

Vietnamese enterprises' participation in improving labor competence serving Industry 4.0

Nguyen Thi Thuy Duong

MSc., Trade University

Email: nguyenthithuyduongbmt@gmail.com

Received 25 February 2022; published 15 June 2022

Abstract: *The Fourth Industrial Revolution has brought about great changes in manufacturing methods as a result of digital technology application, which consequently raises the need for employees to acquire new appropriate skills for those methods. The paper provides a picture of Vietnamese enterprises' participation in improving labor competency in line with the Industry 4.0. It also provides suggestions to the Government, businesses and stakeholders in training Vietnamese workers' competency.*

Keywords: Labor Competency Frameworks, Industry 4.0, Training for Workers, Enterprise, Vietnam

1. Rationale

The Fourth Industrial Revolution (Industry 4.0) brings both opportunities and challenges to all actors related to labor supply and demand and employment, requiring strategies to be set for each actor involved in the labor market - including proactive implementation. The participation of enterprises as employers in training not only contributes to reducing the State's burden on infrastructure investment, but also helps train skilled workers in line with market needs, satisfying the requirements of Industry 4.0. Although the government has promulgated a number of policies to encourage and attract enterprises to participate in training to improve labor

competency in Vietnam, the participation of enterprises in this field is still limited. Based on an overview study and survey results of the Vietnam Chamber of Commerce and Industry (VCCI) for 435 enterprises¹, the paper hereby summarizes the labor competency framework, and evaluates the current state of labor quality

¹ The author analyzes and processes data from the original data set of the enterprise survey conducted by VCCI in 2021 for 435 enterprises with details distributed by: (i) sector: 10 state-owned enterprises, 387 foreign enterprises, 38 FDI enterprises; (ii) size: 97 micro enterprises, 134 small enterprises, 88 medium enterprises, and 116 large enterprises; (iii) business lines: 181 manufacturing enterprises and 254 non-manufacturing enterprises; and (iv) participatory degree in the global value chain (GVC): 249 enterprises participating in GVC, and 186 enterprises that have not participated in GVC.

in enterprises that meet Industry 4.0 requirements.

2. Labor competency framework that meets Industry 4.0 requirements

A number of world-wide studies have been concerned about the framework of competencies or skills of workers in the context of Industry 4.0. Aulbur et al. (2016) showed that the Industry 4.0 will transform the working environment and the jobs that workers are expected to perform, thereby altering the necessary skills needed to perform the jobs. Core work related skills are classified into 3 major categories including 9 subgroups with more than 30 specific skills: (i) *Ability* (cognitive analytics, physical abilities); (ii) *Basic skills* (content skills, process skills, social skills, resource management skills, systems skills); and (iii) *Cross-functional skills* (complex problem-solving skills, technical skills).

ABD (2021) conducted a series of studies on skills necessary for labor in the 4 countries of Cambodia, Indonesia, the Philippines and Vietnam based on 10 categories of skills that help workers improve their performance, including (1) Critical thinking and adaptative learning; (2) Written and verbal communication; (3) Numeracy; (4) Complex problem solving; (5) Management; (6) Social; (7) Evaluation, judgment, and decision making;

(8) Technical; (9) Computer literacy; (10) Digital/ information and communication technology.

Prifti et al. (2017) provided a service skills' competency framework for Industry 4.0, including 8 groups: (1) Leading and deciding; (2) Supporting and cooperating; (3) Interacting and presenting; (4) Analyzing and interpreting; (5) Creating and conceptualizing; (6) Organizing and executing; (7) Adapting and coping; (8) Enterprising and performing.

Based on the results of over 230 studies that address the skills needed for Industry 4.0, Maisiri et al. (2019) used a systematic literature review methodology to filter the skills mentioned in these studies. These skills are divided into 2 groups by Maisiri and colleagues, including technical skills (technological skills, programming skills, and digital skills) and non-technical skills (soft skills comprising thinking skills,

Table 1. Proposed Labor Competency Framework for Industry 4.0

	Skill sub-groups	Skill set
Technical skills	Technological skills	<ul style="list-style-type: none"> • Digitalization and reading comprehension • Ability to work with advanced technologies (IoT, autonomous robots, 3D printing)
	Programming skills	<ul style="list-style-type: none"> • Simulation skills • Computer and software programming skills
	Digital skills	<ul style="list-style-type: none"> • Data analytics/ data processing • IT/data/cyber security • Cloud computing skills • IT knowledge and abilities • AI skills • Digital content creation skills
Soft skills	Thinking skills	<ul style="list-style-type: none"> • Collaboration (including machine - human)
	Social skills	<ul style="list-style-type: none"> • Self-awareness, self-organization
	Personal skills	<ul style="list-style-type: none"> • Lifelong learning skills • Adaptability

Source: Maisiri et al. (2019).

social skills, and personal skills). These sub-skills are measured by 39 worker specific skills.

