

Accelerating the Digitalization Process in Rural China and Promoting Common Prosperity

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Abstract Under the historical background of promoting agricultural and rural modernization in an all-round way, this paper deeply analyzes the practical significance of digital construction in rural China, and explores the problems in the digitalization level of rural infrastructure, farmers' digitalization awareness and accomplishment, and agricultural digital system. Countermeasures and suggestions are put forward from four aspects: digital village construction policy system, rural digital infrastructure construction, rural digital talent cultivation system, and agricultural digital system, and the rural digital construction of Huzhou City is taken as an example, in order to further realize the goal of empowering rural farmers with digital technology for common prosperity.

Key words Digital village, Digital technology, Rural farmer, Common prosperity

1 Introduction

In 2000 and 2003, Xi Jinping made strategic plans for "Digital Fujian" and "Digital Zhejiang", respectively, which became the ideological source and practical starting point for the construction of digital China, laying a foundation for the construction and development of "digital China". Since the 18th National Congress of the Communist Party of China, regarding the construction and development of "digital China", the CPC Central Committee and the State Council have successively promulgated and implemented policy documents, such as national cyber development strategy, national big data strategy, digital economy development strategy, the 14th Five-Year Plan for informatization planning, "20 measures" for data and overall layout plan for the construction of digital China, to drive the transformation of production, life and governance patterns through digitalization, and accelerate the construction of digital China, in order to inject strong impetus into building a modern socialist country in an all-round way and promoting the great rejuvenation of the Chinese nation^[1].

Digital village construction is a vital way for rural economic and social development, an important driving force for rural revitalization and common prosperity, and an important way to realize agricultural and rural modernization. In 2015, Lai Zhongxiong published an article titled "Internet + agriculture, the road to modernization of Fujian agriculture" in Fujian Daily. In recent years, China has attached great importance to the construction of digital village. In 2018, the No. 1 central document proposed for the first time to implement the digital village strategy. Subsequent-

ly, China has taken a series of measures to accelerate the construction of digital village. In 2019, the *Outline of Digital Village Development Strategy* proposed that digital village is not only a strategic direction for rural revitalization, but also an important part of building a digital China. In 2023, the No. 1 central document put forward the requirements of "in-depth implementation of digital village development actions and promotion of digital application scenarios". Rural digital construction has become an important part of promoting the implementation of China's rural revitalization strategy. Digital construction promotes the all-round upgrade of agriculture, the comprehensive progress of rural areas, and the comprehensive development of farmers, and accelerating village digital construction is an effective way to promote common prosperity^[2]. In view of this, this paper analyzes the practical significance and existing problems of digital construction in rural China, and puts forward some countermeasures and suggestions for reference.

2 Practical significance of digital village construction

2.1 Digital village construction will activate new driving forces for rural revitalization

Digital village is a modern rural organization model built with the endogenous characteristics of intelligent agricultural economy, informatization of farmers' skills and networking of rural development, which provides a strong driving force for rural economic and social development by empowering and enhancing the agricultural and rural modernization development through digitalization, thus promoting common prosperity and realizing the strategic goal of digital China and rural revitalization at an early date. Building digital village is of great strategic significance for promoting the integrated development of urban and rural areas, promoting the comprehensive revitalization of rural areas, promoting common prosperity, and solving the problem of unbalanced and inadequate development. In recent years, with the

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rapid development of the new generation of digital technologies, digital economy has become a global trend, and the construction of modern new villages combined with emerging technologies can help rural revitalization^[3]. It can find ideas for characteristic industries, find ways for farmers to get rich and find a path for rural revitalization by strengthening the deep integration of emerging information technology with agriculture and rural areas, creating new forms of modern rural business, and accelerating the construction of smart agricultural service platforms, thus accelerating the construction of a modern rural industrial system. Rural digital transformation is an important measure to comprehensively promote rural revitalization in the new era and new journey.

