

## Impact of Industrial Revolution 4.0 on Vietnam's Textile Industry

### Author's Details:

<sup>(1)</sup>**Thi Hong Hanh Le**-University of Economic and Technical Industries

<sup>(2)</sup>**Thi Thu Hien Phan**-University of Economic and Technical Industries

**Correspondence:** Thi Thu Hien Phan No. 296/61/12 Linh Nam Street, Hoang Mai District, Hanoi, Vietnam. E: [ptthien.kt@uneti.edu.vn](mailto:ptthien.kt@uneti.edu.vn); T: +(84) 0914 915 926

**Abstract:** *The paper analyzed and assessed the status of the impact of the industrial revolution 4.0 on Vietnamese textile and garment enterprises. Since then, we have presented the challenges as well as challenges for Vietnamese textile enterprises. On the basis of opportunities and challenges, Vietnamese textile and garment enterprises will find their core values for sustainable development. Finally, we offer solutions to help Vietnamese textile enterprises catch up with the development trend of technology, especially the industrial revolution 4.0.*

**Keywords:** *Industrial revolution 4.0, textile industry, Vietnam*

### 1. Introduction

The Fourth Industrial Revolution (CMCN 4.0) is based on digital technology and integrates smart technologies to optimize processes and production methods; especially those technologies that are and will have major impacts such as 3D printing technology in product manufacturing, biotechnology, new material technology, automation technology, robots, etc. are changing the base. Production background of the world. The timely grasp of the achievements of the CMCN 4.0 can be considered a key, an opportunity to create a breakthrough development for our economy in the coming time in order to successfully implement the industrialization process. However, there are many challenges in the short and medium term. The advantage of labor, especially low-cost labor, the advantages of resources will be significantly reduced; labor intensive and resource-intensive industries will lose advantages and be gradually narrowed.

Currently, Vietnam is maintaining a growth model based on resource exploitation, processing, and assembly, conducting industrialization and modernization based on attracting foreign direct investment and FDI in labor-intensive industries. low skills. However, this growth model will face a big challenge in the context of the CMCN 4.0 when robots, artificial intelligence will replace human labor, production-manufacturing activities in the future will return again industrialized countries. In CMCN 4.0, labor costs and processing and assembly stages are becoming less and less important, they can gradually be completely replaced by robots when technological breakthroughs allow the wide application of people. Smarter machine with lower cost. The production lines are and will gradually shift to re-shoring, not because of rising labor costs, but because multinational corporations want to bring production closer to customers to can react more quickly to changing needs.

### 2. Impact of industrial revolution 4.0 on Vietnam's textile and garment industry

#### 2.1. Impact of industrial revolution 4.0 on Vietnamese textile production technology

The textile and garment industry has 3 main areas: Yarn - Textile and Dyeing - Garment, in which the textile and dyeing industry has applied automation as well as a lot of information technology applications in the past, especially the process. This has improved productivity, speed as well as reducing the number of workers. If in the past 10 years, 10 thousand spindles had to use more than 110 employees, in 2016, the most advanced enterprises of Vietnam with 10,000 spindles also needed only 25 - 30 employees, down nearly 4 times. compared to before. In other words, labor productivity per capita has increased nearly 4 times in recent times. In the world, there are the most advanced factories that are applying 10 thousand spindles with 10 workers for suitable products, with little change.

In the textile industry, there has also been a change, with the previous 400-500 revolutions/minute up to 1,000 - 1,200 rpm being popular today. Especially the data link between odd textile devices in terms of productivity, quality, and type of errors has fundamentally changed the way of managing textile factories. The dyeing industry used to depend heavily on the skills of people who make color formulas and control the dyeing process in machines, with the application of information technology to create data (data) is growing, especially for applications. Using Big Data in the new phase, the successful, good quality dye formulas of all factories can link together and interpolate a formula for new items and orders. but less dependent on the technical skill of the recipe maker and thereby stabilize the dye quality, stabilize the dye formulation and increase the exact dyeing rate for the first time.

