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Research Paper

The Qualifications Needed by Logistics Employees in the Future Industry and its Implications in Higher Education Institutions

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Abstract

Human resources play a fundamental role in affecting logistics companies' performance. The advancement of technology has caused significant implications in the logistics industry. This research aims to explore the qualifications needed by logistics employees in the future industry and discuss the implications in higher education institutions. The authors used a semi-systematic review to examine five relevant research articles published in reputable journals, ranging from 2017-2022. Content Analysis was conducted to identify, analyze, and report patterns. The findings of the study revealed that there are several qualifications needed by logistics employees to perform challenging tasks in the future. Body fitness, problem-solving and decision-making, creativity and innovation, adaptability, communication, leadership, and teamwork are some of the industry's top qualifications. Higher education institutions need to anticipate the current issue of human resources. Some strategies that can be employed include integrating ICT in the teaching and learning activities to familiarize students with the use of ICT, conducting an internship program in the logistics industry to provide students with real working experience, and involving stakeholders in the curriculum review and design.

Keywords *education, human resources, logistics, qualifications*

INTRODUCTION

Logistics is said as one of the most important pillars of the activities of trade and the economy of a country. It greatly impacts the country's development and growth along with many other variables. The role of logistics can be found in the government sector, as well as in the private business sector (Sergi et al., 2021).

The advancement of technology has brought tremendous changes in human life. Industry 4.0 has emerged and demanded integration, connection, decentralization, and an intelligent supply chain. The concept of Logistics 4.0 was born and offered technological advances that can be utilized to provide customers with the right products, at the right time, at the right place, and in the right quantity (Cimini et al., 2021). Various areas of logistics have undergone various changes and improvements, including warehouse management, transportation, and the planning of resources (Barreto, Amaral and Pereira, 2017). Technology has supported the logistics process, both in the physical process as well as information exchange (Timm and Lorig, 2016). The use of Radio Frequency Identification (RFID), Enterprise Resource Planning (ERP), and Electronic Data Interchange (EDI) is common to be able to give quick responses to customer requirements (Burrell et al., 2020).

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The role of humans in the logistics industry and its relations with technology then becomes a great issue. There are two possible evolutions regarding technology and the role of the logistics operator. Firstly, technology replaces the operators in performing some tasks. Secondly, the technology supports the operators in performing some tasks. Some scholars argue that automation and digitalization in the logistics industry do not eliminate the role of humans. Human work is still considered significant and cannot be replaced entirely by technology (Neumann et al., 2021). However, tasks that require the use of physical force (e.g. handling of materials) and involve continuous and repetitive activities (e.g. inventory control, manual packaging) are more likely to be replaced by technology. Thus, the tasks related to decision-making, coordination, problem-solving, etc. become the focus of logistics operators nowadays (Cimini et al., 2019).

In all business organizations, the important role of humans is undeniable. Thus, human factors (HF) become an essential part of the logistics industry. According to (Stern and Becker, 2019) Human Factors (HF) are "all physical, psychological, and social characteristics of humans, which influence the action in sociotechnical systems". To maintain high service levels and competitiveness of a company, continuous improvements need to be done with the support of human resources. HF (including perceptual, mental, physical, and psychosocial factors) has a great impact on the performance of a logistics company (Glock et al., 2017; Minh, 2021).

Human factors are concerned with understanding the interactions among humans and other elements of a system that is aimed to optimize the well-being of humans and improve the performance of the system (IEA, 2017). It is important to consider human characteristics to maintain the level of productivity and efficiency of an organization. Other benefits mentioned by the scholars include improving quality, reducing costs, facilitating new technology implementation, and improving team functions (Glock et al., 2017).

The essential role of humans in the logistics industry has drawn the attention of various scholars and researchers. However, studies discussing human factors in logistics and the implications in education sectors are still very limited. This paper aims to fill the gap by exploring the qualifications needed by logistics workers in the future industry. The implications in higher education institutions will also be discussed. The research questions guiding this study are (1) What qualifications are needed by the logistics employees in the future industry? (2) What are the implications in higher education institutions?

LITERATURE REVIEW

Industry 4.0

Before the term "Industry 4.0" was introduced, the concept of "smart logistics" was known to describe how technology is used to manage the flow of materials. The formalization of Industry 4.0 then resulted in the emergence of Logistic 4.0 which refers to the use of the Internet of Things (IoT), the technology of cloud, big data analysis, cyber-physical systems, RFID, and automated vehicles to support logistics activities. Four areas in logistics can be supported by technology, including decision-making, interconnectivity, information flow, and automation in production. More specifically, the technology can also be applied in the activities of Resource Planning (RP), Warehouse Management System (WMS), Transportation Management System (TMS), Intelligent Transportation System (ITS), and Information Security. It is important to note that in all activities, the role of the human element is prominent (Cimini et al., 2019; de Miranda et al., 2020; Rossini, Powell and Kundu, 2023).

