Digital economy leads the integrated development of rural primary, secondary and tertiary industries

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Abstract. The rapid development of the digital economy has driven the digital and intelligent transformation and development of rural primary, secondary and tertiary industries, which has a revolutionary impact on the ways and paths of agricultural transformation iteration and rural industrial integration development. The integrated development of primary, secondary and tertiary industries in rural areas is a key measure to continuously promote rural revitalization. The digital economy still faces some challenges in leading the integrated development of rural industries, including high uncertainty in the macro policy environment, weak connection between the implementation and use of digital technology at the meso level and farmers, and the optimization of the interest linkage at the micro subject level. Based on the theory of industrial integration, the article attempts to analyze the empowering points of the digital economy from the perspectives of digital reconstruction of industrial factors, digital and intelligent transformation of the entire production process, and cultivation of new service models. It proposes ways to strengthen the construction of rural digital infrastructure, increase the effective supply of digital economy talents, and build a unified standard collaborative guarantee mechanism to assist in the development of rural industrial integration.

1. Introduction

The digital economy, supported by new information technology, takes data as a new factor of production, and drives the Digital transformation and iteration of traditional industries in the process of integration with capital, technology, labor and other factors, so as to achieve high-quality development of the global economy. The digital economy has the characteristics of wide coverage, fast dissemination, and deep impact, and is a transformative force in reshaping the global economic industrial structure. In the new stage of development, seizing the opportunities of digital development, reshaping the modern industrial system in rural areas, and promoting the digitization and digital industrialization of industries in rural areas will be a key issue of concern for academia and the industry. In view of this, how to effectively deal with the difficulties and challenges faced by Digital transformation in the process of agricultural and rural industrial integration, and how to adapt to the rapid development trend of digital economy to enable iterative upgrading of rural industries to achieve high-quality development, need further discussion and analysis.

2. Research overview

The digital economy is a series of economic activities that use digital information and knowledge as production factors, leverage modern information network technology carriers, and leverage the advantages of information and communication technology to effectively improve efficiency and optimize economic structure[1]. The development of the digital economy cannot be separated from the effective support of digital technology, including high security level data collection, transmission, storage, cleaning technology, deep learning and other analysis technologies, hardware intelligent control and other return servo technologies. The rapid development of the digital economy has given birth to new formats and models. The effective integration of the digital economy and traditional agricultural economy will be an important growth pole for achieving high-quality development of agriculture and rural areas in the future. The academic research on the integration and development of digital economy and rural industries mainly focuses on the following three aspects:

2.1 Research on the effective integration of digital economy and agricultural industry elements

Data elements and their main undertakers will usually face higher initial costs, while the marginal cost gradually decreases and tends to zero, which provides a good opportunity for the transformation and iteration of the agricultural industry. The digital, digital and intelligent transformation and development of the traditional agricultural industry can further improve the development quality, and effectively integrate with the

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secondary and tertiary industries to achieve the integration and symbiosis of the primary, secondary and tertiary industries in rural areas[2]. In addition, the embedding of technologies such as big data and artificial intelligence can increase the labor complexity of traditional agriculture, enhance the added value of agricultural products, and accurately achieve the full process of planning, feedback, and control.

2.2 Research on the iterative transformation of agricultural industry production technology led by digital economy

The effective integration of digital technology and traditional agricultural management systems can further reduce transaction costs, optimize factor allocation, and overcome the bottleneck of information asymmetry in rural economic development. On the one hand, modern digital technology embeds effective data into the entire process of agricultural production, improving the level of digital intelligence in the agricultural industry. For example, the application of intelligent soil and fertilizer detection technology, intelligent management technology in the agricultural industry, and other technologies can achieve real-time monitoring and precise control of the growth and planting environment of agricultural products, as well as disaster warning[3]. On the other hand, the digital economy is conducive to breaking the constraints of low efficiency, high volatility, and uncontrollable quality in agricultural production processes, and giving a multiplier effect to the integrated development of rural primary, secondary and tertiary industries.

