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The Implementation of the Digital Economy in Promoting Rural Revitalization

Shihan Liu, Tingting Li*, Huiting Wang

School of Economics and Management, Dalian University of Science and Technology, Dalian 116000, Liaoning Province, China

Corresponding author: Tingting Li, ltt19900521@dlust.edu.cn

Abstract: The government in recent years has adopted the e-commerce poverty alleviation policy and used e-commerce platforms to promote the sales of rural products, increase farmers' incomes, and help rural revitalization. This policy has played a positive role in improving the livelihood of farmers and promoting the construction of rural infrastructure. At the same time, the integration of agriculture with the Internet has brought new vitality to the rural economy, promoted agricultural modernization and knowledge, and improved productivity and farmers' income. The government has introduced the Internet of Things and cloud computing technology to help agricultural production become large-scale, intensive, and intelligent, which improves labor efficiency and provides support for rural revitalization. In addition, the digital economy has given rise to new agricultural operators, such as e-commerce and agricultural cooperatives, providing new models and sales channels for the development of rural industries. Driven by the rural revitalization strategy, the rapid development of digital agriculture, rural e-commerce, and smart tourism has brought huge growth to the rural economy

Keywords: Digital economy; Rural revitalization; Grain yields

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1. The current situation of the digital economy empowering rural revitalization

1.1. The digital economy increases farmers' incomes

Digital technology empowers agriculture and connects farmers directly to markets. With the improvement of rural digital infrastructure, the rural digital economy has become increasingly developed, accelerating the progress of the agricultural industry. Digital technology helps production and operation management and increases agricultural output value. The rise of rural e-commerce has broadened the sales channels of agricultural products and increased farmers' incomes [1]. In addition, new forms of business such as digital tourism and smart tourism have also promoted the optimization of the rural industrial structure.

In some rural areas of China, intelligent agriculture technology has been popularized to improve crop yield and quality while reducing resource waste. The technology includes drones, Internet-of-Things sensors, data analysis, and so on, to provide services such as monitoring, precision fertilization, and automatic irrigation for

crops, which improve farmers' economic benefits. The online education platform and digital training courses enable farmers to learn agricultural technology and management knowledge, which improves their skills to adapt to the needs of the digital era, thus allowing them to operate agriculture more efficiently and improve output and income (**Figure 1**) [2].

Practical cases such as intelligent agriculture and agriculture integrated with Internet have provided farmers with more efficient, environmentally friendly and safe agricultural production methods, expanded channels for increasing income, and injected new vitality into rural revitalization. The complete digital infrastructure has improved the level of public services in rural society, and made full use of Internet technology to build a convenient service platform for rural people, so that farmers can enjoy convenience at their doorsteps.

