

Karl Marx's Theory of the Productive Forces in the Present Fourth Industrial Revolution

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Abstract

The purpose of the article is to assert Marx's correctness in maintaining the role of the productive forces in the production process. The paper clarifies the concept of productive forces, describes the factors that make up productive forces, and looks at productive forces in social development. Nowadays, in the Fourth Industrial Revolution, Marx's arguments are still valid when explained from the perspective of the factors that make up the productive forces. The paper uses a method of justifying with clarifying the relationship of workers and the production process using a comprehensive and historical practice. In addition, the article also uses analytical and synthesis methods to re-systemize the concept of productive forces in this day and age. The study results show that the more science and technology develop, the higher the requirements for human qualifications, skills, capacity, and health. Labor still plays an essential role in the production process, whether it be performed by humans or artificial intelligence.

Keywords: *Productive forces, Karl Marx, historical materialism, socio-economic forms, material production activities*

Introduction

This paper examines Karl Marx's theory on labor forces in the digital era and aims to examine whether labor forces remain relevant in this age and how the ideology affects social capital in the ideology. Overall, this paper will discuss productive forces and the theories underlying them. To examine the concepts, a discussion section is provided focusing on Marx's arguments regarding productive forces, the relationship between labor and the production process, and the development of productive forces in the Fourth Industrial Revolution.

Social development is about material production to create more material wealth for society. The study of Marx's philosophy on historical materialism is the basis for research. Marx clarified the relationship between workers and the means of production. Engels evaluated this discovery of Marx, "discovering the law of development of human history" in the same way Darwin discovered the law of organic nature. Theoretically, Marx (1983) affirmed his completely materialistic conception. The movement and development of productive forces become the science and technology that will

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change people's lives. The productive forces in the Fourth Revolution are also the object of the paper's research. The article uses materialistic dialectic, comprehensive methodology, and historical methodology to clarify whether the research object is productive in the Second Industrial Revolution. In addition, the article also uses methods of observation, description, analysis, and synthesis to clarify the content that forms the factors that create the productive forces through human labor and the production process.

The scope of the study is to learn about productive forces from Marx's point of view, from the time of Marx to the present, that is, the material production process of capitalism from the second half of the 19th century to the present day, the early 21st century. The above factors still interact and directly affect the development of productive forces (Bapuji et al., 2020). By studying productive forces, those working in management and policy-making are the basis for making human development policies and the need for policies that promote science and technological development.

Productive Forces

Productive forces is a concept of historical materialism to clarify the role of the mode of production in determining the development of society in different epochs (Vareshchenko & Karpenko, 2021). Productive forces are mentioned in many aspects such as economics, politics, the philosophy of Plato or Adam Smith, and Marxist philosophers (Shuliakov, 2021; Stepnov et al., 2021). In the present day, which includes the Covid pandemic, the Fourth Industrial Revolution is enhanced by capitalist governments and companies and increased investment to replace workers. When machines can be replaced, workers lose their jobs. At this time, enterprises have the right to demand labor of knowledge such as creativity and high-level technical skills. As a result, workers always face the risk of unemployment, mental pressure at work, and increasingly poor material life due to high income tax. Especially during the Covid pandemic, capitalism revealed its essence. To ensure the stable economic growth of businesses, the state does not close production to protect workers from the epidemic; they do not care about the health and spiritual and material life of employees. This makes workers feel meaningless. They feel depressed, abandoned by the state and the companies for which they work. Therefore, the renewed study of historical materialism, in which productive forces affect humans in the digital age, is of interest.

Labor is part of the productive forces; employees are people with specific knowledge, experience, labor skills, and creative capacity in the production process. Labor is the subject in the production

process, for workers show creativity in production and consumption to create material wealth (Nureev & Orekhovsky, 2021). This is the basis for continuous production to meet human needs. At this time, material wealth exists as goods (Shatunova et al., 2019).

