# $\overline{\mathrm{E} B}$ <br> Developing the current productive forces in Vietnam in terms of science and technology 

Tran Mai Uoc ${ }^{1}$<br>Ho Chi Minh University of Banking, Vietnam<br>maiuoctran@gmail.com


#### Abstract

: Currently, in the face of challenges posed by the Fourth Industrial Revolution and the process of international integration, science - technology, and innovation are always considered the most important basis for rapid and sustainable development. Science and technology developed, gradually becoming a direct production force, leading to a tremendous change in the production process, and promoting the strong development of Vietnam's economy. This study aims to analyze and clarify the issues related to the role of science and technology in the development of productive forces, challenges, and solutions for science and technology to promote the development of productive forces in Vietnam today. The results show that, before the impact of Industry 4.0, especially digital technology developed strongly, creating breakthroughs in many fields, bringing both opportunities and posing challenges for all nations. In Vietnam today, the role of science and technology in the development of productive forces is increasingly affirmed. The article also outlines and analyzes the challenges and basic solutions for science and technology to promote the development of productive forces in Vietnam today. The drawback of this research is that it has not pointed out and analyzed the characteristics and factors affecting the development of production forces in Vietnam today in terms of science and technology.


Keywords: development; productive forces; science; science - technology.

## Introduction:

After 36 years of renovation, Vietnam has achieved impressive development achievements with outstanding results such as the size of Vietnam's economy increased 12 times, per capita income increased 8.3 times, export-import turnover increased 29.5 times, foreign direct investment (FDI) increased 22 times, the proportion of poor households in the country from $58 \%$ in 1993 to only $2.23 \%$ in 2021 according to new standards. From a poor, backward, and undernourished country, Vietnam has risen to become a middle-income country with a GDP per capita of US $\$ 2,779$ by 2020 and is one of the major agricultural exporters in the world. So far, Vietnam has had diplomatic relations with 189/193 UN member states, including strategic partnerships and comprehensive partnerships with 30 countries; the Communist Party of Vietnam has established relations with 247 political parties in 111 countries, the National Assembly of Vietnam has relations with parliaments of more

[^0]than 140 countries; Vietnam has trade relations with over 220 partners, 71 countries have recognized the market economy status for Vietnam. Vietnam has also signed and joined 15 free trade agreements, including many new-generation free trade agreements. To achieve these achievements, the key factor is to build an independent, self-reliant, and proactive economy, actively integrating into the world, and one of the important factors is to focus on developing production forces. Production forces play an important role in the socioeconomic construction and development of a country. It is impossible to have a highly developed economy if not based on its solid foundation of modern productive forces. In the current context, economic competition and trade wars between countries are increasingly fierce; The Fourth Industrial Revolution, especially digital technology, has developed strongly, creating breakthroughs in many fields, bringing both opportunities and posing challenges for all nationalities; Green and digital economy development has become an important trend, which is of interest to many countries in the world, including Vietnam, the development of productive forces has profound theoretical and practical significance.

## Research questions

Question 1: The role of science and technology in the development of productive forces is shown through what points?

Question 2: What are the challenges and solutions for science and technology to promote the development of productive forces in Vietnam today?

## Objectives

The purpose of the article is to analyze and clarify issues related to the role of science and technology in the development of productive forces, challenges, and solutions for science and technology to promote the development of productive forces in Vietnam today.

## Methodology

- Group of theoretical research methods: using theoretical analysis, synthesis, and systematization methods to define instrumental concepts and build theoretical frameworks for articles.
- Group of practical research methods:
+ Observation method: Observing the development of production forces in Vietnam today in terms of science and technology.
+ In-depth interview method: Get the opinions of employees, managers, businesses, and researchers to learn about the development of the production force in Vietnam today. In addition, the article also uses a combination of specific research methods such as deduction and induction, logic and history, comparison, and collation of theory with practice.