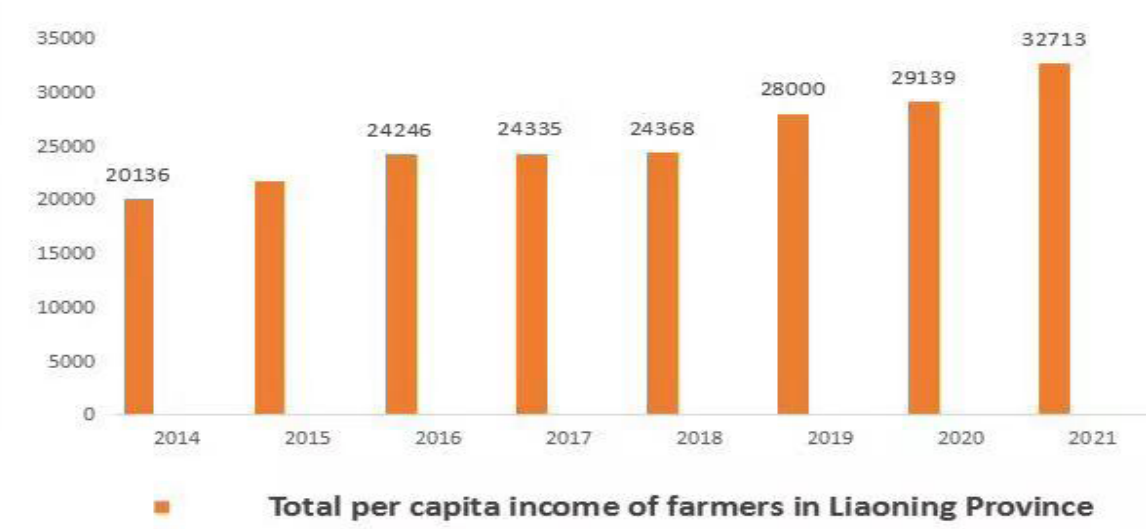

Figure 1. Per capita gross income of farmers in Liaoning Province, China, from 2014 to 2021, Source: Statistical Yearbook of Liaoning Province, China

1.2. The digital economy boosts agricultural production

The digital economy has played an important role in boosting agricultural production. Its strong integration and far-reaching capabilities, empowered by digital technology, have changed the traditional agricultural structure, promoted the development of new agricultural techniques, and promoted the modernization of the agricultural field and the innovation of development methods, thereby greatly improving agricultural production efficiency and the value of the agricultural industry chain.

First of all, the digital economy provides farmers with many smart agriculture technologies, such as precision agriculture technology, drones, laser measurement, and so on. These technologies have enabled the refined management of agricultural production, thus reducing resource waste and environmental damage while improving crop yields and quality through precise fertilization, precise irrigation, and pest and disease prediction.

Secondly, the digital economy has played a positive role in the transformation and upgrading of the agricultural industry. The digital economy promotes the implementation of digital management in rural industries, which not only saves costs, optimizes processes, and improves product quality in the production field, but also forms a business model of integration of production, supply, and marketing of agricultural products in the business field, further strengthens the brand awareness of agricultural enterprises and improves the output of agricultural food **(Figure 2)** [3].

In 2023, China's national grain output achieved a historical record, reaching a total of 1,390.82 billion catties, an increase of 17.76 billion catties over the previous year. This has provided solid support for the

continuous recovery of China's economy with sufficient food supply and abundant stocks [4].

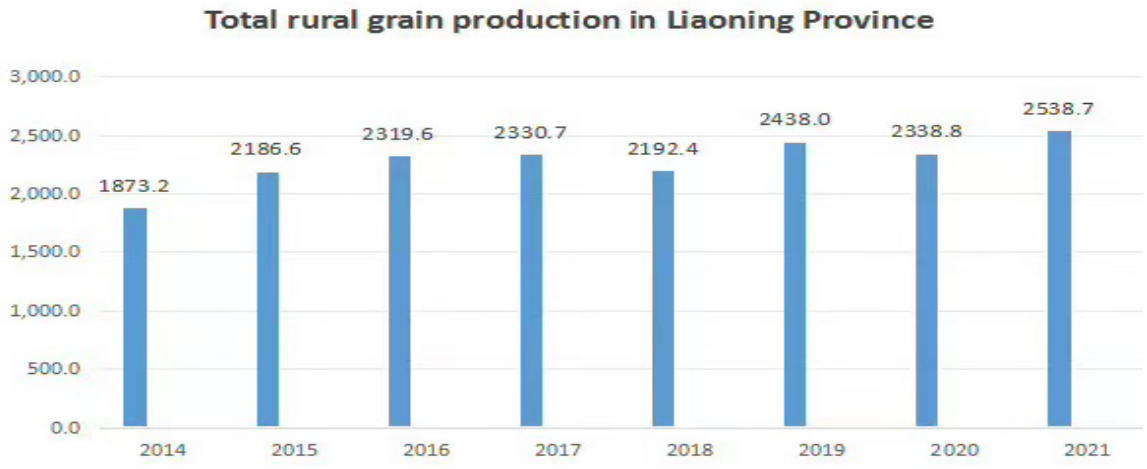

Figure 2. Total rural grain production in Liaoning Province, China, from 2014 to 2021, Source: Statistical Yearbook of Liaoning Province, China