The production process is necessary for organizing production, including labor documents and labor objects (Stepnov et al., 2021). Labor documents are the material elements of production that people rely on to impact the labor object to transform the labor object into a product to meet the production needs of people. In labor documents, including labor tools and means of work, labor tools are material means that people directly use to impact the working group to transform them to create material wealth to serve the needs of people and society. Labor tools are “intermediate” material elements used to “transfer” between workers and objects of labor in the production process. The labor tools are the “organ” of knowledge in the human brain, the material production process. Therefore, labor tools play a decisive role in labor productivity and product quality (Benlagha & Hemrit, 2018; Miller, 2021).

In the development process, infrastructure (including roads, ports, electricity systems, telecommunications, etc.) is becoming increasingly important and plays a decisive role in the production process and production capacity of social production (Saenko et al., 2020). The subject of labor is the material element of production that human labor and labor documents impact to change the shape and physical properties of the employees.

Productive Forces in the Fourth Industrial Revolution

The development of society has changed much compared to Marx’s 19th century, and many argue that Marx’s conception of productive forces is no longer valid. With the analysis of the structure that formed the productive forces, however, the Fourth Industrial Revolution proved that Marx’s argument was correct in expressing labor with the production process.

Besides the factors of the employees, the production process expresses the subject of labor and labor documents. In the labor documents, labor tools with the means of work create material wealth. Labor documents complete to develop high labor productivity. The more human knowledge grows, the more modern labor tools people create. At all times, labor tools engaged in production are always the most critical factor of the labor tools.

The level of development of labor tools is a measure of the story of the natural conquest of people. It is a different manufacturing industry and penetrates the elements that make up the productive forces

that bring quality changes to the productive forces. Thus, science and technology developed to become the direct cause of many significant changes in production, and life has become natural for productive forces (Skryl & Gregorić, 2021).

From Marx's day to the current Fourth Industrial Revolution, productive forces research many different ways. The concept of the productive forces introduced to date remains intact. Therefore, this study refers to the productive forces during the Fourth Industrial Revolution as clarifying the movement and development of labor and production process from Marx's time to the present. Thereby, the article finds that the theoretical basis of the concept to be clarified in this article is the productive forces.

The Theoretical Basis of the Concept of Productive Forces

Productive forces is a concept (German *produktivkräfte*) central in Marxism and historical materialism. Marx first scientifically explained the idea in a 1845 work criticizing Friedrich List's national system of political economy. Marx argued that the force of production is a material activity, and Marx exposed List's mundane nature (Marx & Engels, 2010f). According to Marx, the productive forces exist objectively. People are not free to choose their productive forces "since every productive force is a force that achieves a product of a by-operation... not created by them, but by the previous generation... Each of the next generations has had productive forces erect previous generations and used by the new generation as raw materials for the new production" (Marx & Engels, 2010g).

Marx put forward the theory of productive forces, a view called historical materialism. Marx predicted that although capitalism had created enormous material wealth for society, internal crises would lead to self-destruction in the future, and capitalism would be replaced by a new system called socialism. Marx traced the history of many modes of production, in which the clarification of the productive forces was evident for that purpose. Based on the different modes of production, Marx made a judgment about the collapse of the industrial capitalist model of production and its replacement by communism.

The productive forces relationship between labor and nature reflects the ability of humans to conquer nature with absolute power. That power is generalized into productive forces. The level of productive forces manifests itself in the story of the conquest of humans; productive forces speak to the actual

capacity of people to produce material wealth for society to ensure human needs. Overall, those factors are productive forces.

The descriptive method indicates the factors that make up the production process, Marx states in his writings. People as workers are involved in the production process. Marx refers to the strength of the physical and intellectual, the factors that make up the ability of people to work: “To possess the real body of nature in a form useful to one’s own life, man uses the natural forces that belong to their bodies: hands, feet, head, and hands” (Marx & Engels, 2010a). However, if it stops there, the material production process is not yet possible. In addition to the working subject himself, humans use other factors such as “the mechanical, physical, chemical properties of objects, depending on their purpose, using those objects as tools to act on other objects” (Marx & Engels, 2010g). These things, called “organs,” give workers the ability to extend their hands and impact the natural world more effectively. If the production process is necessary for the material production process, the employees are the subject, playing a role in deciding production development (Olefirenko & Galuschenko, 2018).

