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Developing high-quality workforce in Vietnam in the context of digital economy – opportunities and challenges

Desarrollo de mano de obra de alta calidad en Vietnam en el contexto de la economía digital - oportunidades y retos

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Abstracts

Developing a high-quality workforce is considered a cornerstone factor in ensuring the advancement, deep integration, sustainability, and stability of the economy in the era of digital economic growth. Being in a golden period of population structure with abundant human resources, a young labor force, Vietnam can welcome diverse opportunities for developing skilled and high-quality human resources. However, the current situation shows that high-quality human resources still face many shortcomings that do not meet the requirements of the economy. Promoting the transformation of the labor structure towards developing specialized and technically skilled human resources, linking training quality with labor demand, and enhancing labor force management in a modern direction, especially in the context of digital economic development, plays a crucial role in Vietnam's economic model. Currently, the Vietnamese economy is gradually approaching the digital economy as a suitable step to promote rapid and sustainable economic growth in Vietnam. In this study, the author will focus on analyzing and evaluating the current high-quality human resources in Vietnam while also outlining the opportunities and challenges in developing the digital economy, thereby suggesting some solutions for developing qualified workforce in the context of digital economic development.

Keywords: qualified workforce, digital economy, development, Vietnam

Resumen

El desarrollo de una mano de obra de alta calidad se considera un factor fundamental para garantizar el avance, la integración profunda, la sostenibilidad y la estabilidad de la economía en la era del crecimiento económico digital. Al encontrarse en un periodo dorado de estructura demográfica con abundantes recursos humanos, una mano de obra joven, Vietnam puede acoger diversas oportunidades para desarrollar recursos humanos cualificados y de alta calidad. Sin embargo, la situación actual muestra que los recursos humanos de alta calidad aún se enfrentan a muchas deficiencias que no satisfacen los requisitos de la economía. Promover la transformación de la estructura laboral hacia el desarrollo de recursos humanos especializados y técnicamente cualificados, vincular la calidad de la formación con la demanda laboral y mejorar la gestión de la mano de obra en una dirección moderna, especialmente en el contexto del desarrollo económico digital, desempeña un papel crucial en el modelo económico de Vietnam. En la actualidad, la economía vietnamita se está acercando gradualmente a la economía digital como un paso adecuado para promover un crecimiento económico rápido y sostenible en Vietnam. En este estudio, el autor se centrará en el análisis y la evaluación de los actuales recursos humanos de alta calidad en Vietnam, al tiempo que esbozará las oportunidades y desafíos en el desarrollo de la economía digital, sugiriendo así algunas soluciones para el desarrollo de mano de obra cualificada en el contexto del desarrollo económico digital.

Palabras clave: mano de obra cualificada, economía digital, desarrollo, Vietnam

Introduction

Throughout various historical periods and stages of societal progress, possessing an appropriate human resource (HR) capacity is indispensable. For Vietnam to nurture a digital economy amidst the forces of globalization and the Fourth Industrial Revolution (4IR), it requires a range of resources: natural, financial, research and development, and human resources, among others. Among these, human resources are considered paramount, exerting a profound influence on societal sustainability and progress. As competition intensifies, a knowledge-based economy reliant on a highly skilled workforce takes on an increasingly central role in addressing societal challenges like inequality, poverty, environmental degradation, and overall societal development. Vietnam is currently experiencing a period of heightened industrialization, modernization, international integration, and advancements in the digital economy, further highlighting the critical significance of high-quality human resources.

To expedite, streamline, and enhance the quality of industrialization, modernization, and digital economic development processes, the Vietnamese Party and Government promptly acknowledged the crucial role of human capital in implementing this strategy. This includes accumulating scientific knowledge, improving education and training, strengthening scientific and technological capabilities, and integrating internationally to leverage foreign capital and technology. The cultivation of a high-caliber workforce emerges as a critical determinant of socio-economic progress. Thus, investing in the development of top-tier human resources stands as an imperative for all nations, particularly those in the developing world seeking to expeditiously bridge the development gap with their global counterparts.

The socio-economic development strategy for the period 2011–2020 outlines three key areas of progress, one of which centers on enhancing human resources, particularly focusing on high-quality personnel. This entails “enhancing the socialist-oriented market economy institution with an emphasis on fostering a fair competitive

landscape and administrative restructuring; accelerating the advancement of human resources, particularly those of high caliber, by fundamentally reforming the national education system and closely integrating human resource development with scientific and technological advancements" (Government, 2011).

The digital economy and digital technology offer abundant opportunities for Vietnam to advance rapidly, leapfrog, and narrow the economic development disparity with advanced nations worldwide. Nevertheless, they also bring forth multiple challenges for the government, the people, businesses, and particularly Vietnam's skilled workforce. The digital economy trend is leaving Vietnam behind; consequently, various societal sectors, including the general public, businesses, and notably the labor force, have not adequately emphasized and uniformly comprehended the implications of the digital economy and its challenges to economic development.

The endorsement of the national strategy for digital economic and societal advancement until 2025, with a forward-looking vision to 2030, also delineates the following initiatives, "Developing digital proficiency with an emphasis on fostering technology-driven expertise; substantially increasing training resources for areas including information technology, digital technology, Industry 4.0, and the Internet of Things; expanding university and postgraduate programs to include specialized coursework in digital transformation and the digital economy, and improving the training of doctoral-level educators and researchers in digital technology, digital transformation, and the digital economy." (Government, 2022).

