

Exploring the Connotation and Development Path of New Quality Productive Forces: A Perspective based on Marx's Elements of Productive Forces

Liangyong Wang^{1, *}, Shenling Wang²

¹ School of Marxism, Anhui University of Finance and Economics, Bengbu, Anhui, China

² School of Statistics and Applied Mathematics, Anhui University of Finance and Economics, Bengbu, Anhui, China

* Corresponding author: 1624379672@qq.com

Abstract: This paper explores the connotation, opportunities and challenges, and development path of new quality productive forces from the perspective of Marx's elements of productive forces. New quality productive forces represent a leap and upgrade of productive forces in the new era, and their connotation can be explained from three dimensions: the laborer, the object of labor, and the means of production, with new characteristics emerging. High-quality and innovative talents have become the core driving force, with laborers needing to possess innovative thinking, digital skills, and high efficiency; data, information, and knowledge have become important resources; and new-generation information technologies have become the key support, promoting the intelligent, digital, and networked transformation of production tools and methods. These three elements are interdependent and mutually reinforcing, jointly driving the improvement of productive forces and providing strong impetus for high-quality economic development. In developing new quality productive forces, China faces both significant opportunities, such as breakthroughs in core technologies, rapid development of the digital economy, and accelerated construction of new infrastructure, and challenges, including "bottlenecks" in core technologies, regional digital divides, and institutional and systemic barriers. Based on this, this paper proposes to use talent as the engine, technology as the support, institutions as the safeguard, and industry as the carrier, and to promote China's economy to a new stage of higher quality, more efficient, and more sustainable development through comprehensive collaborative innovation, in line with Marx's theory of productive forces.

Keywords: New Quality Productive Forces, Marx's Theory of Productive Forces, Development Path, Opportunities and Challenges.

1. Introduction

General Secretary Xi Jinping pointed out that "to develop new productive forces, we must further deepen the reform in an all-round way and form a new type of production relationship that suits it"[1]. This important exposition points out the direction for the development of China's productivity in the new era, and also provides an important basis for the innovative development of Marxist Productivity Theory. At present, the global scientific and technological revolution and industrial transformation are accelerating, with a new round of technological and industrial revolutions deeply evolving. These changes are reshaping the global innovation landscape and reconfiguring the global economic structure. New-generation information technologies, represented by artificial intelligence, big data, cloud computing, and blockchain, are developing rapidly. They are profoundly altering human modes of production and lifestyle and driving a qualitative leap in productive forces. New quality productive forces, as an advanced form of contemporary productive forces catalyzed by revolutionary technological breakthroughs, innovative allocation of production factors, and in-depth industrial transformation and upgrading, have become a key force in promoting high-quality economic development. However, confronted with new situations and tasks, China still faces several challenges in developing new quality productive forces. These include dependence on others for core technologies, the need to enhance technological innovation capabilities, the arduous task of industrial structure adjustment, significant pressure on traditional

industry transformation and upgrading, insufficient supply of high-quality talents, prominent structural contradictions in talent supply, and the existence of institutional and systemic barriers that urgently need to be removed to promote the development of new quality productive forces.

Against this backdrop, how can we accurately understand the connotation of new quality productive forces? How can we develop new quality productive forces in line with China's actual conditions? These questions urgently require in-depth research and answers. Guided by Marx's theory of productive forces and combined with China's actual situation, this study thoroughly analyzes the connotation of new quality productive forces, combs through the opportunities and challenges faced in their development, and explores development pathways. It aims to provide theoretical support for understanding and grasping new quality productive forces and to offer path references for their development. This study mainly employs literature research and theoretical analysis methods. By sorting through relevant literature, it clarifies the conceptual connotation, characteristic manifestations, and development trends of new quality productive forces. Using Marx's theory of productive forces, it analyzes the constituent elements of new quality productive forces and their interrelationships. Combined with China's actual situation, it explores path choices and policy recommendations for developing new quality productive forces.

