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The Impact of the Information Technology Revolution on Modern Productive Forces: A Philosophical Epistemology Approach

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Abstract— *From a philosophical perspective, the author of this article has examined the essence of the information technology revolution to analyze its impact on the productive forces in the modern economy. As a driving force behind the transformation of scientific knowledge into direct productive power (establishing a knowledge economy, enhancing the increasingly significant role of knowledge, and providing a foundation for economic integration and globalization), modern information technology has profoundly impacted the elements of productive forces: creating significant changes in the social division of labor, altering the structure of labor, and transforming the content and nature of labor.*

Keywords— *Information Technology Revolution, Modern Productive Forces, Philosophical Epistemology.*

I. INTRODUCTION

The information technology revolution is one of the most extraordinary phenomena in the development of human society at this point between two millennia. This revolution is creating what is known as the information society, the postmodern society, etc. Regardless of the terminology used, these names all imply the profound impact of modern information technology on all aspects of social life. So, what exactly is the information technology revolution? How does it affect the productive forces of society, and what can we hope for from this impact? These are the issues that this article aims to address.

As we know, the first and most fundamental activity that defines the essence of humanity is material production. Material production is the activity through which humans create the means of subsistence to sustain and develop their existence, not only as individuals but also as a species. In this sense, human material production is essentially labor. In the process of labor, humans must constantly seek appropriate methods, processes, rules, and skills to influence the natural world to create products that serve their survival needs. It is from here that technology begins to exist as the development and application of tools, machines, materials, and processes to solve human problems.

The history of human social development is also the history of technological innovations and inventions. Initially, technology was simply the creation of rudimentary tools, such as sharpened stones, stone axes, or bows and arrows. These tools helped humans hunt more effectively, gradually distinguishing themselves from the animal world. The development of technology continued as humans invented tools like plows, harrows, windmills, and water mills. These tools helped humans transition from a foraging lifestyle to an agricultural economy, with farming and animal husbandry as the main activities. This technology enabled humans to thrive for tens of thousands of years within an agricultural economy, and its momentum continues to this day. The invention of the steam engine marked the beginning of the industrial economy, characterized primarily by production through mechanical machinery and later, automated machinery. Thanks to industrial production, humanity has created a vast amount of goods, surpassing the total of all previous eras combined. Notably, from the mid-20th century to the early 21st century, with the invention of a series of new technologies, including information technology as a key component, the development of human society has undergone qualitative changes.

Information technology is a complex system that includes: electronic computers, multimedia communication, and the global network. With the revolution in information technology, humanity is entering an era known as the information age or digital age. The material production system in the information age relies primarily on automation, information, and knowledge. This new technological phenomenon is having a profound impact on all aspects of social life, from material production to mental activities, from individuals to society, and from the economy to human culture. This reality provides the basis for some optimistic viewpoints suggesting that humanity is transitioning to a new type of society-knowledge society or post-capitalist society-with very promising prospects. Whether this viewpoint is correct or not requires fundamental explanation and analysis, but it also demonstrates that the massive impact of the information technology revolution on all aspects of social life is undeniable.

Why does the information technology revolution have such a tremendous influence? The answer lies in the fundamental difference between information technology and the technologies that humanity has created in the past. It is the invention of a completely new method for storing, processing, and transmitting information in production and all other social activities. The core factor creating this technological breakthrough is the advent of modern information technology, especially electronic computers. One could say that electronic computers are the focal point, the key element determining the appearance of modern technologies. All other inventions revolve around it and bear its strong imprint.

In brief, information technology is the type of technology that creates technical devices related to storing, transmitting, and processing information, such as electronic computers, mobile phones, television, fiber optics, etc. Accompanying these devices are technical solutions that allow people to work directly with information. The qualitative difference of information technology compared to previous technologies is that its inputs, outputs, and processing are information and knowledge, rather than purely physical products. While previous technologies were limited to saving physical labor or enhancing the efficiency of natural and material resources, information technology realizes the partial replacement of human brain functions. With information technology, intellect (the source of intellectual energy-knowledge) becomes the primary energy source of technology. Information technology contributes to replacing manual labor with intellectual work. In other words, information technology focuses on harnessing intellectual resources.

The first field to experience the direct and significant impact of the information technology revolution is material production, with a focus on the transformation of production forces under the influence of advances in information technology.

The information technology revolution, in a narrow sense, and the modern technology revolution, in a broader sense, not only affect physical functions but primarily impact intellectual functions. The extensive influence of information technology lies in its ability to be computerized, meaning its capability to penetrate all other technological sectors. Information technology forms a bridge, a connection between technologies, linking the links and processes of material production activities. Thanks to this specificity, information technology has quickly become the key to transforming scientific and technological knowledge into "direct productive forces." C. Marx once predicted that, at a certain level of development, "universal social knowledge" would become "direct productive forces." Today, with the rapid development of information technology and its consequences, Marx's prediction has become reality.

