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Digital Economy Empowers Rural Ecological Construction

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Abstract: Due to the promotion of policies such as rural revitalization, the continuous improvement of rural living standards through digitization, and the gradual narrowing of urban-rural income gap, the construction and governance of ecological civilization in rural areas have also entered an important strategic development period. This article first explains the concepts and theories of digital economy and rural ecology, and then summarizes the current development status and problems of digital economy empowering rural ecological construction through a large amount of literature. Finally, from the perspectives of economics, environmental science, and other disciplines, it provides development strategies and relevant suggestions for digital economy empowering rural ecological construction.

Keywords: Digital Economy; Rural Ecology; Ecological Construction; Rural Development.

1. Introduction

In February 2023, the Central Committee of the Communist Party of China and the State Council issued the "Overall Layout Plan for the Construction of Digital China", which proposed to "deeply implement digital rural development actions, empower rural industrial development, rural construction, and rural governance with digitization". With the development and popularization of digital technology, digital economic activities have also begun to emerge in rural areas [1]. In order to attract digital economy enterprises and investment, rural areas need to provide modern infrastructure, communication networks, and services, which may lead to land development, natural resource consumption, and ecological environment damage.

The proposal of empowering rural ecology with the digital economy indicates the need to attach importance to rural ecological protection and sustainable development while developing the digital economy. Corresponding policies and measures need to be formulated to promote the healthy development of rural digital economy, while protecting the ecological environment, improving the digital capabilities of rural areas, and seeking coordination and balance between digital economy and ecological development.

This article conducts relevant research and analysis on the background and social significance of this research, focusing on the current situation of digital economy and rural ecology, and provides development suggestions.

2. Related Concepts

The concept of the digital economy: Don Tapscott, the father of the digital economy, first proposed the concept of the digital economy. The digital economy refers to a new economic form based on digital technology that promotes economic development and social change through digitization, networking, and intelligence. The core of the digital economy is information and data. Through the application of digital technology, efficient flow of information, intelligent analysis of data, and innovative digital services can be achieved. The development of the digital economy can bring multiple benefits such as economic growth, employment opportunities, and improvement of innovation capabilities.

The concept of rural ecology: Rural ecology includes natural resources, agriculture and biodiversity, ecotourism, and residents' health and environmental quality. The development of rural ecology includes promoting the transformation of agricultural production methods, promoting agricultural ecology, recycling, and greening, and improving agricultural production efficiency and farmers' income.

The concept of digital economy empowerment: Digital economy empowerment refers to the process of bringing new opportunities, efficiency, and creativity to individuals, enterprises, and society through the application of digital technology and the Internet. The digital economy empowers the use of technology to provide growth and development momentum for various fields of the economy and society. The empowerment of the digital economy is reflected in various aspects such as innovation driven, breaking barriers, improving production efficiency, and enhancing user experience. At the same time, the empowerment of the digital economy has created new employment opportunities. Overall, the concept of empowering the digital economy emphasizes the positive impact of the application and innovation of digital technology on various aspects of the economy, employment, society, and environment.

3. Theoretical Basis and Literature Review

At present, the research on digital economy empowering rural ecological construction in the domestic theoretical community originates from the proposal of digital rural development strategies. With the development of recent years, the relevant theories of digital economy promoting rural revitalization have gradually matured. Focuse on literature on rural ecological construction and digital economy in the past

three years.

He Weida, Wen Jialong, and Zhang Manyin (2022) based on panel data from 29 provinces (autonomous regions, municipalities directly under the central government) in China from 2006 to 2018, found that the development of the digital economy has a significant positive promoting effect on the improvement of ecological efficiency. The level of economic development, industrial structure optimization, and technological level are also important factors in promoting the improvement of ecological efficiency[2]; He Leihua, Wang Feng, and Wang Changming (2022) empirically tested the driving effect, mechanism, and heterogeneity characteristics of the digital economy on rural revitalization based on the measured digital economy development index and rural revitalization index in "How does the digital economy drive rural revitalization?" They clarified the importance of the digital economy in rural development [3]; Zhang Xiaomei (2023)explained the importance of improving the institutional system on the road of rural ecological civilization constructionin ". The Dilemmas and Paths of Rural Ecological Civilization Construction", pointed out the project difficulties, and proposed constructive and feasible measures [4]; He Minggao and Chen Xi (2023) comprehensively applied high-tech and management science theories to design an ecological agriculture system that integrates the digital economy and the real economy in "Research and Application of Whole Industry Chain Modern Ecological Agriculture Empowered by the Digital Economy". They constructed a complete set of "soft hard" intelligent agriculture core algorithms and system architecture, and proposed a series of specific integration methods and channels for rural ecological agriculture and digital economy [5]; Xiao Shunwu and Dong Pengbin (2023) clarified the practical difficulties faced by the digital economy serving rural revitalization in the process of Chinese-style modernization, such as the difficulties in digital industry upgrading, the lack of digital professionals, the slow construction of digital villages, the lack of digital regulatory incentives, and the lack of standardization of digital governance, and proposed relevant implementation paths [6]; Bai Fuchen, Gao Peng, and Zheng Wolin (2023) mentioned in their article "Empowering Rural Co prosperity with Ecological Resources - The Promoting Role of Digital Economy" that digital economy and ecological resource value have a driving effect on rural co prosperity. They proposed constructive suggestions from three aspects: promoting rural digital development, building ecological resource supervision, development, trading platforms, and promoting the realization of ecological resource value through digital economy empowerment [7].