Currently in Vietnam, there is a significant body of research on high-quality human resources and their development, with notable examples including works such as "The role of human resources in the context of industrialization and modernization" (Pham Minh Hac, 1996); "Exploring human resources and their role in the process of industrialization and modernization" (Pham, 2001); "Further exploration of the concept of human resources" (Doan, 2000); "Enhancing human resource quality to align with the demands of industrialization and modernization" (Mai, 1999); and "Addressing key issues in the development of high-quality human resources in Vietnam" (Nguyen, 2016), among others.

In terms of a highly qualified workforce, a large amount of research has been conducted, including notable examples such as “Developing high-quality human resources to meet the requirements of transitioning growth models in our country today” (Luong, 2015); “Vietnam’s intellectual resources - history, current status, and prospects” (Nguyen, 2012); “Building and harnessing Vietnam’s intellectual resources for the national revitalization cause” (Nguyen, 2010); and so on.

The current state and solutions for enhancing high-quality human resources in Vietnam are subjects of considerable interest and investigation among various scholars, institutions, and individuals. Examples of such efforts include the “Human Resources Development Strategy of Vietnam for the 2011–2020 period” by the Government of the Socialist Republic of Vietnam in 2001 and the examination of “Vietnamese human resources in the economic strategy for 2001–2010” by the Science Information Center - FOCOTECH in 2004. Additionally, works such as “Some issues on the development of high-quality human resources in Vietnam” by Nguyen (2016) and “Human resource development: global experiences and practical applications in Vietnam” by Pham (2017) contribute to this discourse.

Research on how well Vietnam’s high-quality human resources can adapt to the opportunities and challenges of the digital economy is currently lacking. Specifically, there is a significant gap in understanding how effectively they can seize digital economy opportunities and tackle challenges to turn them into competitive advantages. This gap remains despite the rapid advancements in artificial intelligence and digital technology among Vietnam’s skilled workforce. Therefore, this article will explore the role of high-quality human resources in the digital economy, assess the current quality of Vietnam’s high-quality human resources, examine opportunities and challenges in digital economic development, and propose strategies for enhancing high-quality human resources amidst Vietnam’s digital economic growth.

Theoretical background

High-quality workforce

High-quality human resources hold significant historical relevance, as at each stage of societal evolution, people adapt terminology and criteria to denote their pivotal role in shaping and guiding the workforce. Karl Marx, in the global discourse on human resources, asserted that in a collectively implemented and planned industrial society, individuals with comprehensive development capabilities, adept at mastering the entire production system, are of paramount importance (Marx & Engels, 1995). He emphasized the need for individuals capable of swiftly and effectively navigating the complexities of production systems.

When emphasizing the effectiveness of production and the ability to apply scientific and technological achievements to labor, economists argue that high-quality human resources are the core of the workforce, encompassing the physical and mental aspects with expertise, technical proficiency, and skills accumulated by individuals capable of yielding superior incomes in the future.

In Vietnam, the term “high-quality human resources” has gained significant traction since the early 21st century, particularly in recent years owing to the heightened demand for a skilled workforce in an economy deeply integrated into the global market. Consequently, discussions surrounding high-quality human resources have encompassed a variety of perspectives and approaches. For instance, in Pham’s seminal work “The Issue of Human Resources in Industrialization and Modernization” (1996), the author posits that high-quality human resources represent a highly qualified and capable workforce, acting as pioneers in adopting and applying advanced technology within the country’s unique context. They serve as the primary driving force behind industrialization and modernization, catalyzing progress in less skilled sectors through a “spill-over” effect. Similarly, in the research article “Training high-quality human tesources in Vietnam today: Current situation and prospects” (Nguyen & Hoang, 2010), the authors define high-quality human resources as integral components of the overall labor force, comprising individuals

with educational backgrounds from college level and beyond, engaged in various facets of social life, and contributing to the holistic development of communities and society. Another perspective, endorsed by the Ministry of Home Affairs (2015), underscores high-quality human resources as those adept at meeting market demands and possessing expertise across diverse fields like economics, computer science, and foreign languages. They exhibit a spectrum of skills, including dynamism, creativity, collaboration, and a positive work ethic. These individuals not only enhance their physical and mental capacities but also make substantial contributions surpassing those of the broader social labor force.

At the XI Congress, the Communist Party of Vietnam emphasized that “high-quality human resources consist of individuals who demonstrate not only talent and expertise in their specific areas of work but also uphold revolutionary values and unwavering allegiance to the Party, the nation, and the people. They embody the dual qualities of competence and ideological commitment, as espoused by President Ho Chi Minh. These individuals serve as leaders across various domains, playing a crucial role in the country’s workforce.” (Communist Party of Vietnam, 2011)

Considering various viewpoints and interpretations, there can be an argument that high-quality human resources constitute a subset of the broader workforce. They possess advanced levels of education and technical proficiency (with exceptions for cases lacking formal training). These individuals demonstrate exceptional labor skills and promptly adjust to swift advancements in production technology. Moreover, they maintain good health and character, enabling them to creatively utilize their acquired knowledge and skills during training to improve productivity, quality, and efficiency in the production process.

Digital economy

Every economy requires a workforce that aligns with its level of development, especially concerning human resources. Therefore, in the context of the digital economy, it is imperative to have a specialized workforce capable of deploying, coordinating, and managing it effectively. This digital workforce comprises

individuals whose combined quantity and caliber fulfill specific criteria, including intellectual, physical, and ethical-spiritual traits. These attributes play a crucial role for individuals and the digital economy alike, enabling effective engagement in labor and the creative process.