Thus, according to Marx, without humans who know how to manufacture and use labor tools to impact the natural world, there will be no material production process (McNeill, 2021). Marx believed that natural production is the prediction for every production process. He wrote:

Without mentioning the more or less developed edging of social production, labor productivity associated with natural conditions ... Economically, the natural conditions outside are divided into two major categories: the natural abundance of resources used as living materials, that is, the fertile nature of the land, the very fishy currents, etc., and the natural plenty of resources used as Labor documents such as fast-flowing waterfalls, rivers that boats can walk, wood, metal, coal, etc. At the beginning of civilization, the first type of resource was decisive; at a higher stage of development, the second type of natural resources was powerful. (Marx & Engels, 2010b)

However, Marx emphasized that natural production does not play a decisive role in progressive development (development by increasing social productivity); on the contrary, “Too generous nature will lead people away like walking a toddler. It does not make human development natural, inevitable” (Marx & Engels, 2010b).

Productive forces have labor (an important factor) and a production process. The production process has labor documents (labor tools and means of work) and the subject of labor. Even science and

technology are the core elements of the productive forces. Still, science itself cannot cause any positive or negative impact on the world, but it will affect human practice. The development level of the productive forces of a people is most evident at the development level of the labor division. The productive forces play a functional role in creating material wealth and are the motivation of social development.

Discussion

Marx's Arguments Regarding Productive Forces

The point of this paper is to clarify Marx's arguments in the process of his implementation of research on socio-history, the production process of human reality, and social development to this day. Marx said that humans themselves began to be distinguished from animals when humans produced living materials for their essential needs. "One must be able to live before he can 'make history,'" he wrote, but to live, we first need food, water, shelter, clothing, etc. The first prerequisite for human existence is the production of materials to satisfy essential needs (Marx & Engels, 2010f). Marx wrote, "The production of materials for the direct and political material activity of a certain stage of economic development of a people or an era creates a basis from which people develop state institutions, legal views, art and even religious notions of people"(Marx & Engels, 2010e). That has affirmed the radicality of Marx's materialist conception.

According to Marx, material production is a typical human activity. It is an essential activity that determines the existence and development of humans and human society. In the process of material production, humans simultaneously have two relationships: with nature and with each other. The human side associated with nature is the manifestation of the productive forces; however, not all human relationships with nature create productive forces (such as emotional, aesthetic, and perception relationships). Only relationships in which people and nature make up material wealth that serves their needs while helping them transform themselves are relationships that create productive forces.

Marx said that the productive forces show people's practical capacity to change the natural world. When conducting material production, people use labor tools to impact the natural world to create material wealth to serve their essential needs. In the same process, humans grasp the laws of nature, turning the natural world from unspoiled and pure to a "second world" with the participation of

human hands and minds. Material production changes, so the productive forces is a dynamic factor and a process that innovates and develops.

The productive forces create a material basis for the existence and development of human society. It is also the essential criterion for evaluating social progress in each certain historical period. Marx and Engels' critique of political economy refers to the combination of work (tools, machines, land, infrastructure, etc.) with human labor. Marx and Engels probably came up with this concept from Adam Smith's reference to "the productive power of Labor" (e.g., chapter 8 of *The Wealth of Nations*, 1776) (Samuels, 1977), although the German political economist Friedrich List also mentioned "power productivity" in *The National System of Political Economy* (1841).

Therefore, in his work "German Ideology", Marx affirmed, "History is just a continuation of the individual generations in which each generation exploits the materials, capitalism, productive forces left by all previous generations; therefore, each generation, on the one hand, continues the activity passed down, under circumstances that have completely changed, and on the other hand, transforms the old circumstances with a completely changed activity" (Marx & Engels, 2010f).

The productive forces applying humans to the production process (body and brain, tools and techniques, materials, resources, the quality of cooperation of workers and equipment) are included in this concept, including technically indispensable management and technical functions for production (in contrast to social control functions). Human knowledge can also be a motivation for production.

