TECHNOLOGY REVOLUTION 4.0 IS A SOCIAL-ECONOMIC DEVELOPMENT SOLUTION FOR DEVELOPING COUNTRIES

LA REVOLUCIÓN TECNOLÓGICA 4.0 ES UNA SOLUCIÓN DE DESARROLLO SOCIOECONÓMICO PARA LOS PAÍSES EN DESARROLLO

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ABSTRACT

Facing the inevitable development trend of the economy and the challenges posed by the requirements of building a digital economy, developing countries need to develop the country's socio-economic development. The technology revolution has pushed countries' economies to grow in the direction of linking global economies. As a result, developing countries face many challenges in maintaining strong macroeconomics, controlling external debt and inflation, and investing effectively in infrastructure and technology capabilities that will contribute to productivity growth. The article uses analysis, comparison, and synthesis methods to clarify the role of the technological revolution on the economies of developed countries in controlling the macroeconomic environment and allocating resources. The article also describes the reality of the application of 4.0 technology in Vietnam to clarify other countries' transition from low-income to high-income status through technology application.

Keywords: 4.0 technology revolution; economy-society; developing country.

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RESUMEN

Frente a la inevitable tendencia de desarrollo de la economía y los desafíos que plantean los requisitos para construir una economía digital, los países en desarrollo deben desarrollar el desarrollo socioeconómico del país. La revolución tecnológica ha empujado a las economías de los países a crecer en la dirección de vincular las economías globales. Como resultado, los países en desarrollo enfrentan muchos desafíos para mantener una macroeconomía sólida, controlar la deuda externa y la inflación e invertir de manera efectiva en infraestructura y capacidades tecnológicas que contribuirán al crecimiento de la productividad. El artículo utiliza métodos de análisis, comparación y síntesis para aclarar el papel de la revolución tecnológica en las economías de los países desarrollados en el control del entorno macroeconómico y la asignación de recursos. El artículo también describe la realidad de la aplicación de la tecnología 4.0 en Vietnam para aclarar la transición de otros países de bajos ingresos a altos ingresos a través de la aplicación de tecnología.

Palabras clave: 4.0 technology revolution; economía-sociedad; país en desarrollo.

INTRODUCTION

The industrial revolution 4.0, with the power of science and technology in robotics and artificial intelligence, allows developing countries to use artificial intelligence to change the national economy and society. Computers and computer networks link most fields related to human life, such as economics, banking, construction, agriculture, transportation, education, entertainment, household appliances, information information, communication technology, etc. This article uses the dialectical materialistic methodology to comprehensively clarify the impact of the Industrial Revolution 4.0 combines technology in the physical, digital and biological fields, which creates new possibilities and profoundly impacts the political and social systems of the world economy and countries in particular. This paper also uses analytical and holistic methods to explain Industry 4.0 with applications in artificial intelligence, robots, the Internet of things, and vehicles. Self-driving, 3D printing, and nanotechnology have impacted the economies of all countries, especially developing countries such as Vietnam. Besides, the article uses comparative and historical methods to see the opportunities and challenges for Vietnam. Many developing countries have started applying technology to change their economy and orient themselves to developed countries with heavy industrial production. To date, according to International Monetary Fund data, ten countries were once considered "developing," including Argentina, Brazil, China, Egypt, India, Indonesia, Malaysia, Mexico, the Philippines, and Russia. South Africa, Thailand, and Turkey have to group into a new group called "newly industrialized countries."Currently has opportunities to shorten the gap when applying the industrial revolution 4.0 but may face the risk of falling further behind if not taking advantage of the advantages and opportunities of this revolution.

Firstly, the need to apply the 4.0 technology revolution in Vietnam today

According to data from the International Monetary Fund, as of October 2018, the world still has at least 152 countries classified as "developing countries", most are concentrated in 4 regions, including the Middle East (Afghanistan, Iran, Iraq); Africa (Ghana, Kenya, Zimbabwe); South America (Argentina, Brazil, Chile), and Southeast Asia (Indonesia, Cambodia, Vietnam...).

What these countries have in common is that they all have modest living standards, low human development index (HDI) with meager per capita incomes, and incredibly underdeveloped technology platforms. In these countries, the indicators of the economy may not be equal to that of developed countries, but on macroeconomic values, they are far ahead of the rest.