2. The Connotation of New Quality Productive Forces

In his works such as *Das Kapital*, Marx systematically

elaborated on the elements of productive forces and their interrelationships[2], providing a scientific theoretical framework for understanding the nature and development laws of productive forces. Marx posited that productive forces are the objective material power through which people utilize and transform nature in the process of labor to meet human needs. These forces are primarily composed of three elements: the laborer, the object of labor, and the means of production.[1]. Firstly, the laborer is the most active and revolutionary element in the productive forces and the principal agent of production. Through their physical and intellectual capacities, laborers utilize tools to work on the objects of labor, creating material wealth that satisfies human needs. Marx emphasized that the quality, skills, and enthusiasm of laborers directly influence the level of development of productive forces. Secondly, the object of labor encompasses all items processed by laborers during production, including naturally occurring objects and raw materials processed by humans. The variety, quantity, and quality of the objects of labor directly affect production efficiency and product quality. Thirdly, the means of production are all material conditions used by laborers to influence and transform the objects of labor, including tools and auxiliary materials. Production tools, which laborers use to directly work on the objects of labor, are significant indicators of the level of productive forces. Auxiliary materials refer to all material conditions other than tools, such as land, workshops, and roads. Marx's theory on the elements of productive forces and their interrelationships provides scientific guidance for understanding the connotation of new quality productive forces. New quality productive forces represent a leap and upgrade of productive forces in the new era, and their connotation can be explained from three dimensions: the laborer, the object of labor, and the means of production.

2.1. The Laborer Dimension: High-Quality and Innovative Talents as the Core Driving Force

Firstly, new quality productive forces impose higher demands on the quality of laborers, emphasizing the comprehensive enhancement of laborer quality. Laborers are required to possess innovative thinking, digital skills, and high efficiency. In the era of new quality productive forces, where technological updates and market demands change rapidly, laborers need to have innovative thinking to break through traditional mindsets, propose new ideas and solutions, and address new problems. Meanwhile, as digitalization, networking, and intelligence are significant characteristics of new quality productive forces, laborers must master digital skills to proficiently use digital tools and platforms for data analysis, information processing, and knowledge sharing. Additionally, new quality productive forces pursue low input and high output, demanding that laborers have high efficiency to optimize workflows, enhance work quality, and create more value within a unit of time.

Secondly, unlike traditional laborers who primarily rely on physical strength and simple skills for production, laborers in the context of new quality productive forces need to have higher levels of knowledge, technical ability, and innovation capacity to adapt to the rapidly changing technological environment and market demands. In the era of new quality productive forces, the pace of knowledge renewal accelerates, and laborers need to continuously acquire new knowledge and

skills to keep pace with the times. Moreover, supported by new-generation information technologies, new quality productive forces require laborers to have strong technical capabilities to operate and maintain advanced production equipment and solve technical problems encountered in production. Most importantly, new quality productive forces emphasize innovation-driven development, and laborers need to have the ability to apply new technologies and concepts to production practices, develop new products and services, and explore new markets. Thirdly, high-quality and innovative talents are the core driving force of new quality productive forces. They are capable of keenly perceiving the development trends of new technologies and tools and creatively applying them to production practices, thereby enhancing production efficiency and reducing production costs. At the same time, they can develop new products and services that meet user needs based on market demands, explore new market spaces, and create new economic growth points. The innovative activities of high-quality and innovative talents can drive the continuous improvement of productive forces and promote high-quality economic development.

