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DEVELOPING DIGITAL HUMAN RESOURCES TO MEET THE REQUIREMENTS OF THE DIGITAL ECONOMY IN VIETNAM TODAY

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Abstract:
The Industrial Revolution 4.0 is accelerating the transformation of the economy from relying on resources as the main thing to an economy based on knowledge resources with the pillar of the internet and digital. The digital economy was born to replace the traditional economy. Therefore, it is necessary to change the labor structure according to which digital human resources must be focused on development. The article clarifies

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the concept, connotation and characteristics of digital human resources; proposing a number of solutions to develop digital human resources in Vietnam.

Keywords: Digital Economy, Digital Human Resources, Industry 4.0, Workforce Development, Vietnam

1. Introduction

The Fourth Industrial Revolution (Industry 4.0) has brought transformative changes to economies worldwide, marked by the convergence of digital technologies and traditional industries. The emergence of the digital economy, characterized by its reliance on digital technologies, data, and knowledge as key production factors, is reshaping economic structures. As economies transition from resource-based to knowledge-based models, the need for digital human resources becomes increasingly urgent. Vietnam, as a developing country navigating these changes, faces both opportunities and challenges in aligning its workforce with the requirements of the digital economy. The digital economy in Vietnam is not merely a sectoral transformation but a comprehensive overhaul of traditional economic systems. Digital technologies are driving new business models, optimizing resource allocation, and creating value across industries such as agriculture, manufacturing, services, logistics, and finance. However, realizing the full potential of the digital economy depends on the availability and quality of human resources equipped with digital competencies. Digital human resources, distinct from conventional labor forces, require the intellectual, technical, and

ethical capacities to navigate and harness the potential of digital technologies effectively. Despite significant efforts, Vietnam's progress in developing digital human resources has been modest. While the government has introduced various policies and initiatives, including e-Government development and digital transformation programs, challenges persist. A significant portion of the workforce lacks the skills needed to adapt to digital technologies, and businesses face hurdles in adopting Industry 4.0 technologies due to low readiness and resource constraints. Moreover, the absence of a cohesive legal framework and limited coordination among stakeholders further impede the development of a digitally competent workforce. This study aims to address these challenges by exploring the concept, characteristics, and importance of digital human resources in the context of Vietnam's digital economy. It examines the relationship between the digital economy and digital human resources, emphasizing the role of the government, businesses, and educational institutions in fostering digital skills and competencies. By analyzing the current state of Vietnam's digital workforce and identifying gaps, the study provides actionable recommendations to accelerate the development of digital human resources. The findings of this research are crucial not only for policymakers but also for businesses and educational institutions seeking to align their strategies with the demands of the digital economy. Developing a robust digital workforce is essential for Vietnam to enhance its competitiveness, achieve sustainable economic growth, and position itself as a key player in the global digital landscape. This paper seeks to contribute to this endeavor by

offering insights and solutions to bridge the gap between the current workforce and the demands of the digital economy.

2. Literature review

The development of digital human resources has emerged as a critical topic in the context of the Fourth Industrial Revolution (Industry 4.0), which is reshaping economies globally. This transformation is driven by advancements in digital technologies, resulting in the emergence of the digital economy—a knowledge-based economy where digital technologies and data are central to economic activities. Vietnam, as an emerging economy, is transitioning towards a digital economy, requiring a comprehensive restructuring of its labor force to develop digital human resources capable of meeting these new demands.

The digital economy is characterized by the integration of digital technologies into economic activities, enhancing productivity and creating new business models. It is underpinned by three core processes: material processing, energy processing, and information processing, with the latter being the most pivotal in driving economic transformation. The digital economy transcends traditional boundaries by leveraging connectivity and information technology to optimize resource allocation and facilitate global value chain participation.

In tandem with the growth of the digital economy, the development of digital human resources is imperative. Digital human resources encompass individuals with the intellectual, physical, and ethical capacities to adapt to and excel in environments dominated by digital technologies. These

resources are not limited to elite groups; they represent a broad spectrum of the workforce equipped with digital skills to drive and sustain the digital economy.