Industry 4.0 has significantly affected the logistics company's organization. One of the main impacts

is the implementation of new technologies that lead to task evolution and changes in the job profiles and competencies required by the company. Digitalization and automation are used widely to support routine and standard tasks, as well as cognitive tasks. Thus, the employees must be able to adjust to the current condition to avoid job losses and anticipate the so-called technological unemployment (Lagorio et al., 2021).

Human Competences

Flores, Xu, and Lu (2020) listed several competencies that are significant in supporting the work of employees. Soft skills are also known as social traits or non-cognitive skills. They are closely related to someone's personality traits. These skills are important since they affect how employees manage their interactions and also influence the attitude of employees toward the tasks given to them. Hard skills are also known as technical skills. They refer to specialized knowledge and skills to complete certain tasks. Hard skills often become the focus of training in companies because they are considered more specific and constant, and thus more measurable than soft skills. Cognitive skills refer to employees' intellectual abilities to enable them to learn and master new knowledge and skills. Many scholars agree that considering cognitive attributes in human resource management is highly important. Emotional skills refer to employees' ability to perceive, understand, and regulate their emotions. Emotional skills are essential because they have a great impact on the employees' decision-making, motivation, performance, level of stress, and job satisfaction. Digital skills refer to the employees' ability to operate digital media and utilize the media to support their work. In Industry 4.0, the significance of digital skills is undeniable.

METHODOLOGY

Research Method

This article used a semi-systematic review or narrative review approach. This approach is commonly used for analyzing topics that have been conceptualized differently and studied by various groups of researchers within various fields (Snyder, 2019). The authors attempt to identify and understand the qualifications needed by logistics workers in the future industry by examining 5 (five) relevant research articles published in reputable journals. The year of publication of the articles ranges from 2017-2022. Content Analysis was conducted to identify, analyze, and report patterns.

FINDINGS AND DISCUSSION

In the globalization era, the logistics sector has become increasingly important. The flow of goods from one point to another has a significant impact on human life. To fulfill the customers' demand, logistics companies need to give more focus on improving the logistics system to maintain the quality of services given to the customers and increase the company's competitiveness. The role of humans in supporting the system is very essential.

All articles reviewed in this paper highlighted the importance of the human role in the logistics industry. Hong and Nguyen (2020) found that Human Factors become the second most important in improving the marketing strategy in the logistics industry (after business networks). The performance of logistics companies is highly influenced by human resources, which include the appropriate scale of employees, a qualified number of employees, the work ethic of employees (hard work), the training provided for employees, and the working experience of employees.

The central role of human resources should be anticipated by considering the employees when designing the system of production and logistics. At the managerial level, it is also important to find the best practices on how to manage human resources and give them support with technology. Sgarbossa et al., (2020) illustrated the role of humans in the logistics system in Figure 1. The Figure indicates that human resources play a significant role in all aspects of the system, including operations, control, as well as data science. According to Cimini et al. (2021), there are three kinds of human factors (HF) that affect the operator's task changes in Logistics 4.0. The first is physical HF which includes all the anatomical, anthropometric, physiological, and biomechanical characteristics of humans. This is related to the physical activities conducted by employees. The

second is Cognitive HF which indicates the mental processes when performing tasks (e.g. reasoning, acquiring information, decision making). The third is Organizational HF which refers to all the social and processual variables that influence the work of employees in an organization.

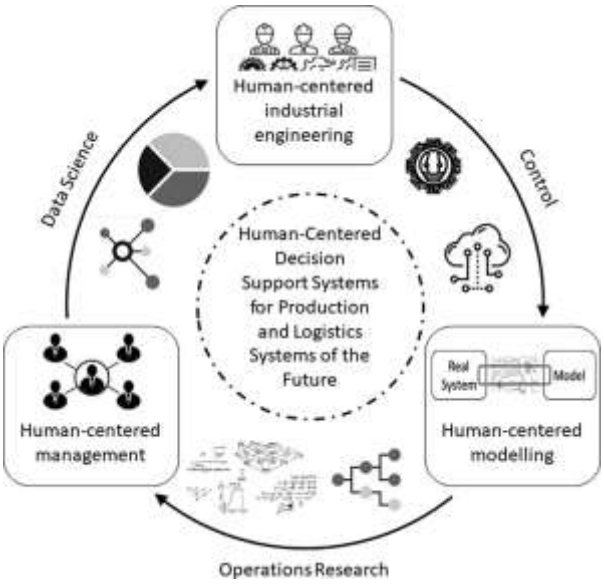

Figure 1. Human-centered perspective

D'Aleo and Sergi (2017) argued that Human Factors have a great contribution to the EU's logistics sector. They analyzed three clusters: Infrastructure, Human Factors, and Institutions. They identified that Human Factors are becoming the most prominent factor in supporting the logistics system. Therefore, it is important to invest in Human Resources through qualified education and training. Qualified employees can contribute to new ideas and innovation to maintain the company's competitiveness.

Sun et al. (2022) examined 115 research papers regarding logistics and found an urgent need to focus on Human-centric smart logistics transformation. It is important to equip workers with the knowledge and skills needed to adapt both technically and psychologically to the new transformation.

