Study of Digitally Empowering Rural Industrial Model Reconstruction to Propel the Construction of a Strong Agricultural Province in Henan

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Abstract: In order to explore the significance of digital economy in the reconstruction of rural industrial models and its practical pathways in the construction of a strong agricultural province in Henan, this paper provides a detailed analysis of the crucial role played by the digital economy in accelerating the revitalization of rural industries, enhancing industrial market risk resistance, and promoting agricultural modernization. Simultaneously, the paper examines the highlights of Henan Province in terms of policy support and experiential lessons from demonstration points, as well as the challenges faced in the areas of conceptual renewal, industrial chain efficiency, agricultural information talent, and rural e-commerce. Furthermore, to propel the construction of a strong agricultural province in Henan, the paper proposes specific pathways, including value leadership, digital empowerment, nurturing new agricultural talents, and leveraging digital technology to stimulate vitality in rural e-commerce. It is hoped that through these strategies, the digital transformation of rural industries in Henan Province can be effectively realized, promoting comprehensive strengthening and sustainable development of its agriculture.

Keywords: Digital economy; Rural industrial models

1. Introduction

Henan Province, as a major agricultural province in China, is currently experiencing a thriving phase in the development of the digital economy. The advancement of the digital economy has further promoted the digitization and intelligence of the agricultural sector, enhancing agricultural production efficiency [1]. In this significant transformation process, Henan Province has introduced advanced technologies such as the Internet of Things (IoT) and smart irrigation systems, achieving efficient and high-quality agricultural production. Moreover, the development of the digital economy in Henan Province includes the digital and

intelligent transformation of traditional manufacturing industries and the rapid rise of emerging Internet enterprises, such as e-commerce. These transformations collectively accelerate technological innovation and the formation of new quality productivity, providing crucial support for the high-quality development of the economy and society in Henan Province. With the assistance of digital transformation, Henan Province is actively promoting the deep integration of new technologies, new models, and new formats with the real economy, further cultivating and strengthening digital industry clusters, and enhancing the core capabilities of digital economic development, aiming to comprehensively build itself into a digital powerhouse.

2. Significance of Digitally Empowering Rural Industrial Model Reconstruction

Agriculture, as the foundation of a nation, plays a crucial role in ensuring national stability. With the advent of a new era, a deeper understanding of agricultural, rural, and farmer issues has emerged, highlighting the key role of rural development in achieving national rejuvenation. Currently, the world is amidst a new wave of technological revolution, with digital economy emerging as a core force propelling global economic development. By integrating digital technology with traditional production factors and optimizing resource allocation through algorithms, various production factors, including land and technology, can be effectively enhanced in terms of productivity. In contemporary China, the application of digital technology is showing immense potential. The core industries of China's digital economy contributed 9.3% to the Gross Domestic Product (GDP) in 2022, and it is projected to increase to 10% by 2025. Therefore, it is a critical period to accelerate the cultivation of new economic advantages and expedite the process of agricultural modernization. The development of the digital economy provides a fresh development path for rural revitalization, injecting new vitality into the development of rural industries, making them more intelligent and vibrant, and holding significant implications for the long-term development of rural industries.

(1) Digitally empowering the acceleration of rural industrial revitalization

The core of promoting rural revitalization lies in industrial development, as rural revitalization, without industrial support, is akin to a tree without roots. Among the primary objectives of rural revitalization, industrial prosperity occupies a paramount position, underscoring its crucial role in propelling rural progress. The prosperity and strength of a nation depend on the affluence of its people, and the growth of farmers' income is closely tied to the development of industries. Therefore, the goal of rural industrial revitalization is to build an efficient and high-quality industrial system, providing support for the sustained growth of farmers' income. The combination of the development of the digital economy and the modernization of rural industries will significantly accelerate the pace of rural revitalization. The utilization of digital technologies such as satellite remote sensing, remote video monitoring, and the Internet of Things can convert agricultural information, including soil quality, light, humidity, temperature, and crop growth conditions, into visualized data. Additionally, the analysis of agricultural production and operation data using big data and artificial intelligence can effectively guide crop planting, fertilization, and sales strategies, predict output and sales volume, thereby providing intelligent support for agricultural operations.

(2) Enhancing industrial resilience to market risks through digital economy

The digital economy plays a crucial role in strengthening the ability of industries to cope with market risks. It propels traditional industries towards intelligent transformation while considering local factors such as natural resources, ecological conditions, land distribution, labor, and capital. Utilizing methods such as the Internet of Things, remote sensing technology, and mobile internet, the digital economy, through the collection, processing, and analysis of big data, aids in timely and accurate prediction of market trends. Furthermore, in-depth analysis of consumer behavior enables producers to grasp market dynamics, formulate

more flexible production and sales strategies, effectively avoiding market risks. The outbreak of the COVID-19 pandemic in 2020 highlighted the importance of digital technology, prompting an urgent need for the rural industry to transition towards digital development. The convergence application of modern information technologies such as big data, blockchain, artificial intelligence, the Internet of Things, and 5G has brought innovation and fruitful results to agriculture and rural informatization, enhancing the industry's ability to resist market risks.

