Research on Problems and Countermeasures of Agricultural New Quality Productive Forces in Promoting Agricultural Green Development

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Abstract. This paper delves into the critical theme of leveraging agricultural new quality productive forces to advance agricultural green development. It systematically examines the key challenges currently impeding this process, including the low conversion rate of agricultural technologies, inadequate technological support within the production system, and insufficient cultivation of the green technology market. In response to these identified issues, the study proposes a series of targeted countermeasures. These encompass accelerating the transformation of agricultural scientific and technological achievements into practical applications, fostering coordinated modernization of the agricultural industrial, production, and operational systems, and actively cultivating a robust green technology innovation ecosystem. The overarching objective is to harness technological innovation and systemic optimization to steer agriculture towards a greener, low-carbon, highly efficient, and sustainable trajectory. Ultimately, this research aims to provide both theoretical underpinnings and actionable pathways for the realization of agricultural green development.

Keywords: Agricultural New Quality Productive Forces; Agricultural Green Development; Technological Innovation

1 Introduction

New quality productive forces represent a higher-level coordination of the three factors of production-labor object, labor materials, and laborers-with a substantial increase in total factor productivity as its core indicator. It signifies a "qualitative change" in productive forces, breaking away from traditional economic growth patterns and conventional productive force development paths. Since the concept of new quality productive forces was introduced, scholars have conducted in-depth research on its applicable fields and how it can effectively function. In the agricultural sector, Yao Xing'an and Yang Wenjuan (2025) argue that new quality productive forces can promote high-quality agricultural development, and that they can enhance the level of high-quality agricultural development by improving agricultural innovation, coordination, openness, and sharing[1] Bai Shengbao and Fan Jianwu (2025) propose practical pathways for

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new quality productive forces and rural revitalization: empowering rural revitalization through technological innovation, optimal allocation of factors, and industrial upgrading to reshape the momentum for comprehensive rural revitalization, thereby boosting rural revitalization[2]. Shen Jie (2025), in studying how new quality productive forces assist agricultural and rural modernization, points out that using new quality productive forces to drive agricultural and rural modernization plays a foundational role in accelerating Chinese-style modernization[3].

Scholars have explored the application and role of new quality productive forces in agriculture extensively. The 2025 Central "No. 1 Document" introduced the innovative concept of "agricultural new quality productive forces," sparking widespread discussion among scholars about its conceptual connotation. Zhang Jun and Li Yan (2025) believe that agricultural new quality productive forces inherit and develop Marxist political economy, emphasizing the leading role of technological innovation, innovative allocation of production factors, deep industrial transformation and upgrading, and a significant increase in total factor productivity[4]. Chen Qiqi (2025) argues that in the current era, agricultural new quality productive forces, relying on technological innovation, digital transformation, popularization of green technologies, and exploration of new business models, are accelerating towards modernization, intelligence, and greening[5]. Zhu Honghui et al. (2025) mention that agricultural new quality productive forces are mainly reflected in the two aspects of "new" and "quality." "New" refers to new types of laborers, labor objects, and labor tools; "quality" refers to the continuous improvement of agricultural product quality, total agricultural factor productivity, the level of agricultural green sustainability, and farmers' income[6]. Lian Xiaomei and Wang Xi (2025) point out that agricultural new quality productive forces emphasize the advanced quality of "high technology, high efficiency, and high quality." Unlike the technology-driven model of industrial new quality productive forces, agricultural new quality productive forces must also consider ecological laws[7].

Agricultural green development is a crucial pathway for promoting sustainable agricultural development. Liu Yingxiao (2023) believes agricultural green development is based on problems existing throughout the agricultural process, using various means to achieve improvement in rural production and living conditions and enhance the capacity for green agricultural supply-a new model of ecological circular agriculture representing a development direction and goal[8]. Miloš Dimitrijević et al. (2022) propose that the concept of the green economy is highly aligned with sustainable development, with its core being the balance between "improving social well-being" and "avoiding ecological risks" through economic activities. Agriculture, as a key sector, needs to meet the triple goals of "economic returns, ecological protection, and social value[9]. Parviz Koohafkan (2012) suggests that the fundamental connotations of agricultural green development include optimizing the ecological environment, improving the safety and quality of agricultural products, scientifically adjusting the industrial structure, and enhancing the influence of agricultural product brands[10].

In the process of promoting agricultural green development, some problems and deficiencies have been exposed: a shortage of high-quality modern agricultural talent; low scale of agricultural production and difficulty in managing organizational operations; slow development of digital technologies; insufficient investment in technological

research and development, low application and conversion rate of agricultural technological achievements, etc.