2.2 Digital village construction promotes equal access to public services in urban and rural areas Equalization of urban and rural public services is an important path to achieve the goal of rural revitalization and common prosperity. With the development of The Times, the emergence of digital technology provides a new way to solve the problem of urban and rural public service equalization. According to the *2021 National County Digital Agriculture Rural Development Level Evaluation Report*, the overall level of digital agriculture and rural informatization development in Zhejiang Province in 2020 ranked first in China. In addition, a total of 26 counties (cities and districts) in Zhejiang Province were awarded "2021 Advanced Counties in the Development of Agricultural and Rural Informatization at the National County Level". Zhejiang has achieved remarkable results in rural digital construction and urban-rural integrated development. Hence, the application of digital technology to urban and rural public services can effectively promote the equal development of urban and rural public services^[4]. The construction of digital village has strengthened the endogenous supply capacity of rural public services, and further narrowed the development gap between urban and rural areas, thus promoting the equalization of urban and rural public services.

2.3 Rural digital technology platform connects thousands of villages and millions of households and is an important carrier to realize common prosperity In recent years, with the accelerated innovation in the Internet, big data, blockchain and other technologies, it can provide an important boost to promote the common prosperity of farmers and rural areas by grasping the development trend and law of digital economy. There are a large number of scattered agricultural production service demands in rural areas. However, the new agricultural production social service platform built by the combination of Internet and Internet of Things technology can provide an effective way to meet these demands, and promote the large-scale introduction of rural agricultural varieties, inputs, equipment and technologies to small farmers by integrating, adjusting and optimizing offline service resources, so as to reduce production cost and promote common prosperity. The Thousand Vegetable Plots Project is a typical example. It is reported that the Thousand Vegetable Plots Project is a new three-party win-win public welfare model of "thousand enterprises helping

thousand villages" and "thousand families helping thousand households". The plan, led by Lai Jinfeng, is to contact volunteers from all walks of life through cooperatives to form public welfare groups, mobilize farmers to reclaim restricted land for ecological farming, and then claim agricultural products by enterprises to provide ecological capital for farmers. The implementation of the project not only opens up a market for farmers' agricultural products, increases production and income, but also provides consumers with green and original ecological food, showing a win-win model. In addition, Zhuyi Village in Daoming Town, Chongzhou City, Sichuan Province create a brand and "production, manufacturing, sales, consumption" whole-process industrial big data platform by deeply integrating digitalization and bamboo weaving industry, which not only help improving and upgrading the bamboo weaving industry, but also promote the formation of a modern agricultural smart service ecosystem with multi-party linkage and online and offline integration of production and marketing coordination. The transformation of agriculture and rural areas driven by digital technology to foster new business forms and models, such as creative agriculture, adopted agriculture, and the integration of agriculture and tourism, can speed up the solution to the basic and overall problems that restrict the development of "agriculture, rural areas and farmers".

3 Problems in the construction of digital village in China

3.1 The digitization level of rural infrastructure is generally low The construction of digital village is based on emerging information technologies such as 5G, the Internet of Things, big data, and artificial intelligence, and agricultural blockchain and agricultural Internet platforms are created to make digital technology deeply integrate with agriculture and rural farmers and promote the digital transformation of rural areas, so as to improve agricultural production efficiency, promote rural economic development and rural revitalization, and ultimately realize common prosperity. Therefore, the digitization level of rural infrastructure is associated with the development process of digital village construction. Statistics from the China Internet Network Information Center show that as of March 2020, the Internet penetration rate in China's rural areas had reached 46.2%, but the digitalization levels of rural infrastructure such as rural transportation, rural energy, water conservancy projects, agricultural industry and cultural, health and education construction were still relatively low. In addition, some natural villages and remote mountainous areas in China have blocked traffic and are far away from urban centers, and there are still phenomena such as low wireless network coverage, poor signal and slow network speed. The digital infrastructure in rural areas is relatively weak, which is not conducive to the digitalization construction of agriculture and rural areas, leading to generally low digitalization level of rural infrastructure in China. Since the out-

break of COVID-19 in 2020, China has called on students to use distance education courses, but students in some rural areas are unable to use the Internet for normal classes, which undoubtedly further exposes problems such as incomplete Internet infrastructure in rural areas of China^[5].

