Digital Economy Driving Rural Revitalization: Current Status, Challenges, and Future Pathways

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Abstract

With the rapid development of information technology, the digital economy has become a significant driver of global economic growth. In China, the digital economy not only fosters urban development but also plays a crucial role in rural revitalization. This paper, based on a detailed analysis of elements such as digital public infrastructure, the level of digitalization of public services, and the digital transformation of industries, explores the foundational realities and implementation pathways of the digital economy empowering rural revitalization. The study summarizes the successful experiences of the digital economy in supporting rural revitalization and provides policy recommendations for future development. The research in dictates that the digital economy is gradually becoming the core driving force for rural revitalization, aiding in the sustainable development of rural areas in China.

Keywords

Rural revitalization, Digital economy, Rural transformation, Information technology, Public services, Level of digitalization

Introduction

In recent years, the rapid rise of digital economy has become an important engine of global economic growth. Report to the 20th CPC National Congress of the Party clearly pointed out that "the most arduous and arduous task of building a socialist modern country in an all-round way is still in the countryside", which highlighted the importance and urgency of promoting rural revitalization in the new era [1]. In the new journey towards the goal of the second century, it is of great practical significance to explore the realization path of rural revitalization from the perspective of digital economy. This is not only a key measure to promote the digital transformation of rural areas in China, but also an important link to promote the coordinated development of urban and rural areas.

According to the White Paper on Global Digital Economy (2022) issued by China Institute of Information and Communication, by the end of 2023, the scale of digital economy in China has exceeded 33 trillion-yuan, accounting for more than 60% of GDP [2]. The rapid development of digital economy has profoundly changed people's lifestyle and production mode, and at the same time brought unprecedented new opportunities for rural revitalization. The Party's Report to the 20th CPC National Congress further clarified that it is necessary to "comprehensively promote rural revitalization and accelerate the modernization of agriculture and rural areas", with special emphasis

on the digital upgrading of rural infrastructure and public services. This provides a solid policy foundation and a clear development direction for the digital economy to empower rural revitalization.

Although the digital economy in urban areas is quite mature, the degree of digitalization in rural areas is still relatively backward. The construction of digital infrastructure in rural areas is weak, the digital literacy of farmers is uneven, and the digital transformation of agricultural production and rural industries faces many challenges [3]. Therefore, how to effectively use the power of digital economy to promote rural revitalization has become a key issue to be solved urgently.

Empowering rural revitalization with digital economy is not only an important way to realize rural economic growth, but also a key means to improve farmers' living standards and promote the modernization of rural social governance. By deeply studying the application path of digital economy in rural revitalization, we can explore effective strategies to optimize rural economic structure, increase farmers' income and improve rural living environment. This paper aims to enrich the theoretical framework of digital economy and rural development research by systematically analyzing the role of digital economy in rural revitalization and explore how to solve rural development through digital means [4-7].

Feasibility of structural problems. This paper provides theoretical support for the government to formulate relevant policies, especially in improving rural digital infrastructure, improving farmers' digital literacy and promoting industrial digital transformation [8].

Analysis on the necessity of empowering rural revitalization by digital economy

In the process of building a socialist modern country in an all-round way, the digital economy has become the core engine to promote social and economic development, especially in solving the "three rural issues" and promoting the coordinated development of urban and rural areas [9]. The empowerment of digital economy has injected new kinetic energy and path choice into rural revitalization. This paper will systematically analyze the necessity of digital economy empowering rural revitalization from three aspects: the demand of national strategy implementation, the urgency of rural transformation and upgrading, and the necessity of improving farmers' living standards [10,11].

The demand for national strategy implementation
With the sustained development of China's economy, the imbalance between urban and rural development has become increasingly prominent. Due to weak infrastructure, lack of public services and single industrial structure, the gap between urban areas. And rural areas are widening in rural areas. To solve this problem, the state has implemented a series of strategic measures in recent years, trying to promote the coordinated development of urban and rural areas through rural revitalization. Digital economy empowerment has become a key force to promote rural modernization and narrow the gap between urban and rural areas [12].