## Result and Discussion

## Science and technology: The most important driving force for the development of modern production forces in Vietnam today

In industry, science and technology development, and gradually become a direct production force, leading to a tremendous change in the production process. The trend
of globalization, along with the transfer and international integration of science and technology, has boosted our country's economy. Simple, handcrafted labor tools have been replaced by modern machinery and equipment lines. Human labor is liberated, manual labor is gradually replaced by intellectual labor, and simple labor is gradually replaced by increasing specialization. The above changes cause labor productivity to increase dramatically, the volume of products made more and more and of high quality. Thanks to this, our economic structure is undergoing a strong shift. The contribution of industry, construction, and services tends to increase more strongly than the agricultural sector. From a purely agricultural country, Vietnam has built many factories and enterprises with advanced technology lines; many hi-tech export processing zones. This was noted at the 12th Congress of the Party: "Industrial production technology has changed in level towards modernity. The proportion of the manufacturing and processing industry in the value of industrial production increased, and the proportion of the mining industry decreased. The commercial and service sector is growing quite well" $[2,83]$. In agriculture, intending to industrialize and modernize agriculture and rural areas, the Party and the State actively apply modern scientific and technological achievements to agricultural production. The mechanization of agricultural production is increasingly promoted. Many modern machines are put into agricultural production such as tractors, harvesters, seeding machines, and dryers. Thanks to the introduction of modern machinery and equipment into production and the application of reasonable management mechanisms, productivity and quality in our country's agricultural production are increasing. The irrigation sector has also been significantly improved with the introduction of a variety of large-capacity pumps that can be irrigated on a wide range. Many new rice varieties, crops, and plant varieties are put into production with quality, good resistance to pests and diseases, natural disasters, bringing high productivity, and not only meeting domestic demand but also exporting abroad. The application of science and technology to agricultural production also creates conditions for farmers to access new achievements of science and technology, contributing to gradually improving the quality of rural human resources in general and the whole country in particular. Our country has formed key agricultural areas, and specialized farming, with agricultural products such as rice (Vietnam ranks second in Asia and third in the world for rice export), seafood, vegetables, tubers, and fruits... The role of science and technology in the development of modern agriculture in our country has been noted by our Party: "Agricultural and rural industrialization and modernization have made changes, agriculture has developed more comprehensively in the direction of exploiting the advantages of tropical agriculture; the application of science and technology and the level of mechanization has been raised" $[2,84]$.

For Vietnam, the role of science and technology in the development of productive forces is reflected in several contents:

Firstly, with the rapid and strong development of science and technology, it shows an increasingly close relationship between science and technology and production. Previously, production was not associated with science and has not been modernized, today science and technology is an increasingly modern and indispensable factor in the socio-economic development of each country. Scientific and technological achievements are increasingly penetrating the production process and becoming a direct force for production; the time of application of scientific and
technological achievements to production is increasingly clear and becoming an inevitable trend.

Secondly, science and technology have a strong impact on the instrument of labor, the object of labor has created a leap of factors in the means of production. The strong development of science and technology has formed a general movement trend of modern productive forces, which is to constantly replace technical equipment, processes, and technological systems for low productivity, high consumption of raw materials, materials, disposal of environmental pollutants... with high-tech equipment and systems that carry a lot of knowledge and at the same time give high-quality productivity. In the factors constituting and determining the development of the productive force, the instrument of labor holds a very important position, it is the decisive factor of labor productivity, showing the ability to conquer and master the nature of man.

Thirdly, science and technology not only have a strong impact on the development of the means of production but also workers - the leading factor of the productive force. The activity of the means of production depends on the two criteria of the worker, physical and mental, but people must also depend on the existing means of production, depending on which means of production they use. In the past, workers only had skills, experience, habits, and physical strength, but today under the impact of the scientific and technological revolution, workers need to know, and understand,... to participate in the production process. Workers are no longer the direct manipulators in the production system but mainly use scientific knowledge to control the production process. Along with education and training, science and technology have become key driving forces for the country's socioeconomic development.