The existing research by Chinese scholars indicates that the current digital economy empowers rural ecological construction, and the potential of digital economy in rural ecological construction is enormous. However, there are still problems such as weak foundation and imperfect related systems. This article will combine the current development status of digital economy empowering rural ecological construction, and propose reasonable development paths and countermeasures based on existing literature and theories.

4. Development Status

Nowadays, the role of digital economy in rural ecological construction mainly relies on modern digital technology to develop a new model of green and efficient development of rural ecological industries. However, research has shown that the role of digital economy in rural ecological construction often faces various practical problems in resource allocation.

4.1. Digital Technology Helps Optimize and Upgrade Industries, But the Government's Efforts to Rectify the Industrial Ecology are Insufficient

The development of rural industrial ecology can be achieved through overall planning, strengthening the design of industrial chains, and gradually integrating digital technology into industrial development. Compared with traditional industrial elements, emerging elements such as digital and information have improved industrial production efficiency through a more comprehensive application system. It has driven the aggregation of various factors into the industry, and with the assistance of traditional factors such as manual labor and capital costs, it has improved the efficiency of manufacturing, distribution, marketing, and played its role in promoting the improvement of the manufacturing industry.

The digital and intelligent development to frural industries urgently requires coordination and cooperation between the government and the market. Firstly, the government increases capital investment while attracting social capital to join. Secondly, increase the construction of industrial digital infrastructure and improve the efficiency of rural network services. Adopting digital technology to strengthen rural road construction, utilizing satellite navigation technology to update rural road routes in real-time, and automation technology can promote the construction and improvement of rural logistics systems.

However, due to the allocation of funds and resources by local governments, although rural governments have increased their emphasis on rural ecological construction in recent years, due to the multifaceted nature of ecological rural construction, abundant funding requirements, and long construction cycles, most governments find it difficult to achieve significant construction results in a short period of time due to insufficient financial support.

4.2. Digital Technology Accelerates Agricultural Technological Innovation, and Villagers Generally Lack Enthusiasm for Participating in Infrastructure Construction

The digital innovation of rural agricultural industry chain involves technologies such as the Internet of Things, artificial intelligence, cloud computing, and blockchain, while also combining data bases such as meteorological geography, ecological environment, and agricultural production.

From the technical route analysis of the digital agriculture industry chain, the current digital agriculture integrates satellite positioning technology, remote sensing technology, etc., and enables science and technology to collaborate with agricultural planting related disciplines to create a closed digital information system:

The Internet of Things technology uses intelligent technologies such as sensors and monitoring devices to enable people to understand and control the growth of plants in real time during the agricultural planting process, reduce labor loss, ensure the quality of product growth, improve product yield, and achieve real-time monitoring and data collection of key nodes such as farmland, aquaculture farms, and agricultural product processing, thus achieving information

and intelligent management of the entire agricultural industry chain.(2) Usingbig data analysis and artificial intelligence, through data collection and analysis, combined with intelligent technology, to provide prediction and decision support in agricultural production, market, supply chain, and other aspects, optimize decision effectiveness, and promote the rational allocation of production resources.

However, due to the limitations of villagers' cultural awareness level and rural technology level, it is difficult to gather and efficiently carry out digital rural ecological construction, which directly leads to a low level of execution by rural governance teams and incomplete implementation of policies. In this situation, the efficiency of digital governance cannot be rapidly realized, and the level of rural autonomy cannot be improved, resulting in a lower level of digitalization of the overall rural governance system.

4.3. Digital Technology Drives the Adjustment of Financing Structure, But the Cutting-Edge Application of Ecological Technology is Weak

Utilize digital technology to create a digital financing platform, absorb infrastructure construction funds from multiple aspects, and improve the efficiency of social resource allocation. In recent years, building a green, ecological, and low-carbon modern rural ecological industry system has gradually become the development direction of rural industrial revitalization. The digital economy can provide technical support for industrial development, change the outdated mode of traditional rural industries, and promote the economization and ecology of e-commerce flow. Provide new dividends for rural ecological industries that innovate green production methods.

