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Vietnam's Logistics Industry in the Fourth Industrial Revolution

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Abstract:
Industrial Revolution 4.0 is taking place quickly and vigorously. It comprehensively impacts all areas, such as industry structure, supply and demand of the labor market, production management systems, etc. Logistics and supply chain management are also impacted. The scope of the article provides some background knowledge about Logistics in the 4.0 industrial revolution as well as the future trends of Logistics development. The paper also presents the opportunities and challenges that Vietnam's Logistics faces in the industrial revolution of 4.0. This study used qualitative methods through the analysis and synthesis of documents related to Logistics 4.0, experts' opinion, and the Danang City businesses. Since then, the authors have proposed solutions to help Vietnam's Logistics catch up with the world's trends.
Keywords: *Industry 4.0, Logistics 4.0, Vietnam.*

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I. INTRODUCTION

Industrial Revolution 4.0 is beginning and will affect all socio-economic fields. The industrial revolution 4.0 requires professionals in society to transform in the direction of "smarter" to meet society's needs. With an essential role in the development of an enterprise in particular and of the whole country, Logistics must also catch up with the trend of the digital age, which in this article is presented with the term "Logistics 4.0". So will the explosion of technology 4.0 create conditions for development or challenges to overcome for production and business enterprises in Logistics?

II. OVERVIEW OF LOGISTICS 4.0

The development process of Logistics is often considered in terms of the level of service that the Logistics business provides. However, in this article, we will analyze the development process of Logistics corresponding to the industrial revolution. Accordingly, Logistics goes through the following stages: [6]

- Logistics 1.0 (from the end of the 19th century to the beginning of the 20th century): The stage of mechanization of transport. Steam-powered ships and trains were used as a primary means of transport instead of people and animals to transport goods.
- Logistics 2.0 (from the early 20th century to 1960): The invention of electricity and mass production led to the automation of the transportation of goods. Therefore, Logistics at this stage are also automated, such as an automatic warehouse and sorting system, an automatic loading and unloading system, etc.
- Logistics 3.0 (1960 - 2000): The stage of systematization of Logistics management originated from the invention of computers and information technology. By using information technology systems in the field of Logistics, such as Warehouse Management Systems (WMS) and Transportation Management Systems (TMS), automating and efficiently managing Logistics, inventory, and transportation has been developed and improved considerably.
- Logistics 4.0 (2000 - Present): This is the latest development stage of Logistics, mainly based on the development of the Internet of Things (IoT) and Big Data (Big Data). The primary purpose of Logistics 4.0 is labor-saving and workforce standardization in supply chain management. Technologies like warehouse robots and autonomous driving are trying to replace processes that do not require human input and decision-making. The aim is the perfect balance between automation and mechanization.

III. VIETNAM LOGISTICS UNDER THE IMPACT OF THE 4.0 REVOLUTION

With the advantage of a coastline of 3,260 km stretching from North to South, located in the Asia-

Pacific region in the international maritime route, Vietnam has favorable geographical conditions to develop logistics services.

According to the data of the Vietnam Logistics Business Association (VLA), Vietnam currently has about 4,000 logistics enterprises operating in the fields of road, rail, sea, inland waterway, air transport, forwarding, warehousing, customs agency, inspection, cargo testing, loading and unloading of goods, ... and undertake a part of international logistics services through acting as agents for foreign businesses that are shippers, ship owners, international logistics service providers. Of which, there are about 1,300 active enterprises. However, most enterprises are SMEs, and only about 1% are large. About 75% of enterprises are concentrated in the Ho Chi Minh City area. In which state-owned enterprises account for 20%, private enterprises 10%, and limited liability companies 20%. Logistics enterprises in Vietnam are mainly small-scale; when registered, up to 90% of enterprises have a capital of less than 10 billion VND, 5% have capital from 10 to 20 billion VND, and the remaining 5% have capital from 20 billion VND or more. Meanwhile, the number of Logistics enterprises participating in the Association of Logistics Service Enterprises is only over 360, which shows that the connectivity of Vietnamese enterprises still needs to improve; most are still operating alone.