To consistently implement the policy that science and technology are the leading national policy, a key driving force for the development of modern productive forces, productivity, quality, efficiency, and competitiveness of the economy, the 13th Party Congress continues to identify, along with comprehensive human resource development, science and technology as one of the three strategic breakthroughs in national construction and protection. Accordingly, the 13th Party Congress requires a strong focus on science and technology development, innovation, and digital transformation to create breakthroughs in productivity, efficiency quality, and competitiveness. At the same time, it is necessary to build specific and outstanding institutions, mechanisms, and policies, promote innovation and application of technology transfer; improve research capacity, master several new technologies; take enterprises as the center of research and development, application and transfer of technology and application of digital technology. Developing a national innovation system, an innovative start-up ecosystem. At the same time, it is necessary to urgently develop a science and technology development strategy in line with the general trend of the world and the country's conditions, adapting to the Fourth Industrial Revolution. The Congress affirmed: "There is a strategy for scientific and technological development in line with the general trend of the world and the country's conditions, meeting the requirements of national construction and defense in the new situation, adapting to the Fourth Industrial Revolution"[3,140]. Continue to grasp and consistently implement the policy that science and technology are the leading national policy, a key driving force for the development of modern productive forces,
innovation of growth models, and improvement of productivity, quality, efficiency, and competitiveness of the economy.

The 13th Party Congress also made more specific the scientific disciplines that need to be focused on development, namely: natural science, science-technology, social science and humanities, especially, for the first time, the science of political theory was strongly emphasized. At the same time, mention more specifically the requirements for scientific fields, thereby promoting the strong development of social sciences and humanities to have a scientific basis that best serves the cause of innovation, economic and social development. Encourage creativity, improve responsibility, and respect for differences in social science and humanities research. Closely linking social sciences and humanities with natural sciences and technology in the process of implementing the tasks of economic and social development of the country. In the current national context, this Party document attaches great importance to the transfer and application of scientific and technological advances to economic, cultural, social, and human development, national defense, and security. Reviewing and rearranging the system of scientific and technological organizations associated with the comprehensive renovation of scientific and technological human resource policies, prioritizing the attraction of talents and scientists who are dedicated to the development and protection of the country. This is a very important guideline for bringing Vietnamese science and technology to develop. Therefore, it is necessary to soon review and rearrange the system of scientific and technological organizations associated with the comprehensive renovation of scientific and technological human resources policies. To increase investment in the development of science and technology according to the market mechanism, based on mobilizing social resources from the State to enterprises and individuals. The State will support and encourage individuals, organizations, and enterprises to invest in research and development, transfer and application of scientific and technological advances, on the principle of order, based on the final results and efficiency. The Party and State of Vietnam also determined to develop some key scientific and technological branches, directly contributing to solving urgent problems, suitable to the conditions and resources of the country. Prioritize the transfer and application of scientific and technological advances into key areas. In particular, focus on developing digital infrastructure, ensuring network security, creating favorable conditions for people and business communities to safely access digital resources, and building digital databases. Enables the implementation of new policy testing mechanisms, and accelerates the deployment and application of new technologies, innovations, and new business models. "There are mechanisms, economic and financial policies to encourage enterprises to participate in research, development and technological innovation [3,226]. Clearly define the targets and action programs to apply and develop science, technology, and innovation in all aspects of activities at all levels, branches, and localities, emphasizing the need to promote international cooperation and integration, improve the capacity of national innovation, take the task of building and protecting the Fatherland and human development as goals. "Timely solve problems, well implement policies on training, fostering, attracting, applying and remunerating scientific and technological staff, especially leading experts and talents in the field of science and technology" $[3,142]$. Strengthen international cooperation and integration in science and technology. To adopt policies to support international academic exchange activities and promote
innovation. Diversify international cooperation, and prioritize strategic partners. To associate international cooperation in science and technology with all fields of socioeconomic life, defense, and security. At the same time, it is necessary to clearly define the focus of international cooperation in science and technology to meet the requirements of national development in the coming time, which is: "Promoting international integration and cooperation in science and technology, diversifying partners, selecting strategic partners who are countries with advanced science and technology" $[3,230]$, closely linking international cooperation in science and technology with international economic cooperation. Develop a network connecting Vietnamese talents, attracting the participation of the overseas Vietnamese scientific community.