The Outline of Digital Village Development Strategy released in 2019 points out that "digital village" is an important path for rural revitalization and a key component of the construction of digital China [13]. The outline emphasizes that digital technology should be fully utilized to promote the digital transformation of agriculture and rural areas and realize the balanced development of urban and rural public services. Since then, the digital economy has gradually become the core pillar of the rural revitalization strategy. The Digital Village Development Action Plan (2022-2025) issued in 2022 defined eight key tasks, such as upgrading digital infrastructure, smart agriculture and improving digital governance capacity [14]. In 2024, "Opinions on Learning and Applying the Experience of" Demonstrating Thousands of Villages and Renovating Ten Thousand Villages "to Effectively Promote the All-round Revitalization of Rural Areas" further emphasized

the importance of promoting the deep integration of agricultural modernization and digital technology [15].

Digital economy not only improves the efficiency of agricultural production, optimizes the allocation of resources and increases the added value of agricultural products, but also improves rural social management and the quality of life of farmers through digital public services and social governance [16]. At the same time, the digital economy shows comprehensive advantages in infrastructure construction, public services and social governance.

For example, using big data, cloud computing and other technologies to realize the digitalization of the whole agricultural industry chain and improve market competitiveness; Promote rural culture through the Internet platform and promote the development of rural tourism; The application of digital technology has also shortened the gap between urban and rural public services and realized the sharing of resources such as education and medical care.

Urgency of rural transformation and upgrading

Traditional industries in rural areas generally have problems such as short industrial chain, low added value and weak market competitiveness. The involvement of digital economy can help traditional industries complete the transformation and upgrade from low added value to high added value through technological innovation and information transformation and promote the extension of industrial chain and industrial integration. Taking intelligent agriculture and digital logistics as examples, with the help of Internet of Things, big data and other technologies, the whole process of information management of agricultural production, processing and circulation can be realized, thus improving production efficiency, reducing costs and enhancing market competitiveness. At the same time, the digital economy can also promote the development of rural tourism, promote rural culture and natural resources through online platforms, attract more urban residents to spend in rural areas,

and form new economic growth points.

Digital economy can promote the upgrading of rural manufacturing industry. Through industrial internet, intelligent manufacturing and other technologies, small and medium-sized enterprises in rural areas can realize automatic and intelligent production and improve product quality and market competitiveness. The application of digital economy not only optimizes the rural industrial structure but also enhances the overall efficiency of rural industries and enhances the sustainable development capacity of rural economy [17].

Digital economy cannot only transform traditional industries but also give birth to a series of emerging industries, which has become a new kinetic energy for rural economic development. The development of emerging industries such as rural e-commerce, digital travel and intelligent manufacturing has greatly broadened the growth space of rural economy and injected new vitality into the countryside. In addition, the digital economy can also promote rural employment, attract migrant workers to return home to start businesses, and further promote the optimization of rural population structure and the transformation of economic development model [18].

The necessity of improving farmers' living standards

Digital economy provides farmers with various ways to increase their income. First, the development of e-commerce provides farmers with a direct market-oriented channel. Farmers can directly sell agricultural products through e-commerce platforms, eliminating intermediate links and obtaining higher profits. Secondly, the digital economy has promoted the development of rural service industry, and farmers can realize diversified income by participating in emerging industries such as rural e-commerce, logistics and tourism [19].

Digital economy has promoted the transformation and upgrading of rural labor force. Through online education and skills training, farmers can learn new technologies and enhance their competitiveness, to find high-paying jobs in a wider job market. The

popularization of digital economy not only directly increases farmers' income, but also improves farmers' skill level, which makes it possible for rural labor force to flow and transform across regions [20].