In this paper, the author evaluates the current situation of labor competencies and enterprises' involvement in training provision to improve labor competencies in accordance with the framework set by Maisiri et al. (2019), focusing on two main groups of skills of *technical skills* and *soft skills* (See: Table 1).

3. Labor quality in enterprises in Vietnam for Industry 4.0

3.1. The gap from awareness to action in the application of Technology 4.0

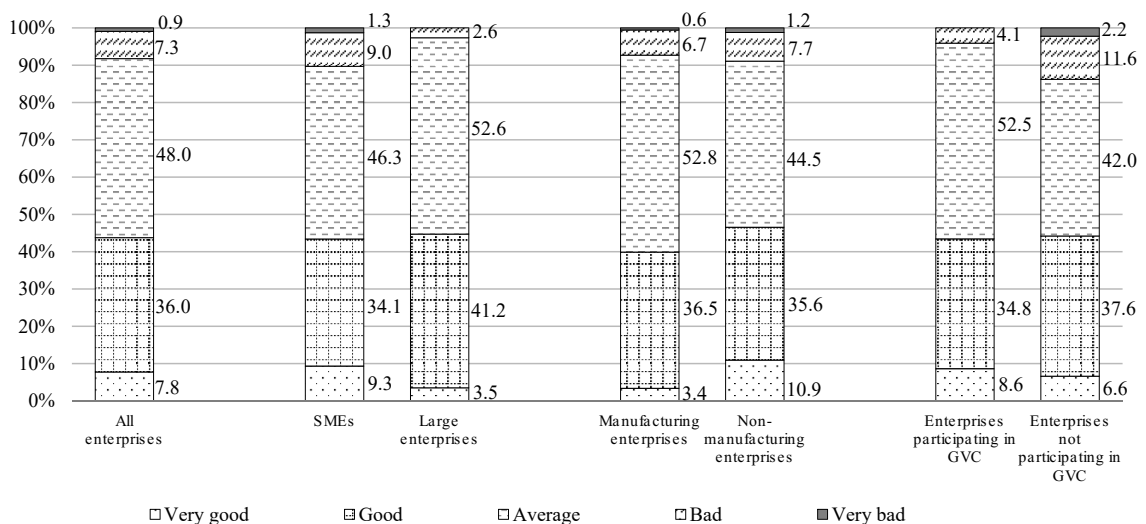
The findings drawn from data analysis show that although the majority of the surveyed enterprises (80%) begin to aware of and a half of those are interested in specific technologies, only a fifth of the surveyed enterprises are actually using these technologies. Large enterprises and those participating in GCV are more likely take interest in high-tech than SMEs

and those not participating in GCV. This development, on the one hand, displays the advantages and initiative of large enterprises and those participating in GVC in accessing technology 4.0; on the other hand, it poses a problem that needs to be addressed for SMEs in gradually approaching new technologies to adapt to the development trend of Industry 4.0.

3.2. Enterprises' delay in preparing workforce for Industry 4.0

Together with applying 4.0 technologies, enterprises must also prepare the adequate workforce being able to use these technologies. However, according to the author's data analysis, nearly a half of the enterprises have not prepared their workforce for Industry 4.0 while 39.4% of those merely just reached at the planning stage, only 11.8% of those already had training plans yet have not implemented, 6% of the surveyed enterprises had training plans and are executing their plans. This shows the delay of enterprises

Figure 1. Comparison of labor competencies in enterprises today and those required for Industry 4.0



Source: Author's data analysis from the results of VCCI's enterprise survey (2021).

in preparing their workforce for Industry 4.0, particularly SMEs and those not participating in GVC.