The livable environment on the road to rural revitalization is closely related to the lives of villagers. Although some areas advocate the improvement of rural toilets and gradually promote the reuse of rural household waste, the current treatment of rural domestic sewage is a significant weakness and has significant resistance to ecological construction. This to some extent reflects the weak application of rural ecological technology.

4.4. Digital Technology Promotes the Integration and Development of Industries, and There are Few Talents Supporting the Construction of Digital Intelligence

The integrated development of rural related industries mainly relies on the digital economy, which transforms the new and old driving forces from theoretical analysis, quantitative measurement, and influencing factors, in order to achieve high-quality integrated development of rural industries. Digital technology is an important driving force for promoting dynamic changes in industrial synergy, and technological innovation plays a crucial role in connecting the entire industrial chain. Therefore, utilizing technology to intelligently transform rural industries can connect with other industries, strengthen the relevance of rural industries, and further integrate rural ecological industries.

The above development methods have measures and policies in the current rural construction, but empowering rural ecological construction with digital economy requires a large number of digital talents and agricultural technology talents. At present, the reserve of technical talents in rural areas is relatively small, which leads to insufficient integration of rural industries.

5. Existing Problems

5.1. Incomplete Policies and Incomplete Implementation

(1) The relative lack of coordinated policies and regulations has led to insufficient guarantees for digital rural construction [8]. Both the government and enterprises are striving to promote rural revitalization, but the collaborative work in policies and regulations still needs to be further strengthened.

(2) The mechanism for introducing rural talents still needs to be vigorously promoted and fully covered. The talent gap is an important factor that currently restricts the digital and intelligent transformation of rural industries. At the National Organization Ministers' Meeting, it was proposed that currently, we need to increase the construction of talent teams for rural revitalization, and empower rural revitalization with talent revitalization.

(3) The construction of rural information infrastructure still needs to be accelerated. This not only includes traditional infrastructure construction, but also requires attention to the application and promotion of digital technology to promote the modernization of agriculture and rural areas.

5.2. Technical Constraints

(1) Backward digital infrastructure in rural areas: The network facilities and digital equipment in rural areas are relatively backward, which limits the application of digital technology in rural ecological construction. We need to strengthen the construction of digital infrastructure in rural areas, improve network coverage and the popularization of digital equipment.

(2) Difficulty in integrating agricultural data: Agricultural data involves multiple links such as production, circulation, and sales, but currently these data are scattered across different departments and institutions, making integration difficult. It is necessary to strengthen data sharing and integration across departments and institutions to form a complete agricultural data system.

(3) Insufficient application of agricultural intelligence technology: Agricultural intelligence technologies such as intelligent irrigation, intelligent fertilization, and intelligent prevention and control are relatively less applied in rural ecological construction. It is necessary to strengthen the research and application of agricultural intelligent technology, promote the digitization of agricultural production, and improve the efficiency and sustainability of agricultural production.

(4) Information security risk: The application of digital technology involves a large amount of data collection, storage, and use, which poses information security risks. We need to strengthen information security management to ensure the personal information security and privacy rights of farmers.

5.3. Industrial Scale Constraints

The proportion of industrial structure in Anhui Province in 2021 is7.9:40.5:51.6, adjusted to 7.8:41.3:50.9 in 2022.Among them, the proportion of the primary and secondary industries is relatively high, while the proportion of the tertiary industry is50.9%. By comparison, the proportion of the three industries in China in 2022

was7.3:39.9:52.8, respectively. By comparison, it can be seen that the proportion of the primary and secondary industries in Anhui Province is slightly higher than the national average, while the proportion of the tertiary industry is lower than the national average. The proportion of the tertiary industry in Anhui Province has decreased, the development speed of the ecological industry has slowed down, limiting sustainable economic growth, reducing opportunities for green employment, and reducing the possibility of innovation and technology transfer. This may affect the people's sense of gain, happiness, and security from the coordinated development of the ecological environment and economic construction, and hinder rural ecological construction.

5.4. Few Digital Talents

The digital integration development of rural industries requires human support, and the demand for talent is mainly reflected in the digital professional talent. Therefore, to rely on the digital economy to support rural construction, sufficient digital talents are needed. However, due to multiple factors such as rural environment and economy, most rural areas are unable to attract more digital professional talents to return to their hometowns for entrepreneurship and employment. The results of the third agricultural census in Anhui Province show that the number of agricultural workers in Anhui Province is decreasing. In 2016, the number of agricultural workers in the province was 15.57 million, a decrease of 588000 compared to 2006.There are less than 50000 agricultural technology promotion talents in the province, with a significant gap.