(3) Contribution of digital economy to promoting agricultural and rural modernization

The digital economy plays a crucial role in advancing agricultural and rural modernization. In comparison to traditional agriculture, China's agriculture has made significant progress in terms of intelligence and informatization, yet it still faces challenges such as low labor productivity, insufficient application of advanced technology, rising production costs, and an aging workforce. Digital empowerment, based on digital technology and rooted in agricultural resources, drives the digital transformation of the entire agricultural industry chain. This transformation creates a data-driven, closed-loop system covering the entire agricultural process, promoting scientific production, effective supply and demand coordination, digital management, and accelerating the convergence of the primary, secondary, and tertiary industries. This leads to the emergence of new formats and models, expediting the process of agricultural and rural modernization.

3. Highlights in the Development of Rural Industrial Models Empowered by Henan Province's Digital Economy

Henan Province has exhibited remarkable highlights and characteristics in the development of rural industrial models empowered by the digital economy:

(1) Development of smart agriculture and unmanned farms

Henan Province serves as a significant example of agricultural modernization in the development of smart agriculture and unmanned farms. These farms integrate biotechnology, smart agricultural machinery, and information technology, achieving automation and intelligence in agricultural production. Advanced technologies such as smart sensing, navigation, and management are applied in the operation of these unmanned farms. For instance, smart agricultural machinery can precisely locate and execute specific agricultural tasks, such as spraying and fertilizing, enhancing operational accuracy and significantly reducing reliance on human labor. Against the backdrop of rapid urbanization in China, the model of unmanned farms effectively alleviates the shortage of rural labor, improves agricultural production efficiency, and provides direction for the future development of smart agriculture, indicating a significant transformation in agricultural production methods.

(2) Application of 5G technology in agriculture

Henan Province has made significant achievements in the application of 5G technology in agriculture. Taking the example of 5G application in Wexin Tea Village in Shanghe District, Xinyang City, the local 5G network is used for real-time monitoring of tea gardens. Simultaneously, soil sensors automatically collect crucial environmental data, which is transmitted in real-time via the 5G network to the management platform. Administrators can utilize this data for accurate prediction and management of the tea tree's growth conditions, thereby improving the efficiency and precision of agricultural production. This process facilitates the traceability of the entire product lifecycle, providing consumers with detailed information about tea production by scanning a QR code. Additionally, Henan Province is in the process of constructing a full-process tea traceability platform, further enhancing the transparency and market competitiveness of products.

(3) Overall development environment of Henan Province's digital economy

The development environment of Henan Province's digital economy benefits from its strategic deployment in the context of the rise of new-generation information technology. Rich human resources, an application market, industrial cluster advantages within the province, and continually improving infrastructure and technological innovation capabilities provide fertile ground for the development of the digital economy and informatization. As the global economy enters a new stage characterized by digitization, networking, and intelligence, Henan Province is at a crucial period of accelerating economic and social transformation and upgrading. The implementation of major strategies such as ecological protection and high-quality development in the Yellow River Basin brings new opportunities for the development of the province's digital economy, injecting sustained momentum. In this environment, Henan Province continues to advance industrial digitalization and digitization, aiming to create a digital economy that is internationally competitive, thereby becoming a powerful force driving rapid, inclusive, and sustainable economic growth.

4. Challenges in Digitally Empowering the Reconstruction of Rural Industrial Models in Henan Province

(1) Need for strengthening conceptual updates

While Henan Province boasts outstanding advantages and a solid practical foundation in digital economy and information construction, there is a need for enhanced conceptual updates. With the rise of new-generation information technologies such as the Internet of Things, big data, and artificial intelligence, the global economy has entered a new phase characterized by digitization, networking, and intelligence. Faced with this transformation, Henan Province must accelerate the development of the digital economy, promote digital industrialization and industrial digitization, facilitate the deep integration of the digital economy with the real economy, and build internationally competitive digital industrial clusters. To achieve this, it is imperative for Henan Province to update its concepts during the process of digital transformation, strengthen awareness and application of new technologies, and adapt to the requirements of the digital economy era.

(2) Efficiency improvement needed in the industrial Chain

While digital rural construction in Henan Province is gradually advancing and has achieved some results, the promotion and application of these technologies are still in the early stages. Widespread application of unmanned farms and smart agricultural technologies requires further technological breakthroughs and improvements in industrial chain efficiency. The development of high-end sensors, model algorithms, and associated policy support and capital investment are crucial for enhancing the efficiency of the industrial chain. Additionally, the application of digital technology throughout the entire agricultural production process, including planting, management, harvesting, and storage, requires further promotion and optimization.