Large enterprises and enterprises participating in GVC generally have better workforce preparation for Industry 4.0 than SMEs and those not involving in GVC. The close connection between enterprises participating in GVC and the international environment has created a driving force for them to continuously innovate and improve their competitiveness to meet global standards in the context of Industry 4.0, especially improving the quality of human resources. As for those that are not prepared for the workforce of the new era, it is partly due to their confidence that their labor is meeting the requirements of Industry 4.0, representing 43.8%. However, nearly a half of the surveyed enterprises found that their labor only met the average level, and 8.2% of those thought that their labor would have difficulties in adapting to the new wave of Industry 4.0 (See: Figure 1).

3.3. Shortage of specialized technical workers to meet Industry 4.0

In terms of the overall workforce, the skills most valued by enterprises include social skills and personal skills, followed by thinking skills and technology skills, and finally digital skills and programming skills. This shows that even in Industry 4.0, soft skills still play a more significant role than technical skills.

Regarding technical workers, basic information technology skills are the most important, followed by soft skills and technological skills. According to the author's findings, enterprises think

that today specialized technical labor is not keeping up with the required level in all skills. The responsiveness of today technical workers is more appreciated in the application of basic IT and soft skills than in more complex technical related skills such as simulation skills, virtual reality, AI and digital content creation.

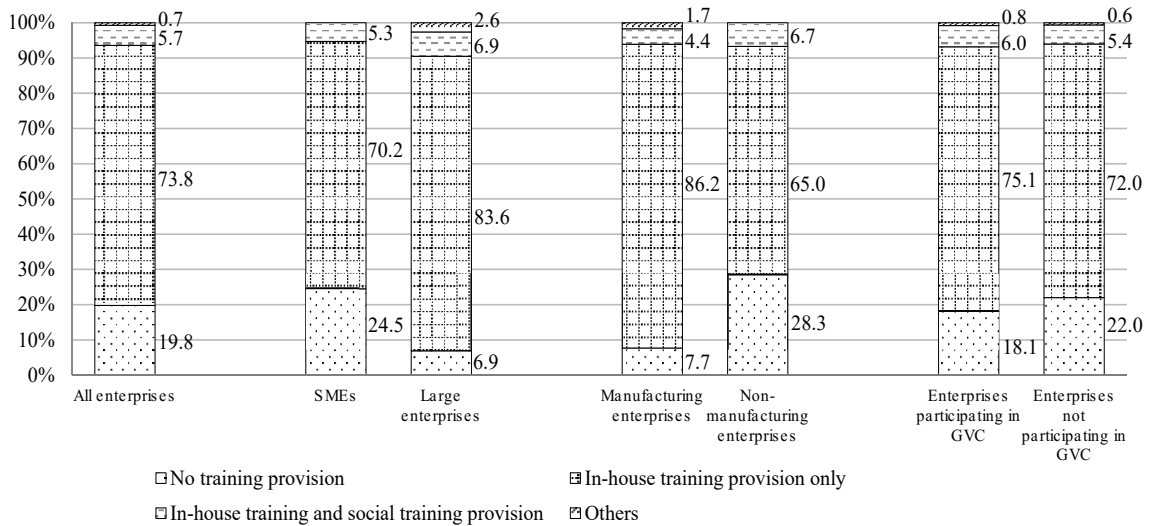
4. Competence training for labor

4.1. Enterprises have actively provided training to improve labor competency

According to the author's analysis, almost 80% of the surveyed enterprises have conducted training to improve labor competency, of which the majority are in the form of in-house training (accounting for 73.8%) and a few enterprises provide training for human resources (representing 5.7%) (See: Figure 2). The proportion of enterprises that have conducted training for their labor is high. This, on the one hand, shows the initiative of enterprises in building a workforce suitable for their operations; on the other hand, it indicates that the quality of human resources has not yet met the demand, forcing many enterprises to retrain their labor.

There is a significant difference between SMEs and large enterprises in competence training. The proportion of enterprises that do not provide training for their labor in SMEs is nearly 4 times greater than the figure for large enterprises, which means a lower data of enterprises providing in-house training, or those providing both in-house training and training for the entire society. Differences are also found in manufacturing and non-manufacturing enterprises. The findings display stronger

Figure 2. Enterprises' participation in training provision for workers



Source: Author's data analysis from the results of VCCI's enterprise survey (2021).

training to improve labor competency in manufacturing enterprises (occupying 92.3%); meanwhile, the figure for non-manufacturing enterprises accounts for only 71.7%, which means more than a quarter of non-manufacturing enterprises have not provided training for their labor.