According to the survey data of the research team, including VLA, Import-Export Department (Ministry of Industry and Trade); Trade Union University, University of Transport Technology, 2018 marked very remarkable progress in the application of technology in Logistics, reflected in the increased in local application solutions, especially the appearance of total solutions with system integration, application of artificial intelligence. In 2017, the concept of Logistics 4.0 was still quite vague; this year, it has been mentioned a lot in the media and the professional world, clearly showing signs of a new wave.

Based on the foundation from previous years, main thanks to the high growth momentum of the economy in general and import and export in particular, Vietnam's logistics service industry in 2018 continued to achieve a growth rate of about 12% - 14%. Statistics show that the sales of Logistics enterprises listed on the stock exchange have a growth rate of 12.77%. According to the 2018 Logistics White Paper published by the Vietnam Logistics Service Association (VLA) 2018, Vietnam's LPI index increased by 25 places compared to 2016, ranked 39th out of 160 countries, ranked 3rd in ASEAN countries. All six parameters/criteria for evaluating LPI 2018 have increased dramatically, of which the highest increase is Logistics service quality capacity (ranked 33, up 29 places) and ability to track and trace export goods (ranked 34, up 41 places). The evaluation criteria that increased very well are Customs (ranked 41, up 23 places) and Logistics infrastructure (ranked 47, increased by 23 places). Delivery time criteria (ranked 40th, up 16 places) and criteria on international shipments (ranked 49th, increased 1 level compared to 2016). With these positive trends, according to the Vietnam Logistics Business Association (VLA), the logistics service industry can contribute about 5% of GDP in 2017 and even higher in 2025.

There are four primary application areas of new technologies in Logistics. The most prominent applications are in road transport through vehicle capacity optimization, route planning, and control, timing and schedule, and improving utilization rates. The rise of companies like Uber and Grab has clearly shown signs of this new wave. Next, the second outstanding segment is the solution to automate e-commerce warehouses, express delivery, and last-mile delivery. Currently, the market has had the first applications of Lazada and is continuing to attract the participation of many large companies in the industry. Third, some large manufacturing companies like Samsung also launched operating systems that combine production automation with lean manufacturing principles, which operate very efficiently. Finally, a few retailers in the country are implementing a combination of information systems - automation - artificial intelligence in supply chain management from purchasing to distribution.

However, before the technology application trend, there were very few domestic logistics enterprises willing to invest and apply new technology in their operations. While the use of simple device technologies such as laptops, global positioning devices, 1D barcode readers, and support platforms for connecting online Logistics service information are recognized by Logistics enterprises in common use up to 99 - 100%, the technologies and equipment that are complex and require high level are rarely used by businesses. Specifically, smartphones directly involved in the working process account for only 30%, the radio-formatting system only accounts for 10%, the automatic call distribution system is less than 5%, and the identification device voice is less than 5%. Notably, many indicators account for less than 1%, such as the online logistics information service supporting platform; the service robot picks up / arranges goods; warehouse lifting robots, automatic storage and picking robots, order fulfillment robots, terminal electronic devices connecting to customers, blockchain technology application, etc.

Thus, in the face of the strong development trend of science and technology and the industrial revolution 4.0, besides the incredible opportunities brought, the logistics industry in Vietnam will have to face many difficulties and challenges:

3.1. Opportunities

Like previous industrial revolutions, industrial revolution 4.0 promises many great benefits. For the Logistics industry, the 4.0 revolution contributes to reducing transportation and communication costs, thereby optimizing business costs, and the logistics system of enterprises also becomes transparent.

Thanks to technology development, businesses can shorten order fulfillment time and satisfy customers. It is possible to imagine a business providing logistics services for customers, which includes the service of bringing goods to retail warehouses or distribution centers of customers. A 40-foot container contains the number of goods that need to be brought to hundreds of different warehouses of customers, to facilitate delivery, it is necessary to divide the shipment into many bills of lading. If before, this Logistics business had to do every detail to send to the shipping line, and again had to wait for the shipping company to make each bill of lading to be sent to them, which was a waste of time. Nevertheless, thanks to the application of an electronic data interchange system (Electronic Data Interchange - EDI), the parties can save much time, specifically: Logistics enterprises update all encrypted information in the system. EDI system and then send it to the shipping line; the shipping line also through EDI to decode and update that information and check the validity of the information. This saves a lot of time and minimizes the risks of errors in the bill of lading process.