Along with production's social and technical relations, the productive forces form a historically specific production method. At each stage of human history, production is conducted in a certain way, a way of life, its way of production, and its method. The method of production is how humans conduct material production at specific historical periods of human society. The mode of production is the unity between the productive forces with a certain level and the corresponding production relationship.

The level of productive forces manifests itself in the story of the natural conquest of humans; the productive forces speak to the actual capacity of people to produce material wealth for society to ensure human needs. To conduct production, humans must use particular materials and technical elements. These factors are the productive forces, including the labor force, which involves three factors: fitness, mental strength, and labor skills.

Labor includes direct workers and indirect workers and managers; along with the development of science and technology, the proportion of indirect workers increases and requires more highly presented workers. High-quality workers do not have to participate in the production line but become the operator and inspect the production line.

The production process is the physical element of the output that people rely on to influence labor. Labor power is the material factor of labor production. In labor documents, production tools are the decisive factor, and a part is a transporter, the general production conditions, called infrastructure (such as roads, ports, electricity systems, telecommunications, etc.). In the development process, the infrastructure system is becoming increasingly important and plays a decisive role in the production process and production capacity of social production. Science and technology in the production material finished with extensive development is the role that determines the development of the productive forces in the current period.

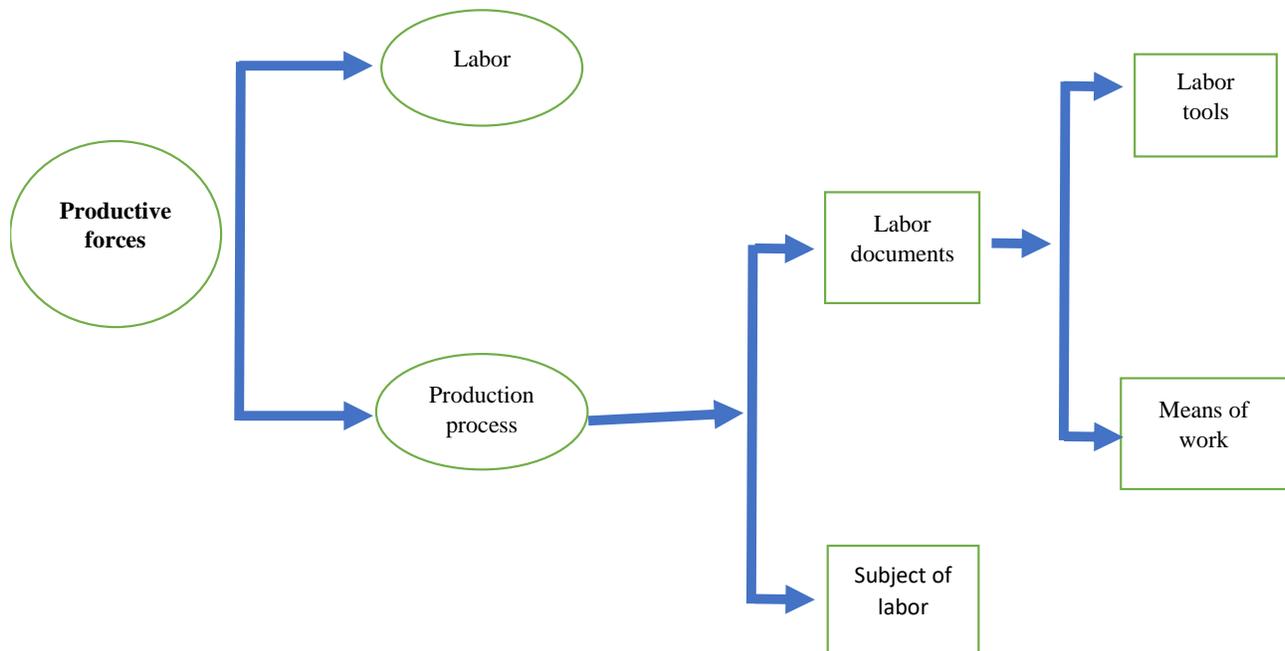


Figure 1: Diagram of productive forces

The Concept of Productive Forces

Marx explained that the productive forces begin with the premises of material production that require factors belonging to the employees (capacity, skills, knowledge, etc.), along with inevitable production processes: the subjects of labor and labor documents (labor tools, means of work) in the production process. All these factors form the productive forces of the production process. Thus, the amount of production is the synthesis of materials and spiritual aspects that create the practical power of changing nature according to human survival and development needs. Marx used various classifications. In the first division, Marx said, the abstract labor process does not depend on different historical forms. It does not put people to work in society but places people with nature, from the point of view of a simple labor process (Marx & Engels, 2010g). In his second division, Marx said, “people, with their productive forces personality, not only created material wealth but together with natural production became the revolutionary force that promoted the development of society” (Marx & Engels, 2010f).

The factors that make up the productive forces, each of which Marx analyzed, explains its role. Labor, represented by human beings with sure knowledge, experience, skills, and creativity in the production process, creates a considerable amount of social material wealth. Labor is the employee who implements their labor process. Based on Hegel’s point of view, Marx explains, labor is at the heart of self-determination, and laborers must feel happy with their activity when creating products as fruit in conquering the natural world (Bashir et al., 2021). Labor is an activity that makes products for satisfying the material and spiritual needs of people; however, as the privately owned system of manufacturing materials, capitalism deprived it of the value of labor as it was, instead approaching labor as a job, manipulation that workers take to repay the capitalist debt to meet their current needs. The worker who makes the product does not have to satisfy his purpose, and his labor product does not belong to him. Instead, these products are confiscated and sold for profit (Hanon, 2021).