2.3 Research on the organic integration of digital economy and agricultural industry chain

The improvement of big data computing power and the application of deep learning and other technologies effectively promote the integration of digital economy into traditional agriculture, promote the digital iteration of the entire agricultural product production chain, and achieve the effective integration of rural primary, secondary and tertiary industries. Since Naruto Imura proposed the concept of "six industries", Japan has actively practiced the integration and development of the primary, secondary and tertiary industries, achieving the goals of increasing the added value of agricultural products, extending the industrial and value chains, and forming a multi-dimensional and large-scale development pattern. The Netherlands has also formed farmers' cooperative organizations to stimulate innovative development in knowledge rural areas and effectively integrate the primary, secondary and tertiary industries in rural areas. At the same time, the resource endowment of traditional villages is embedded in digital technology, and the development of new formats such as rural leisure tourism helps promote sustainable development in rural areas.

The existing literature mainly studies the integration of digital economy and agricultural industrial factors, the transformation and iteration of agricultural production technology led by digital economy, and the integration and development of digital economy and agricultural industrial chain, which provides a more detailed research basis for this paper. However, how to adapt to the development trend of digital economy and lead the integration and development of rural primary, secondary and tertiary industries needs to be further explored. The possible innovation of this article lies in proposing feasible paths to empower the integrated development of rural primary, secondary and tertiary industries from the perspectives of digital reconstruction of industrial factors, digital and intelligent transformation of the entire production process, and cultivation of new service models.

3. Fundamental of research theory

3.1 Industrial integration theory

Industrial integration refers to the dynamic process of overlapping and restructuring after the intersection and infiltration of factors such as markets, resources, and technology, resulting in the gradual integration of independent industries and the emergence of new industries. Pennings proposed four types of industrial integration: supply substitution integration, supply complementarity integration, demand substitution integration, and demand complementarity integration[4]. Li Wuwei divided the types of industrial integration into three types: inter industry extension integration, intra industry restructuring integration, and emerging technology penetration integration[5]. In the context of the digital economy leading the development of the entire industry, the three major industries driven by digital technology intersect, penetrate, and restructure each other, thus achieving a new development model of industrial structure restructuring and resource integration. Reasonably embedding digital technology into traditional rural industries, promoting the mutual integration of the primary, secondary and tertiary industries in rural areas, in order to achieve a multiplier effect of industrial integration and development.

4. The main issues of digital economy leading the integration of rural primary, secondary and tertiary industries

Firstly, at the macro environmental level, in recent years, the uncertainty of the economic development environment both domestically and internationally has gradually increased. The disruptive technological means and structural adjustments in technological costs that have emerged during the development of digital technology can exacerbate the uncertainty of the development of the digital economy. At the same time, the data communication, interface standards, and technical specifications between different countries and regional departments are not unified enough, and there is a lack of basic guarantee systems for the development of
the digital economy across regions, departments, and industries. Especially in areas such as security identification, transaction sharing, power maintenance, and transmission supervision, it is urgent to solve these problems.

Secondly, at the meso technological level, digital technology still faces many difficulties in expanding the basic production functions of agriculture and exploring the diverse values of rural areas. How to empower existing industries such as agricultural product processing and manufacturing, rural e-commerce live streaming, and rural leisure tourism, further guide local enterprises to develop intelligent processing and manufacturing of grain, oil, and food, and ensure effective compensation for the weak link between small farmers and the large market[6]. At the same time, there are security risks in the extraction, transmission, storage, and sharing of agricultural big data, and it is difficult to achieve effective links between big data from different interface sources, seriously affecting the efficiency of big data usage, making data, as a core production factor, only stay in the development concept and difficult to reasonably implement and solve practical problems.

Thirdly, at the micro level, the digital economy faces the problem of effective integration between the digital economy and the real economy in leading the industrial transformation and upgrading development in rural areas. Especially, the relatively backward digital technology talent support and infrastructure construction level in rural areas make it difficult to ensure the continuous transformation and iteration of agriculture. For the diversified entities that are fully introducing digital technology to promote the integrated development of the agricultural industry, they face practical problems such as large investment amounts, long capital return cycles, and slow investment effects. The solution to these problems requires early market cultivation and sustained investment follow-up to achieve profitability. However, the digital technology level of most agricultural related enterprises is limited, and their ability to invest funds is insufficient. Embedding universal digital technology into enterprises to meet their own needs needs needs needs to be improved, exacerbating the problem of digital islands while making it difficult to form a benign mechanism of interest linkage[7].