The “digital economy” is a novel term that lacks consensus in its definition. To date, various organizations, including the Organization for Economic Co-operation and Development (OECD) and the G20, have proposed different interpretations regarding its scope and magnitude. Buhkt and Heeks (2017) offer three distinct definitions of the digital economy: in a broader sense, it encompasses conventional sectors striving to integrate digital technology into their operations, such as e-commerce, industry 4.0 manufacturing, agriculture 4.0, electronic tourism, high-tech industries, and e-government. That means the digital economy includes sectors with business models closely linked to digital technology, such as online platforms, platform support services like the sharing economy, crowdfunding, and the gig economy. In a narrower sense, it only includes information and communication technology sectors, encompassing the production of ICT and semiconductor equipment, telecommunications services, internet access, data processing and other information services, and software development. In short, the digital economy in this report is defined as an economy primarily driven by digital technology, particularly transactions conducted online via the Internet. It encompasses all sectors and economic activities, including industry, agriculture, services, production, distribution, circulation of goods, transportation, logistics, banking, and finance, where digital technology is being applied.

Decision No. 411/QD-TTg, issued on March 31, 2022, greenlights the national strategy for digital economy and digital society development until 2025, with a vision reaching to 2030. This decision defines the digital economy as an active utilization of digital technology and data as primary inputs, operating primarily within digital environments, utilizing information and communication technology to enhance labor productivity, and redefining business models (Government, 2022). According to this decision, the digital economy comprises several sectors: the ICT digital economy,

which includes the information technology industry and telecommunications services; the platform digital economy, encompassing economic activities driven by digital platforms, online systems connecting supply and demand, and online services; and the sectoral digital economy, covering digital economic activities across various industries and fields. The strategy prioritizes the development of the ICT digital economy, focusing on domestic businesses and domestically produced digital technology products, alongside strategic foreign direct investment and increased export capabilities. Additionally, it emphasizes nurturing a foundational digital economy, with a focus on national digital platforms driving sectoral and field-specific digital economic advancements. Lastly, it underscores the development of industry-specific digital economies, prioritizing the adoption of shared, integrated digital platforms within each respective industry and field (Government, 2022).

Therefore, by leveraging information technology and smart technology connectivity, the digital economy enhances the flexibility, dynamism, and innovation of modern economic activities. It emerges as a crucial driver, fueling productivity growth and optimizing economic structures. As a result, it offers both opportunities and challenges for global development.

Research method

The article uses historical methods, logic, document analysis methods, comparative methods, and descriptive statistical techniques to clarify the research content. The idea of high-quality human resources is dependent on the level of social development in each historical period. By utilizing historical and logical methods, the author is able to effectively summarize the evolution of research on high-quality human resources throughout different stages of social development. This approach helps to establish a coherent argument and ensure a logical connection between previous studies to enhance the research content. The document analysis method enables the writer to gain a thorough understanding of top-notch human resources and the digital economy in Vietnam, providing a realistic and objective evaluation of the current situation as well as the potential opportunities and challenges for developing high-quality human resources in the digital economy. Statistical and

comparative methods in the research allows the author to assess the current status of high-quality human resources in Vietnam more accurately by incorporating data from various sources such as statistics, published data, industry reports, and previous research, thereby enhancing the credibility and validity of the research findings.

Research questions:

This study aims to address the following four questions:

(1) What role and importance do high-quality human resources play in the digital economy?
(2) How does Vietnam's high-quality human resources situation stand today?
(3) What are the opportunities and challenges for Vietnam's high-quality human resource development in light of digital economic development?
(4) What implications and solutions can the study provide to tackle the existing constraints and challenges in developing high-quality human resources in Vietnam within the context of the digital economy?

Findings

The role and significance of high-quality human resources in the digital economy

First, within the digital economy, high-quality human capital emerges as the foremost determinant of a nation's socio-economic advancement. Individuals not only serve as the focal point of development strategies, but they also actively participate in progress. They assume a pivotal role in the production process by engaging in the extraction, utilization, safeguarding, and replenishment of diverse resources. In development endeavors, while natural and cultural assets hold significant importance, human resources emerge as the paramount and decisive factor, encapsulating cultural essence and possessing boundless creative potential. According to Toffler (1990), an American futurist, money will eventually run out, power will fade, and only human intelligence, when utilized properly, will not only fail

to diminish but also grow. The ascendancy of the United States as a global economic powerhouse owes to multifaceted factors, most prominently its contribution to nurturing around two-thirds of Nobel laureates to date, including esteemed economists like Krugman and Stiliz, renowned for their pioneering scientific and technological insights that consistently spearhead humanity's developmental trajectory. Singapore, one of East Asia's "four tigers," asserts its status as a pivotal international nexus for commerce and services by steadfastly endeavoring to metamorphose into an "intellectual haven," underscoring the indispensable role of human capital, with talent serving as the catalyst for national ascendancy.

Second, high-quality human resources are crucial for the success of Vietnam's digital economic development. A high-quality workforce ensures the efficient achievement of digital economic development goals and serves as the driving force for the digital economy. This stems from the need to cultivate human resources that align with the rapid evolution of the social production force in the digital economic development process. While other resources may be abundant but can become exhausted without proper exploitation and utilization, human resources, with their innate potential for intelligence and adaptability, remain consistently dynamic and evolving. Thanks to human intelligence, society is constantly developing, and people can discover and improve the natural world. Human decisions influence both the survival and functioning of humanity, while the quality of human resources shapes both material possessions and life quality. High-quality human resources have the ability to catalyze breakthroughs in productivity, enhance the quality of socio-economic movements, and ensure the sustainable development of the digital economy in the future.

Third, within the era of the digital economy, a highly qualified workforce holds paramount importance in propelling and utilizing science and technology, restructuring the economy, transitioning the development paradigm, and serving as a pivotal competitive advantage for swift, efficient, and enduring progress. As science and technology evolve to directly drive production and the knowledge economy progressively shapes socio-economic progress, a competitive edge relies on technological prowess, knowledge, innovative thought, and human creativity.