Despite its potential, Vietnam faces significant challenges in developing digital human resources. A majority of businesses, especially in traditional industries, remain unprepared for digital transformation, with 82% of enterprises at the nascent stage of readiness. Additionally, Vietnam lacks a cohesive legal and institutional framework to support the transition to a digital economy. Issues such as data protection, electronic authentication, and inter-agency data sharing remain unaddressed, hindering the development of e-Government and digital infrastructure.

Existing literature emphasizes the importance of digital transformation but often overlooks the role of digital human resources in this process. While studies have explored the digital economy and its implications, a comprehensive framework addressing the specific requirements of digital human resource development in Vietnam is limited. This paper contributes to filling this gap by identifying the characteristics of digital human resources and proposing actionable strategies for their development.

3. Research method

This study employs the dialectical materialist approach to analyze the development of digital human resources in Vietnam. Dialectical materialism emphasizes the interrelationship and dynamic interaction between phenomena, recognizing that the development of digital human resources is both influenced by and a determinant of the digital economy.

By examining the mutual impact between economic transformation and workforce restructuring, the study identifies the factors driving the evolution of digital human resources. Data were gathered through a synthesis of secondary sources, including government reports, policy analyses, and academic literature, to ensure a comprehensive understanding of the subject. This approach enables the identification of contradictions in the current workforce structure and provides solutions grounded in the socio-economic conditions of Vietnam. The method ensures that the recommendations align with the nation's broader goals of sustainable development in the digital era.

4. Result and Discussion

4.1. Concept and characteristics of the digital economy and digital human resources

- Digital economy and its connotations: The digital economy is an economy based on digital technologies, in which economic activities use digital information and digital knowledge as the main production factors. Using the internet and information networks as operational spaces, taking telecommunications and information technology (ICT) services as the core and main driving force to increase labor productivity and optimize the economy. Simply put, the economy is related to digital technology, using digital technology and digital data to create new business models and super-surplus value for the economy. The digital economy is a long-term development process, a process of digital transformation at the national level at different levels, all sectors, all businesses, all individuals and the Government can use digital technology to do their jobs

better. there is even a breakthrough to bring outstanding productivity and efficiency.

According to research by the Oxford Digital Economy Collaborative Group, the digital economy is "an economy that operates mainly based on digital technology" (Pavlekovskaya, et al, 2018, September), especially electronic transactions conducted through the internet. The digital economy includes all sectors of the economy (industry, agriculture, services, production, distribution, circulation of goods, transportation, logistics, finance and banking,...) to which digital technology is applied. The digital economy with characteristics such as: i) Gathered in 3 main processing processes intertwined, including: material processing, energy processing and information processing. In particular, information processing plays the most important role and is also the easiest field to digitize. Connectivity/hyper-connectivity between actors and economic cycles thanks to the achievements of information technology and the internet helps to connect resources, eliminate many intermediaries, and increase opportunities to access global value chains. Therefore, it can be defined: the digital economy is an economy in which the organizational models and operating methods of the economy are based on the application of digital technology; In which, digital technology on the basis of the development of the Internet and human creativity is the main resource and resource to operate the entire economy.

Digital human resources and their characteristics: The concept of "human resources" (Human Resources) is understood as the concept of "human resources". When used as a tool for the management and implementation of socio-

economic development strategies, human resources include a part of the population of working age, capable of working and people outside the working age who participate in labor, also known as labor resources. The part of the labor force consisting of all people of working age or older who are capable and in need of labor is called the labor force (Bowen, W. G., & Finegan, T. A, 2015). Human resources are not merely the labor force that already exists and will have, but also includes the physical, intellectual, and spiritual strength of individuals in a community or a country that is or is likely to be used in the process of social development. Considering from different angles, there may be different concepts of human resources, but these concepts are all unified in the basic content: human resources are the source of labor for society. Human beings, as the constituent elements of the productive forces holding the leading position, the basic resource and the inexhaustible resource of development, cannot be considered merely from the perspective of quantity or quality, but the synthesis of both quantity and quality; not only a part of the population of working age but also generations of people with potentials and strengths in nature and social improvement.