4.2. Objectives of training to improve labor competency

Enterprises pay the most attention in training to improve a number of skills that their labor already acquired (65.1%), followed by training for unskilled workers (57.6%), and training new skills (46.1%). Thus, the implementation of training based on the basic knowledge mastered by workers will help reduce training time and costs compared with providing training the entire skill sets from scratch. However, as analyzed above, currently, the initiative of enterprises for Industry 4.0 remains low, and the majority of enterprises have not been ready to prepare qualified workforce in the face of the new wave. The fact that

only 17.6% of enterprises participating in the survey have conducted training to improve specialized skills is a case in point.

4.3. Organizing training for labor

Enterprises mainly use the in-house training form while cooperation with external training institutions remains limited. However, if looking at the details of training objectives, in-house training is commonly used for either unskilled workers or provision of advanced training to improve labor competency. Meanwhile, cooperating with external training institutions is more frequently used for training new skills, particularly specialized skills for Industry 4.0. This means that enterprises attach more importance to the role of external training institutions in providing new skills' training, especially those related to Industry 4.0 while the provision of training for unskilled labor or advanced training is more likely conducted internally using the in-house training format.

5. Cooperation with external training institutions to improve labor competency

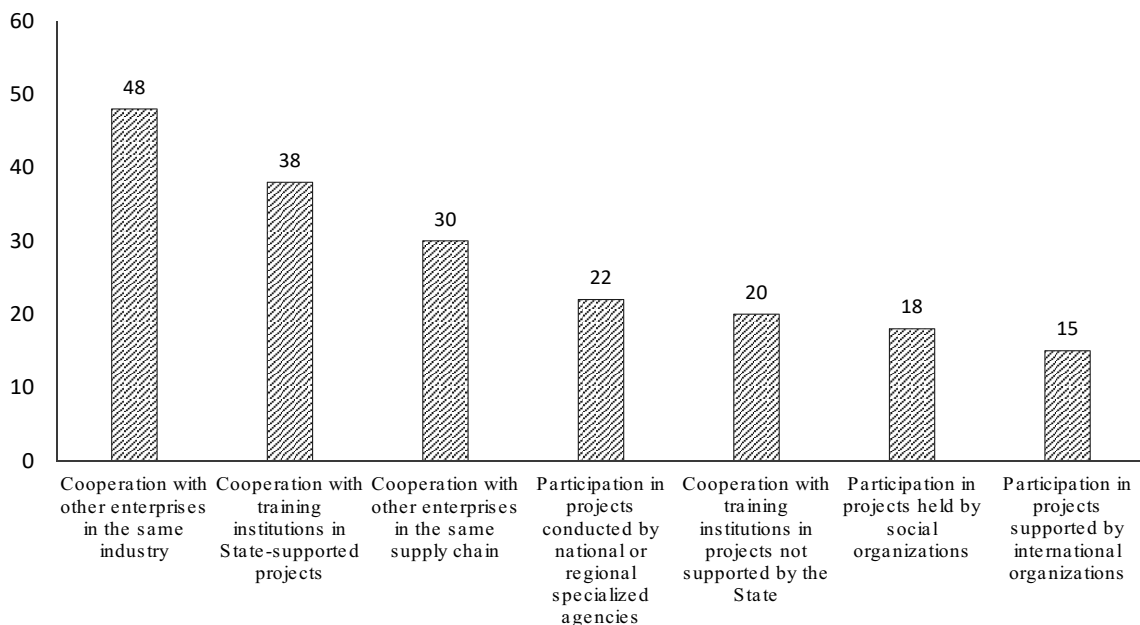
5.1. Forms of cooperation between enterprises and external training institutions

Although the proportion of enterprises that cooperate with external training institutions remains limited, up to two-thirds of the enterprises have cooperated with external training institutions, exhibiting a relatively positive development. Large enterprises, manufacturing enterprises, and enterprises involving in GVC often require more cooperation with external training institutions. Almost 60% of enterprise that have not cooperated with external training institutions expressed their desire to implement this form of collaboration in the near future.