2.2. The Object of Labor Dimension: Data, Information, and Knowledge as Important Resources

Firstly, new quality productive forces break through the limitations of the material form of traditional objects of labor, incorporating new types of elements such as data, information, and knowledge into the scope of objects of labor[3]. Traditional objects of labor mainly refer to naturally occurring objects and raw materials processed by humans, which have material forms and physical attributes. However, in the era of new quality productive forces, new types of elements such as data, information, and knowledge have become important objects of labor. Although these elements have intangible and virtual attributes, they can create value just like material objects. Incorporating these new elements into the scope of objects of labor not only expands the connotation and extension of productive forces but also injects new vitality into economic development, driving productive forces to a higher level. Secondly, data, as an important element of new quality productive forces, is referred to as the "oil of the new era." By collecting, analyzing, and applying data, it is possible to achieve precise production, personalized customization, and intelligent decision-making, thereby optimizing production processes and improving production efficiency. Moreover, data can give rise to new business models and forms, such as big data analytics and artificial intelligence applications, creating new value growth points for economic development. The widespread application of data not only enhances the efficiency of traditional industries but also drives the rapid development of emerging industries, becoming one of the core driving forces of new quality productive forces. Thirdly, information and knowledge are also important resources of new quality productive forces and are key factors in driving technological progress and industrial upgrading. The rapid dissemination of information breaks through the limitations of time and space, promoting the sharing and application of knowledge and accelerating the diffusion and innovation of technology. The sharing and application of knowledge further promote cooperation among industry, academia, and research, facilitating the transformation of scientific and technological

achievements, enhancing the technological level of industries, and providing important support for high-quality economic development. Through the flow and integration of information and knowledge, new quality productive forces can play a role in a wider range of fields, driving the optimization of economic structure and industrial upgrading.

2.3. The Means of Production Dimension: New-Generation Information Technology as the Key Support

Firstly, new quality productive forces are supported by new-generation information technology, which drives the intelligent, digital, and networked transformation of production tools and methods[4]. New-generation information technologies such as artificial intelligence (AI), big data, and cloud computing are profoundly transforming traditional modes of production and business models, giving rise to new industrial forms and economic growth points. These technologies are not only important indicators of new quality productive forces but also key drivers of productivity development. The application of AI endows production tools with the ability to learn and make decisions autonomously, achieving intelligent production processes. Big data and cloud computing technologies digitize production processes, significantly enhancing production efficiency and product quality. Meanwhile, the Internet of Things (IoT) and 5G technologies enable interconnected production equipment and systems, creating highly coordinated production networks. Secondly, new-generation information technologies are reshaping traditional industries and driving production methods towards flexibility, personalization, and servitization. They have also given birth to new business models, such as the platform economy and the sharing economy, injecting new vitality into economic development. Moreover, these technologies have given rise to new industrial forms, such as the AI, big data, and cloud computing industries. These emerging industries have become new engines of economic growth, providing important support for the optimization of economic structure and industrial upgrading. Thirdly, the deep integration of new-generation information technologies with traditional industries will further promote the transformation and upgrading of traditional industries, enhancing industrial efficiency and competitiveness. By empowering traditional industries, these technologies drive them towards high-end, intelligent, and green development, improving production efficiency, product quality, and service levels, and strengthening market competitiveness. This integration also promotes the coordinated development of traditional and emerging industries, contributing to the construction of a modern industrial system and the realization of high-quality economic development.

2.4. The Dialectical Unity of the Three Major Elements of New Quality Productive Forces

Marx believed that there exists a dialectical unity among the three major elements of productive forces. The laborer is the dominant factor: The laborer is the principal agent of production, the creator and user of production tools, and the processor and transformer of the object of labor. The quality, skills, and enthusiasm of the laborer determine the efficiency of the use of production tools and the degree of utilization of

the object of labor. The object of labor is the material basis: The object of labor serves as the material foundation of production activities and is the object upon which the laborer exerts influence. The variety, quantity, and quality of the object of labor restrict the scale and efficiency of production activities. The means of production are an important condition: The means of production are an essential condition for the laborer to engage in production activities and act as the intermediary between the laborer and the object of labor. The level of production tools directly reflects the level of development of productive forces.

In the development of new quality productive forces, the dialectical unity among the three major elements—laborer, object of labor, and means of production—continues to play a crucial role, exhibiting new characteristics. Firstly, high-quality and innovative laborers, as the core driving force of new quality productive forces, can creatively apply new-generation information technologies to promote the intelligent, digital, and networked transformation of production tools and methods. Secondly, new types of objects of labor, such as data, information, and knowledge, have become important resources, providing laborers with a broader scope of action while also imposing higher demands on their skills and quality. Thirdly, new-generation information technologies, as new means of production, not only enhance the efficiency of traditional production tools but also give rise to new tools and materials, further driving the development of productive forces. Fourthly, in the development of new quality productive forces, the synergistic interaction among laborers, objects of labor, and means of production is particularly important. High-quality laborers, equipped with innovative thinking and digital skills, can better utilize new types of objects of labor, such as data and information, to drive the intelligent transformation of production tools and the digitalization of production methods. Meanwhile, the widespread application of new-generation information technologies provides laborers with more efficient tools and richer objects of labor, further stimulating their creativity and enthusiasm. This virtuous cycle not only propels the leap in productive forces but also lays a solid foundation for the sustainable development of the economy and society. The three elements are interdependent and mutually reinforcing, forming an organic whole of new quality productive forces, driving the continuous improvement of productive forces and providing strong impetus for high-quality economic development.