Furthermore, Marx said, humans are “tool-making animals.” Therefore, in addition to using the labor tools available in nature, man also makes a “naturally supplied” object that is improved through many production processes to become a product that meets human needs. Therefore, the strength, knowledge, and level of people assert higher and higher.

Marx discussed the results of the immediate production process. The production process involves human-purpose manufacturing processes for creating material products. The production process used for human activities using labor documents directly impacts the subject of labor to create social

material wealth. To satisfy the basic needs of humans, people need labor documents production and subject labor in productive processes. So the development of the productive forces transforms the product in the life and determines the evolution of society from low to high (Lafrance, 2021).

Thereby withdrawing, the productive forces become meaningful and essential through workers' relationship with the production process. It demonstrates Labor's practical ability to renovate the natural world. Labor uses labor tools to impact the natural world and create material wealth that serves its essential needs. In the same process, men grasp the laws of nature and transform nature into a "second world" with the participation of their hands and minds. Material production is constantly changing, so the productive forces are a dynamic factor and a continuous innovation and development process. It is also the essential criterion for evaluating the progress of society in a specific historical period. Therefore in the work "German Ideology," Marx affirmed: "History is nothing but the success of different generations, each generation exploiting material, Capital, Productive forces passed on to it by previous generations. Therefore, on the one hand, continues to operate traditionally in completely changing circumstances, on the other hand, modifying the old circumstances with a completely changed activity" (Marx & Engels, 2010f).

The production process shows its existence through two factors: labor documents and the subject of labor. The subject of labor is a concept in Marx's political economy that addresses everything that people apply to labor (O'Regan, 2021). The subjects of labor may be materials directly supplied by nature, such as wood or coal or materials that Labor has renovated. In the second case, the object of labor (for example, fibers in a textile plant or semiconductor chips in a computer assembly plant) is called raw materials (Marx & Engels, 1845). A subject of labor is sometimes called an object of labor.

Subjects of labor are material forms capable of being created into items according to the purpose, requirements to meet particular human needs, and only when affected by humans will it become the object of labor. Marx said that "While all raw materials are subject to Labor, is that all employees are raw materials. The subjects of Labor are understood only as raw materials if they went through the Labor process" (Marx & Engels, 2010c).

Labor documents are the material element of production that people rely on to impact the labor object to transform the hybrid into a product that meets the needs of the human output. Labor documents are things that don't directly produce products but have a significant impact on production. Labor documents affect the efficiency of the social output. These factors contribute to

increasing or reducing transaction costs and the cost of transporting supplies, preserving products also taken from the product's value. Labor documentation is an essential component of labor tools (for example, tools, equipment, and machines). Labor documents include labor tools and means of work. Means of work are material production factors and labor tools that people use to impact workers in material production.