Enterprises, especially large ones, still focus more on cooperation with enterprises in the same industry or the same supply chain to jointly provide training to improve

labor competency as these enterprises are those who best understand the needs of their business and their labor competency as well as the needs of their supply chains. Enterprises also take interest in the model of cooperation under State-supported projects because enterprises think that the State plays a crucial role in promoting linkages between enterprises and training institutions through developing orientation of skills in accordance with economic development strategies or financial support. Without the support of the State, the percentage of enterprises wishing to cooperate will reduce significantly. Models of vocational training cooperation with the participation of professional agencies, social organizations or international organizations are not yet developed in Vietnam, which is more likely to be sought by SMEs (See: Figure 3).

Figure 3. Cooperation models that enterprises want to set up with training institutions to improve labor competency (%)



Source: Author's data analysis from the results of VCCI's enterprise survey (2021).

5.2. Benefits and barriers that enterprises encounter when cooperating in provision of training for their labor

Most enterprises enjoy the benefits such as solving the training needs to improve their labor competency or reducing the costs of recruiting and training employees. Other benefits include performing social responsibilities and improving the enterprises' status and images (See: Figure 4).

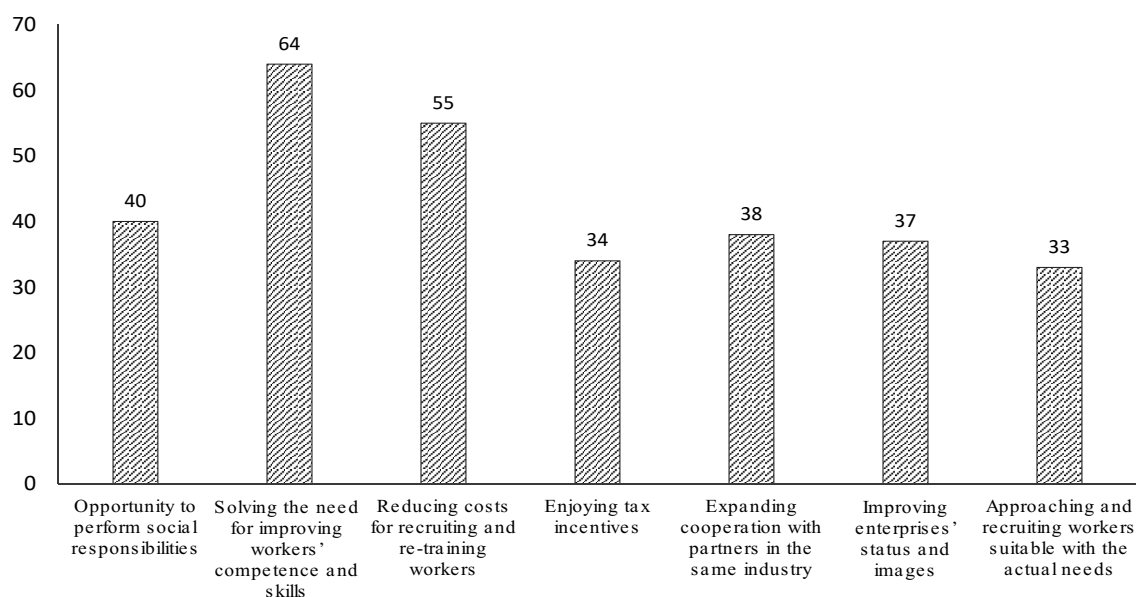
The first external barrier that enterprises encounter is the lack of supporting and motivating mechanism for their participation in training cooperation. The next barrier is the shortage of a long-term cooperation mechanism with training institutions, the overlap of many management agencies or the lack of trust in the capacity of training institutions. Regarding internal barriers, more than half of the surveyed enterprises claimed that there is no need

to improve their labor skills due to their simple production technology. Another barrier is related to investment costs. The lack of experts/human resources capable of participating in the training process or lack of machinery and technology to meet training requirements are mentioned as obstacles by approximately a third of the enterprises.