Digital economy provides a new path for optimizing rural public services. The popularization of digital technology can significantly improve the level of public services in rural areas such as education, medical care and culture. For example, the popularization of distance education and telemedicine has enabled rural residents to enjoy the same educational and medical resources as urban residents, further narrowing the gap between urban and rural areas and improving the quality of life of farmers [21].

The realistic foundation of digital economy empowering rural revitalization

At present, the practice of digital economy empowering rural revitalization in China has achieved initial results.

Results, but to achieve comprehensive rural revitalization, there are still many practical challenges and constraints of development foundation. The construction of digital public infrastructure, the digital level of basic public services and the digital transformation of industries are important factors affecting rural revitalization, which need to be further discussed and improved.

The present situation and challenges of digital public infrastructure construction

Digital public infrastructure is the basic condition for the development of digital economy and plays a key role in promoting rural revitalization. Although China's rural digital public infrastructure construction has made some progress, such as the improvement of network coverage and the initial construction of smart agriculture platform, it is still obviously unbalanced and insufficient [22].

First, the network infrastructure is not perfect. Although rural areas in some developed areas have achieved full coverage of broadband networks and introduced 5G technology, the network infrastructure is still lagging in remote and economically backward areas.

For example, satellite positioning technology and geographic information systems have not been popularized in some remote areas, which limits the popularization of precision agriculture technology. It not only affects the ability of rural residents to obtain digital services but also restricts the development and revitalization of rural economy.

Secondly, the digitization level of agricultural water conservancy infrastructure is low. The traditional agricultural water conservancy facilities in rural areas are old, with large water consumption and low efficiency, and it is difficult to meet the needs of modern agricultural production. The lack of intelligent and automatic water conservancy facilities makes agricultural production in rural areas vulnerable to natural disasters, which increases the risk and cost of agricultural production. This shows that it is still an urgent problem to improve the digital level of agricultural infrastructure, especially the intelligent upgrade of water conservancy facilities.

Finally, the digitalization process of rural logistics infrastructure is still in its infancy. Although some areas have explored the new mode of "internet plus Logistics", overall, the digital level of rural logistics still needs to be improved, and the circulation efficiency of agricultural products is low, which affects the overall development of rural economy. Therefore, it is an important task to accelerate the construction of smart logistics infrastructure and promote the digital transformation of agricultural products circulation.

Improvement and limitation of digitalization level of basic public services

Digital public service is an important means to improve the quality of life of rural residents and bridge the gap between urban and rural areas. In recent years, with the popularization and application of digital technology, the digitization level of basic public services such as education and medical care in rural areas has been significantly improved, but there is still a certain gap compared

with cities.

In terms of education, information equipment in rural schools is gradually popularized, and the application of smart classrooms is also being promoted. However, the digital literacy of rural teachers is uneven, and the distribution of teaching resources is uneven, which leads to the gap between the education quality of rural students and that of urban students. This phenomenon shows that to improve the digital level of rural education, it is necessary not only to build hardware facilities, but also to strengthen teachers' digital literacy training and the sharing of high-quality educational resources.

In terms of medical care, the promotion of telemedicine services enables rural residents to enjoy convenient medical services to a certain extent. However, the digital literacy and professional level of rural primary medical teams still need to be further improved. The allocation of medical resources is unbalanced, especially in remote areas, and there are still problems of insufficient supply and poor management of medical services. It restricts the quality and accessibility of rural medical services, and it is urgent to improve it by improving the digital level and management ability of medical teams.

Although the digital development of basic public services has achieved certain results, it is necessary to further narrow the gap between urban and rural digital services and improve the quality and coverage of rural public services to truly revitalize the countryside

Present situation and development bottleneck of industrial digital transformation

Industrial digital transformation is an important engine to promote rural economic development. However, the digital transformation of rural industries in China is still in its infancy, facing many challenges and bottlenecks.