Consequently, human resources are recognized as a pivotal component within the array of development resources, alongside natural resources, financial assets, and scientific and technological capabilities. Human resources emerge as the most dynamic factor, serving as the wellspring of all material wealth and the catalyst for civilization-building. They play a decisive role in the exploration, utilization, application of science and technology, and regeneration of other resources.

Fourth, high-quality human resources are crucial in determining national competitiveness and serve as a prerequisite for international integration. The expansion of economic globalization encompasses various dimensions in scale, level, and manifestation, resulting in both intricate positive and negative outcomes and presenting a range of opportunities and challenges. Countries are increasingly experiencing heightened interdependence, integration, competition, and collaboration on the global stage. As the knowledge economy advances vigorously, it further underscores the importance of high-quality human resources as a crucial factor in shaping the development trajectory of each nation. In a world characterized by rapid transformations and intense international competition across diverse sectors, including human resources, nations equipped with high-quality human capital, a conducive legal framework for investment, and a stable socio-political environment are positioned for success. According to the World Economic Forum's 2012 assessment, high-quality human resources emerged as one of the primary factors influencing a country's competitiveness. Their significance stems from the fact that natural resources exist in potential form; they become inactive without human intervention during the labor process. Humans possess the unique ability to explore, enhance, and transform other natural and societal resources.

How Vietnam's high-quality human resources situation stand today

According to statistics from the General Statistics Office, as of June 2022, Vietnam's human resources are on the rise in tandem with population growth. The General Statistics Office estimates the country's population at 97.58 million individuals, with approximately 54.6 million people aged 15 and above constituting the labor force, representing nearly 65% of the total population (General Statistics Office, 2022). On

average, around 500 thousand individuals enter the labor force annually. In 2020 alone, due to the repercussions of the COVID-19 pandemic, the labor force aged 15 and above saw a decline of 1.2 million individuals compared to 2019, primarily driven by reductions in rural areas (a decrease of over 1.1 million individuals) (General Statistics Office, 2020). According to the statistics of the labor force in 2022, the number of individuals in the labor force has surged from 27.87 million in 1986 to the present count of 51.4 million as of the second quarter of 2022. Additionally, the proportion of trained workers has ascended from 49% in 2014 to the current level of 67% (General Statistics Office, 2022).

Regarding the human development index (HDI): between 2016 and 2020, both the nationwide HDI and that of most of the 63 provinces and centrally run cities showed a steady increase. The country's HDI rose from 0.682 in 2016 to 0.687 in 2017, further increasing to 0.693 in 2018, 0.703 in 2019, and 0.706 in 2020 (General Statistics Office, 2020). As a result, Vietnam, previously classified among countries and territories with average HDI levels in 2018 and earlier, advanced to the high-level group in both 2019 and 2020. Vietnam's HDI ranking among countries and territories globally rose from 118th position in 2018 to 117th in 2019, with the possibility of further improvement in 2020 based on the UNDP's updated rankings. Although the HDI of the entire country and most regions witnessed an increase, the rate of growth was relatively moderate. In 2020, the country's HDI reached 0.706, marking an increase of merely 0.024 compared to 2016, with an average annual growth rate of 0.9%. Despite the transition from Group 3 to Group 2, Vietnam's HDI remains at the lower end of Group 2. In the global HDI ranking, Vietnam's position has seen minimal improvement, with the Southeast Asia region maintaining its seventh position out of 11 countries (General Statistics Office, 2020). This underscores that the overall quality of education and training, particularly in human resource development, has not played a leading role in fostering the advancement of the human factor, particularly in terms of high-quality human resources.

Regarding the structure of qualified human resources: The educational level of Vietnamese human resources is continuously improving year by year. The rate

of trained workers has more than doubled after about 20 years, from 10.3% (in 2000) to 22.8% (General Statistics Office, 2019). During the period 2009–2019, the educational level of Vietnamese human resources has improved. The distribution of the labor force by educational level increased sharply in high-skilled groups and decreased sharply in low-skilled groups. Not only has the level of education improved, but the technical expertise of Vietnamese human resources is also constantly improving. The proportion of the population with technical expertise has increased significantly compared to 2007, increasing by 6.3 percentage points, from 17.7% (2007) to 24% (second quarter of 2020). The proportion of the population with a university degree or higher increased the most, from 4.9% (2007) to 11.1% (second quarter of 2020). This shows that in recent years, Vietnam's university and post-university education have undergone major changes, contributing to improving the quality of the country's human resources. Nonetheless, as indicated by a recent Ministry of Labor, War Invalids, and Social Affairs report, informal and unskilled laborers continue to constitute the majority. Despite this, the proportion of trained, certified, and qualified workers remained subpar in 2020, hovering at around 24.5%, below the aimed-for 40%. Furthermore, the trained human resources available do not align with practical requirements and fail to meet societal needs (Ministry of Labor, War Invalids, and Social Affairs, 2021).