## Challenges and solutions for science and technology to promote the development of productive forces in Vietnam today

The application of science and technology, connection with research organizations and enterprises are still at a modest level. Products with gray matter content, science and technology content for production, and people's lives are not much. There has not been a strong innovation movement, science and technology have not been attached to the market. Research projects of international stature, with breakthrough contributions to socio-economic development, are few. The organizational system and apparatus of the Vietnam Union of Science and Technology Associations still have some shortcomings; the content and mode of operation have not had many innovations, and have not created a favorable environment to encourage and inspire intellectuals to actively innovate and make many contributions to major issues of the country. The Union has not been proactive in proposing mechanisms and policies to promote the development of science and technology in the country, especially since the development closely follows the country's reality in the current period of a digital economy and digital society. There is still a "brain drain" or not fully exploiting the gray matter of the country.

In addition, the science and technology market in Vietnam is still slow to develop, there are few reputable and experienced intermediaries in supply and demand connection activities. The technology supply in the market is limited, technological innovation has not yet become an urgent need of enterprises. Social investment, especially by enterprises in science and technology, is still low compared to potential; the ability to absorb technology and technological innovation of domestic enterprises is not high. Besides, although Vietnam has a large scale of human resources and health, it lacks skills and innovation capacity. This is the disadvantage of Vietnamese labor to integrate with world labor. According to the World Economic Forum (WEF) in 2019, Vietnam's digital skills are rated at 3.8 out of 7 (97th), and critical teaching skills are only at 3 out of 7 (106th out of 141 economies). Scientific staff, especially leading scientists, are lacking and lack large scientific centers; the efficiency of using national key laboratories and the operation results of high-tech parks are low. The lack of scientific management mechanisms, especially the mechanism of autonomy, selfresponsibility, respect, and treatment of talents, is still limited. Meanwhile, improving the quantity and quality of scientific staff cannot be done in a short time, it requires a lot of time and effort and is also a significant challenge for the development of science and technology in Vietnam. The number of enterprises participating in research in the
field of science and technology currently accounts for nearly $9 \%$, this proportion tends to increase, but the proportion of enterprises working directly related to scientific research and development accounts for a very small proportion compared to the size of enterprises in operation. Vietnam's innovation struggle is quite faint compared to other countries in the region when the number of patents and patents applied for commercialization in Vietnam is quite far away from other countries. In particular, investment in research and development (R\&D) in Vietnam is still quite limited. According to calculations, Vietnam's R\&D spending in 2018 was only about $0.4 \%$ of GDP compared to $3.3 \%$ of Japan's GDP, $2.2 \%$ of Singapore's GDP, and $2.1 \%$ of China's GDP. In South Korea, R\&D spending currently accounts for $4.2 \%$ of GDP, and the number of patents applied for the brand surpasses Japan with 4,378 patents per million people, with a per capita income of $\$ 29,891$. In addition, investment capital for science and technology has not been paid much attention to. Investment by Vietnamese enterprises in scientific research and technological development is still quite low, mainly from the state budget.

## What are the basic solutions?

Firstly, raise awareness of the science and technology market. Focus on reviewing and removing difficulties and bottlenecks in institutions, mechanisms, and policies for the synchronous, effective, modern, and integrated development of the science and technology market. Ministries, sectors, agencies, and localities shall develop and integrate plans for the development of science and technology markets into five-year and annual socio-economic development plans. Focusing on the development of information technology, biotechnology, new material technology, new energy technology, aerospace technology... Currently, high-tech industries are considered the pillars of the knowledge economy. In particular, high-tech industries are characterized by high and rapid growth; contributing greatly to the national economy and creating new jobs; being able to compete internationally; the time from scientific research to technological creation is shorter than before; being able to penetrate directly and quickly into all areas of social life (economic, political, cultural, social, military, management); effectively use natural resources, and exploit knowledge resources to exploit natural resources effectively. Secondly, follow the solutions set out in the National Science and Technology Market Development Program to 2030 according to Decision No. 1158/QD-TTg dated July 13, 2021, of the Prime Minister [10]. At the same time, it is necessary to develop and implement advanced scientific and technological cooperation contents and plans with strong countries in science and technology because they are strategic partners of Vietnam. Industrialization and modernization have pushed our country to strengthen cooperation with other countries to carry out common tasks and research projects, import projects of research results or technology transfer, scientific seminars, technology exhibitions, exchange of experts, documents, and scientific information. However, in the process of developing and implementing content and plans for scientific and advanced technology cooperation of strong countries in science and technology, there are still many limitations such as: raising new disputes related to intellectual property, copyright, trademarks, geographical indications, industrial designs - areas where Vietnam is at a very low development level compared to them. Therefore, it is necessary to establish excellent scientific research centers based on long-term cooperation between scientific research institutions in Vietnam and foreign countries.