3.2 Farmers have low digital consciousness and accomplishment

Farmer is an important factor affecting rural digital construction. In the process of China's digital village construction, the lack of digital consciousness and accomplishment of farmers and digital operation ability is an important reason hindering rural digital transformation. With the gradual improvement of China's urban economic development level, a large number of young rural labor force choose to work in big cities, resulting in serious aging of rural labor force. *Development of National Undertakings for the Aged* published in 2018 points out that nearly 60% of the elderly over the age of 60 in China are from rural areas. According to the *Statistical Report on China's Internet Development*, as of December 2021, the Internet usage rate in rural areas was only 55.9%, and the number of Internet users in rural areas was only 41.38% of the national population, whereas the number of people who did not use the Internet in rural areas was more than 2.2 times the number of people who used the Internet^[6]; by December 2022, China's Internet penetration rate had reached 75.6%, but the number of rural Internet users was only 28.87% of China's total Internet users, and the number of non-Internet users aged 60 and above was 37.4% of China's non-Internet users^[7]. In rural areas, most of the elderly have a low level of education, little understanding and application of emerging information technology, low digital consciousness and relatively low digital accomplishment. As a result, the process of digital construction in rural China is slow.

3.3 The agricultural digital system is not yet sound

In the process of agricultural digitization construction, the collection, statistics, analysis, processing, supervision and management of agricultural data are particularly important^[5]. At present, China's agricultural digitization construction is still in the initial stage, with data acquisition mainly relying on the government and national data platform, and the ability and proportion of farmers directly connected to the e-commerce platform is not high. Moreover, because the network broadband service in some rural areas of China is not perfect with low utilization rate, it is difficult for farmers to obtain agricultural professional data. In addition, in the process of agricultural data processing, it is difficult to use conventional digital information processing software to effectively classify and summarize agricultural data due to the wide variety of agricultural products in various regions of China, miscellaneous information data sources, various types and constant variables. Chinese farmers lack digital consciousness and accomplishment, with low digital application ability, which leads to greater obstacles in processing agricultural data. Finally, digital security issues limit the realization of digital value. Digital village construction must first solve the problem of digital security, so as to promote the flow and sha-

ring of data, and give play to the driving role of data as a factor of production^[8]. At present, China has not established a sound digital information supervision and management system, and agricultural data is prone to data leakage, data tampering and unauthorized use when circulating on the Internet. As a consequence, some farmers are reluctant to share agricultural data, which makes it difficult to realize the sharing link and hinders the process of agricultural digitalization.

4 Countermeasures and suggestions for promoting rural digital construction in China

4.1 Strengthening government support and improving relevant digital rural construction policy system

In the process of rural digital construction, some rural areas are remote and there are many problems in digital construction, resulting in slow digital transformation in rural areas. Therefore, the government should increase support for areas with relatively slow digital construction by adhering to the principle of adapting to local conditions, increase investment in policy subsidies for digital transformation and digital infrastructure construction, and reasonably allocate digital construction funds to various areas with insufficient digital development in rural areas, thus accelerating rural digital construction and promoting common prosperity. Besides, the completeness of relevant policies and systems for digital rural construction is vital to the process of digital construction in rural China. Therefore, it is crucial to improve the relevant overall system and promote the specification for digital village construction. Taking the basic problems of digital village construction as the guide, the government should assume the leadership responsibility of digital village construction, formulate corresponding short-term and long-term plans according to the actual situation of the village while implementing the spirit of the central document, and arrange various departments to formulate specific work tasks and implement them, so as to constantly improve the policies and measures related to digital village construction.

4.2 Strengthening the construction of digital villages and consolidating the foundation of digital infrastructure construction for rural development

The premise of realizing rural digital economy is to carry out digital transformation of rural transportation, hydropower, energy, education, health, market and other infrastructure by making use of emerging sensing technology, computing technology and network communication technology, and build a complete rural information infrastructure system. First of all, it is necessary to increase the number of Internet and mobile communication base stations, especially in some remote villages, and connect optical fiber and mobile broadband to villages, in order to improve the Internet penetration rate. In addition, it is necessary to improve the quality of the network to get larger information carrying capacity and higher network speed, thus accelerating the digitalization, networking and intelligent development of