5.3. Competence of enterprises in the cooperation of labor competence training

In general, the competence of enterprises that participate in the collaboration of providing labor competence training remain mostly at the average threshold. Specifically, their ability to receive labor after training is most appreciated. Enterprises seem more confident in providing support for training than intervening in training and evaluation related activities. Large enterprises and enterprises involved in GVC are those that are rated higher in all competence aspects

Figure 4. Benefits enterprises gain when participating in training to improve labor competency (%)



Source: Author's data analysis from the results of VCCI's enterprise survey (2021).

than SMEs and enterprises not participating in GVC.

6. Conclusion and recommendations

This study shows that enterprises' labor and technological preparation for Industry 4.0 remains limited in Vietnam. Currently, nearly a half of the enterprises have not made any significant preparation. Meanwhile, the majority of enterprises rated their labor competency average or lower than the requirements of Industry 4.0. Though enterprises appreciated the need for both soft skills and technical skills, the training of soft skills for labor has not been given much attention compared to technical skills' training at vocational schools in Vietnam. Furthermore, the current training of technical skills has not satisfied enterprises' requirements.

To address these problems, promoting the participation of enterprises in training is an important solution. A number of enterprises have conducted competence training for their employees, mainly in the form of in-house training to serve their needs. The collaboration between enterprises and external training institutions remained weak with more focus on providing training of new skills or specialized skills for Industry 4.0. To promote the participation of enterprises in training to improve labor competency, some recommendations are proposed as follows:

For the State: The policy that many enterprises believe will positively transform the participation of enterprises in training and improving labor competency for Industry 4.0 is the development of skill's standard

framework for Industry 4.0, and the innovation of training programs in line with Industry 4.0. In addition, enterprises also want the State to invest in high quality vocational training facilities, identify key industries and occupations, and alter the management mechanism so that these facilities could enjoy more autonomy. At the same time, it is necessary to have an independent third party to verify the quality of the training institutions and provide transparent ranking information of training institutions according to specific criteria; therefore, enterprises have a firmer ground to choose their partners. Finally, enterprises want the State to continue promoting the process of socialization in vocational training and establish many channels to connect enterprises with training institutions.

Regarding training institutions: enterprises believe that training institutions need to improve their training capacity in line with Industry 4.0 to ensure that trainees after graduation meet the requirements of the labor market. Enterprises also expect training institutions to regularly provide information about their training programs to enterprises and recognize enterprises' feedback to make timely changes in their training programs. Training institutions should have a clear commitment to the output standards and a mutually agreed trainee evaluation to ensure the competency of labor.

Regarding enterprises: Enterprises need to develop strategies and allocate resources to labor training, actively cooperate with training institutions to update new professional standards and new

technologies. Enterprises' leadership need to change their perception of the benefits derived from cooperating with training institutions, establish a specialized training department to coordinate with external training institutions, provide capacity needs of workers for determining the output standards of training institutions so as to satisfy their needs and reduce the need to re-train workers.

Promoting the participation of intermediary organizations: The study also shows that many enterprises want organization representing enterprises, social organizations and international organizations to have more seminars and training related to opportunities and challenges in the context of Industry 4.0, and the importance of qualified labor preparation, with an emphasis on clarifying the opportunities, challenges, benefits and costs for enterprises in training cooperation. In addition, intermediary organizations should support enterprises and training institutions to improve their competence, especially in providing social skills' training, updating new skill models

and framework according to international organizations □

References

1. ADB (2021), *Reaping the benefits of Industry 4.0 through skills development in Viet Nam*, <http://dx.doi.org/10.22617/SPR200308>, accessed on 10 December 2021.
2. Aulbur W., Arvind CJ and Bigghe R. (2016), *Skill development for Industry 4.0*, <https://www.globalskillsummit.com/Whitepaper-Summary.pdf>, accessed on 15 November 2021.
3. Maisiri W., Darwish H. & Van Dyk L. (2019), "An investigation of Industry 4.0 skills requirements", *South African Journal of Industrial Engineering*, November 2019, Vol. 30 (3) Special Edition, pp. 90-105.
4. Prifti, L., Knigge, M., Kienegger, H., Krcmar, H. (2017), "A competency model for 'Industrie 4.0' employees", in: Leimeister, J.M., Brenner, W. (Hrsg.) (2017), *Proceedings der 13. Internationalen Tagung Wirtschaftsinformatik (WI 2017)*, St. Gallen, S. 46-60.