India has gradually become one of the leading countries in the information technology industry when it has poured substantial human resources and capital into developing information technology and education. India has announced its AI (artificial intelligence) strategy to turn this country into a "workshop" for AI development. The South Asian nation's #AIforAll strategy focuses on smart cities' healthcare, agriculture, education, infrastructure, and transportation projects.

Vietnam is also taking steps to transform the region into a new industrial country. People's lives are gradually changed and improved thanks to technological achievements.

Vietnam's economic renovation has accelerated industrialization and modernization, and Vietnam has made a profound transformation. Before 1986, Vietnam from a less developed country with a low per capita income; now, Vietnam has become a group of low - middle-income countries, and its position in the international arena is increasingly enhanced. But In the group of 34 low-middle-income countries included in the GII ranking list in 2021, Vietnam continues to hold the top position and maintain its ranking among 45 leading countries globally. Among the countries ranked above Vietnam in 2021, there is no country in the lower middle-income level like Vietnam; there are only five countries in the upper middle-income level (China, Malaysia, Thailand, Bulgaria, and Vietnam). Turkey and the rest develop countries/economies belong to the high-income group. The economic structure of industries shifts towards gradually reducing the proportion of the mining industry, rapidly increasing the balance of the processing and manufacturing industries; some industrial products are exported on a large scale, occupying a firm position in the world market. But compared to the set target, our country's industrialization and modernization process are still slow, and the capacity is low power. The technology level of the economy is still lacking.

Industry 4.0 is the fourth industrial revolution in human history. Industry 4.0 focuses on digital technology; from the processes resounding in history, the 4th revolution upgraded to a whole new level with the practical support of the Internet and has given birth to intelligent and practical technology devices for social life. Technology 4.0 helps businesses be more flexible in the production process with a supply chain following an intelligent model, producing quality products at low cost and saving time and money on production costs.

The first industrial revolution used water and steam power to mechanize production. The second revolution took place thanks to the application of electricity to mass production. The 3rd revolution uses electronics and information technology to automate production. The 4th industrial revolution is a perfect synthesis, inheritance, and creation when combining technologies, blurring the lines between physical, digital, and biological. That is why the keyword 4.0 technology is always a topic of discussion in all aspects of social life.

Industrial revolution 4.0 was developed based on three main pillars: physics, biotechnology, and digital. That are combining all fields to improve the quality of life for people. The emergence of the 4th

industrial revolution has helped blur all boundaries between things. This revolution is transforming every industry in every country. The breadth and depth of these changes constitute the transformation of the entire production, management, and governance systems worldwide. Industry 4.0 has empowered business owners to control better and understand every aspect of companies. Science and technology enable data to leverage to increase productivity, improve processes, drive growth in the quality of life and raise income levels for workers, the country, and the wider humanity(Walsh et al., 2021).

Second, the 4.0 technology revolution is an essential driving force for Vietnam's socio-economic development

Science, technology, and innovation have in all aspects of activities at all levels, branches, and localities in industrialization and modernization. The fusion of technology characterizes the 4.0 technology revolution, thereby removing the boundaries between the physical, digital, and biological fields, bringing the combination of virtual and physical systems. Assessment and assessment are strongly developed in science, technology, and innovation, taking the enterprise as the center; promoting the development of new business models, digital economy, and society. That allows the implementation of a new policy testing mechanism and facilitates the deployment and application of new technologies, innovation, and business models. "There are economic and financial mechanisms and policies to encourage enterprises to participate in research, development and technological innovation"(Vietnam, 2021a). In which our Party clearly defines targets and action programs for application and development.

Vietnam's economy has not yet reached the current industrial level as advanced countries in the world. Still, the Fourth Industrial Revolution has opened up opportunities for our country to "go behind" instead. Then it can make efforts to "go along" several key areas, have strengths, can strive to "go ahead, go ahead". Therefore, the Communist Party of Vietnamadvocates "strongly shifting the economy to a model, growth based on productivity, scientific and technological progress, innovation, high-quality human resources"(Vietnam, 2021b). That policy emphasizes the development of science and technology and upholds the creation requirement as a central and transparent orientation in the accelerating trend of the Fourth Industrial Revolution. Communist Party of Vietnam is determined: To promote the development of several key economic sectors and fields, which have potential, advantages, and great room for growth as a driving force for change in the spirit of catching up, advancing with, and surpassing them in some areas compared to the region and the world"(Vietnam, 2021b).