China's rural areas. Secondly, it is necessary to integrate digitalization and informatization with the original rural infrastructure, promote the digital transformation and intelligent development of the original infrastructure, and promote the continuous upgrading of rural infrastructure. Meantime, it is necessary to constantly improve the level of data access and sharing in rural areas, and promote the transformation and upgrading of rural agriculture by building a basic information sharing platform covering rural agricultural comprehensive information, establishing a data sharing mechanism, expanding data access ways, and improving the convenience and transparency of information access. Finally, in the construction of new infrastructure, the government should actively learn from the standards of new urban infrastructure construction, strive to narrow the "digital divide", and comprehensively promote the modernization of agriculture and rural areas.

4.3 Establishing a system for cultivating digital talents in rural areas and improving farmers' digital consciousness and accomplishment In the construction of digital villages, industry is the foundation and talent is the fundamental. The construction of digital village can not be separated from the establishment of rural digital talent team. Rural grass-roots organizations should give full play to their guiding role, and do a good job in the education and publicity of digital rural construction to change the conservative and solidified ideas of farmers and make them understand the significance of digital rural construction more comprehensively, which can help farmers actively adapt to the digital transformation of rural areas^[9]. Furthermore, local governments should formulate an action plan to improve farmers' digital accomplishment and skills according to the actual situation of local rural agriculture, expand the coverage of emerging digital technologies such as 5G, big data and artificial intelligence in rural areas, encourage colleges and universities, scientific research institutions and other departments to actively participate in cooperation, and actively call on relevant professionals to guide and train in rural areas. And according to farmers' education level, the difficulty of digital technology should be reduced appropriately to improve the learning interest and acceptance ability of farmers. Moreover, training courses on rural digital accomplishment and digital skills should be actively launched through a combination of online and offline methods, which can make farmers have more sense of participation and access in digital life, and enhance the digital concept, accomplishment and skills of rural residents.

4.4 Opening up the problem of "data silos" in agricultural digital transformation and establishing a sound agricultural digital system "Data silos" refers to the closed and semi-closed phenomena, such as asymmetry and redundancy, which are formed in the process of formation, analysis and use of data and data sets due to the incompleteness of subject initiative, object technicality, policy environment and system construction^[10]. In rural digital transformation, it is extremely important to realize the interconnection of data collection, processing and supervision.

First of all, with the support of data collection, the offline crop farming and online sales data analysis database can be established to enhance the breadth and depth of digital information penetration in rural areas. It has important guidance and reference significance for crop cultivation and sowing in other areas by understanding the growth cycle and different stages of crops via the Internet. Then, we should attach great importance to data security in terms of technology and system, build a data security system in the digital transformation of agriculture, and establish a mature legal and regulatory system for data confirmation, flow and protection. The supervision of data abuse can be strengthened through the implementation of network data security management regulations, thus improving the security of user data use. Meantime, it is also necessary to establish a good processing mechanism for security issues before and after the use of data, predict and detect data before use, and conduct online early warning management after use to improve farmers' trust in the Internet, so as to effectively promote the process of rural digital construction^[5].

5 Problems in the construction of digital villages in Huzhou City

In 2021, Zhejiang Province officially became a pilot demonstration zone for the construction of common prosperity, and Huzhou City was one of the pilots in the field of narrowing the gap between urban and rural areas. In 2023, *Zhejiang Digital Village Development Report (2022)* issued by the Zhejiang Provincial Department of Agriculture and Rural Affairs proposed that the digital village development level of Huzhou City ranked first in the province for 4 consecutive years. It can be seen that Huzhou City has achieved excellent results in the process of digital village construction, but there are still the following problems.

5.1 New infrastructure in rural areas is relatively weak In the process of building a digital village, it is particularly important to build a solid digital infrastructure. At present, Huzhou City has basically achieved the "same network speed" in urban and rural areas. 5G networks have effectively covered Huzhou central urban areas, central urban areas of districts and counties, key towns and key public areas, and the upgrading of backbone support networks has been basically completed. Although the digital economy development of Huzhou has been in a leading position in China, there are still some shortcomings and problems. The number and layout of new infrastructure such as rural 5G base stations, fiber broadband, and Internet of Things facilities in Huzhou need to be improved.