The digital foundation of rural industries is weak. The traditional industrial chain in rural areas is short, and the products are mainly primary products, lacking effective docking with the middle and high-end market. This industrial structure not only limits the sustainable development of rural economy but also affects the depth and breadth of industrial digital transformation. To promote the digital transformation of rural industries, we must adjust the industrial structure, enhance the added value of products, and promote the deep integration of rural primary, secondary and tertiary industries.

The practical experience of digital transformation is insufficient. Although some areas have made beneficial explorations in industrial digitalization, overall, the digital transformation in rural areas still lacks mature models and experiences. The popularization rate of scientific and technological achievements is low, and there is a gap between digital technology and industrial management subjects, which makes the digital transformation of rural industries face great resistance. Therefore, under policy guidance and technical support, we need to actively promote successful experiences, accelerate the application of digital technology in rural industries, and enhance the overall competitiveness of rural industries.

Insufficient policy support for digital economy to empower rural industry development. Although the state has issued several policies to support the digital development of rural industries, in the specific implementation process, the landing effect and implementation of the policies still need to be strengthened. In guiding the digital transformation of rural industries, local governments need to further strengthen the coordination of policies and the integration of resources to form a joint force for the digital development of industries.

The path choice of digital economy empowering rural revitalization

To give full play to the role of digital economy in rural revitalization, we must systematically explore ways to improve farmers' participation in digital application scenarios, promote the digital upgrading of agricultural and rural production factors, and promote the digital transformation and upgrading of

traditional industries.

Improve farmers' participation in digital application scenarios

Farmers are the main body of rural revitalization, and improving their digital literacy and skills is the key to realizing rural revitalization. In the Report on Investigation and Analysis of Rural Digital Literacy in China under the Background of Rural Revitalization Strategy, the score of farmers' digital literacy is only 35.1, which is about 37.5% lower than that of urban residents. To improve farmers' participation in digital application scenarios, we should first improve the digital skills training system. For example, local governments can set up skills training schools in conjunction with vocational colleges, set up characteristic agronomy classes according to the actual needs of farmers, and provide services such as agricultural technology and legal consultation. At the same time, we should also promote the digital transformation of rural infrastructure, accelerate the construction of 5G base stations and smart logistics infrastructure, and further improve the digital level of rural areas.

Promote the digital upgrading of agricultural and rural production factors

As a new factor of production, data has become a key force to promote economic development. To speed up the digital transformation of rural areas, it is necessary to scientifically and reasonably carry out macro-control of resource elements and ensure the rational distribution of capital, talents and other elements. First, take information as a new factor to promote the development of digital agriculture, and comprehensively manage agricultural production through information means. For example, Wuxi City, Jiangsu Province, promotes unmanned agricultural production through information technology, and Zeng Cheng District, Guangzhou City, builds "Digital Agriculture Silicon Valley" and other typical cases, which provide the whole country with experience for digital agriculture development. Second, promote the deep integration of data elements and traditional production factors. For example, combine data elements with local

cultural resources and industrial and commercial capital to further release the vitality of traditional elements and promote the high-quality development of rural economy.

Promote the digital transformation and upgrading of traditional industries

Promoting the digital and intelligent transformation of traditional industries is the key to improving total productivity and expanding the new space of industrial integration. First, we should optimize the rural industrial structure, empower the layout of rural industrial chain through the digital economy, and promote the modern transformation of rural industries. Secondly, we should increase investment in rural industrial science and technology innovation and build a modern economic system. For example, Junlian County, Yibin City, Sichuan Province has created a sustainable development model combining ecology and economy by integrating "smart agriculture" into the tea industry park. Finally, enhance the innovation kinetic energy of rural industries. For example, the establishment of rural entrepreneurship incubation bases will promote the digital development of rural e-commerce and cultural tourism industries and inject new development momentum into the rural economy.

Future prospect of digital economy empowering rural revitalization

In the future development process, the digital economy will further penetrate all fields of rural revitalization, providing sustained impetus for the all-round development of rural economy, society and culture. However, to achieve this goal, we need all-round support and guarantee in terms of policies, technology, talents and funds.