In the 4.0 technology revolution, Vietnam still faces difficulties optimizing resources and connecting supply and demand. With the unlimited digital economy creating economic and competitive pressure, trade war, market competition, resources, technology, and high-quality human resources, attracting investment is increasingly fierce. Vietnam is to integrate into the global economy. In that case, it needs to go deeper and fully and effectively fulfill its commitments when participating in new-generation free trade agreements in the economy. Development is not sustainable; there are still many limitations and weaknesses, especially the level of technology, labor productivity improvement, the efficiency of the economy, and the story of digital transformation. Therefore, when Vietnam promotes and develops the 4.0 technology revolution, it will improve the economy's productivity, quality, efficiency, and competitiveness. Industry 4.0 prioritizes businesses and vital economic sectors to invest in digital

technology, 5G and post-5G connectivity, artificial intelligence, blockchain, 3D printing, the Internet of Things, security, network security, clean energy, and environmental technology. The foundation of industrialization and modernization in forming spearheads of economic development according to the advanced level of world science and technology (Thi-Pham & Bui-Xuan, 2021).

Third, the current situation of enterprises promoting science and technology in Vietnam today

The country currently has 15 technology exchanges, 50 technology incubators, and 186 industrial property representative organizations. Innovative startup ecosystem vibrantly developed, with over 3000 startups, 40 venture capital funds, 40 co-working spaces, 30 business incubators, and ten business promoters. The technology market and the intellectual property system gradually improved, creating a favorable environment for business enterprises. Standards and technical regulations are designed with a harmonization rate, with international standards reaching nearly 50%. Technology application and transfer centers in 63 provinces and cities upgraded. There have been many positive changes in international cooperation in science and technology mechanisms and policies to attract and create favorable conditions for overseas Vietnamese intellectuals to contribute to the country's science have been improved with consistent implementation of the innovation policy, accelerating industrialization and modernization based on science and technology, over the past years, our country has achieved remarkable achievements: Reaching the middle-income threshold 2008; the economy achieved a high growth rate: the period 2011-2015 reached 5.9%, the period 2016-2019 reached 6.8%; the size of the economy increased 2.4 times from 116 billion USD in 2010 to 271.2 billion USD in 2020. GDP per capita increased from 1331 USD in 2010 to 2779 USD in 2020. "The quality of economic growth has gradually improved; the economic structure initially shifted to depth." The proportion of the export value of high-tech products increased from 19% in 2010 to 50% in 2020. Science - technology has gradually affirmed its driving role in socio-economic development. The country's scientific and technological potential is enhanced. The efficiency of scientific and technical activities has been improved, creating positive changes for innovation and creative startups. The level of science and technology for production enhances, and participation in the global value chain is more effective(Le et al., 2021).

Vietnam's economy, when applying science and technology 4.0, has had a quick change, and it is best to take a shortcut to catch up with the rapid development of the digital economy. The 5G network has begun to be deployed commercially with the core infrastructure – a high-speed broadband network-creating a good foundation for promoting brilliant manufacturing activities. Currently, Vietnam ranks in the group of economies consuming digital technology and ranks 15th out of 40 actively pursuing Industry 4.0. With a production operating system on a digitized platform connected to automatic lines throughout the value chain, Thaco Madaz, Complex Vinfast automobile production in Cat Hai Economic Zone, and Vinamilk dairy factory in Binh Duong. According to the World Bank, in 2021, Vietnamese enterprises in Vietnam's processing and manufacturing industry still 70% use machines controlled by humans, 20% do manual work, only 9% use machines controlled by computers, and less than 1% use advanced technology(Vo-Thai et al., 2021).