Qualifications Needed by Logistics Employees in the Future Industry.

Based on the articles, the authors summarize the qualifications needed by logistics employees to be able to perform tasks in the future. They are categorized into 3 groups: physical, cognitive, and organizational.

1. Physical
   Health and body fitness is important since employees may have to perform various tasks that need repetitive movements, reactivity, and good working postures to avoid the risk of accidents.
2. Cognitive
   a. Ability to solve problems and make decisions.
      These abilities are parts of cognitive HF. They are fundamental since the challenges in the future logistics industry are becoming more complicated. The employees need to be able to solve problems when facing complex issues and make appropriate decisions.
   b. Creativity and innovation.
      Creativity and innovation are also parts of cognitive HF. In the era of Logistics 4.0, creativity and innovation become highly essential. It is important that the employees can create innovative solutions and think "out of the box".
   c. Ability to adapt to technology.

Information technology has brought significant changes which happen very rapidly. Employees in the logistics industry must have the ability to adapt quickly to any changes, especially in the utilization of technology to support task completion.

3. Organizational
   a. Communication
      Industry 4.0 and Logistics 4.0 have demanded an integrated and interconnected supply chain. Communication skills are incredibly needed to ensure all processes can run smoothly and problems can be tackled effectively.
   b. Leadership and teamwork
      In many organizations, leadership and teamwork skills are very important. These are fundamental skills that are needed at the moment and will still be relevant in the future.

The Implications in Higher Education Institutions

The introduction of new technology and digitalization surely have brought consequences to human factors in the logistics industry. It is important to prepare workers with adequate knowledge and skills to be able to keep up with the challenges of working in the digital era.

Higher education institutions become one of the main sources that provide the logistics industry with competent workers who are assigned to create and manage more efficient logistics systems and supply chains with the support of technology (Ozment and Keller, 2011). It is required that the graduates of the educational institution have the knowledge and skills needed to perform various tasks and responsibilities in the workplace.

To fulfill the demands, education institutions need to consider the following aspects during the process of education:

1. Information and communication technology (ICT) should be integrated into the syllabus and implemented in teaching and learning activities.

   Traditional teaching methods should be replaced with technological-based teaching and learning. It is important to familiarize students with the technology-based environment with the use of educational videos, storage of data, internet databases, guided discovery, etc. ICT can be used to visualize, build, and communicate ideas. The use of ICT in classrooms has been proven effective in enhancing the teaching and learning process (Sanjay Shah, 2022). The computer-assisted instructions, for example, can complement traditional teaching techniques, enabling students to learn the teaching materials more easily (Banagiri et al., 2021).

2. Students should be allowed to join an Internship Program to provide them with real working experience in the logistics industry. Educational institutions must build cooperation with relevant industries to facilitate students finding the best place to have their internship.

   Abubakar and Wang (2019) found that experience significantly affects employees' performance (together with age and general cognitive abilities). Therefore, an internship program for students in the logistics industry will bring a lot of benefits. This is in line with a study conducted by Anjum (2020) who revealed that internship programs can enhance the professional as well as personal skills of students. Students can learn the technical skills needed to perform tasks and learn to deal with people with different characteristics that they meet in the workplace.

3. Involvement of stakeholders in the curriculum review and design.

   From the perspective of education, "link and match" between the curriculum and the real working situation is fundamental. Students need to learn the materials and practice skills that are relevant to the real needs of the industry. What students learn in college should

support them in doing their tasks in the workplace. Involving stakeholders, especially those who come from the logistics industry, will provide valuable feedback regarding the suitability and effectiveness of the curriculum. As Garcia and Simbulan (2021) argued involving stakeholders in the curriculum review enables the institution to identify accurately the needs of the logistics industry related to the qualifications of human resources. It can also enhance the quality of the program and increase the opportunity for the graduates to get employed in the relevant industry. However, building collaboration with business organizations is not always easy. Mikova, Mihova and Stefanov (2020) revealed that most business organizations perceive higher education institutions as a source of talent and valuable knowledge that can improve the competitiveness of the employees. However, many of them limit the interaction or collaboration with higher education institutions.

CONCLUSION AND FURTHER RESEARCH

Human resources play a fundamental role in affecting logistics companies' performance. The advancement of technology has brought Logistics 4.0 and caused significant implications for human factors in the logistics industry. There are several qualifications needed by logistics employees to be able to perform challenging tasks in the future. Body fitness, problem-solving and decision-making, creativity and innovation, adaptability, communication, leadership, and teamwork are some of the industry's top qualifications.

Higher education institutions, as one of the main providers for logistics workers, need to anticipate the current issue of human resources to ensure that the graduates have the knowledge and skills needed. Some of the strategies that can be employed include: (1) Integrating ICT in the teaching and learning activities to familiarize students with the use of ICT and build their adaptability to technology; (2) Conducting an internship program in the logistics industry to provide students with real working experience; (3) Involving stakeholders in the curriculum review and design.

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