The continuous strengthening of policy support

Policy is an important guarantee to promote rural digital transformation. National and local governments should continue to strengthen policy support for rural revitalization, formulate more specific and operational implementation plans, and provide a good policy environment for digital

economy to empower rural revitalization.

For example, relevant laws and regulations should be further improved to ensure the standardized application of digital technology in agriculture, education, medical care and other fields, and to protect farmers' digital rights and interests. At the same time, we should also strengthen policy support for rural digital infrastructure construction to ensure that all localities can smoothly promote rural digital transformation.

Deepening application of technological innovation

Technological innovation is the core driving force for the development of digital economy. With the continuous maturity of technologies such as 5G, big data and artificial intelligence, the speed and depth of rural digital transformation will be further accelerated. For example, through the Internet of Things technology, the whole process of agricultural production can be monitored and managed to improve production efficiency and resource utilization; Ensure the traceability and quality safety of agricultural products through blockchain technology; Through artificial intelligence technology to improve the effect of farmers' digital skills training and promote the improvement of rural education and medical level.

All-round promotion of talent training

Talent is the key factor to promote the development of digital economy. The success of rural digital transformation depends on whether enough digital talents can be trained and attracted. Therefore, we should strengthen the training of rural digital talents and establish a perfect talent training and introduction mechanism. For example, through vocational education and continuing education, improving the digital literacy of rural grassroots cadres and farmers; Through preferential policies and living security measures, we will attract urban digital talents to work in rural areas and promote the development of rural economy.

Diversified expansion of capital guarantee

Capital is an important guarantee for digital infrastructure construction and technology promotion. Rural digital transformation needs more diversified sources of funds; besides government financial input, it should also attract social capital and international investment. For example, through the establishment of townships Village digital economy special fund to support rural digital infrastructure and industrial construction; By establishing PPP (public-private partnership) model, attract enterprises to participate in the investment and operation of rural digital transformation projects; By introducing international cooperation projects and learning from foreign advanced experience and technology, we will accelerate the pace of rural digital transformation in China.

Conclusion

Empowering rural revitalization by digital economy is an inevitable choice for rural development in China in the new era, and it is also a strategic measure to promote rural comprehensive revitalization. By discussing the necessity, realistic basis and path choice of digital economy to revitalize rural areas, we find that digital economy has injected new kinetic energy into solving the problems of agriculture, rural areas and farmers, narrowing the gap between urban and rural areas and promoting rural digital transformation.

The strategic significance of digital economy in rural revitalization is far-reaching. It not only promoted the process of social modernization in China but also provided new development opportunities for rural revitalization. The wide application of digital technology has improved the rural infrastructure construction, enhanced farmers' digital literacy and quality of life, and significantly improved agricultural production efficiency and market competitiveness.

However, the development of rural digital economy in China is still in the primary stage and faces many challenges. Although progress has been made in the construction of digital infrastructure, the digitalization of public services and the digital transformation of industries, the coverage of infrastructure in remote areas is insufficient, the

digital transformation of industries is slow, and the shortage of skilled digital personnel still needs to be solved.

This paper suggests that rural revitalization can be further promoted by increasing farmers' participation in digital application scenarios, promoting the digital upgrading of agricultural and rural production factors, and accelerating the digital transformation of traditional industries. These measures will not only improve the digital level of rural areas but also inject new vitality into rural economy and promote sustainable development.

In the future, with the development of digital economy and the wide application of new technologies, rural areas will.

The connotation of revitalization will be more abundant. Governments at all levels and all walks of life should strengthen cooperation, further increase policy support and capital investment, promote the deep integration of digital technology with rural economic and social development, and ensure the full implementation of the rural revitalization strategy. This is not only an important way to achieve common prosperity, but also an important part of promoting China's social modernization.

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Conflicts of Interest

The authors declare no conflict of interest.

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