Vietnam's labor productivity remains comparatively low in comparison to neighboring countries. According to data from the General Statistics Office, Vietnam's labor productivity reached 84.4 million VND per worker (equivalent to about 7,398 USD) in 2016 and is projected to rise to 171.3 million VND per worker by 2021, marking an increase of over two-fold compared to 2016. In 2019, Vietnamese labor productivity stood at 110.5 million VND per employee (equivalent to 4,792 USD) (General Statistics Office, 2020). The transition of Vietnamese workers from the agricultural sector to the industrial and service sectors has been instrumental in driving up labor productivity. While much of Vietnam's increase in labor productivity stems from within-sector productivity improvements, labor mobility also accounts for approximately one-third of the

overall increase in economic labor productivity. Compared to other countries in the ASEAN region, Vietnam boasts a high labor productivity growth rate. Between 2011 and 2019, Vietnam's labor productivity, based on purchasing power parity in 2017 (PPP 2017), grew at an average rate of 5.1% annually, surpassing the average growth rates of Singapore, Malaysia, Thailand, Laos, the Philippines, and Indonesia (General Statistics Office, 2020). However, Vietnam's labor productivity remains significantly lower than that of other countries in the region. Vietnamese labor productivity stands at only 8.4% of Singapore's, 23.1% of Malaysia's, 41.5% of Thailand's, 55.5% of Indonesia's, and 62.8% of the Philippines'. Comparatively, Cambodia's labor productivity is 1.8 times higher than Vietnam's. According to the International Labor Organization (ILO), in 2021, Singaporean workers will contribute approximately 73.7 USD to the country's GDP per hour of work, whereas Vietnamese workers will contribute around 7.3 USD per hour to GDP (International Labor Organization, ILO, 2021).

Opportunities and challenges toward the enhancement of a high-quality workforce in Vietnam in the digital economy

Vietnam's integration into the global landscape is accelerating with the onset of the Fourth Industrial Revolution (Industry 4.0), calling for robust efforts to ensure synchronized and effective economic integration. This transition entails moving away from traditional resource dependencies towards harnessing knowledge-based resources, facilitated by the widespread influence of the internet and digital technology. The digital economy represents an inevitable and prolonged trajectory, necessitating nationwide digital transformation across various sectors. Within this context, digital technology becomes paramount for every sector, enterprise, individual, and governmental entity to achieve their respective objectives efficiently. In this framework, the management of human resources, especially digital human resources, takes on heightened importance. Digital human resources replace routine labor with automated systems and machinery, emphasizing the importance of high-quality human capital. As a result, administrators must exercise strategic foresight

and continually enhance human resource management capabilities. These efforts extend throughout society, catalyzing positive changes in business human resources and aligning them with the demands of the digital economy. The experiences of other nations underscore the crucial role of human resources, alongside institutions and technology, in successfully navigating the digital transformation. Therefore, concerted attention and investment in human resource development are essential to swiftly adapting to evolving quality standards and labor structures, facilitating the rapid formation and growth of digital human resources.

The advent of the digital economy presents both opportunities and significant challenges for nations worldwide, including Vietnam, a newcomer in the early stages of embracing the Fourth Industrial Revolution and embarking on a journey towards digital economic development and transformation. Drawing from insights gleaned from the experiences of other nations and analyzing the fundamental strengths of Vietnam's human resources as outlined earlier, we can delineate the opportunities and challenges that lie ahead for Vietnam's economy in transitioning to a digital economic model, as follows:

Opportunities:

First, in the contemporary era marked by the scientific and technological revolution, the onset of the Fourth Industrial Revolution (4.0) is profoundly shaping the landscape of human resource development and social production. Science, technology, and knowledge have emerged as paramount resources and driving forces for progress, overshadowing the erstwhile dominance of capital, land, and natural resources in national development. The proliferation of internet infrastructure and interconnected global information networks has ushered in favorable conditions for knowledge acquisition and dissemination. For Vietnam, a country committed to making education a fundamental pillar of its national policy, these advancements offer an unparalleled opportunity. With a robust information technology infrastructure and a high proportion of internet users relative to nations with comparable per capita income, Vietnam is poised for accelerated, leapfrogging economic growth. This

paves the way for rapid advancements, enabling Vietnam to narrow the economic development gap with more advanced nations on the global stage.

The Asia-Pacific area, encompassing Southeast Asia, has emerged as a vibrant hub for development, assuming a progressively significant role in global economic growth. Within this region, several major economies boast robust financial, scientific, and technological capabilities, along with dynamic growth trajectories. Nations such as the US, China, Japan, Korea, and Taiwan feature sizable markets and substantial investment potential. Positioned within this dynamic economic landscape, Vietnam garners international attention and simultaneously fosters opportunities for development.

From a broader perspective, the Vietnamese government has demonstrated resolute determination, clear direction, and proactive measures in fostering the digital economy's growth within the country. On March 31, 2022, the Prime Minister ratified the National Strategy for Advancing the Digital Economy and Society until 2025, with a vision extending to 2030: "The present situation presents Vietnam with a vital opportunity that it must seize promptly to drive forward the digital economy and society. It is imperative to prioritize the development of the digital economy and society within national development strategies. Institutions that nurture the growth of the digital economy and society play a pivotal role in driving innovation forward. Digital human resources, comprising experts, technologists, and individuals with versatile digital skills, are instrumental in driving the development of the digital economy. It is crucial to empower every individual to become a digital entrepreneur, transform every business and household into a digital enterprise, and harness digital technology for conducting online business." (Prime Minister, 2023) By 2025, targets include elevating the digital economy's contribution to 20% of GDP, with each sector's digitalization reaching a minimum of 10% and digital economy workers comprising over 2% of the workforce. By 2030, these objectives will be raised further, targeting the digital economy to contribute 30% to GDP, with sectoral digitalization reaching at least 20% and digital economy workers making up more than 3% of the workforce (Prime Minister, 2023). Central to achieving these objectives is the imperative task of cultivating digital human resources tailored to the demands of the

digital economy, which serves as a crucial foundation for ongoing development endeavors.