DISCUSSION

Firstly, it is necessary to associate the economy with the promotion of 4.0 technology application

In Vietnam, in 2020, the proportion of the processing and manufacturing industry in GDP will reach 16.7%. The balance of high-tech industries is, on average, accounting for 40% of added value and export turnover of the whole processing and manufacturing industry (Trade, 2021). The readiness of Vietnamese enterprises before the Fourth Industrial Revolution shows that is a 5-point scale, most industries have scores below 2.5 in all aspects. Vietnam's industry has low internal resources regarding technology level, competitiveness, and added value. Enterprises mainly depend on external resources (foreign direct investment, spare parts, and accessories), imported raw materials, and supplies. Particularly for 2021, the intense outbreak of the fourth Covid-19 wave, along with strict blockades and prolonged distancing (especially in the third quarter of 2021), hurt the number of patients numbers of businesses. The total number of enterprises entering and re-entering the market in 2021 will reach nearly 160 thousand, down 10.7% compared to 2020. Enterprises withdrew119.8 thousand from the market, up 17.8%, most of which were enterprises under five years old with a small capital scale. Thus, manufacturing enterprises show that enterprises conduct digital transformation in business activities. Industrial human resources are still weak, the percentage of trained workers is low, there is a lack of linkage between the production area and training institutions, and the leadership team of industrial enterprises lacks experience in competing in the world. In the global market, there is a lack of scientific theoretical background on production management and no opportunity to access effective production management methods. Social resources have not focused much on investment in production. The nature of the manufacturing sector requires a large amount of long-term investment capital, a slow payback period, and less attractive profit margins than investments in other fields such as real estate and finance. The reason is the lack of legal framework, mechanisms, and policies, linkages between the domestic business sector, the FDI sector, and the world market, and lack of orientation in social resource allocation(Statistics, 2022).

Second, the socio-economic conditions of developing countries hinder the promotion of the 4.0 technology revolution

The first is awareness of the role of science, technology, and innovation in the cause of industrialization and modernization in Vietnam. The organization and implementation of promoting science, technology, and innovation have not met the requirements of becoming the foundation, national policy, and driving force for socio-economic development. Many research tasks have not yet followed production and life requirements. The contribution of science and technology to growth, economic restructuring, and increasing social labor productivity are still relevant. Some sectoral, field and local development master plans and plans basic on in-depth scientific assessment. Especially from 2020 until now due to the Covid-19 epidemic that has affected the entire socio-economic of the country. The impacts of Covid-19 on people's health, livelihoods, and economic activities are enormous. In this context, the requirements placed on the Government, businesses, and people on digital transformation to face the Covid-19 pandemic reduce the pandemic's negative impact on economic activities and lay the foundation for long-term economic recovery that has been taking place on a global scale. As a result, science, technology, and innovation associated with digital transformation and digital technology have become indispensable components of resilience and long-term economic recovery after the pandemic,

a new driving force for continued growth and innovation in many necessary socio-economic fields. According to a survey by the Ministry of Industry and Trade, most businesses are at a low level of access compared to the requirements of developing smart manufacturing and smart factory. The rate of application of 4.0 technologies is minimal, only 2-3%, and the expected rate of investment in applying these technologies to enterprises is also relatively modest(Trade, 2021).

Information to improve, upgrade and renew also faces many difficulties. In addition, a large percentage of businesses cannot control their devices with information technology because most of the enterprises' equipment has been invested in for a long time, making applying technology difficult. Therefore, management software application in enterprises is still minimal, especially in supply chain and product lifecycle management. The quality of labor has also not met the requirements, especially the skills associated with current operation and production requirements.

For developed countries to become high-income countries, the fastest way is to promote the creation and application of 4.0 technology. For Vietnam, a developing country, the strengths gained in the doi moi process need to be combined with the advantages of the world economy to develop the country's socio-economic development.

Third, build synchronous infrastructure with several modern works

Vietnam needs modern, high-quality, synchronous, comprehensive, safe telecommunications, information technology, and data infrastructure. The system of infrastructure, especially information technology, telecommunications, data, electricity, and energy, plays an important role and is the basic foundation to ensure the sustainable development of the economy. There is the basis for deploying technologies and services of the digital economy, thereby promoting national digital transformation activities promoting the development of Vietnam's digital economy. It is necessary to prioritize investment in building synchronous and modern infrastructure in urban areas, extensive urban areas, creating breakthroughs in developing information technology and telecommunications infrastructure, and building and connecting the national database. At the same time, it is also promoting the construction of critical infrastructure projects on the road, railway, sea, and air traffic connecting regions, regions, economic centers, energy infrastructure development, etc. build and complete irrigation systems, lakes, dikes, and dams, improve capacity for natural disaster prevention and control, and adapt to climate change. However, the implementation of several projects was delayed and prolonged due to a lack of investment capital, problems in compensation and site clearance, due to the capacity of the investor, and construction and construction units were still limited. For digital database infrastructure, it is necessary to focus on developing digital infrastructure and ensuring network security, creating conditions for people and businesses to conveniently and safely access digital resources because this is the infrastructure of the digital infrastructure. The platform holds the position that determines the ability and speed of digital transformation and is also the foundation for the establishment and operation of digital businesses in the Fourth Industrial Revolution. The Communist Party of Vietnam recognizes that building a synchronous and modern infrastructure system in both economic and social terms is one of the three strategic breakthroughs for socio-economic development in the coming time(Vietnam, 2021b). Focus on developing information infrastructure and telecommunications infrastructure, creating the foundation for the country to digitally transform, gradually expanding the digital economy and digital society. It is necessary to review, supplement