1.3. Industrial integration promotes the construction of digital villages

The promotion of digital village construction has injected new vitality into the development of China's rural economy. In the context of the digital economy, the comprehensive integration of the secondary and tertiary industries has become an important factor in promoting rural economic growth. Data shows that China's digital economy has developed rapidly and has become a new driving force for economic growth. According to the China Internet Development Report 2021, the scale of China's digital economy reached about 40 trillion yuan in 2020, accounting for 39% of GDP. This means that the digital economy is becoming an important pillar of China's economic development [5].

2. Constraints on the empowerment of rural revitalization by the digital economy

2.1. The gap between urban and rural areas is prominent

There is a big gap between rural residents and urban residents in terms of income, education, medical care, and social security. This makes rural residents face more difficulties and challenges in the process of rural revitalization. The production in rural areas is mainly manual and uses simple machinery, while automated and mechanized production is used in urban areas. So rural production efficiency is low and economic development is slow compared with urban areas (**Figure 3**).

Secondly, the gap in the allocation of educational resources between urban and rural areas is also very obvious. Cities have high-quality educational facilities and abundant educational resources, while rural areas lack educational resources and the quality of teaching is relatively low. As a result, rural children are at a disadvantage at the starting point of education, which further affects the cultivation of rural human resources and economic and social development.

The health care and social security gap between urban and rural areas cannot be ignored. Urban residents enjoy a relatively complete medical security and social security system, while rural residents have a relatively low level of medical security and a mediocre social security system. This puts rural residents at greater risk in the event of illness or accidents.

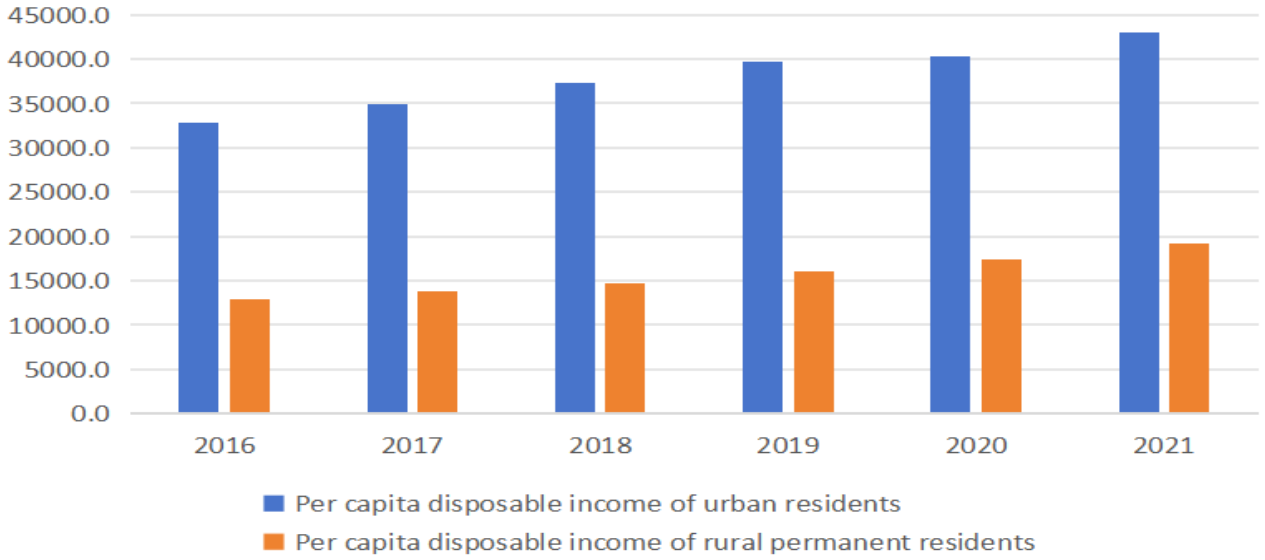

Figure 3. Urban-rural disparity data in Liaoning Province, China, from 2014 to 2021, Source: Statistical Yearbook of Liaoning Province, China

2.2. Lack of talents in the digital economy

Digital village development needs to widely apply the concept of digitalization to rural development. However, the villagers are still stuck with the traditional concept in the existing digital village development, and the acceptance of the concept of digital development is low.