In summary, Marx's theory of productive forces is instructive for the study of new quality productive forces, providing a scientific theoretical framework for analyzing their connotation, characteristics, and development laws. Marx's emphasis on the laborer as the most active and revolutionary element in productive forces suggests that in the development of new quality productive forces, we should place great importance on talent cultivation and motivation, and inspire the creativity and enthusiasm of laborers. Marx's discussion on the dialectical relationship among the elements of productive forces provides theoretical guidance for understanding the interplay and coordinated development of these elements in new quality productive forces.

3. Exploring the Pathways for Developing New Quality Productive Forces in China

3.1. Opportunities for Developing New Quality Productive Forces in China

In recent years, China's scientific and technological capabilities have been significantly enhanced, the scale of the digital economy has continued to expand, and the construction of new types of infrastructure has been accelerated. These developments have created a foundation of technological accumulation, market space, and hardware support for the cultivation of new quality productive forces.

From the perspective of technological innovation and breakthroughs, China has made significant progress in several frontier technology fields. For example, in the fields of artificial intelligence, quantum computing, and 5G communications, China has not only achieved technological breakthroughs but also secured an important position on the global stage. The development of these technologies provides robust technological support for the formation and development of new quality productive forces. The rapid development of the digital economy offers vast space for the cultivation of new quality productive forces, with the deep integration of digital technology and the real economy giving rise to new business forms and models. The accelerated construction of new types of infrastructure provides a solid hardware foundation for the development of new quality productive forces. The continuous improvement of information infrastructure, represented by 5G base stations, industrial internet, and big data centers, offers strong support for the application of technology and industrial upgrading.

Moreover, the strong policy support from the Chinese government has created a favorable policy environment for the development of new quality productive forces. For example, the revised "National Natural Science Fund Regulations" clearly stipulate that special application and review regulations can be formulated for major original and interdisciplinary innovative fund projects. The in-depth transformation of traditional industries has provided new growth points for the development of new quality productive forces. The transformation of traditional industries is crucial for the construction of a modern industrial system. By using digital and green technologies to transform and upgrade traditional industries, it is possible to continuously promote the coordinated development of traditional and emerging industries, forming the industrial foundation of new quality productive forces. China has also made significant progress in innovation ecosystems and talent support. The country's emphasis on basic research and key core technology breakthroughs has provided strong innovation momentum for the development of new quality productive forces.

It is evident that China faces significant opportunities in developing new quality productive forces. Advantages in technological innovation, digital economy, new types of infrastructure construction, policy support, traditional industry transformation, and innovation ecosystems and talent support provide a solid foundation for the cultivation and development of new quality productive forces. Through continuous technological innovation, industrial upgrading, and policy support, China is expected to occupy an important position in the global new round of technological revolution and industrial transformation.

3.2. Challenges in Developing New Quality Productive Forces in China

The challenges faced by China in developing new quality productive forces cannot be ignored. The "bottleneck" issue of key core technologies is prominent, with high external dependence in areas such as high-end chips, basic software, and precision instruments, posing risks to the stability of industrial chains and supply chains. Additionally, there are significant differences in digital infrastructure and skill levels between regions and between urban and rural areas, with the digital divide constraining the inclusive sharing of technological dividends. At a deeper level, some institutional and systemic barriers have yet to be removed, such as the smooth flow of innovative elements, the existence of market access barriers, and the incomplete governance system for data sharing and security, all of which still restrict the release of new quality productive forces.