Scientific knowledge becoming a direct productive force through technology holds special significance in the development of production, human development, and society. It creates a unified, integrated, and complementary process between the production of material wealth and intellectual wealth. In practice, today's technological products contain a high level of intellectual content. They are not merely the crystallization of physical labor value, but primarily and predominantly represent the value of mental and intellectual labor. The intellectual imprints are increasingly embedded in material products. Currently, the balance between material and intellectual costs for a product is shifting towards a reduction in material content and an increase in intellectual (knowledge) content.

We can better understand the argument that the information revolution drives the transformation of scientific knowledge into a direct productive force by examining the role of information technology in economic development.

Firstly, information technology is a crucial factor in creating a knowledge economy. This is because, with its capacity for computerization-i.e., the ability to apply information technology to other technologies and various areas of social life-information technology plays a key role as the central technology in the high-tech system, forming the pillar of the knowledge economy, which includes biotechnology, new energy technologies, new materials technologies, and information technology itself. Due to this unique characteristic, information technology is both a connector of these technologies and a driving force for their development. Any country aiming to enter the knowledge economy must pay attention to developing information infrastructure and even the information industry. Thus, it can be affirmed that without information technology, there would be no knowledge economy.

Secondly, information technology enhances the role of knowledge. "Universal social knowledge" is gradually becoming the source and driving force of economic development. In the knowledge economy, production processes primarily rely on intellect and knowledge. Human knowledge and intellect are now seen as an inexhaustible, renewable resource that does not deplete through exploitation like natural resources. Therefore, the more knowledge there is, the more new knowledge can be created. Under the influence of information technology, human knowledge is continually increasing. Knowledge strongly and directly affects productive forces, causing the proportion of material costs (raw materials, machinery, etc., production tools, and physical labor) in production to decrease, while the proportion of intangible costs (intellect, intellectual labor) increases.

Under the impact of the Internet, knowledge is becoming highly socialized. Globalization and the spread of the Internet are reducing the control of knowledge. Today, knowledge is no longer the exclusive possession of researchers, technical experts, or capital owners. Once socialized through information technology, knowledge is disseminated to a wide audience both in terms of scale and speed, thereby accelerating the introduction of scientific inventions and technological innovations into production. Whereas historically, the journey from the laboratory to production was long, this distance is now continually being minimized, creating a stimulus for the development of productive forces on a global scale and promoting globalization.

Thirdly, information technology provides the foundation for economic integration and globalization. The current era of globalization differs not only in degree but also in nature from previous globalizations due to technical differences. Technically, previous globalizations were based on reduced transportation costs due to innovations like railways, automobiles, steamships, and steam-powered boats. These means allowed people to reach more places more quickly and cheaply. Today's globalization relies on the decreasing costs of telecommunications thanks to innovations in information technology, such as microprocessors, telecommunications satellites, fiber optics, and especially the Internet. These technologies connect the world more quickly and tightly. Using information technology products, developing countries can not only export raw materials to developed countries and import finished products but can also become major producers. With information technology tools and devices, such as computers

and remote conferencing technologies, developing countries have the opportunity to become marketers in various countries while remaining unified. Today, affordable computers and telecommunications enable people to provide and exchange services like health consultations, software development, and information processing on a global scale.

The difference between today's globalization and previous forms lies in the fact that while earlier globalizations were primarily trade-based, today's globalization, in addition to trade—exemplified by the Internet—also relies on production with a high degree of specialization and de-specialization. Today, in consumer fields, there is a greater focus on products with renowned brands, such as telecommunications and electronics from companies like Nokia, Samsung, Philips, Electrolux, and many others, rather than on where these products are manufactured—whether in Hong Kong, Singapore, Thailand, the USA, or China. In practice, each component of a product may be manufactured in different countries, with the final assembly taking place in another country. The quality of goods today follows international standards, as indicated by ISO certifications. This requirement reflects the high level of internationalization and globalization of products and production.

II. To understand more deeply the role of information technology in material production, we should analyze its impact on the elements of productive forces.

Firstly, the strong development of productive forces under the influence of modern information technology is creating massive changes in the division of social labor. Specifically:

The division of labor, influenced by information technology, is shifting towards increased intellectual labor and reduced manual labor. A new form of labor—information labor—has emerged. This type of labor is directly related to information and processes such as information input, output, and processing. Workers in the information field are diverse and multi-disciplinary; they may include office staff, programmers, specialists, engineers, researchers, entrepreneurs, analysts, etc. Their tasks involve producing, processing, exchanging information, and providing the basis for decision-making. The requirements for information labor include not only mastery of operational skills but also the ability to adapt and innovate in response to continuous changes in work, aiming to achieve maximum efficiency. Thus, in the new economy, the division of labor no longer primarily depends on natural resources, vocational training, abundant labor, or large capital, but increasingly relies on labor with creative capabilities and knowledge application, with information labor being a direct producer of knowledge.