and adjust the planning on building infrastructure systems for the development of the digital economy in the immediate future, ensuring the overall efficiency and systematicity, especially the electricity network, telecommunications infrastructure, and infrastructure. In information and communication technology, data infrastructure needs to prioritize for investment by the government. Implement the transformation of telecommunications infrastructure into information technology infrastructure. Develop and complete the planning for developing national broadband infrastructure, cloud computing infrastructure, national data management, and reliable electronic identification and authentication service infrastructure.

Fourth, the Development of production associated with the 4.0 technology revolution

In Vietnam, industrialization and modernization are mainly at the processing level. To develop into an industrial country, Vietnam must develop smart manufacturing. Smart manufacturing is a quick step and shortens the distance to help businesses produce according to the process, increase accuracy, and easily control data based on the control machine system. Implementing lean production principles combined with automatic production equipment is necessary to make the production process more efficient and productive. Waste in production needs to eliminate with equipment that will produce smaller tolerances. Overcome the wrong work, redo the product, and reduce the amount of waste discharged. At the same time, there should be management support with the assembly and equipping of machines that are applied with technology to form a management system so that engines can directly monitor the production status without needing to through reports on production stages and processes. To control costs to optimize production by accelerating the introduction of applications and machine achievements into the production line to reduce unnecessary labor at many locations. Robots and automatic devices will coordinate with humans to bring the best efficiency. That lowers investment costs. Ensure production processes increase productivity. And ensure the safety of human resources in the production process, it is also necessary to pay attention to optimizing productivity with machines that can operate for a long time, operating continuously without resting. The suitable function ensures accuracy and easy-to-control data, making the process neat. Therefore, developing innovative products is the realization of industrialization and modernization in our country. However, Vietnam needs to build national data synchronously and systematically to do that. If the database is not open, it cannot be accessed or called the closed part; it is certainly not qualified for intelligent systems to operate. There is still no comprehensive national database in Vietnam today. Therefore, Vietnam needs to build a database in some areas, such as population and land management. It is necessary to make a national database so that businesses, localities, industries, and fields, when building their databases, can be integrated into the national database system to avoid the situation. As each place makes a different configuration, it will be challenging to incorporate it when it comes to time, and it does not fully reflect the country's digital data. Vietnamese enterprises' challenge is automating production and bringing intelligent systems into production and business, building a technology platform to share data as a basis for interconnection with intelligent management software. To do so, Vietnam needs to have policies and legal regulations to ensure the interests of people and businesses in cyber security. Develop e-government to create the database. In the industry, it is necessary to focus on intelligent production processes on a national and international scale. Prioritize using technology solutions, software, and systems that domestic organizations and enterprises have researched and mastered. The features of social networks and intelligent mobile phones transmit information to people and businesses. Must have experience setting up production models and

digital transformation in enterprises, exploiting digital technology in optimizing the operation of the production platform, building an intelligent factory on old foundations, and digitizing the supply chain to improve production efficiency. The database needs to exploit effectively; the usable organ is a significant factor.

CONCLUSION

Thus, the development of science, technology, and innovation is to promote the industrialization and modernization of the country in the context that the Fourth Industrial Revolution is taking place firmly. Because the focus of industrialization and modernization is to accelerate, break through, and simultaneously implement both processes of transforming the dependent industry, outsourcing and assembling to active research, application, technology creation, and transformation of the industrial economy to a knowledge-based digital economy. Therefore, in transforming the growth model, accelerating industrialization and modernization, and improving labor productivity and competitiveness of the economy, science – technology, and innovation should be promoted to play a central and pivotal role in the country's socio-economic development.

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