, the government has issued policies to attract young labors from many countries in the European Union (EU) and other countries. Most of the work forces are trained in Germany and then continue to work for German enterprises (Bach, 2018).

From above analysis, it can be learned from the German vocational training system as follows: firstly, the channeling and career orientation for learners takes place right from the high school level so that learners can choose the appropriate career and training model; secondly, training should be linked with actual manufacturing situation in enterprises, then learners will accumulate experiences and form profession skills; thirdly, vocational training is strictly regulated, however, the roles of enterprises are also appreciated in order to both attract resources from enterprises and associate vocational training with the use of trained labors; fourth, trainers are also required with high vocational skills besides their knowledge.

4.2. Experiences of China

Determining agricultural development with skilled farmers is a top priority area, 4 principles of Chinese vocational training are: bringing job education to villages and communes; demand-based vocational education; standardizing educational activities and strictly manage vocational training. Chinese vocational training program is designed to serve seasonal agriculture, farming fields and farmers’ demand, therefore, it will motivate and stimulate the people's potential and creativity. After graduation with a certain degree, farmers easily earn for their living from the profession that they learn. Local authorities will access the skills of professional farmers whether it is suitable for the scale of farming or not. In particular, all data will be gathered into files so that the manager can supervise it.

Moreover, professional farmers will also enjoy many support policies such as agricultural price compensation, advantages in land tax, easy access to preferential loans, technical guiding, high technology, etc. A number of universities in China have tasks on studying training strategies for rural workers. With these preferential policies, Chinese agricultural products, which are manufactured in a closed cycle have been present in many countries all over the world (Minh, 2008 & Hoa, 2010).
Actually, China has formulated a labor resource development strategy, which focuses on improving the quality of rural labor resources with contents such as changing the mindset and perceptions of officials and civil servants at all levels of labor resources and the implications of improving and developing labor resources which are in line with national strategies and policies; implement the strategy of "Science and Education energize China", "China’s founded education", building a learning society, enhancing students' creativity and practice; expanding the scale of education in high schools and colleges; strengthening vocational training, mobilizing civil education and diversifying investment in education, expanding the broad scope of education; investing in adult education, secondary and primary education, vocational education, investing in poor areas minority areas, large rural areas in the West; focusing on vocational training in enterprises; increasing costs for training; using people in suitable way and replacing appropriate people in the right places; encouraging and supporting the establishment of labor resource development organizations, quickly catching up with the international level, especially in the context of developing agriculture 4.0 requiring qualified and skilled labor forces.

4.3. Experiences of Thailand

Thailand has an advanced agriculture that has exported seeds and processed agricultural products to many high value markets all over the world. Determining that the most important factor in the development of Thailand Agriculture 4.0 is the human factor, Thai government has focused on the goal of training Thai people to be strong in the 21st century and integrate them into the world by measures on reforming the training education system to create new human resources, helping Thailand to become national leaders in the region, integrating the world into transforming ecosystems into purpose-based, results-based learning. It is shown in the goals and governance of training and education system, teacher skills and teaching models, curriculum, teaching and learning methods.

For the rural labors, Thailand has paid its attention to building program of skill development for trainees with possibility to study flexibly and transform in the program. Thailand has determined that Industry 4.0 will be the spearhead of the economic proportion, so the training of human resources has a specific orientation in the fields of robotics and automation. The Thai government has created the system of integrated education, training and career development for Thai people to suit the future career orientation of trainees. Strong supporting measures include renovating education systems and institutions, strengthening the career development orientation, developing skills to meet the demands of Agriculture 4.0.

4.4. Experiences of Bac Kan province

Rural labor in Bac Kan province currently accounts for 75% of the population and more than 50% of the social labor force. For sustainable livelihood, the province has concentrated its resources, improved the quality of vocational training for rural labors associated with job creation. In the period of 2010-2019, vocational training is organized for 25,486 laborers and the rate of labor force under vocational training is 42%, reaching a good level in the region.

Vocational training for rural labors in the province has been conducted in the form of "on-the-job-training", improving the quality of teaching and learning at vocational training centers and colleges, combining orientation, management and supervision of vocational training of political and social organizations.

A highlight of the issue in the province is that it is effectively integrated through the activities of socio-political organizations with international programs and projects. With funding from the Government of Luxembourg, Bac Kan has invested in building a boarding ethnic minority vocational college, organized training at three levels: college, intermediate, elementary and fostering, improving vocational skills as required, scientific research, joint training. The curriculum and professions are developed according to practical requirements, needs of students such as: mechanical engineering, animal husbandry - veterinary, cultivation and protection plants... All trained persons after joining training can get jobs.
Bac Kan provincial Farmers’ Union (FU), for instance, in cooperation with the Project Management Board of the project on “Pro-Poor Partnerships for Agro- Forestry Development (3PAD)” funded by the International Fund for Agricultural Development (IFAD), has successfully built and implemented farmer- to- farmer training model since 2011. Accordingly, a team of farmer trainers has been developed to train other farmers on cultivation techniques, animal husbandry, science and technology transfer. They are good farmers in production and business who have succeeded in developing a family economic model and are reputable in the community. Also, they are local people so they understand the customs and traditions and can convey knowledge and experiences to other farmers in their own language, especially for ethnic minorities. Staying in the hamlets and villages, having practical cultivation model for field visit, they can easily help and guide when the farmers meet with difficulties and obstacles. This model is really effective as it is easy to understand, apply, practical and cost-saving for farmers when taking part in.