Therefore, it can be defined: Human resources are the sum of the number and quality of human beings with the sum of the criteria of intellect, physical strength and moral and spiritual qualities that create the capacity that people themselves and society have been and will mobilize in the process of creative labor for social development and progress (Aloni, N, 2002). Every economy requires a productive force corresponding to its qualifications, especially human resources.

Therefore, corresponding to the digital economy, there must be digital human resources to deploy, organize its implementation and operation. Therefore, it can be understood that digital human resources are the overall quantity and quality of human beings with the sum of the criteria of intellect, physical strength and moral and spiritual qualities to create the capacity that people themselves and the digital economy are and will need to mobilize in the labor process. creative. If the essence of the digital economy is an economy based on the application of digital technologies, an economy developed based on knowledge, where the role of knowledge is considered a resource for the development of the economy, it requires digital human resources to be well-trained human resources, are professional, ethical, capable of mastering technology, creative and able to adapt quickly to technological changes in the economy.

It can be seen that the characteristics of digital human resources are expressed in aspects such as: Having the ability to master digital technology devices in the process of interaction of economic activities. Be able to adapt in the fastest time to the working environment and to new scientific and technological advances. Have a disciplined and ethical manner at work. Ability to think breakthrough at work, also known as creativity. This is considered a sufficient condition and a characteristic criterion of digital human resources.

To satisfy the above aspects, it is necessary for digital human resources to be well-trained and constantly receive new additional training. Looking at the above aspects reflecting the connotation of digital human resources, we can compare it with

the concept of high-quality human resources that is commonly used today. Basically, between digital human resources and high-quality human resources, there is uniformity in many aspects of qualifications, skills, qualities, and ethics. However, in terms of appearance or quantity majority, high-quality human resources are the elite group in the graph tower of human resources, they account for a small number and are the elite group in the total social labor force, while digital human resources are human resources in the digital economy. are the main forces for deploying and realizing the digital economy, determining the existence of the digital economy, therefore they are the total number of labor force in society, and at the same time this force has the ability to master digital technology devices, operate them in the process of production and business and other activities of the economy.

Every economic organization needs specific human resources to operate it, the productive force is always the core of an economy and determines whether that economy exists or not (Foss, N. J, 2005). In other words, between the productive forces and the economy, between human resources and the economy, there is a dialectical relationship of mutual regulation, in which the emergence of the economy is the cause of regulating the appearance of human resources and the qualifications of the productive forces, and the quality of human resources and the level of development of the productive forces determine the success of that economic organization. In today's trend, under the impact of the Industrial Revolution 4.0, the transformation of the economic shape of the world economy from a resource-based economy to

a knowledge-based economy, Vietnam's economy is now also gradually shifting to a knowledge-based economy with the pillars of cities the achievements of the Industrial Revolution 4.0 are constantly applied - the digital economy was born, gradually replacing the traditional economy. Therefore, in order to successfully transform Vietnam's economy into a digital economy, it is necessary to have digital human resources. Therefore, parallel to the transformation of the economy to the digital economy in our country is the process of shifting the labor structure in the economy, whereby the increasingly developed digital human resources occupy a leading role in the total social workforce. Therefore, the development of digital human resources is inevitable in the process of labor restructuring in Vietnam today.

2. Some solutions to develop digital human resources in Vietnam today

First, promote the role of the Government in developing the digital economy. The Government plays a leading role, creating mechanisms and environments to promote digital transformation activities of the whole society, making a digital society appear. To fulfill this role, the Government needs to focus on the following issues: The Government needs to further promote the innovation of models and ways of applying digital technology in managing all aspects of economic and social life; step by step developing, perfecting and transforming all management activities of the Government into e-Government on the basis of digital technology. The public service system provided online will turn every citizen into an e-citizen, every business into an e-business. Step by step realize the