Second, Vietnam's infrastructure is conducive to digital transformation and applications. It boasts a well-developed telecommunications network, advanced information technology systems, and widespread internet infrastructure, rivaling those of many developed nations. In recent years, different facets of the digital economy have undergone rapid evolution, foreshadowing substantial growth in the foreseeable future. Additionally, Vietnam is witnessing a swift and extensive adoption of digital technology across diverse sectors, from commerce and banking to healthcare, education, transportation, tourism, entertainment, advertising, marketing, agriculture, industry, and online applications. This trend has created a robust demand for a diverse range of skilled labor, offering ample opportunities for workforce development.

Third, Vietnam's human resources are an important advantage; the majority of workers are young and willing to learn and progress. The population is large, quite highly educated, and has a relatively good background in mathematics and information technology. The quality of Vietnamese labor in recent years has also gradually improved. Trained workers have partly met the requirements of businesses and the labor market; Vietnam's technical workforce has gradually mastered science and technology, taking on the most complex job positions in production and business. Therefore, moving to the digital economy will create advantages in quickly meeting the technical, technological, and operational management requirements of the labor market.

Challenges

First, *there is a deficiency in societal focus on the development of human resources in general and specifically on cultivating high-quality human capital.*

Despite human resources, particularly high-quality human resources, being acknowledged as vital for national development, they have not received adequate attention in terms of skills training, healthcare, and holistic education encompassing moral and spiritual aspects. The understanding of the role and significance of human

resources, especially high-quality ones, in socio-economic development remains superficial and lacks depth across leaders, policymakers, businesses, and employers. Issues such as having a perspective but lacking direction, formulating policies without corresponding actions, and facing resource shortages are still prevalent. While education and training are recognized as national priorities, the organization and implementation of these initiatives often fall short of proper attention. In investment policies and project decisions, investors tend to prioritize land, capital, and technology over human resources or labor, resulting in a lack of comprehensive human resource planning.

Second, significant geographical disparities in job creation are evident as the digital economy develops, driven by widespread digital transformation and automation in various countries. This trend has the potential to exacerbate regional inequalities. Evidence from the United States indicates that new industries predominantly emerge in urban areas with a high concentration of skilled workers. However, not all segments of the workforce stand to benefit equally from the digital economy's development. Low-skilled workers, older individuals, and those at risk of displacement by automation stand to gain little from the job opportunities created in high-tech industries. Therefore, it is crucial to prioritize skill enhancement and training for these groups to ensure their participation in the evolving job market.

Vietnam lags behind in embracing the digital economy trend. Awareness among various segments of society, including businesses and workers, regarding the opportunities and challenges posed by the digital economy remains inadequate. Economic development efforts have been uneven and insufficient. According to recent research conducted by the Institute of Economic and Policy Research (VEPR), a significant majority, approximately 85%, of Vietnamese industrial enterprises still operate outside the realm of the digital economy, with only 13% at a rudimentary stage of digital integration. The level of awareness regarding the digital economy, as well as the corresponding adaptation strategies, varies significantly and inconsistently across different sectors, ranging from governmental bodies to businesses and individual workers. This disparity may result in a workforce that is ill-prepared to navigate the digital landscape, lacking the necessary skills, access to

opportunities, and adaptability required for effective participation in the digital economy. Consequently, they risk being left behind in the rapidly evolving digital environment.

Third, at the macro level, the legal and institutional framework for the development of the digital economy in Vietnam is incomplete, lacks coherence and transparency, and exhibits various shortcomings. Due to limited experience, state management agencies face significant challenges in operational management, resulting in a fragmented approach by businesses. Additionally, cybersecurity poses a substantial threat to the safety and security of digital operations, given the increasing interconnectedness of social enterprises in today's world. Social networks serve as critical platforms for businesses and vital channels for user feedback in the digital economy, shaping market reactions across various domains. Vietnam ranked among the top three countries globally in terms of cyber attacks in 2018, underscoring the importance of ensuring safety and security in the digital sphere for business growth. As the digital economy emerges as a cornerstone of economic activity, addressing these challenges becomes imperative.

Fourth, Vietnam continues to face challenges with the quality of its human resources. The composition of workers with technical and professional qualifications remains unbalanced, the proportion of trained workers is inadequate, and the scarcity of highly skilled individuals fails to meet labor market demands and the requirements for mobility and integration. Furthermore, the gap between vocational education and the evolving demands of the labor market is expanding. The digital economy and 4.0 Industrial Revolution demand increasingly high-quality human resources, yet Vietnam's supply lacks both quantity and proficiency. Despite the digital nature of 4.0 Industrial Revolution, Vietnam's information technology, computer engineering, and automation industries suffer from a shortage of highly skilled human resources. According to expert estimates, the demand for information technology professionals increases by 47% annually, while the number of graduates in the field only rises by 8% per year. However, not all of these human resources meet the necessary quality standards. A recent study reveals that up to 72% of

information technology students lack practical experience, and 42% exhibit deficiencies in teamwork skills.

During recent forums and seminars focusing on the digital economy, the 4.0 Industrial Revolution, and human resources, numerous businesses have expressed challenges in recruitment, noting that hired employees often do not meet job requirements, necessitating additional training and coaching within the enterprises. Current statistics reveal that among the 350 universities in Vietnam, merely 12 possess a faculty well-versed in STEM (science, technology, engineering, and mathematics) teaching methods, crucial for equipping students with essential knowledge and skills. It's noteworthy that while these 12 universities boast faculty equipped with STEM teaching expertise, not all institutions can consistently train and adhere to standardized procedures for producing qualified human resources. Additionally, shifts in economic models and structures have resulted in changes in labor supply and demand, outpacing the ability of educational institutions to align their training programs with evolving business needs. Recent surveys underscore significant challenges faced by Vietnam's high-quality human resources in adapting to the demands of the digital economy, including post-graduation integration into the workforce, adaptability to change, familiarity with new technologies, practical skills, awareness, and work styles.