The Relationship Between Labor and the Production Process

The research process found that Marx made his arguments about the productive forces with the workers and production process being two constituent factors. However, the paper found the most harmonious and justified relationship between workers and the production process during the study. Thereby, the role of knowledge of workers and the development of science and technology contributing to the production process has created a unified whole of productive forces in creating material wealth in society.

To Marx, the relationship between labor and production process shows that people want to renovate the natural world to create material wealth and have synthetic strength. First of all, it is fitness and mind, the factors that make up the ability of men to work. "To possess natural things in a form useful for his life, man uses the forces of nature in himself: hands and feet, head and hands" (Marx & Engels, 2010g). However, if it stops there, it is impossible to take place in the production process. In addition to themselves, humans use other factors, such as "using the mechanical, physical and chemical properties of objects to act on other objects according to their purposes" (Marx & Engels, 2010g). These objects are called "tools" by Marx to help workers reach out, making the process of impacting nature more effective. If production material is a necessary condition for material production, the employee is the subject that plays a decisive role in the development of production. According to Marx, without humans making and using labor tools to impact the natural world, there would be no production of material wealth.

The amount of production changes the production of society through relationships with workers and the production process. Labor has a vital role to play in contributing to the production process through their productivity. According to Marx, production capacity is the production capacity of specific production. It reflects the results of the purposeful labor of people in a sure unit of time. Therefore, according to Marx, "In the form of social production, the production capacity of Labor depends on the natural conditions in which Labor carry out ... External natural conditions, from an

economic point of view, is divided into two large classes: natural wealth for self-signing - that is, fertile land, water has many fish, etc.; and natural wealth in Labor tools, such as waterfalls, rivers, wood, metal, coal, etc. At the beginning of civilization, it was the first class of decisive significance; later, it was the second class in a more advanced society” (Marx & Engels, 2010g).

The production force that represents the role of Labor concerning the production process has created a huge amount of material wealth thanks to Labor’s productivity. In particular, the role of science and technology participates in the production process. Marx said, “The development of capital is a symbol of the extent. General social knowledge transforms into an immediate force of production, so it is also an expression of the degree to which the conditions of the process can take place subject to the control of popular intelligence and adapted to that process. Still, the productive force is not to create as knowledge. Still, it is also the direct social practical organ of the process. real-life process” (Marx & Engels, 2010d). Knowledge is constantly evolving and becomes a direct productive force. Join a certain profession, and for that profession, the application of science to production immediately becomes one of the decisive and simulated factors (Marx & Engels, 2010d). Thus, productive processes are people’s practical ability to influence nature to create material wealth.

In social material life, productive processes together with relations of production constitute the mode of production. Therefore, productive processes make materials to satisfy the needs of human existence and development. The productive forces are a factor of creativity that is historical. The development level of the productive forces reflects the level of the conquest of the natural world of humans. The manual level of the productive forces reflects a much lower level of biological conquest than the productive forces at the level of industrial engineering and high technology.

The Productive Forces Manifest in the Fourth Industrial Revolution

Today, science and technology have made significant progress, contributing to creating productive forces that humanity has never seen. Social knowledge, in general, is becoming an instant productive force, as Marx predicted, and as a result, productivity increases rapidly. Productivity is measured by the number of products generated in a unit of time or by the amount of time spent producing a product unit. Through it, productivity reflects the effectiveness of the use of labor. In essence, it measures the value of output generated by an employee over a certain time, or the amount of time it takes to produce a unit of production. Thus, productivity reflects the relationship between the production (product) and input (labor) measured by labor time.

The Fourth Industrial Revolution currently characterizes the combined use of hardware, robots, and information technology software, a combination of advanced technologies such as the Internet of Things (IoT), artificial intelligence (A.I.), virtual reality (V.R.), augmented reality (A.R.), social networks, cloud computing, big data analytics, etc. The entire real world to the digital world is very fast and large, integrating many fields with multi-dimensional interaction (Kien, 2020).