Agricultural new quality productive forces provide the core driving force for agricultural green development through technological innovation and factor optimization. At the technological level, they significantly enhance resource utilization efficiency through innovative applications such as intelligent agricultural machinery and precision agriculture technologies. In terms of factor allocation, they optimize traditional factors like labor, and introduce new production factors such as data and technology. Practice shows that agricultural new quality productive forces improve total factor productivity.

Academia has formed a relatively rich academic accumulation around agricultural new quality productive forces and agricultural green development, which provides an important theoretical foundation for this paper. However, there remains room for deepening the understanding of the internal logical relationship and systematic analytical elaboration between the two, requiring further exploration. Based on this, this paper will employ theoretical construction to explore the problems faced in the process of agricultural new quality productive forces promoting agricultural green development, conduct policy research, and provide targeted suggestions.

2 Problems in Agricultural New Quality Productive Forces Promoting Agricultural Green Development

Agricultural new quality productive forces are an important engine for promoting agricultural green development. Although China's agricultural green transformation has made significant progress in recent years, a series of practical challenges and structural problems must be squarely faced.

2.1 Low Conversion Rate of Agricultural Technologies; The Application Effectiveness of Innovative Technologies in Agricultural Production Practice Needs Improvement

The essence of agricultural new quality productive forces lies in technological innovation as the core engine. Currently, China's agricultural technological innovation capability has achieved a significant leap compared to the past, but the conversion rate of agricultural technologies and the practical application capability of technological innovations remain relatively weak.

Firstly, the mechanism for converting agricultural scientific and technological achievements is inefficient, and the synergistic effectiveness of industry-university-research collaboration is insufficient. The reasons are, on one hand, a disconnect between the needs of research institutes and market entities, leading to some agricultural patented technologies being shelved due to a lack of industrial supporting facilities. On the other hand, the technology extension system has a "last mile" problem, resulting in low penetration rates of new agricultural technologies.

Secondly, core key technologies are constrained by others, and the independent innovation capability for green technologies needs enhancement. China still faces

"bottleneck" problems in key areas such as efficient breeding and cultivated land quality. For example, there is still a gap compared to international advanced levels in the variety and quality of domestic vegetable seeds, leading to heavy reliance on foreign imports for many high-end vegetable seeds. Meanwhile, investment in Chinese agricultural technology shows a trend of marginalization.

Thirdly, smallholder farmers have weak technology adoption capacity, and barriers exist for large-scale application. Smallholder farmers account for approximately 98.1% of all types of agricultural operation households nationwide. Currently, the ability of this group to apply modern production technologies is relatively limited. At the same time, land fragmentation is prominent. This "small, scattered, and weak" operational structure presents a structural contradiction with the scale and standardization required by modern agricultural technologies.

2.2 Weak Technological Support Capacity of the Agricultural Production System; The Technological Level of the Industrial System Needs Improvement, and the Technological Application of the Operational System Needs Deepening

Firstly, the production system lacks strong technological support. Although China's agricultural modernization has made great progress at this stage, there are still deficiencies in technological support capacity. First, research and development on production development methods lags behind other agricultural powerhouses. Regarding agricultural machinery and equipment, the current level of mechanization and the intelligence of agricultural machinery and equipment in China still have considerable room for improvement. Secondly, due to insufficient basic research and technological innovation, core technologies such as agricultural sensors and intelligent decision-making algorithm models are lacking. Thirdly, the risk prevention and control support from technological means is insufficient. For example, global warming significantly impacts agricultural production, mainly reflected in reduced yield, pest and disease spread, etc. At present, deficiencies still exist in accurately monitoring crop status and predicting risks faced during crop growth in China's agricultural production process.

Secondly, the technological level of the industrial system needs to be raised. The primary problem lies in poor linkage within the agricultural industrial chain, lacking effective connection between pre-production and post-production stages; technological problems in deep processing of agricultural products are also becoming prominent, with processing lacking technological innovation and support. Next, there is a clear disconnect between agricultural industrial technology R&D achievements and practical application. Producers are not well-informed about processing, storage, and deep processing/refining technologies for post-production stages. Finally, there is a lack of independent innovation capability within the agricultural industry. There are few proprietary intellectual property technologies and products, and agricultural technologies and tools used in the production process are constrained.

Thirdly, the technological application capacity of the agricultural operational system needs improvement. For a long time, China's agricultural technology innovation system has primarily involved research institutes and universities, with technology-based

agricultural enterprises holding a relatively low status. Furthermore, there is a lack of high-level innovation platforms among such enterprises in China, and there are relatively few leading technology-based enterprises.