Thirdly, promote interconnection, towards synchronization of the science and technology market with the markets of goods, services, labor, and finance. Promote public-private cooperation, and mobilize social resources in the development of science and technology markets. Focus on encouraging enterprises to import core technology through research institutes and universities to decode, absorb and master the technology, accelerating the pace of technological innovation of enterprises. At the same time, it is necessary to proactively build, complete, supplement, and coordinate with directly relevant agencies to synchronize financial institutions for science and technology, especially in the current strong international integration conditions; review the system of legal documents and policies on intellectual property, technology transfer, and competition; create conditions for participants in the science and technology market to access credit sources with low-interest rates; complete the policy of importing technology from abroad into Vietnam, thereby encouraging the transfer of advanced technologies and limiting old and obsolete technologies from abroad into Vietnam.

## Conclusion

Assessing the achievements of socio-economic development after the renovation process in Vietnam, the important role of science and technology for socio-economic development in general and the development of productive forces, in particular, is undeniable. Science and technology developed, and gradually became a direct production force, leading to a tremendous change in the production process. The trend of globalization, along with the international transfer and integration of science and technology, has boosted Vietnam's economy. Simple, handcrafted labor tools have been replaced by modern machinery and equipment lines. Human labor is liberated, manual labor is gradually replaced by intellectual labor, and simple labor is gradually replaced by increasing specialization. The above changes cause labor productivity to increase dramatically, the volume of products made more and more and of high quality. Thanks to this, Vietnam's economic structure is undergoing a strong shift. The contribution of industry, construction, and services tends to increase more strongly than the agricultural sector. From a purely agricultural country, Vietnam has built many factories and enterprises with advanced technology lines; many high-tech export processing zones, commercial and service areas have grown quite well. In the context of accelerating industrialization, modernization of the country, and current international integration, science and technology, and innovation are always considered the most important basis for rapid and sustainable development.

This study aims to analyze and clarify the issues related to the role of science and technology in the development of productive forces, challenges, and solutions for science and technology to promote the development of productive forces in Vietnam today. The results show that in the face of the impact of Industry 4.0, especially digital technology has developed strongly, creating breakthroughs in many fields, bringing both opportunities and posing challenges for all nations; Green and digital economy development has become an important trend, which is of interest to many countries in the world, including Vietnam, the development of productive forces is an urgent issue. In Vietnam today, the role of science and technology in the development of the productive force is shown through: the increasingly close relationship between science and technology and production; science and technology strongly affect the tools of
labor, and the object of labor has created a leap of factors in the means of production; science and technology not only have a strong impact on the development of the means of production but also have impacts on workers - the leading factor of the productive force. The challenges for science and technology to promote the development of productive forces in Vietnam today are: The application of science and technology, connection with research organizations and enterprises are still modest. Products with gray matter content, science and technology content for production, and people's lives are not much. There has not been a strong innovation movement, science and technology have not been attached to the market. In addition, the science and technology market in Vietnam is still slow to develop, there are few reputable and experienced intermediaries in supply and demand connection activities. The number of enterprises participating in research in the field of science and technology currently accounts for a low proportion. Investment capital for science and technology has not been paid much attention. The basic solutions for science and technology to promote the development of productive forces in Vietnam today will be: raising awareness of the science and technology market; sticking to the solutions set out in the National Science and Technology Market Development Program to 2030; developing and implementing content, plans for scientific and advanced technology cooperation with countries that are strong in science and technology because they are strategic partners of Vietnam; promoting interconnection, moving towards synchronization of the science and technology market with the markets for goods, services, labor, and finance. The drawback of this research is that it has not pointed out and analyzed the characteristics and factors affecting the development of productive forces in Vietnam today in terms of science and technology.

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[^0]:    ${ }^{1}$ Assoc. Prof. Dr. Ho Chi Minh University of Banking, 36 Ton That Dam Street, Distict 1, HCMC, 70000, Vietnam. Orcid: 0000-0002-4659-7661