First of all, the information technology in rural areas needs to be improved. The information technology in rural areas is relatively lagging compared with urban areas, which limits farmers' ability to understand and apply digital technology. In addition, the learning ability of the rural labor force is generally weak, which is also an important factor restricting the development of digitalization.

According to the 2021 Comprehensive Survey and Research Report on China's Rural Revitalization, education level is an important indicator of human capital. The survey data stated that the level of human capital in rural households is generally low. Among the population aged 15 and over, the illiteracy rate is nearly 2 percentage points higher than the national level. The tertiary gross enrolment ratio of the 18 to 22-year-old population is nearly 9 percentage points below the national level. This shows that improving the education level of the rural population is the key to driving digital development.

Secondly, the overall number of high-quality farmers is small, so there is a shortage of talent in the development of agricultural modernization and the digital economy. This problem can be alleviated to a certain extent by cultivating high-quality farmers, but just the cultivation of high-quality farmers is not enough to improve the digital economy greatly.

2.3. Weak digital infrastructure

Digital agriculture is an important driving force for China's agricultural modernization, but there is a problem with rural areas only having weak basic technology. Technological innovation that is not advanced enough will fail to truly solve the substantive problems in agricultural production. At the same time, the application of advanced technology is still in its infancy and has not been fully utilized. The development of digital agriculture is still in its early stages, which is mainly led by the government and lacks a perfect market operation process that refines policy guidance, resulting in restricted development.

The digital economy empowers rural revitalization, and data is the key support. China's agricultural data is abundant and complex, but there is a problem of data islands, which makes data collection and integration difficult. In addition, there are also problems with the quality and standardization of agricultural data, which causes difficulties in data application and analysis, and further restricts the development of digital agriculture.

2.4. The dilemma of grain yield

Grain production is the foundation of rural revitalization, but China's grain yield is facing difficulties. Although food production has remained stable, yields are only about 70 percent of the world average. So increasing grain yields is crucial to rural revitalization. China has a large population and limited land resources, which leads to the distribution of agricultural production resources and affects the increase of yield. There is a certain gap in China's agricultural production technology compared with developed countries. The outdated rural infrastructure, such as water conservancy facilities and farm roads, restricts the process of agricultural mechanization and modernization. Water conservancy facilities and farm roads are the key infrastructure to increase grain yields, but the facilities in some areas are aging and seriously damaged, and the condition of farm roads is poor, which affects agricultural production efficiency. In addition, global warming, water shortages, and declining soil quality have also brought great challenges to agricultural production.

3. The implementation path of the digital economy to promote rural revitalization

3.1. The digital economy shortens the gap between urban and rural areas

It is necessary to improve rural infrastructure and increase production and living conditions to solve the problem of urban-rural disparity. The government should increase investment in rural infrastructure, including roads, water, electricity, communications, and so on, and strengthen the construction of public facilities such as sanitary toilets and garbage disposal facilities.

The government should guide farmers to develop modern agriculture skills, promote agricultural science and technology, cultivate new business entities such as family farms and cooperatives, and give full play to the advantages of rural characteristic industries such as ecological agriculture and rural tourism.

The government should increase investment in rural education resources, upgrade school facilities, increase the quality of teachers, and improve the level of education. At the same time, vocational education and skills training in rural areas should be promoted to improve farmers' ability to find employment and start businesses. The government should also emphasize the construction of the rural social security system and increase the intensity of assistance.