In the past, the first dyeing rate was only from 70% to 80%, now there are many factories with the first accurate dyeing rate of up to 95% - 98%, simple items from polyester can reach 99% - 100%. However, these phases do not use a lot of labor, so it has little impact on labor fluctuations in the region. At the same time, it does not affect much on the level of skills in the textile industry, while the workers themselves who also have basic training, so upgrading them to meet new requirements will not take much time. Normally, a Fiber - Weaving and Dyeing factory has a capacity of about 500-600 workers and when applying the technology, it will not need so many workers. However, when expanding production, it is possible to use trained workers in the surplus old factory when changing technology to not reduce the workforce.

Particularly for sewing, there are 2 main products, one is fashion products, there are many difficult details and constantly changing, so the area of high fashion products will be difficult to implement. automation in production because of small order sizes, constantly changing designs, many different sizes will be obstacles to the application of robots in production. Areas of standardized production with many fixed details, little change, are completely capable of applying robots and currently, robots are entering difficult stages such as transplanting neck, hands, and shoots. Checks, which require high worker skills, productivity depends on workers, there are automation devices for this area to reduce the number of workers, increase productivity and especially Stable quality between products together.

In addition to the production section of the garment industry, one of the important applications of technology 4.0 is the design and 3D printing technology that will help shape each product for each person going straight to production. effective way. These are new trends applied in the garment industry.

## **2.2. Impact of 4.0 industrial revolution on Vietnamese textile and garment workers**

Applying new generation technology will help increase labor productivity and use less labor, so the gap in labor costs in one product between developing and developing countries will be increasingly narrow. again. Therefore, there are high value items, if automated, it is possible to return to the country to produce. However, it does not mean that all items are capable of moving at the same time. In essence, the structure of the product still has labor costs, so with a large range of costs, this is still significant, affecting the decision to choose a low-cost production site. The tendency is that very high-end or small quantities of goods, of which labor costs are low, are now supplemented by automation, which will likely return to the country itself.

Firstly, the impact on the quantity and quality of jobs through the replacement of labor by machines, robots, artificial intelligence and the application of information technology to a number of industries that are happening rapidly. penetrating the workplace on the Vietnamese labor market. This will also change the nature of the job, will do some work disappear but will also create many new jobs such as Uber or Grab a taxi.

Typically, the risk of replacing labor in the textile and footwear industry in Vietnam. 3D printing technology has progressed to the point where it is possible to produce shoes on the spot, and this technology will soon be completed in the near future. This means that consumers in developed countries can immediately have a pair of shoes produced according to the needs of their customers without having to go through a production or import process from another country.

However, automation is not a threat to job seekers, if they are skilled. Most employers think that digitalization will increase recruitment capacity in the future. Only 10% expect to reduce the number of manpower because of automation. Therefore, when automating, most businesses will need more people but not less.

Second, the impact on the quality of human resources to meet the requirements of the CMCN 4.0. According to many studies, the necessary labor skills in the new technology era in addition to hard technical skills (medium and high) include specialized knowledge and skills that belong to technical expertise to actually Existing work needs to have soft or core work skills such as creative thinking ability and proactive work, skills to use computers, internet, foreign language skills and skills teamwork, safety skills and compliance with labor discipline, problem solving skills, time management skills, concentration skills.

In Vietnam, although the labor force is abundant, the quality of supply is still low and is improving, but the process is quite slow.

Thirdly, with the digital platform, integrating all information about technology, processes, production methods, needs of industry, profession, skills ... and especially the ability to connect, Sharing around the world through technology devices ... will change the way of connecting supply and demand in the labor market. The status of workers does not have the necessary skills to meet the requirements of current or future jobs, and there are many other factors that limit the ability to improve those skills and succeed at work. In Vietnam, the current lack of qualifications and skills will increase when major trends begin to affect the employment picture. Even workers with appropriate skills are unlikely to find jobs that match their qualifications or interests. The basic reason is that there is no place or place for workers and businesses to connect with each other effectively.

Fourth, a great impact on the analysis and forecast of labor market information. CMCN 4.0 will have a strong impact on the quantity, quality or nature of current and future jobs. And now, a fundamental reason is the lack of information on job opportunities, lack of information on the quality of workers, lack of time, limited selection of jobs, and lack of income, so it is difficult to switch to jobs. the more appropriate, or a series of other factors that lead to an imbalance between supply and demand in the labor market Thus, how to solve the above problem, that is the work of analyzing and forecasting labor market information. However, this work in Vietnam still faces many difficulties.