Accompanying the rise of information labor is a rapid transformation in the economic sector structure. The contraction of jobs in agriculture and industry, along with the expansion of new types of service sector jobs, inevitably leads to changes in labor structure. The number of workers in fields related to information and information processing is rapidly increasing, especially in software development, research and development, analysis, measurement, education and training, and numerous other sectors. The labor structure is shifting towards a growing number of intellectual workers. The role of production managers is becoming increasingly important, determining the success or failure of companies and economic organizations. Thus, while bringing significant benefits—such as driving economic growth, creating more material wealth, and generating new job opportunities—the new production system, with its stringent requirements for skills and labor capabilities, will also exclude individuals who do not meet these requirements.

It can be seen that the modern scientific and technological revolution, primarily driven by information technology, has contributed to changing the content and nature of labor. In terms of content, labor is shifting from manual and mechanical work to information and intellectual labor. In terms of nature, labor is evolving towards increased socialization. The socialization of labor is reflected in the direct production organization between production units on a large scale, with a division of labor that ensures both specialization and widespread de-specialization.

The transformation of labor content and nature under the influence of the information technology revolution raises the question of whether the essence of labor is changing. Historically, in production systems based on private ownership of the means of production, labor has been a coerced necessity, becoming what Marx referred to as "alienated labor." Today, with changes in labor content and nature, we might hope that labor is no longer a form of servitude but is gradually returning to its true essence as a need and a form of human free and creative activity. Information technology is laying the groundwork for changing the position and function of humans in the production process. With the advancement of information technology, many functions previously performed by humans in the production cycle are gradually being transferred to machines. This has allowed people to reduce the time spent on physical tasks and dedicate more time to intellectual, creative, and enjoyable activities. People are no longer bound to the production machinery as in the industrial economy; instead, they have more freedom in their activities. Information technology, along with other technologies of the scientific and technological revolution, is contributing to creating a unified "science - technology - production" system. Within this system, labor increasingly encompasses scientific, intellectual, and creative content.

However, it is important to note that this does not mean that technological advancements, including information technology, are the sole factors determining the change in the nature of labor. Marxism has pointed out that the essence of labor is creativity, but under private ownership of the means of production, this essential quality of labor has been alienated. Therefore, simply attributing labor's return to its original creative nature to advances in science, technology, and information technology is insufficient. In this regard, we should consider the viewpoint of technological determinism, which argues that technological development will dictate the entire development of other social life areas. In practice, this has not occurred as anticipated, as there are still conflicts of interest

between the wealthy and the poor, and between developed and developing countries.

The greatest contradiction in capitalist societies today, including highly developed capitalist countries like the United States that benefit from information technology, remains the conflict between the highly socialized nature of the productive forces and the private ownership of the means of production. Although capitalism has made certain adjustments in distribution and diversified forms of ownership due to the demands of production, the essence of capitalist private ownership has not changed. Despite some segments of the population experiencing upward mobility or improved living conditions, power still resides with major capitalists and groups capable of manipulating national economies, and even the global economy.

In the modern economy, the contradiction between the significantly advanced productive forces and capitalist production relations at the international level remains quite prevalent. Although the productive forces have made significant qualitative leaps, the production relations have not yet undergone corresponding changes that align with the development of the productive forces at both national and international levels. Although some leading capitalist powers have made adjustments in development policies, these are still only adaptations and remain localized. Overall, the system of private capitalist ownership of the means of production in these countries continues to be maintained, and this is the root of the severe contradictions within capitalist society. Furthermore, today, the dominance of capitalist private ownership is no longer confined to capitalist countries but has extended globally through multinational and transnational corporations. The holders of these corporations are major capitalist conglomerates from developed capitalist countries. They have the capability to harness and dominate the latest achievements in science and technology, especially in information technology. It can be firmly asserted that in the information age and today's knowledge economy, those who control information will prevail and maintain dominance. Developed capitalist countries are doing just that, and thus the contradictions between individuals in the information age cannot be eradicated. Therefore, it is illusory to believe that the development of modern science and technology can change the essence of capitalism. This is where in-depth research on the impact of modern technologies, including information technology, in relation to other social transformations is an urgent necessity, particularly on a philosophical level.

REFERENCES

[1]. http://en.wikipedia.org/wiki/category:Technology
[2]. Xem: Peter Drucker. *Xã hội hậu tư bản.* Viện Nghiên cứu Quản lý kinh tế Trung ương, Trung tâm thông tin tư liệu, Hà Nội, 1995.
[3]. C.Mác và Ph.Ăngghen. *Toàn tập*, t.46, ph.II. Nxb Chính trị Quốc gia, Hà Nội, 2000, tr.372.
[4]. Xem: Thomas L.Friedman. *Chiếc Lexus và cây Ôliu, Toàn cầu hoá là gì?*.Nxb Khoa học xã hội, Hà Nội, 2005, tr.27 - 28.
[5]. Trần Thanh Phương. *Tác động của cuộc cách mạng khoa học-công nghệ, thông tin đối với thế giới, khu vực và Việt Nam*. Thông tin khoa học xã hội. Chuyên đề: Sự đột phá của khoa học thông tin trước thế kỷ 21. Viện Thông tin khoa học xã hội, Hà Nội, 1998, tr.32 - 35.