Fifth, the labor market is experiencing significant stratification: In the 4.0 Industrial Revolution, inexpensive labor no longer served as a competitive advantage for nations globally. Numerous traditional occupations are expected to vanish, leading to a stark division in the international labor market between low-skilled and high-skilled workers. Moreover, the emergence of artificial intelligence, such as smart robots, further diminishes the demand for low-skilled labor. Particularly noteworthy is that the 4.0 Industrial Revolution not only jeopardizes the positions of low-skilled workers but also impacts middle-skilled workers unless they acquire new skills—particularly creative ones. As technological advancements continue to accelerate, the necessity for highly qualified and skilled labor becomes increasingly inevitable. Furthermore, the Fourth Industrial Revolution not only elevates the standards for human resource quality but also necessitates a transformation in human resource

training requirements and methodologies. Consequently, the urgent task of preparing high-quality human resources for the 4.0 Industrial Revolution has become a focal point for numerous countries worldwide.

Sixth, intense competition in the realm of human resources is evident, particularly in burgeoning technology sectors that are experiencing widespread practical application. This trend exerts pressure on organizations to recruit and cultivate talent in these specialized fields. Domestically, professionals in areas such as artificial intelligence, the Internet of Things, autonomous vehicles, and robotics, among others, are in high demand and command substantial salaries. Salaries for individuals in these fields may experience annual increases ranging from 50% to 100% over the course of a few years. Consequently, sheer workforce size no longer serves as a competitive advantage. Through technology, companies can streamline operations and execute tasks that were once exclusive to larger enterprises, primarily by leveraging technology to innovate new business models and generate distinct competitive advantages.

Experts predict that the digital era will revolutionize our way of life, employment, and production, particularly in the realm of labor, as machines progressively replace human workers. Vietnam is no exception to this trend, particularly given its abundant but often unskilled labor force. Presently, a significant portion of the workforce lacks technical expertise, and essential skills such as teamwork, problem-solving, computer literacy, foreign language proficiency, professional ethics, and adaptability to new environments are often deficient. Furthermore, highly skilled workers still possessed limited capacity for scientific and technological innovation and creativity.

To transform challenges into opportunities, workers must acquire new skills to remain competitive in the job market. Essential skills needed to thrive in the 4.0 Industrial Revolution include complex problem-solving, critical thinking, creativity, human resource management, collaboration, emotional intelligence, decision-making, customer service orientation, negotiation, and cognitive flexibility. In the digital era, all segments of the labor force are impacted, particularly vulnerable groups such as the elderly and those with low skill levels. While this may lead to job displacement, it also presents opportunities as new fields emerge.

The last challenge lies in training and developing digital human resources. The adaptation to workforce training poses requirements and hurdles for both businesses and educational institutions, including universities and vocational training centers. Tertiary education institutions currently grapple with the challenge of determining suitable training for future human resource needs. This uncertainty stems from projections suggesting that within the next 10 to 20 years, 70% of the skills that workers currently possess will become obsolete, while approximately 80% of new skills will emerge. Consequently, educational institutions must determine which skills to prioritize in their training programs to meet evolving demands. These required skills including complex problem-solving, critical thinking, creativity, teamwork, emotional intelligence, negotiation, and self-learning abilities, rather than merely focusing on knowledge acquisition, which can be mastered more efficiently by robots. Some educational institutions are transitioning to "work-based education," tailoring their training to match job requirements and adapting activities dynamically to evolving human resource needs. The rapid evolution of job requirements underscores the importance of self-directed learning as the primary focus of contemporary education. However, many universities prioritize imparting knowledge over fostering students' self-study skills. Similarly, businesses are adopting a learning enterprise model that encourages employees to engage in self-directed learning processes.

In summary, the digital transformation journey presents a multitude of opportunities along with significant challenges for Vietnam's high-quality human resources. This underscores the need for concerted efforts from the government, businesses, and individuals to prioritize the training and development of digital leadership and human resources, viewing it as both an opportunity and a challenge for further advancement.

Discussion

Based on the research findings, it is evident that high-quality human resources play a pivotal role in driving the growth and advancement of the digital economy, thereby directly influencing its success or failure. While the digital economic landscape offers

abundant opportunities for high-quality human resources to thrive and excel, the current scarcity, inadequacy, weakness, and uneven distribution of such resources across industries, sectors, and economic regions in Vietnam present significant challenges. To triumph over the abovementioned challenge and to facilitate the capability of high-quality human resources in capitalizing on opportunities, transforming challenges into advantages within the digital economy, and ultimately becoming a cornerstone of the country's sustainable development, it is imperative to have a comprehensive set of solutions. These solutions should aim to empower high-quality human resources in Vietnam, enabling them to unleash their potential, fulfill their roles, and leverage their strengths within the digital economy, thereby realizing national objectives. Within the context of this research, the author proposes several implications and solutions for fostering high-quality human resources in Vietnam amidst the digital economy, as outlined below:

First and foremost, increase awareness of the role, position, and importance of high-quality human resources in successfully implementing the causes of industrialization and modernization in the country.