Fifth, regional countries have strategies, policies, and action plans in the context of CMCN 4.0. If Vietnam does not have precise and specific steps, the risk of being left behind is very easy.

However, with acumen and flexibility, in the past 10 years, Vietnam Textile and Garment industry have welcomed the trend of shifting production of the world to Vietnam, rising strongly with dozens of times of growth. Particularly in 2017, despite many difficulties, with high determination, the textile and garment industry has gradually stabilized and overcome challenges with export turnover of over USD 31 billion, achieving a growth rate of over 10.2%, surpassing goals.

### **3. Opportunities and challenges for Vietnam's textile industry**

It can be said that the achievements of CMCN 4.0 are an important premise in improving labor productivity and product quality in the DM industry. For example, the yarn factory model 4.0 allows to reduce up to 70% of labor and reduce energy use by 25%. Textile dyeing factory 4.0 helps reduce 30% of labor, 50% of the water used for dyeing and 50% of energy consumption.

In particular, for the garment industry, the trend of using robots or automation devices for difficult techniques or repetitive work steps is of interest to businesses (businesses). Using robots in fabric spreading, cutting can help reduce up to 80% of labor, saving 3% of materials; in difficult stages such as bag, hand, and neck ... using automatic devices and robots will significantly reduce the number of employees, increase product quality, reduce dependence on skilled labor.

Besides, with the development trend of CMCN 4.0 with a high level of automation and robotization, together with an Internet connection of everything (IoT) applied in the production process, circulation is inevitable. The necessary labor per unit of product will drastically decrease. Thus, the advantage of low cost labor - which is a traditional advantage to promote the growth of Vietnam's DM industry will no longer exist. Instead, the growth of Vietnam's DM industry will depend on the unit price of labor on a product. If investing in technology, building a reasonable production management system, helping to improve labor productivity, there may still be labor unit prices on a low product, despite high labor wages.

On the other hand, it is not possible to continue the trend of utilizing more workers. The CMCN 4.0 created an opportunity for Vietnam's DM industry to break out, escaping the trap of using many workers but not high wages, unstable labor.

In addition, the current global supply chain's interest in clean production, sustainable production, environmental protection, social responsibility ... also requires DMs to invest and innovate technology. a reasonable way to make the best use of resources ...

Before the 4.0 industrial revolution, when the level of automation was pushed to the maximum, Vietnamese textiles and garments would lose the advantage of low-cost and high-skilled labor. Therefore, there are concerns that Vietnam textile and garment industry will struggle because many orders will return to developed countries. So, is the 4.0 industrial revolution really threatening Vietnam's textile industry?

Thanks to the policy of economic integration, along with the sensitivity and flexibility, in recent years, Vietnam's textile and apparel industry has welcomed the trend of strongly shifting the world's textile and garment production to Vietnam. After 10 years of joining the WTO, Vietnam's export turnover (textile exports) increased 3.6 times, but in which, the value of Vietnam in textile and garment products increased by 2.5 billion USD. In 2007, it was 16 billion USD in 2017 (ie, increased by 6 times). In particular, over a period of 15 years, after we had BTA with the US in 2002, our textile and garment exports increased more than 10 times, from the US \$ 3 billion to the US \$ 36 billion in 2018.

In the past 10 years, Vietnam's textile and garment industry has strongly increased thanks to the advantage of low-cost labor, high skilled skills, and the suitability of Vietnamese employees' personalities with the textile industry and the same geographical position. advantage due to many seaports. However, with the new development trend of the world economy, when the 4th industrial revolution began to take place, with a high level of automation and robotization, along with internet connection all things (IoT ) applied in the production process, circulation, all the necessary labor on a unit of product will drastically decrease. For example, in the yarn industry, in the 1990-2000 year, the factory with 10,000 piles required 110 workers to operate, then by 2017, with modern machinery and equipment with a 20% increase, also home That machine will have a 7-fold increase in productivity per capita and a reduction of only 15-20 workers (equivalent to a six-fold decrease in personnel). In the textile industry, in 1990-2000, the most modern textile machinery can reach speeds of 400-450 rpm, in 2012-2013, the weaving machine reaches a speed of 1,000 rpm. Currently, popular weaving machines have speeds of up to 1,600-1,800 rpm, producing four times the output. Not only that, with the trend of IOT, the stages in the production and circulation process are connected to each other, so the management and design costs are also significantly reduced. In the garment industry, with automatic transport systems between stages in the production line, machines can replace people at the most difficult stages, achieve higher productivity and more stable quality.