Marx developed his doctrine during the Second Industrial Revolution. (The first revolution marked the advent of steam engines, and the second of electricity.) Today, productive forces have far exceeded those in Marx's time. Meanwhile, humanity is nearing the end of the Third Industrial Revolution with digital tools (computers) and is entering the Fourth Revolution to open the era of artificial intelligence.

Modern science and technological achievements have directly impacted all factors that constitute the productive forces: production process and labor objects. In particular, during the Fourth Industrial Revolution, workers mainly used the production process as natural resources and machinery to create products (Xie & Chen, 2021). The Fourth Industrial Revolution is changing the mode of production and manufacturing, strongly impacting all elements of the productive forces. Therefore, Marx's socio-economic doctrine in general and the view of the productive forces need to be refreshed to be socially aware.

Labor, the Fourth Industrial Revolution, machinery, robots, artificial intelligence, and the application of information technology creates through the replacement of labor capacity with some industries and professions that are rapidly penetrating the workplace in the labor market. The employment trend will shift from manual labor production to manufacturing in a fast automation process of output. The Fourth Industrial Revolution also changed the function of humans in production: Humans gradually no longer directly operated technical systems but moved to primarily create and regulate that process. So, the working class includes purely foot-and-limb workers and mental workers with scientific and technical qualifications. Employees' skills, experience, and creative capacity are now much higher (Panić et al., 2021).

Labor in the feudal society made great progress. That progress is due to the requirements of the revolution forcing them to develop their own knowledge to meet the requirements of science and technology. Specifically, during the period of the First Revolution (in the late 18th to early 19th centuries), the simple, small-scale economy based on manual labor was replaced by industry and large-scale machinery manufacturing. During the Second Industrial Revolution at the end of the 19th

century, economic and technical advances were made possible by developing the telegraph, telephone, railway, and the application of the production line of goods; the Second Industrial Revolution is mainly about internal combustion engines and electric machines. The Third Industrial Revolution in the latter half of the 20th century saw advances in electronic infrastructure, computers and digital technology based on the development of semiconductors and supercomputers, personal computers, and the internet. This process is basically complete thanks to high-tech scientific achievements. The Fourth Industrial Revolution began at the beginning of the 21st century (around 2016) with the innovations of the digital revolution, new technologies such as 3D printing, robotics, artificial intelligence, the Internet of Things, SMAC, nanotechnology, etc. The revolutions show that machines have changed the way people work. At the first revolution, the skilled craftsmen of earlier days were pleased to see a product from start to finish. When they see a knife, barrel, shirt, or skirt, they feel like they've done their job. But when the second and third scientific and technological revolutions developed, machines were programmed to break down the production process into several stages and let workers work with a small operation, repeating the same job over and over again, making working speeds faster. The key to these changes was that plant managers enforced industrial discipline, forcing workers to work regular, often long, hours.

With advances in science and technology, this Fourth Industrial Revolution will change the nature of businesses along with the changing needs of workers' skills. Information technology and automation can change the way work is done by augmenting or replacing workers in specific tasks. That could alter demand for certain types of human labor, eliminating some jobs and creating new ones. At the same time, the need for enhanced cognitive skills, social behavior skills, and skill combinations related to greater adaptability is emerging.

The return of the productive forces puts demands on labor. The educated workforce tends to increase in quantity and quality, which has gradually changed the balance of standard and higher-level workers. Labor must meet the technical skills requirements (medium and high) including in-depth knowledge and skills to perform specific jobs, and at the same time it requires core soft skills including creative thinking ability and initiative in work, computer and internet skills, foreign language skills, teamwork skills, occupational discipline, safety and compliance skills, problem-solving skills, time management skills, focused skills, etc. Digital technology integrates all information related to technology, processes, production methods, the needs of industries, professions, skills, etc., and especially the ability to connect and share information worldwide

through technological devices. That will change the supply and demand structure in the labor market, abolishing complex boundaries between countries in the region and promoting creative employment for each member state. Improving the qualifications of human resources by applying automation to production will create opportunities to transfer workers to different dynamic positions and train them to adapt more quickly to technology. Instead of manually doing their job, workers will now have their machine control skills enhanced to do those jobs for them (Rytikova & Medvedev, 2021).