To implement this, farmer trainers are trained by the participatory method which takes learners as the center. They prepare the lesson content based on personal experiences. After training, they become confident, proactive and can sign many service delivery contracts.

However, the model still faces some difficulties such as: farmer trainers only have practical experience, not yet have deep training in pedagogy and professionalism, no professional qualifications, so the preparation of lesson plans is still embarrassing, signing contracts with programs, projects, settlement of limited support funds.

4.5. Experiences of Lam Dong province

Lam Dong is the one of the leading provinces in the country where high-tech agriculture has been well developed, thus, there is also a great demand for human resources to meet the field.

Since 2010, under the policy of Project 1956, agricultural vocational training for rural labors has been supported with 21,699 people, reaching 49.2% of the whole period, in which, the total number of female employees is 11,538, 1,884 people from poor households, 8,759 ethnic minorities people, 106 people from households whose agricultural land has been recovered, people from near-poor households, etc. (Phan, 2019).

Focused training professions are local advantageous seedlings with standards, agricultural restructure practices and new rural area building such as growing VietGAP-based-vegetables and flowers; planting mulberry to raise silkworms; planting and tending special plants like mushrooms, strawberries, etc; planting medicinal plants like artichoke, ginseng, etc); planting and tending bonsai; cold- water fish farming techniques; techniques for raising dairy cows; planting and tending short-term plants; planting, tending and exploiting long-term industrial plants like rubber, tea, coffee, passion fruit, cocoa, pepper, cashew, etc; repairing agricultural machines; tissue culture, etc.

Moreover, apprenticeship has attracted young rural labors to participate in, improving the efficiency of rural production, contributing to economic restructuring towards favorable conditions and income for rural labors, especially female ones. The results of vocational training associated with job creation continue to be confirmed that over 80% of rural labors after vocational training gets suitable jobs following what they have learned (Son, 2019).

To achieve the above results, Lam Dong province has also implemented many synchronous solutions from standardizing vocational training on agriculture to calling for large investors to transfer advanced technology faculties to employees, thereby, improving labor productivity as well as the quality of local agricultural products. The province has also invested in infrastructure, selected management models, organized production and business, developed hi-tech agricultural human resources in the province based on 03 following paths:

Firstly, the Vietnamese State and local government bodies have paid attention to training, agriculture extension programs, vocational training for farmers, building new rural areas, etc., in the whole province. A part of funding for technical infrastructure construction is provided, new breed are supplied, product trademarks are
developed, agricultural festivals are organized, outstanding individuals and enterprises in production and business are honored, etc that encourage every levels, sectors in the area to study and work in high-tech agriculture.

Secondly, FDI enterprises take the initiative in researching, transferring and training rural labors. The structure of high-tech agricultural human resources are fair among leaders, managers, researchers, technology transferers and technical human resources, producers, harvesters, processing and circulation in the market.

Enterprises are currently focusing on developing the most effective hi-tech agricultural human resources in the province (Dang, 2015).

Thirdly, international cooperation has been strengthened to attract foreign resources in hi-tech agricultural production, investing in infrastructure, which both improve farmers' qualifications and support them to access new technologies. Moreover, the competitiveness of domestic and export markets is also at higher level.

5. Lessons learned for Vietnam

From the experiences of Germany, China, Thailand and some localities of Bac Kan, Tuyen Quang province, lessons can be generally drawn in vocational training for Vietnamese rural labors as follows:

Firstly, it is indispensable for the support and management role of the state. Where vocational training is given comprehensive attention in facilities, vocational training system and especially policies to support labors, the effectiveness of vocational training is improved.

Secondly, it is necessary to have the participation of many partners including localities, political social organizations, enterprises, training establishments and even skillful farmers with good production and business in vocational training activities.

Thirdly, training establishments should be in selected in accordance with the requirements and characteristics of vocational training for rural labors, including focusing on-the-job vocational training and ensuring employment for labors after training.

Fourthly, vocational professions should be diversified based on the demand of each locality and subjects, especially in the context of Agriculture with high requirements.

Fifthly, resources should be proactively seek and integrated with domestic and international programs, projects to diversify activities of vocational training for rural labors for more effective and sustainable development.

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