At the same time, the survey shows that the number of talents trained in agricultural related majors in universities is relatively small, which cannot meet the current development needs. However, due to farmers' conservative awareness, low awareness of digital construction, limited application of various cutting-edge information technologies, and lack of relevant digital technology training, the overall digital literacy ofvillagers is low, making it difficult to use digital technology to promote industrial production, carry out business management, and sell characteristic products. This greatly limits the channels for villagers to increase their income and become rich.

6. Countermeasures and Suggestions

6.1. Improve Policy Systems

Establishing a sound "digital+green" system is conducive to alleviating the problem of low integration between the digital economy and rural ecological construction. In response to the low coverage of digital equipment in rural areas of Anhui Province, further efforts should be made to promote the construction of digital infrastructure such as broadband communication equipment and mobile internet in rural areas of Anhui Province, accelerate the digital upgrading and transformation of rural infrastructure, and achieve full coverage of digital infrastructure as soon as possible. In terms of talent cultivation, attention should be paid to the cultivation of digital ecological composite talents. It is necessary to proficiently apply digital equipment, understand the digital economy, and have the ability to work hard and be willing to conduct in-depth research on the current situation of rural ecology at the grassroots level. In terms of publicity, we advocate that "green waters and green mountains are golden mountains and silver mountains", cultivate the long-term vision of the public regarding the sustainable development of green agriculture, and enhance the endogenous motivation of the public to build green rural areas. Enhance farmers' recognition of the digital economy, accelerate the process of organizing "digital classrooms into rural areas", truly implement digital education in rural areas, encourage farmers to actively learn information knowledge, and guide the public to participate in the task of empowering rural ecological construction with the digital economy.

6.2. Industrial Technology Improvement and Application

Digitalization, collaboration, and greening jointly contribute to the development of rural industrial technology. Under the influence of the digital economy, through intelligent platforms for precise calculation, coordinating various production links to optimize agricultural resource allocation, saving production costs, improving agricultural production efficiency, achieving precision production, promoting the transformation of agricultural production to standardization and scale, and promoting high-quality transformation and upgrading of rural industrial structure. Pay high attention to the high energy consumption and easily polluting links in the production process, monitor and rectify them in real time, achieve refined management, reduce carbon emissions, save energy consumption, and achieve sustainable agricultural development. When combining digital information technology with its own resources, emerging industries such as tourism and agriculture can develop rapidly through big data, cloud computing, and the Internet of Things; Developing digital technologies that are highly compatible with the development of local industries, taking into account local conditions, so that they can be truly applied in industrial transformation and upgrading; Empowering the entire industry chain through digital technology, promoting digitization in various aspects such as production, processing, and sales, thereby saving costs and improving efficiency. By using digital technology to form the entire industrial chain of rural industrial output sales, it can enhance the comprehensive operational benefits of agricultural resource utilization, pollution reduction, and strive to protect and develop in development.

6.3. Rural Green Finance Industry

The development of rural digital economy generates financing demand that cannot be separated from the support of green finance industry. Increase financing dividends, lower the financing guarantee threshold for rural enterprises, establish convenient financial consulting and service institutions, improve the financing mechanism for rural enterprises, encourage rural enterprises to collaborate in financing, promote the development of green finance in rural areas and the financial inclusion of farmers. For ecologically fragile rural areas, efforts should be made to pilot strong liability insurance for environmental pollution, promote relevant green insurance, alleviate financial pressure on rural enterprises, and strengthen their sense of responsibility for rural environmental governance, promoting coordinated economic and environmental development.

6.4. Complete Legal Provisions

A sound legal system is an important guarantee for empowering rural economy through digital economy. In terms of legislation, it should be based on the different ecological

environment status and digitization process in each village, widely gather public opinion, and revise various legal provisions on the integration of digital economy and rural ecological environment protection in a targeted manner to fill the legal gap and ensure that there is a legal basis. In terms of law enforcement, we will strengthen the supervision mechanism for rural law enforcement, purge the law enforcement team of rural cadres, improve the ability of law enforcement personnel, and ensure strict law enforcement. Forming a strong deterrent force, allowing villagers to consciously establish legal red lines and moral bottom lines in their hearts, cooperate with the integration of digital economy and rural ecology, and improve policy execution.

6.5. Strengthening People's Consciousness and Talent Cultivation

Through digital technology for rural green production and the construction of rural green consumption platforms, farmers' enthusiasm for using green technology can be enhanced, their sense of identification with environmental protection concepts can be enhanced, and their ability to take action on green production and consumption can be formed. They can establish a conscious behavior towards green manufacturing and consumption, and use digital internet platforms to promote and explore the unique ecological and cultural values of rural areas, It can broaden the development path from "green waters and green mountains" to "golden mountains and silver mountains".

Strengthen the cultivation of agricultural majors and digital talents in universities, and encourage new era talents to enter rural areas through measures such as improving policies and increasing subsidies. At the same time, technical training will be provided to farmers to ensure the practical application of information technology.

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