An opportunity that the industrial revolution 4.0 brings to Vietnam Logistics is the emergence of new services related to Logistics activities. In 2017, Ifreight Joint Stock Company launched Vietnam's first online booking system. The ifreight.net system includes a website and a mobile app that helps businesses choose a shipping company with a list of over 40 shipping lines to decide the lowest price at any given time so that they can book online instead of manually.

A typical example of seizing the opportunities created by the industrial revolution 4.0 in Vietnam is the use of new technology in the two fleets of Boeing 787 Dreamliner and Airbus A350 aircraft operated by Vietnam Airlines. When the aircraft is in operation, sensors on the aircraft will send data about the aircraft's status to the ground. The Technical ground staff will receive alerts, plan repairs, and prepare spare parts. These replacement parts can be manufactured while the aircraft is in flight thanks to 3D printing technology and can be repaired as soon as the aircraft lands.

3.2. Challenges

Besides the positive aspects, Vietnam's logistics industry also faces significant challenges in this 4.0 trend transformation:

Firstly, the challenge of infrastructure for Vietnam's logistics service industry

Currently, we are not aware of the development of the logistics industry into a primary service industry to support other economic sectors, so some provinces and cities have potential but commercial infrastructure, transport infrastructure as well as information technology infrastructure have not been adequately invested, so logistics service activities, in general, have not been developed. In addition, due to significant investment costs, businesses only invest in systems such as transportation management (TMS), and warehouse management (WMS)... in a small and inconsistent manner. Companies still need to apply automation systems for warehouses and distribution centers for the entire business.

According to Mr. Nguyen Tuong, senior advisor of the Vietnam Logistics Service Association (VLA), Vietnam's major cities, such as Hanoi, are eligible to develop into logistics service centers of the country. However, the barriers in terms of infrastructure need to be corresponding; the legal system regulating logistics activities such as the chain of transportation services, storage, and supply of goods is still overlapping, lack of stability and unprofessional human resources. These significant gaps slow down the development of the logistics service industry in Vietnam. Hence, it will cause many difficulties for us in promoting cooperation and connection between domestic and foreign logistics service businesses in Vietnam.

The second big problem is that the capacity and competitiveness of Vietnam's logistics service businesses still need to improve.

The weakness of Vietnamese enterprises is that the service costs are still high, and the quality of some services and professionalism could be more uniform. The main reason is the limitation of business size and capital, experience, and qualifications management; the ability to apply information technology still needs to meet the requirements of international logistics activities.

Logistics service is a highly international industry and rapidly applies scientific and technological advances to activities. Developed countries are gradually implementing E-Logistics, green logistics, and E-Documents... and applying cloud computing technology, Blockchain technology... In the context of industrial revolution 4.0, artificial intelligence or robots started to perform several services, such as packing or unloading goods from containers and loading and unloading goods in warehouses and yards... Meanwhile, Vietnam's logistics service providers currently apply information technology to this work at a low level, mainly using electronic customs declaration software, vehicle locating technology, email, and internet essentials...

The third problem is that human resources still need to meet the requirements of international logistics activities.

About the service staff: a team of staff who take care of daily operations; most of them are university graduates but are not professionals, and must improve their professional skills and skills in working.

Regarding the direct labor force: most of them have low education levels; the main work is loading and unloading, counting in warehouses, driving trucks, needing to be trained in industrial manners, and using more strength force than mechanical means. This weakness is due to the outdated means of labor, which do not require specialized labor.

Regarding training programs and improving skills in the logistics industry: The practicality of the curriculum at universities and colleges needs to be higher, making learners not see the full role and contribution of Logistics and transportation in the economy. For businesses, in order for employees to meet the requirements of the job, they often organize internal training courses with in-service instructors. Although this training force has much practical experience, pedagogical skills and communication ability are not guaranteed.

IV. CONCLUSIONS AND RECOMMENDATIONS

Industrial Revolution 4.0 is inevitable in the world today, and it affects all aspects of socio-economic life. Therefore, not out of this rule, Logistics is also profoundly affected in many aspects, from creating smart factories and managing warehouses through automated systems to linking data systems. Massive logistics materials and ensure high-quality human resources.