Thus, the advantage of low-cost labor will no longer lead to the risk of textile production will move back to developed countries. In fact, when textile production returns to developed countries, which are fashion centers, there will be advantages in transportation, because goods will go to the market at a faster rate. In the fashion industry, the speed from design to market is an important competitive factor.

Thus, in the meantime, Vietnam textile and garment industry is facing the situation of being stuck on advantages and low-cost labor of Vietnam cannot compare with countries like Bangladesh and Cambodia, but technology cannot be as high as Developed nation. In this situation, if Vietnamese textile and garment do not have a reasonable transformation strategy, proper investment choices will face great obstacles in maintaining existence and development.

Thus, Vietnam's textile and garment industry has set its determination to continue developing. However, which path will we take and by what method?

First of all, in order to create a competitive advantage, the productivity of Vietnamese textile and garment must increase. But we do not choose to increase productivity by labor skills, but by technology. Therefore, the requirement is to invest in leading technology in the world, reducing labor on a product. Thus, textile enterprises can increase productivity, shorten delivery time, along with increasing salaries for employees, attracting high-quality personnel and at the same time solving competitive problems. personnel.

With that method, the concern is whether the textile and garment industry has significantly reduced the number of employees, making a number of workers lose their jobs?

In fact, in recent years, Vietnam textile and garment export turnover has continuously increased to USD 3 billion / year. To achieve this impressive growth, half of them rely on new investment in manufacturing plants. But with the investment in modern technology, we do not need to open a new factory, still use the same amount of labor and still growing thanks to increasing productivity. Vietnam textile and garment industry is in a good position in the market with stable traditional customers. At this moment, the transformation of modern technology according to the roadmap is the right way for us to keep orders and enough jobs for workers, not to reduce labor. In all three areas: Yarn-textile we all have to reduce labor costs per unit of product to ensure survival and development while participating in the industrial revolution 4.0.

The key thing that Vietnam textile and garment industry must focus on is to reduce labor costs/product units. According to estimates, with the growth rate of 10% per year in recent years, Vietnam textile and garment industry needs 200,000 new employees each year. However, when the industry can focus on investment in high-tech equipment, it can still grow at 10%, but only need to recruit 100,000 additional workers per year. Moreover, when the industry applies management technology to connect all stages in the production process, it also reduces inventory costs. For example, the tailor may know what information the textile side is producing, may be suitable to register immediately so that after weaving, the goods will be delivered immediately to the tailor, saving storage time for the textile and reduce delivery time for the tailor. The connection of such information makes it possible for the parties to use each other's products in the fastest production chain, optimize shipping time, and reduce overall costs during the production process. In addition, we can train and develop workers' ability to operate in our chain.

However, in terms of macro, in order to catch up with the 4.0 industrial revolution, implementing the future development strategy of Vietnam textile and garment, the State should have policies to support the industry in the investment process. High technology, through tax breaks, preferential loan interest rates for businesses investing to achieve green and clean levels in production. Along with that, the State also needs to have a master plan for Vietnam's textile and garment industry, which should be located in the most favorable area or region, so that the industry can overcome new challenges, continue to thrive, contribute to export turnover. By maintaining the growth rate as in the past years, Vietnam's textile and garment industry can completely increase export turnover to USD 60 billion by 2030.

The opportunity of CMCN 4.0 to bring to Vietnam DM industry is very clear, however, technology investment in the direction of 4.0 requires large capital, interest must be paid for high investment costs, equipment depreciation is also high. This is the leading difficulty for Vietnamese DM enterprises, which are mainly small and medium enterprises, low economic potential.