The development of the digital economy will help break the economic barrier between urban and rural areas and promote the integrated development of both areas. The construction of digital villages can improve the level of rural governance, develop rural e-commerce, smart agriculture, and other industries, alleviate the problem of information asymmetry between urban and rural areas, and provide more opportunities for the development of rural industries. This is conducive to increasing the income level of farmers, improving the quality of life, and laying the foundation for rural revitalization.

3.2. Cultivating digital village talents

Under the wave of global modernization and digitalization, it is very important to promote the construction of digital villages. Cultivating information technology talents, especially digital farmers, can achieve this goal by promoting the integration of farmers with modern agriculture and digital villages.

First of all, farmers are trained in digitalization and information technology so that they can master relevant

skills and promote the combination of digital economy and agricultural modernization. At the same time, young people are encouraged to return to their hometowns to start businesses and provide policy support. Secondly, online and offline agricultural technology training is carried out combined with the needs of agricultural development, and scientific and technological personnel are dispatched to rural areas to provide one-to-one guidance for agricultural digital production. In addition, the practical technical training for farmers should be emphasized by providing demonstrations with digital agricultural production technology as an example to stimulate farmers' enthusiasm for engaging in digital agriculture. The state should increase the number of jobs related to agricultural digitalization, promote the policy of bringing talents to rural areas, attract young people to serve rural areas, and promote agricultural modernization.

3.3. Strengthen digital infrastructure

The digital economy is rooted in digital infrastructure, which is of great practical significance for promoting the high-quality development of agriculture in rural areas and the construction of the rural digital economy. Information technology that is suited to the characteristics of agriculture should be developed to improve the efficiency and quality of agricultural production. The government should expand agriculture-related digital technology application services and provide farmers with convenient and efficient digital services to increase farmers' income and sustainable agricultural development. The development of new industries and new forms of business in rural areas can bring more employment opportunities and development space to rural areas through digital means. The Internet-of-Things technology can be introduced to monitor and manage farmland status in real-time and provide accurate farmland management suggestions. The promotion of large-scale, intensive, and intelligent transformation of agricultural production and operations can improve production efficiency and labor utilization.

The farmers can promote agricultural products to the national and even global markets through e-commerce platforms, which bypass geographical restrictions and broaden sales channels. The integration of online publicity and offline display marketing can increase consumer trust, sales, and exposure. Cultivating local characteristic agricultural products and cultural tourism services can enhance the value of products and market competitiveness, and promote the integration of online publicity and offline display marketing. A digital agricultural service platform should be established to provide a scientific basis for agricultural decision-making, resource allocation, and market sales. The construction of the traceability system of agricultural products can manage the traceability of the whole process of agricultural products through blockchain and other technologies to ensure product quality and safety.

3.4. Screening excellent varieties to increase grain yields

China's grain has great potential for higher yield, including soybean, corn, rapeseed, rice, wheat, and so on. This will help to meet the demand for a sustained bumper crop in food production and to cope with the difficulty of increasing the planted area. A comprehensive approach is needed to achieve this. First of all, it is necessary to strengthen the selection of excellent varieties and improve the quality of seeds. The use of big data and the Internet of Things can assist in screening to provide support for the improvement of grain yields. The second is optimizing the structure of land use and improving the efficiency of use [6]. This includes promoting land circulation and large-scale operation, reclaiming wasteland and saline-alkali land, and improving the efficiency of land output. The third is using poultry manure as organic fertilizer to promote the growth of crops instead of chemical fertilizer. This can be achieved by establishing a system for the collection, storage, transportation, and processing of poultry manure, improving the utilization rate and value, and encouraging farmers to use organic

fertilizer. The increase in the grain production capacity per unit will increase farmers' incomes, stimulate their enthusiasm for production, and promote the development of the rural economy and the adjustment of the industrial structure.

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