In terms of technological innovation, although China has made significant progress in frontier technology fields, there is still a gap compared to developed countries. There is a relative shortage of high-precision and innovative talents, with obvious shortcomings and weaknesses in basic research and frontier technology fields. Currently, although the gap in China's technological innovation capabilities with developed countries is gradually narrowing, there is still a significant lag in innovation investment. Moreover, there are still some prominent shortcomings in the institutional mechanisms for technological innovation, with some deep-seated institutional barriers yet to be removed, making it difficult to meet the requirements for the development of new quality productive forces.

Regarding the digital economy and the construction of new types of infrastructure, China has achieved significant results but still faces challenges. The deep integration of digital technology and the real economy needs to be further strengthened to promote the digital transformation of traditional industries. At the same time, the unbalanced development of new types of infrastructure construction between regions also poses challenges to the balanced development of new quality productive forces.

In the transformation of traditional industries, China's traditional industries have a large volume, but the transformation issue is crucial for the construction of a modern industrial system. Promoting the coordinated development of traditional and emerging industries to form the industrial foundation of new quality productive forces requires overcoming many difficulties. In addition, some institutional and systemic barriers, such as the smooth flow of innovative elements, the existence of market access barriers, and the incomplete governance system for data sharing and security, still restrict the release of new quality productive forces.

In terms of innovation ecosystems and talent support, China has made significant progress, but there is still a relative shortage of high-precision and innovative talents. Moreover, while the growing ranks of technology brokers and the booming technology market provide strong support for the transformation of scientific and technological achievements, the improvement of the innovation ecosystem still needs to be further strengthened.

In terms of policy support, the strong policy support from the state has provided a favorable policy environment for the development of new quality productive forces, but the

implementation and execution of policies still need to be further strengthened. At the same time, building a science and technology financial system to support the development of new quality productive forces, promoting better financial services for technological innovation, and achieving mutual promotion and empowerment between science and technology and finance are urgent issues that need to be addressed.

In summary, China faces many challenges in developing new quality productive forces. How to break through bottlenecks while seizing opportunities is the key proposition for promoting the development of new quality productive forces. This requires continuous efforts in technological innovation, the digital economy, the construction of new types of infrastructure, the transformation of traditional industries, innovation ecosystems and talent support, and policy support to achieve rapid development of new quality productive forces.

3.3. Development Pathways for New Quality Productive Forces

Marx's theory of productive forces offers scientific guidance for understanding and promoting the development of new quality productive forces. On this basis, strengthening talent cultivation, developing and utilizing data resources, and promoting the deep integration of new-generation information technology with the real economy can fully unleash the potential of new quality productive forces, achieving a qualitative leap in social productive forces. Given the opportunities and challenges in this development, China needs to base its efforts on actual conditions, use systematic thinking to coordinate technological innovation, industrial transformation, and institutional innovation, and focus on the following pathways:

First, building a Multi-Level Talent Support System to Activate the Source of Innovation. Developing new quality productive forces requires strengthening talent cultivation, improving talent incentive mechanisms, creating an environment conducive to talent growth and development, and stimulating the creativity and enthusiasm of workers to provide strong talent support for the development of new quality productive forces. It is necessary to build a new type of labor force, focusing on "high-precision, cutting-edge, and scarce" fields, cultivating strategic scientists, leading scientific and technological talents, and high-level innovative teams in the direction of artificial intelligence, quantum information, and other frontier areas. At the same time, it is essential to focus on industrial needs and cultivate applied technical talents with digital skills and familiarity with new quality production tools. By improving the vocational education system and deepening the collaborative talent cultivation mechanism between industry, academia, and research, the integration of the talent chain with the innovation chain and the industrial chain can be promoted, forming a "leading talents - supporting talents - skilled talents" echelon structure.