determination to build a Government that creates, develops, has integrity, acts and serves people and businesses, especially in the context of the Industrial Revolution 4.0; completing the foundation for the development of e-Government towards digital government. Currently, the Government of Vietnam is actively promoting the development of the digital economy through a series of mechanisms, policies and digital transformation activities of the Government, such as: Resolution 36a/NQ-CP of the Prime Minister on e-Government, including 3 main items: development of online public services, telecommunications infrastructure, and human resources, with the goal of "promoting the development of e-Government, improving the quality and efficiency of state agencies, serving people and businesses better and better; raising Vietnam's position in e-Government according to the United Nations' ranking; publicly and transparently operate state agencies in the cyber environment". In particular, this policy has been reinforced by Directive No. 16/CT-TTg of the Prime Minister on strengthening access to the Fourth Industrial Revolution. According to the United Nations report on the e-Government Index 2018, Vietnam has risen 11 places to rank 88th out of 193 countries and territories in the ranking of the e-Government Development Index (EGDI). In the group of ASEAN countries, Vietnam is one of ten countries that has jumped from medium to high EGDI, ranking 6th after Singapore, Malaysia, the Philippines, Thailand and Brunei. Although there has been a change in position and ranking, marking the Government's transformation to e-Government and digital Government, that ranking is still modest, especially in the process of

implementing the transformation, "the results of implementing many tasks on e-Government are still very slow and many places[2] are formal". Therefore, in the coming time, in order to promote the digital economy, the Government needs to be more drastic in implementing the tasks and technology application items of the Industrial Revolution 4.0 to build a successful e-Government and switch to digital Government in all its activities

Accelerate the construction and improvement of institutions, create a legal basis for the construction and development of e-Government towards digital Government (Von Haldenwang, C, 2004). The process of building e-Government in developed countries has proven that in order to successfully build e-Government towards Digital Government, the institutional foundation of e-Government and Digital Government must go first, this is one of the important pillars to build a digital economy. digital society. Compared to Vietnam, we still lack many regulations and policies, "in particular, we still lack a synchronous legal framework for building e-Government, specific regulations on authentication of individuals and organizations in electronic transactions as well as legal regulations on clerical documents, etc electronic storage(2). Therefore, in the coming time, the Government needs to promulgate a national strategy on digital economy and digital society; policies on the transition from e-Government to digital Government, including regulations on: data sharing,

[2] Building e-Government towards Digital Government and Digital Economy in Vietnam

personal data protection and personal privacy assurance, electronic authentication, information security, reporting regime between state administrative agencies, etc invest in the application of information technology in accordance with the characteristics of this field in the new situation; services and policies on: training digital human resources, digital business investment, digital sovereignty and intellectual property; proposing to build a legal corridor system for the development of e-Government and digital Government.

The Government actively builds and soon completes digital infrastructure and services, including hard infrastructure and telecommunications networks as a foundation to create soft infrastructure as digital services to help optimize economic activities; further accelerate the speed of building a national database system and open knowledge. National data is considered as the fuel of the economy, but currently national databases on agriculture, finance, population, land management, etc. has not been completed and is only in the early stages, the data connections between ministries and branches have not been connected. Raising awareness of the whole society about the digital economy. The system of press and communication agencies needs regular and complete information about the digital economy to businesses, people and the whole society, thereby forming a proactive attitude to adapt to this development trend. In information work, it is necessary to clarify the responsibilities and roles of the Government, businesses and people in the digital economy.

Secondly, promoting the proactive and active role of businesses in the process of approaching and successfully

passing digital transformation of the system of businesses in the process of digital access and transformation is the central factor determining the success of the digital economy transformation process. According to a survey by the Ministry of Industry and Trade on the readiness to apply the Industrial Revolution 4.0 in the production and business activities of industrial enterprises, although the industry has a number of pioneering enterprises (in fields such as oil and gas, electricity, etc.) that are ready to respond to technological changes, but up to 82% of businesses are still in a new position, of which 61% are still on the sidelines and 21% of businesses are starting to have initial preparation activities. Digital transformation in the industry to build smart production is considered an important driving force for digital economic development. However, 16 out of 17 industries surveyed are having a low level of readiness. Businesses in the pharmaceutical trade and services sector are assessed to have a higher level of access to digital technology and availability. Businesses in the fields of banking, finance, logistics, tourism, and insurance have been strongly applying digital technology in modernizing business processes. According to WEF's research within the framework of the "Digital Transformation Initiative - DTI", 7 technologies that are and will change the world's manufacturing include: Artificial Intelligence (AI); self-driving cars; big data analytics and cloud computing; 3D printing technology; Internet of Things and connected devices; robots; and social networks. These technologies are currently being researched and started to be applied in Vietnam.