2.3 Insufficient Cultivation of the Green Technology Market

Green technologies provide technological support for the greening of productive forces. However, their marketization degree still needs improvement. Currently, the proportion of green technologies within the overall market structure is relatively low, and they receive limited attention. This directly affects the intensity of R&D investment by enterprises in this field, leading to significantly insufficient momentum for the innovative development of green technologies. Secondly, the competitive environment in the green technology market is not fully active yet, lacking systematic and institutionalized mechanisms. Finally, information dissemination channels for the green technology market are not smooth enough, hindering convenient and rapid sharing of relevant information.

3 Countermeasure Research for Agricultural New Quality Productive Forces Promoting Agricultural Green Development

3.1 Vigorously Promote the Transformation of Agricultural Scientific and Technological Innovation Achievements into Real Productive Forces

Agricultural technological innovation is an important part of agricultural new quality productive forces. Promoting agricultural technological innovation requires strengthening basic agricultural research and tackling key core technologies. First, investment in technological R&D needs to be increased. Government, enterprises, and organizations should actively support technological R&D. Second, promoting agricultural technological innovation requires strengthening efforts in cultivating agricultural technological talent. A sound talent cultivation system should be built to create a high-caliber echelon of agricultural technological professionals. Thirdly, an efficient and smooth chain for agricultural technology conversion and application should be constructed. This demands building an efficient system for transforming agricultural scientific and technological achievements, driven by market mechanisms to facilitate the flow of innovation factors, enhancing the practical conversion and utilization rate of agricultural technological achievements.

3.2 Promote Coordinated Development of the Agricultural Industrial System, Production System, and Operational System to Assist Agricultural Green Development

Through accelerating the integrated development of primary, secondary, and tertiary industries, accelerating the construction of modern agricultural machinery and equipment, and actively cultivating new types of agricultural business entities, these measures assist agricultural development transformation and green upgrading.

Firstly, take promoting industrial integration as the starting point to systematically improve the modern agricultural industrial system. Achieving the goal of agricultural green development must rely on the deep integration and coordinated advancement of the primary, secondary, and tertiary industries. To achieve this goal, the first step is to extend and expand the agricultural industrial chain, promoting the transformation of agricultural production models from single raw material output to developing diversified, high value-added end-product systems.

Secondly, accelerate the construction of modern agricultural machinery and equipment to boost the modernization of the production system. An important indicator of agricultural production system modernization is the completeness of agricultural machinery tools and the support of advanced technology. Regarding facility condition improvement, farmland should be improved. Regarding equipment renewal and iteration, focus should be on producing efficient and convenient production machinery. Regarding green transformation and development, actively promote green agriculture to reduce pollution. Regarding advancing digital construction, rely on modern information technology and digital technology for intelligent operation of agricultural production.

Thirdly, cultivate and strengthen new types of agricultural business entities. In the process of advancing operational system modernization, special attention and assistance should be given to professional large-scale farmers, family farms, farmers' cooperatives, and leading agricultural industrialization enterprises.

3.3 Cultivate a Green Technology Innovation System and Strengthen Market-Oriented Guidance

Firstly, strengthen and gradually improve the market-oriented mechanism. First, solicit suggestions from the public and experts/scholars, sorting out technological bottlenecks and needs faced in the agricultural production process, organizing expert evaluation and market research to clarify research directions for green technology innovation. Then, establish a scientific and objective assessment mechanism for the green technology innovation system. Simultaneously, encourage diverse entities such as enterprises and research institutes to participate in green technology innovation.

Secondly, establish a collaborative platform that promotes efficient transformation of green technology innovation and achievements. This platform should cover the establishment of a green technology trading market. Adopt a promotion model combining online and offline methods to systematically advance the application and popularization of green technologies in agricultural production practice. Meanwhile, it is essential to strengthen synergistic linkage and deep cooperation among different green technology

innovation entities to concentrate efforts on breaking through technological bottlenecks.

Thirdly, establish a sound incentive and evaluation mechanism for green technology innovation. Optimize the institutional guarantee system for green technology innovation. For example, the government can implement diversified policy measures such as tax reductions and providing special financial support.

4 Conclusion

This study examines the role of agricultural new quality productive forces in promoting green development. Key challenges include low technology conversion rates, weak industrial system integration, and underdeveloped green technology markets. To address these, it is essential to strengthen technological innovation, modernize agricultural production and operation systems, and foster a market-oriented green technology ecosystem. Only through the coordinated advancement of technology, institutions, and markets can agricultural new quality productive forces fully drive the transition toward sustainable and green agriculture.

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