5. The path of digital economy leading the integrated development of rural primary, secondary and tertiary industries

![Diagram](image_url)

Fig. 1. The digital economy empowers the integrated development of rural industries.

5.1 Strengthen the construction of rural digital infrastructure

Data security is a fundamental prerequisite for the development of the digital economy. We will attempt to integrate digital inclusive finance into the integrated development system of rural primary, secondary and tertiary industries, standardize data management issues in the allocation of production factors in the three major industries, such as artificial intelligence, algorithm programs, and deep learning[8]. Under the premise of fully considering the basic demands of multi-stakeholders, we should strengthen the tilt of big data computing power in rural areas with the help of big data platform, and promote the interest linkage mechanism of all participants with reasonable data production factor management mechanism. The solution to the above problems cannot be achieved without solid digital infrastructure construction. On the one hand, we will continue to deepen the long-term cooperation between rural grassroots and data broadband companies, increase the supply of 5G signal network receiving stations by using rural broadband as a starting point, and use digital technology application scenarios to build an industrial development form that integrates smart government, smart services, and smart industries. We will explore the connection points between local rural characteristic industries and digital economy industries, Release the digital economy as a dividend for agricultural development[9]. On the other hand, it is necessary to properly open the channel for social capital to support the village. Local government departments at all levels should ensure the openness and clarity of the policy environment, give full play to the value of social capital in the case of limited government budget, and create a digital agriculture industry service system that meets the actual needs of local development. The schematic
diagram of digital economy enabling the integrated development of rural primary, secondary and tertiary industries is shown in Figure 1.

5.2 Increase the effective supply of digital economy talents

The digital economy not only empowers the integrated development of rural primary, secondary and tertiary industries, but also puts forward higher requirements for agricultural practitioners. On the one hand, we will increase the supply of digital training in the agricultural industry, provide hierarchical training guidance for existing rural workers and new employment due to the integration and development of the three major industries, and carry out employment assistance actions for returning farmers. We will create an online exchange and interaction platform for farmers’ entrepreneurship and employment, and enhance the sharing of employment and entrepreneurship experiences across regions and industries. On the other hand, digital knowledge and skills training with different difficulty gradients will be conducted for rural laborers of different age groups and educational levels, focusing on improving their ability to apply digital technology and recognize and obtain digital information. This will be complemented by the learning and application of Geographic Information Systems (GIS) and Global Positioning Systems (GNSS) to achieve high-quality employment for rural industry practitioners.

5.3 Building a unified standard collaborative guarantee mechanism

On the premise of fully protecting the security of agricultural land data, strengthen the integration and collaboration mechanism of rural digital economy industry with unified standards. The unified collaboration mechanism should not only include industry development rules, industry development legal protection system, enterprise operation regulation system, etc., but also include a unified regulation mechanism for entering the main industry entry threshold[10]. In addition, we can further strengthen the collaborative work of most departments, improve the collaborative work mechanism to ensure the maximum presentation of the overall functions of economy, society, culture and ecology in rural areas, and try to build a multisectoral data communication platform to break information barriers. At the same time, we will further improve the collaborative investment mechanism of financial financial capital, focusing on the industrial operation of agricultural products, processing and manufacturing of agricultural and sideline products, rural leisure tourism services, agricultural product distribution and e-commerce agriculture and other fields to give full play to the positive advantages of digital inclusive finance to meet the capital needs of different local industries, entities and scales[11]. To ensure the healthy development of the integration of rural primary, secondary and tertiary industries led by the digital economy, it is necessary to establish a legal system that keeps up with the times and has a global development perspective, build a rapid response and feedback database supervision system, optimize the data security, ownership of rights and responsibilities, and interest connection standards involved in rural industry integration, and form a new legal order that meets the needs of the digital economy era.

References