In order for Vietnam's logistics industry to overcome the challenges of the industrial revolution 4.0 and not be out of the game with the world, we need:

4.1. Towards the government

Vietnam's logistics service industry still needs to catch up in applying high technology. In order to apply modern science and technology, catch up with the international level, following the trend of forming the Logistics industry in the context of the industrial revolution 4.0, the State needs to have policies to support a part of investment capital for Logistics enterprises, and policies to encourage high-tech enterprises to have the form of leasing so that logistics enterprises do not have to make a significant initial investment in technology.

Along with that, continue to complete the national and ASEAN single-window system with the active participation of ministries and branches, thereby creating favorable conditions for businesses in carrying out import and export procedures, building and developing e-Government towards digital government and digital economy, with the core being providing high-level online public services to citizens and businesses.

At the same time, consider assigning a focal government agency such as the Ministry of Industry and Trade, the Ministry of Transport or the Ministry of Science and Technology, and the Vietnam Logistics Service Enterprise Association (VLA) to research and implement solutions. The technology platform for Logistics services effectively serves for data exchange between stakeholders, including government agencies, shipping lines, and Logistics companies... and for the process of "digitization" at the national scale.

In addition, consider policies to reserve land for logistics infrastructure development planning, avoid converting agricultural land into real estate, narrowing the functional space of logistics infrastructure.

4.2. Towards Vietnam Logistics Service Association (VLA)

Promote research and application of the achievements of the industrial revolution 4.0 into logistics activities. The Vietnam Logistics Business Association (VLA) is researching the application of high-tech science, such as Blockchain, to several logistics activities. It is researching the mass application of e-DO (Electronic Delivery Paper) for retail shipments (LCL) and participating in the e-B/L project of the International Freight Forwarding Association FIATA. Typically, Saigon Newport applies e-Port and e-DO trials with a few shipping lines...

In the period of extensive economic integration, international cooperation has an essential meaning for developing and improving the competitiveness of Vietnam's logistics service industry. Through international cooperation, Vietnam can take advantage of investment capital in the logistics industry and expand the scale of business operations, gain management experience, training high-quality human resources, and transfer technology in the context of the industrial revolution 4.0. In that context, the role of international connection and cooperation in the Logistics services of the Vietnam Logistics Business Association (VLA) is enormous, thereby continuing to promote positive results and foundations that the Vietnam Logistics Business Association (VLA) has built over the years.

4.3. Towards businesses

Issues that need to be prioritized by businesses to focus on an implementation include: Quickly building a business development strategy based on the industrial revolution 4.0, a new strategy to ensure flexibility, and adapting to the needs of the industry changes. Strategy 4.0 must become part of the enterprise's development strategy. In addition, investment in science and technology must be an essential part of an enterprise's investment

plan.

Following the formation of a proactive approach strategy, businesses need to focus and invest in improving the ability to connect devices to devices. The weakest point of enterprises today is that 70% of enterprises have devices that cannot be controlled by information technology and connected to other devices, and 75% still need digital models. Demanding innovative operations and developing data-driven services are the next steps for businesses. To improve readiness, businesses must prioritize promoting digital transformation and soon focus on developing intelligent products...

Enterprises operating in Logistics need to make many breakthroughs and further promote the application of modern technology, improve management capacity, and strengthen cooperation and connectivity domestically, regionally, and globally. Good supply chain management reduces costs and shortens the time of goods movement. Specifically, domestic logistics enterprises must strengthen the application of modern science and technology according to the trend of forming the logistics industry in the industrial revolution 4.0 to improve competitiveness and service quality and reduce costs, prices, and service fees. More and more logistics service enterprises with high competitiveness in domestic and international markets will be established soon.

In a fiercely competitive environment of the service market and the increasing demand for human resources in the context of the upcoming industrial revolution 4.0, Vietnam's logistics service industry needs high-quality human resources in both Practical skills, professional knowledge, and English proficiency in Logistics. According to a survey by the Vietnam Logistics Business Association (VLA), human resources for logistics service providers from now to 2030 will need to train about 250,000 new and methodical employees to meet domestic requirements and work abroad, especially in the ASEAN Economic Community.

To meet the requirements of highly qualified human resources, logistics enterprises need to coordinate with training institutions to impart students' experience. In addition, businesses can sign orders for management software design or technology application products at universities and colleges, thereby reducing enterprise investment costs and, at the same time, improving practical skills for students, logistics human resources in the future.

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