It is crucial to recognize that high-quality human resources stand as the most invaluable asset and the driving force behind the country's rapid and sustainable development. This realization underscores the paramount importance of ensuring the consistent and focused development of high-quality human resources to meet established goals and requirements. In spearheading the development of high-quality human resources, particular emphasis must be placed on cultivating a cadre of effective leaders and managers, skilled experts, and leading science and technology professionals. These individuals serve as the vanguard, playing a decisive role in shaping high-quality human resources development, from raising awareness to formulating guidelines and policies and ensuring practical implementation. It is imperative to firmly grasp the understanding that cadres constitute a pivotal factor in determining the success or failure of the Vietnamese revolution, the innovation process, and international integration. This entails integrating innovation in the Party's leadership methods with innovative cadre practices, effectively implementing cadre strategies during periods of

industrialization and modernization promotion, and innovating thinking and operational approaches in a substantive, practical, and efficient manner. Additionally, addressing weaknesses at each stage of staff work is essential for progress.

It is imperative to revolutionize the processes of recruitment, evaluation, and compensation of human resources based on their capabilities and work efficiency. This shift serves as the impetus for individuals to continually enhance their professional qualifications, skills, productivity, and labor efficiency to substantiate their status as “high quality.” It is also crucial to avoid situations where individuals with academic degrees, such as bachelor’s or doctorates, are automatically perceived as high quality without demonstrating strong expertise, productivity, or work efficiency. Presently, the Central Organizing Committee is spearheading a project aimed at constructing job positions, which delineates capacity frameworks, outlines job roles, specifies quantities, and defines the specific deliverables associated with each position. These initiatives mark crucial initial strides towards altering perceptions regarding staff evaluation.

Second, the government assumes a pivotal role in establishing mechanisms and conducive environments to drive digital transformation efforts across society, facilitating the emergence of a digital society. This involves enhancing awareness throughout society regarding the digital economy. Media agencies must regularly disseminate comprehensive information about the digital economy to businesses, individuals, and society as a whole, fostering a proactive mindset towards adapting to this evolving trend. In the realm of information dissemination, it's essential to delineate the responsibilities and roles of the government, businesses, and citizens in the digital economy. Furthermore, there’s a need to expedite the establishment and enhancement of institutional frameworks, laying down the legal groundwork for implementing the construction and advancement of e-government towards digital government. This constitutes a crucial pillar in the establishment of a digital economy and society. The government is actively engaged in the construction and imminent completion of digital infrastructure and services, encompassing both physical infrastructure and telecommunications networks. This serves as the bedrock for developing soft infrastructure and digital services aimed at optimizing the functioning

of the digital economy platform. Moreover, efforts are underway to expedite the establishment of the national database system and the dissemination of knowledge. National databases are being prioritized in key areas such as agriculture, finance, population, labor, employment information, and land management.

Third, there should be a concerted effort to emphasize the proactive and constructive role of businesses in the digitalization process. In reality, the transition to a digital economy is more of a policy revolution than merely a technological one. Hence, it is crucial to provide support and incentives for new business models and emerging technologies that fundamentally reshape industries and foster innovation. Businesses stand at the vanguard of this digital revolution; thus, they must prioritize digital transformation to transition into digital enterprises. Throughout the implementation phase, particular attention should be directed towards formulating recruitment and training strategies for cultivating a workforce capable of navigating the digital economy and technology landscape. The government, on its part, should concentrate on establishing a legal framework that facilitates the adoption of new business models and innovative technologies. Additionally, creating experimental environments and extending support to businesses are pivotal in nurturing the development of the digital economy.

Fourth, it is crucial to allocate resources towards enhancing education for the digital economy and society. Accordingly, this entails aligning the education and training development strategy with the overall human resource development approach based on the country's socioeconomic development goals. Since the lack of human resources in IT presents a significant challenge for the development of Vietnam's digital economy, it is necessary to improve the quality of this workforce. Hence, fostering the digital economy and society involves leading educational and training institutions to adopt digital technology, thus cultivating a generation of digitally literate citizens and entrepreneurs for the future.

Establishing and implementing the action plan for digital economic development in the education and training sectors is vital. Encouraging prominent educational institutions and universities to integrate digital technology into their educational practices is essential. Attracting technology companies to invest in digital education

and training is equally crucial. When structuring technical expertise training, it's imperative to align with the demands of the digital economy and assess the current state of human resources. Prioritizing the training of information technology professionals is key. Ensuring a balance between the supply and demand of digital human resources entails taking into account educational levels, technical expertise, and overall human resource quality. When crafting training programs for information technology professionals, it is essential to prioritize accelerating the socialization of IT education. This includes updating IT curricula to reflect emerging technology trends like the Internet of Things, artificial intelligence, and robotics. It is important to give students early exposure to these fields and to promote collaborations between educational institutions and businesses for training in IT applications and hands-on experience.

Conclusion

For Vietnam to achieve rapid and sustainable development, deep integration with regional and global partners, successful industrialization and modernization, and eventual attainment of high-income status by 2045, prioritizing the development of high-quality human resources is paramount. This necessitates channeling maximum resources into this endeavor within the country's future development strategies, making high-quality human resources a true game-changer. Currently, Vietnam’s high-quality human resources lag behind those of other ASEAN countries. However, to foster such resources in the digital economy, the roles of all stakeholders must be maximized. Firstly, there must be a concerted effort to raise awareness and action across society regarding the pivotal role of high-quality human resource development for the digital economy. Secondly, the government must assert its central and leading role by implementing mechanisms and policies that cultivate an environment conducive to digital transformation technology and the digital economy. Thirdly, businesses must take on a proactive role by investing in, adopting, and adapting to digital technologies across all facets of production, commerce, and services. Moreover, individual workers need to continually exhibit proactiveness, integration, digital technology proficiency, and adaptability to technological

advancements. The synchronized coordination of these three roles will significantly contribute to the development of Vietnam's high-quality human resources, enabling the country to capitalize on opportunities and tackle challenges arising in the digital economy landscape.

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