The process of digitizing the economy is more of a policy revolution than a technological revolution (Yuan at al,

2021). Therefore, it is necessary to support and encourage new business models, new technologies that fundamentally change industries, and promote creativity. From the perspective of the digital economy, businesses are a breakthrough stage, so businesses need to focus on digital transformation to become a digital enterprise; The Government focuses on building a legal environment that allows new business models to apply new and innovative technologies, and at the same time creates a testing space in tandem with supporting businesses to develop the digital economy. Promote the startup movement in general and strongly focus on developing the startup movement for the digital business model of enterprises.

Third, building the education of the digital economy and digital society Accordingly, it is necessary to associate the education and training development strategy with the human resource development strategy and the socio-economic development strategy in both macro and micro aspects. Only then can the integration between the supply of human resources and the demand for digital human resources of the economy and labor market be created in terms of educational level, professional and technical qualifications, human resource structure and capacity and quality. With the characteristics of digital human resources, the training of human resources requires innovating both models and structures, changing the mindset from only learning once to work for a lifetime to learning for a lifetime to be able to work for life. Regarding the structure of vocational training, it is adjusted and changed on the basis of the requirements of the digital economy, focusing on training information technology human resources. The

information technology human resource training program should aim to accelerate the socialization of information technology education, especially updating the information technology training curriculum associated with new technology trends such as the Internet of Things (IoT), AI, etc robot technology, creating conditions for students to access this field early; promote training and practice links between schools and the business sector in the application of information technology. The Government needs to create policies to adjust social security and human resource training, implement initiatives on education and information technology infrastructure, develop action plans for internet development combined with artificial intelligence; launching Vietnam's human resources strategy with industry 4.0, in which using people as the core. With the main directions of Big Data technology, network platform, artificial intelligence and investment in research of key scientific projects, universities and research centers closely coordinate with businesses to put projects into practical application. Extensive internet communication and education programs are needed to raise user awareness and skills. Educational programs need to be reviewed to update and educate children about the internet right from high school levels.

To study and change training contents and methods in order to build human resources capable of receiving new production technology trends; focus on promoting training in science, technology, engineering and mathematics (STEM), foreign languages, and informatics; develop training programs and retrain professional knowledge; providing the ability to

self-study flexibly and appropriately for each organization and individual. Building an ecosystem with tripartite linkage and transfer between businesses, schools and learners to meet the needs of training in techniques and technology as well as meeting the needs of learning and updating technology for all ages. Promote the internal resources of domestic universities in combination with research institutes, universities and major research centers in the world on technology and digital platforms in order to build a smart university system and gradually form research centers in science and technology, leading digital in the region and in the world. In Vietnam today, the potential for the development of digital human resources is huge. However, to be able to own digital human resources, it is necessary to implement the triangle of digital human resource development, including; the key and leading role of the Government in terms of mechanisms, policies and environment for the development of digital technology; the central factor of enterprises in investment, transformation and adaptation to digital technology in all production, business and service activities; Training institutions and each human resource themselves need to be proactive, inclusive, capable of mastering digital technologies and quickly adapting to technological changes. In particular, the pioneering role of creating motivation belongs to the Government.

5. Conclusion

The development of digital human resources is essential for Vietnam to successfully transition to a digital economy. As the backbone of economic transformation, digital human resources require not only technical skills but also adaptability,

creativity, and ethical standards. This study highlights the dialectical relationship between workforce development and the digital economy, emphasizing the need for government-led initiatives, business participation, and educational reform. Despite significant challenges, including a lack of digital infrastructure and workforce readiness, Vietnam possesses considerable potential to cultivate a digitally skilled labor force. By implementing comprehensive policies, fostering collaboration among stakeholders, and promoting continuous learning, Vietnam can bridge the gap between its current workforce and the demands of Industry 4.0. Ultimately, investing in digital human resources will enhance national competitiveness, ensure sustainable growth, and position Vietnam as a leader in the global digital transformation.

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