(3) Weakness in agricultural information talent

An essential aspect of agricultural informatization and digital rural construction is talent cultivation, and Henan Province faces the challenge of a relatively weak talent pool in agricultural information. To achieve digital governance in rural areas, there is a need to cultivate and attract more talents with digital skills, especially those proficient in using modern information technology to drive agricultural monitoring, data resource management, and risk control. Furthermore, there is a need to strengthen the training and recruitment of agricultural information technology talents to enhance the capabilities of digital governance in rural areas.

(4) Upgrade needed in rural e-commerce

Henan Province has significant room for improvement in the cultivation of the main bodies of the agricultural and rural digital economy, particularly in the realm of rural e-commerce. While some e-commerce platforms and digital services are already in use in rural areas, their coverage and depth need expansion, especially in areas such as "Internet + social services," "Internet + education," and "Internet + healthcare." Therefore, Henan Province should promptly upgrade rural e-commerce to promote the sale and circulation of agricultural products, improving the quality of life and service levels for rural residents.

5. Pathways for Digitally Empowered Reconstruction of Rural Industrial Models to Boost Henan Province's Agricultural Strength Construction

(1) Value leadership, implementing new development concepts

In the process of pursuing agricultural strength construction, Henan Province first needs to implement new development concepts. This involves integrating values of sustainability and ecological friendliness into agricultural development. For example, Xinxiang City has achieved simultaneous improvement in the quality of agricultural products and environmental protection by promoting ecological and circular agriculture, reducing the use of fertilizers and pesticides. Additionally, experiences from Luoyang City, which actively develops distinctive agriculture by extensively cultivating various organic vegetables and medicinal herbs, leading to the creation of a unique agricultural brand, can be drawn upon. These measures promote the increase in the market value of agricultural products to varying degrees while maintaining ecological balance, achieving dual-path development of the economy and green initiatives.

(2) Digital empowerment, upgrading wealth-generating rural industries

Digital empowerment has played a crucial role in upgrading wealth-generating rural industries. For instance, Henan Province has introduced advanced digital technologies such as intelligent monitoring systems and big data analytics into agricultural production, enhancing agricultural productivity and product quality. Taking Xuchang City as an example, real-time monitoring of crop growth status using satellite remote sensing technology and IoT devices has enabled precise irrigation and fertilization based on data analysis, significantly improving crop yields and resource savings. Furthermore, Zhengzhou City has achieved remarkable results in the construction of smart agricultural demonstration zones, attracting more young people to participate in agricultural innovation and accelerating the transformation from traditional to modern agriculture.

(3) Digital agriculture leading to the cultivation of new digital farmers

To promote agricultural strength construction, Henan Province needs to cultivate a group of new farmers with digital skills. This involves fully utilizing the role of rural digital technology training centers as talent bases, providing training for new farmers in smart agricultural operations and online marketing of agricultural products. For example, Jiaozuo City in Henan Province has conducted various digital technology training courses for farmers, teaching them how to use smartphones and computers to manage agricultural production and imparting skills on selling agricultural products online. These skills have played a significant role in enhancing farmers' digital literacy and increasing income. Additionally, Xinyang City has successfully encouraged many young people to return to their hometowns for entrepreneurship through rural e-commerce training, promoting the integration of local agriculture and e-commerce.

(4) Digital engine, igniting new vitality for rural e-commerce

The application of digital technology has significantly ignited new vitality in rural e-commerce. Henan Province can facilitate the direct sale of agricultural products by establishing online agricultural product

trading platforms. For instance, Zhoukou City has established its own e-commerce platform, allowing farmers to sell their products directly to consumers, greatly reducing intermediary links and achieving a win-win situation for farmers. Similarly, Kaifeng City has increased the exposure and sales volume of local agricultural products through social media marketing strategies. Luoyang City utilizes big data technology to analyze consumer preferences, providing farmers with precise sales strategies. These measures effectively promote the development of rural e-commerce and create more economic benefits for farmers.

6. Conclusion

In conclusion, as a major agricultural province, Henan Province is effectively reconstructing its rural industrial models through the digital economy. In the process of building an agricultural strong province, Henan Province is pioneering various key measures, including the development of smart agriculture and the application of 5G technology, while simultaneously enhancing the digitization of the agricultural industrial chain. Faced with challenges in conceptual updates, industrial chain efficiency, talent cultivation, and e-commerce, Henan Province demonstrates a proactive stance in addressing these challenges. It is anticipated that in the near future, with the continuous development of the digital economy, Henan Province will achieve greater success in agricultural modernization, rural revitalization, and comprehensive socio-economic development.

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