5.2 The practicality of digital application needs to be improved The significance of digital village construction is to build a basic information service platform based on big data technology, providing farmers with accurate planting and sales information in real time, helping the government make accurate decisions, expanding the sales channels and sales methods of agricultural prod-

ucts, helping local industrial restructuring, ensuring the smooth supply chain, and enhancing the value chain. However, the application level of digital agricultural technology is not high in Huzhou City, and most of them mainly carry out digital monitoring of growth environment. The actual effect of digital application needs to be improved since it is not enough to adapt to agriculture and aging, and there is still a long way to go before becoming the first choice.

5.3 Data integration and sharing is not sufficient If the digital economy wants to truly transform agricultural life, it must truly invest in all aspects of agriculture, such as rural environment, arable land, forests, fish ponds, vegetable gardens, *etc.*, in order to truly reflect the actual changes. However, due to the dispersion of agricultural and rural data resources, Huzhou City currently has a weak ability to acquire integrated data of sky and ground and a low coverage rate, which leads to the existence of data silos and insufficient excavation and use of data element value.

5.4 Digital village talent is still in short supply Rural talents with good digital accomplishment are the foundation of digital village construction. In the process of digital village construction in Huzhou City, there are still some problems such as insufficient quantity of high-quality farmers and unreasonable structure. Rural talents such as highly skilled personnel and leaders of mass entrepreneurship and innovation are in short supply. The phenomenon that village "can't afford" and "can't retain" high-end innovative talents and professional and technical talents is very common. With the increasingly vigorous development of digital technology, it has become a key issue in the construction of digital village by transforming mobile phone "new farm tools" into real productivity, developing live broadcast "new farm work" into a new business mode, and building data "new farm materials" into a new production factor. Therefore, it is crucial to improve farmers' informatization application ability and train a large number of digital rural talents.

5.5 Digital village needs to be further strengthened in promoting the equalization of public services and realizing common prosperity At present, Huzhou City is one of the regions with the smallest gap between urban and rural areas in China, and has been given the pilot task of narrowing the gap between urban and rural areas. However, it still needs to be further strengthened in promoting the equalization of public services and realizing common prosperity. By analyzing the development status of Huzhou City in recent years under the general background of building a demonstration area of common prosperity in Zhejiang, it can be seen that there are still gaps between urban and rural areas in education, medical care, income structure and consumption structure. In terms of education, Huzhou City, which is divided into three counties and two districts, has not fully realized integrated enrollment, and the urban high schools obviously have higher enrollment rate and better educational resources; in terms of medical treatment, most of the class A tertiary hospitals in Huzhou City are

distributed in the urban area (Wuxing District), so the medical condition in counties is relatively poor; in terms of income and consumption structure, cities and rural areas in Huzhou also have certain differences.

6 Solutions of digital village construction in Huzhou

6.1 Completing the short board of rural digital infrastructure Digital technology facility is a prerequisite for digital usage capabilities. The government should make up for the short board of insufficient investment in rural digital infrastructure, and actively eliminate the digital divide, creating necessary conditions for farmers to fully enjoy the digital dividend. In addition, the government should constantly promote the pilot construction of one national and four provincial digital villages, and mobilize all sectors of society to participate in the construction of digital villages, striving to achieve full coverage of districts and counties and digital rural development level evaluation in the forefront of the province for 5 consecutive years. Through the full dimensional penetration of "rural brain + Zhenong application", the government should integrate and access all kinds of agricultural basic data resources and dynamic data resources of agricultural industry development in the city, optimize the functional services of "Zhenong code", and strive to increase the number of codes by 8 million.