However, Labor shows its relationship to production when the worker exercises control with their voice. Labor can buy stocks and shares, but it is not the owner of the means of production. Labor doesn't have power in the enterprise; therefore, Labor is not a production relation (Wijaya et al., 2021).

Thus, the current conception of workers is no different from Marx's point of view when referring to workers in terms of qualifications, knowledge, skills, abilities, and experience. However, these requirements are at a higher level, more specialized, and technologically modern. And the labor of workers is not focused on labor but knowledge, especially scientific knowledge.

During the Fourth Industrial Revolution, the object of labor, the concentration of resources, fuels, and raw materials, is not only identified as what is available in nature but shows increasing diversity, including many with an increasingly high content of knowledge. New materials are born, be it intelligent materials, self-repair, or self-cleaning; metals can recover original shapes; ceramics and crystals can turn pressure into energy. In digitalization, a prominent feature of digital technology is introducing the Internet of Things. It refers to connecting things and people through connected technologies on different platforms (iPhone, 3G, 4G, 5G). When the digital internet was born, it could be nG. Therefore, human material production may be tangible that may be invisible. However, according to Marx, it retains its purpose, which is suitable for human use (Kalitanyi & Goldman, 2021).

Labor documents, including labor tools and means of work, shows in the Fourth Industrial Revolution: Labor tools are automation in production with workers using advanced technology in the production process to transfer a large part or all of the human-made output to machinery and equipment. Automated processes will not need too much human intervention but will use different control systems to help machines operate faster and more accurately; there are even some fully automated processes. Automation in manufacturing will become a thriving sector shaped by the Internet of Things, big data, and analytics services related to far-reaching digital changes in

manufacturing. As a result, machines operate continuously without resting in the middle of shifts like workers. Labor productivity is pushed to the maximum by the labor force of devices. Social relations also do not need to be established. Thus, the labor tool is still the same as Marx offers, which is a material means for people to directly influence labor to create material wealth to serve human needs. Means of work, including supply chains, logistics, Data Management System (EDMS), artificial intelligence, along with labor tools, directly participates in the process of impacting labor objects acting to produce material wealth (Nielsen et al., 2021).

The article's research object is that the productive force and its development should mainly put a person in a relationship with nature without clarifying conditions in the production relationship. Therefore, it is not possible to explain labor productivity or describe production methods. Moreover, the article does not place the productive forces and historical context of humankind to analyze the profound changes of historical circumstances that change the productive forces.

Conclusion

Today, science has become a direct cause of many significant productions and changes in human life. Science and technology are penetrating profoundly into the elements of the productive forces, leading to a change in the quantity and quality of productive troops during the Fourth Industrial Revolution today. Today's productive forces have many new characteristics far beyond those of Marx's era. In particular, the various industrial revolutions have pushed science and technology to new productive forces, with high levels of workers and modern production process.

Thus, we cannot deny the enormous role of the productive forces in conquering the natural world of humankind. At the same time, the development of productive troops led to globalization and was the driving force for the development of the Fourth Industrial Revolution. That development is the basis for affirming Marxism's accurate and sustainable values of productive forces; at the same time, new requirements are to increase the vitality of that doctrine to suit the conditions and circumstances of the current period. However, the productive forces were no different in nature or structure than those that formed the productive forces that Marx had given. And just as Marx said, other economic times are not about what they produce but how they grow and with what labor tools. That is why, even today, one still wants to learn about the theory of Marx.

However, because the article focuses only on the study of productive forces and elements of productive forces, it observed, described, and analyzed the relationship of the productive troops with

the production relationship. However, it is not possible to see the self-determination of employees in the reality of their capacity in the production process. That is also the limitation of the article when it is not clear how production methods affect the development of society. It is impossible to show the nature of what the production process is for and for whom.

The article proposes that it is necessary to improve Labor's qualifications, skills, knowledge, culture, and ethics, science and technology into production. To do so, Labor has enough material and spiritual conditions in life. Only then will Labor be happy in labor, work with passion, and master the production process.

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