Second, breaking Through the Bottlenecks of Key Core Technologies to Consolidate the Foundation of Industrial Development. Focus on "bottleneck" areas such as chips, basic software, and high-end equipment, strengthen the national strategic scientific and technological forces, optimize the new national system, and concentrate resources to advance core technology breakthroughs. Meanwhile, accelerate the application of new-generation information

technologies, empower emerging industries such as humanoid robots, vehicle networking, and the Internet of Things with artificial intelligence, and promote the deep integration of digital technology and manufacturing. By building industrial internet platforms and promoting smart factory demonstrations, traditional industries can be intelligently transformed, and data-driven new production models can be cultivated.

Third, deepening Institutional and Mechanism Reform to Release the Vitality of Production Factors. Efforts should be made to break down institutional barriers that restrict new quality productive forces, establish a market-oriented allocation mechanism for data elements, improve data ownership, circulation, and trading rules, and connect data islands. Deepen the reform of the scientific and technological evaluation system and establish a sound incentive mechanism for the transformation of scientific and technological achievements oriented by quality and contribution. Optimize the market access and fair competition environment, support the growth of specialized, refined, unique, and new "little giant" enterprises and technology-oriented "unicorn" enterprises, and build a collaborative innovation ecosystem for enterprises of all sizes. Through the integration of the innovation chain, industrial chain, capital chain, and talent chain, the transformation of scientific and technological achievements from the laboratory to the production line can be accelerated.

Fourth, forward-Looking Layout of Future Tracks to Build New Competitive Advantages in Industry. Focus on future industry directions such as quantum technology, life sciences, and space development, increase investment in basic research and disruptive technology reserves, and seize the high ground in science and technology. Leverage the advantages of China's large-scale domestic market, accelerate technology iteration through open scenarios and pilot demonstrations, and cultivate new growth poles such as the metaverse and bio-manufacturing. At the same time, promote the agglomeration and development of strategic emerging industries, build world-class advanced manufacturing clusters, and form a tiered development pattern of "traditional industry upgrading - emerging industry expansion - future industry cultivation".

In summary, Marx's theory of productive forces is instructive for the study of new quality productive forces, providing a scientific theoretical framework for analyzing their connotation, characteristics, and development laws. Marx's emphasis on the laborer as the most active and revolutionary element in productive forces suggests that in the development of new quality productive forces, we should place great importance on talent cultivation and motivation, and inspire the creativity and enthusiasm of laborers. Marx's discussion on the dialectical relationship among the elements of productive forces provides theoretical guidance for understanding the interplay and coordinated development of these elements in new quality productive forces.

4. Conclusion

This paper explores the connotation, opportunities and challenges, and development pathways of new quality productive forces from the perspective of Marx's elements of productive forces. New quality productive forces represent a leap and upgrade of productive forces in the new era. Their connotation can be explained from three dimensions: the laborer, the object of labor, and the means of production. High-quality and innovative talents have become the core

driving force. Laborers need to possess innovative thinking, digital skills, and high efficiency to adapt to the rapidly changing technological environment and market demands. Data, information, and knowledge have become important resources. These intangible elements have injected new vitality into economic development. New-generation information technologies have become the key support, promoting the intelligent, digital, and networked transformation of production tools and methods. These three elements maintain a dialectical unity in new quality productive forces, and this relationship has been further deepened and expanded under new technological conditions. The three elements are interdependent and mutually reinforcing, forming an organic whole of new quality productive forces, driving the continuous improvement of productive forces and providing strong impetus for high-quality economic development.

Developing new quality productive forces is a profound transformation of productive forces. China faces both significant opportunities and numerous challenges in this regard. To achieve this transformation, it is necessary to use talent as the engine, technology as the support, institutions as the safeguard, and industry as the carrier. By promoting comprehensive collaborative innovation, China's economy can be propelled to a new stage of higher quality, greater efficiency, and more sustainable development.

Looking ahead, the cultivation and development of new quality productive forces will provide a solid foundation for China to occupy an important position in the global new round of technological revolution and industrial

transformation. Through continuous technological innovation, industrial upgrading, and policy support, China is expected to further enhance its position in the global industrial chain and promote high-quality economic development. Moreover, the development of new quality productive forces will also promote coordinated regional development, narrow the urban-rural gap, achieve inclusive sharing of technological dividends, and provide strong impetus for building a modern economic system.

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