6.2 Strengthening the training of rural digital talents and enhancing the digital accomplishment of farmers Huzhou City should strengthen the combination of online and offline training, such as launching a wide range of farmers' mobile phone application skills training, vigorously carrying out agricultural meteorological services, agricultural machinery operation services, Internet of things equipment application, agricultural products online marketing and other information training, to improve farmers' information query, access to information, network marketing, convenient life and other mobile phone application skills, thus achieving the comprehensive improvement of farmers' information application accomplishment. In July 2021, the *Implementation Plan for Zhejiang High-quality Development and Construction of Common Prosperity Demonstration Zone* proposed to "vigorously build a global digital transformation highland", and clearly required to enrich online education methods. All units in Huzhou should implement and make full use of the "Internet + farmer education and training" sharing information platform to enhance farmers' information and cultural accomplishment, help rural personnel training, and drive the overall development of the countryside. In addition, the government should give full play to the advantages of national first "1 + 1 + N" city school cooperative agricultural promotion alliance, strengthen cooperation and exchanges with universities and institutions such as Chinese Academy of Agricultural Sciences, Chinese Academy of Social Sciences, Nanjing Agricultural University, and deepen the cultivation model of "five types of talents" for rural revitalization.

6.3 Fully integrating and sharing data to improve the practicality of digital applications

In the process of constructing digital village, Huzhou City should improve the ability of obtaining integrated data of sky and ground. Data should not only be integrated with the growing environment of crops, but also be combined with rural governance, agriculture and rural service. The digitization of rural governance should be adapted to local conditions, build a platform to solve the problem of large rural area and small population, and improve work efficiency and service ability according to the specific local conditions and realistic situation. Digital agriculture takes information as the factor of agricultural production. When making planting decisions, farmers can accurately understand the demand of a certain crop by using big data, so as to make precise planting decisions; in the planting process, the whole planting process from seed selection, sowing, management to mature harvest and then sales achieves scientific and accurate data support, making product quality more guaranteed. The combination of digital and rural services can help those villages in Huzhou City with less developed basic transportation to vigorously develop rural logistics and rural e-commerce, making it easier for villagers to shop and sell goods. In addition, through the combination of digital and rural medical care, online consultation is achieved via "online consultation, online medical treatment" technology, and farmers can receive expert consultation in the village or town, which help farmers to detect and treat diseases early, and reduce the incidence of poverty and return to poverty due to illness.

With the help of the Internet of Things, big data and 5G applications, the informatization of the whole chain of planting, management, marketing and logistics can be built, and a rural e-commerce platform is created, which help agricultural product publicity, sales and efficient logistics, and promote local entrepreneurship and economic growth. In Quanzhou, Fujian Province, Anxi tea and Dehua ceramics e-commerce have become the No. 1 in China, promoting industrial transformation and upgrading.

6.4 Further promoting the application of digital village in equalizing public services and realizing common prosperity

Huzhou is at the forefront of digital rural governance, and should further increase the application in digital education and digital health care to help achieve equal access to urban and rural public services such as education and medical care. At the same time, it is necessary to vigorously build public digital service platforms related to industries, such as agricultural production, sales, and social services for agricultural production, so as to solve the problems in rural areas due to the aging labor force, insufficient investment in agricultural funds, and information asymmetry, and promote the realization of common prosperity of rural farmers. In addition, digital education of farmers' skills can be carried out through the construction of digital villages, to enhance the knowledge and skills of rural residents in technological new life, inclu-

ding learning to use network terminals, operating intelligent machinery of the Internet of Things, operating and maintaining Internet of Things systems, *etc.*, and enhance the network knowledge and skills of rural residents.

6.5 Vigorously developing digital agriculture We should vigorously develop digital and intelligent agriculture. The introduction of the Internet of Things and big data technology can improve the efficiency of agricultural production and operation, including the use of sensors for environmental monitoring and crop monitoring, the use of intelligent machinery to achieve automated plant protection and harvesting, the use of the Internet of Things system to achieve the connectivity of full links such as production, harvest, logistics, *etc.*, to improve agricultural productivity and efficiency. Intelligent edge gateway provides powerful data acquisition capabilities, edge computing capabilities, linkage control capabilities, achieves intelligent data acquisition, intelligent equipment management and control, and is widely used in agricultural unmanned monitoring, remote equipment communication and agricultural automation control. The government should develop more digital rural application scenarios and create new business formats; build digital rural libraries, preserve agricultural cultural heritage, and achieve equal access to public cultural services.

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