Besides the technology problem, another huge challenge for labor-intensive industries such as DM is the excess labor mobility. According to many types of research of several organizations around the world, automation technology can replace up to 47% of jobs, or modern technology machines can replace 85% of Vietnam's DM labor in the next few decades. This rate, if converted into absolute numbers, will be very large, because DM accounts for nearly 3 million workers, of which about 78% are female workers. On the other hand, DM concentrates more low-skilled workers (about 17% only have primary education) and a significant proportion is no longer young, from 36 years of age (35.84%). This is a group that cannot easily find alternative jobs in the formal sector. Thus, how to resolve redundant labor, how to train human resources to meet the requirements of CMCN 4.0 is also a big problem for Vietnam DM industry.

#### **4. Solutions to help Vietnamese textile enterprises catch up with the trend of the industrial revolution 4.0**

CMCN 4.0 is an inevitable development, which Vietnam cannot stand outside. It brings many opportunities to change the face of the country's economy in general, as well as bring about expectations of positive change for Vietnamese DM enterprises in particular if there is good preparation to grasp get this wave. Accordingly, each company in the industry itself needs to proactively plan their own business strategies to take advantage of the achievements of the CMCN 4.0, as well as minimize challenges.

Besides, the DM industry also needs strong support from the Government, ministries, departments, and sectors. For example, the State has preferential interest rate policies for high-tech investment, or the state management of the environmental sector must comply with the provisions of the law, but cannot provide prohibition. because of fear of pollution, it would be very difficult for the industry to produce materials for DM.

In particular, ministries, departments, and branches need to promote administrative procedure reform. In 2003, there were only 15 procedures, now increased to 402 procedures. The cost of implementing these procedures is equivalent to a 22% tax (while for ASEAN 4 countries only 12%). On the other hand, the time to complete procedures for export and import goods is also much higher than those in the ASEAN group. 4. The promotion of administrative procedure reform will create many favorable conditions. for Vietnamese DM enterprises to improve their competitiveness in the context of competition in the international market increasingly fierce today.

#### **Some solutions for businesses**

One is to study the advanced technologies of CMCN 4.0 and apply them to improve position in the value chain. Enterprises must flexibly adjust their products according to consumers' needs, integrate advanced technologies to minimize production processes, reduce delivery time, shorten product life cycle while ensuring manageability. production logic and product quality, increasing competitiveness.

Secondly, focus on integrating digital technology: Promoting the development of digitized business and production solutions; integrated with sensor systems, control systems, communication networks for business and customer care; efficiently store and use big data based on cloud computing; collect, analyze and process large data to create new knowledge, support decision making and create competitive advantage; Effective analysis, evaluation, and application of data collected from machines and sensors, to quickly make decisions to improve safety, operational efficiency, work processes, services, and maintenance .

Thirdly, businesses need to develop new skills for each individual as well as for organizations; effectively participating and using the smart supply chain created from the CMCN 4.0, more closely linked to the needs of customers.

Fourth, consider people to be the most valuable resource of enterprises. Human resource development strategy must be a part of the long-term development strategy of enterprises. In particular, first of all, there is a solution to improve the quality of existing human resources of enterprises, especially the staff and key specialists through training activities, updating knowledge, equipping skills. (Focus on 3 skills: Proficient in professional

skills, foreign languages, first of all, English ...; proficient in information technology, computers) to improve labor productivity; attach importance to recruitment, have a "headhunting" strategy to supplement high-quality human resources for businesses.

Fifthly, attaching importance to the "enterprise restructuring" in the spirit of entrepreneurship, innovation and creativity; review and update to timely adjust and innovate the enterprise management model in accordance with the development scale of enterprises in each period; build a streamlined, efficient operation and arrange the right workforce and the right people to ensure the highest labor productivity.

Sixthly, the application of new scientific and technological advances in CMCN 4.0 in enterprise management, construction, project management, project promotion, introduction of real estate and online real estate products special is to research and apply blockchain technology into real estate business, to improve labor productivity and business efficiency of enterprises; attach importance to the cooperation with foreign investors and enterprises to increase financial resources, improve corporate governance capacity, increase the diversity of real estate products but still retain Vietnamese architectural identity Male.

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