Influencing Factors of Digital Village Development in China

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Digital rural construction is an important strategy for rural revitalization. In terms of dynamic evolution, the core density curve of China's digital rural construction shifted to the right between 2011 and 2021, accompanied by gradient influence and a multipolar development trend; local general budget revenue, the per capita disposable income of rural residents, rural infrastructure investment, computer ownership per 100 rural residents, added value of primary industry, education level, and rural power generation are some of the factors that affect the development level of China's digital countryside.

level influencing factors digital village

1. Introduction

The digital economy is an economic model that displays the flow of information digitally. It uses digital technologies to facilitate significant changes in economic environments and activities. The 20th National Congress of the Communist Party of China proposed continuing to comprehensively promote the rural revitalisation strategy with the overall goal of accelerating the building of agricultural power. The digital countryside is a strategic direction for rural revitalisation. In the new development stage, the construction of a digital countryside provides new opportunities to improve agricultural production efficiency, activate rural resources, and broaden farmers' income channels. Over the past decade, China has developed and implemented digital technologies rapidly. The spread and spatial spillover effects of digital technology have significantly changed China's industrial and economic structures. The comprehensive application of big data, the Internet, artificial intelligence, blockchain, satellite remote sensing, and other technologies in agriculture and rural areas will bring about innovation in agricultural production technology and in agricultural commercial formats, as well as the modernisation of rural governance. Digital village construction is not only a strategic direction for rural revitalisation but also an important part of the construction of digital China. The Chinese government attaches great importance to the construction of a digital countryside. The Outline of the 14th Five-Year Plan (2021–2025) for National Economic and Social Development proposes accelerating the construction of digital rural areas, building a comprehensive agricultural and rural information service system, establishing an inclusive service mechanism for agriculture-related information, and promoting the digitalisation of rural management services. Recently, the Chinese government has widely applied digital technologies in various fields, such as rural industry, people's livelihoods, and rural governance. In digital agriculture, 5G, the Internet of Things, and big data are used to assist agricultural modernisation, build a new agricultural management model, and simulate, monitor, judge, forecast, and recommend the whole process of

agricultural production, from planning, investment, and production to harvest, processing, and sales, to reduce costs and improve resource utilisation, production efficiency, product quality, and the ecological environment. Digital information platforms will be built to promote the development of new forms of business, such as rural e-commerce and online live broadcasting, so as to increase farmers' incomes and rural prosperity. In terms of rural governance, digital technology is used to build a rural governance platform, and WeChat is used to inform government policies. Video phones are used to construct a "mobile conference hall" for village affairs, which integrated government services, and improved the efficiency of public affairs. In 2022, China's National Development and Reform Commission issued the Action Plan for Digital Rural Development (2022–2025): "By 2025, 4G will be further popularized in rural areas, 5G innovative applications will be made, and the digitalisation of agricultural production and operations will be significantly accelerated, the construction of smart agriculture has achieved initial results, and several high-quality and distinctive rural e-commerce product brands have been developed, the rural network culture is developing vigorously, and the rural digital governance system is gradually improving; By 2035, significant progress is expected in the construction of digital villages, the "digital divide" between urban and rural communities has narrowed significantly, and farmers' digital literacy has improved significantly." Digital rural construction provides new opportunities to improve agricultural production efficiency, activate rural resources, and broaden income channels for farmers. It has also had a profound impact on the transformation of rural governance and organisational forms.

2. The Implications of the Digital Economy

The digital economy was first proposed by American scholar Tapscott [1], who believed that the digital economy is "an economic model that presents information flow in a digital way". Goldfarb et al. [2] suggested the digital economy as an economic activity that uses digital technology to reduce intermediate transaction, search, trade, and transportation costs. Bukht et al. [3] proposed that the digital economy consists of the digital sector, the digital economy, and the digital economy.

3. Factors Influencing the Digital Economy

Katharine Willis [4] researched rural villages in Cornwall, England, to highlight the implications of integrating information technologies with rural communities. He discovered the mechanism of digital infrastructure transformation, particularly the role of rural village committees in providing resources to support digital integration and developing a place to integrate digital skills and resources within the community. Fujisaki et al. [5] found that Japan's integration of private-sector digital technology into rural public services has solved the problem of declining utilisation, income, and the attractiveness of rural public transport. Through regional planning and management, digital technology matches the needs of the community, and the public transportation information of the community can be incorporated into the public transportation network to realise the sustainable development of rural transportation. Jane E. Fountain [6] stated that the development of a digital government should be a process where technical innovation and modifications in governance structure work in parallel. The success of the development of digital government can only be ensured if the governance structure and organisational culture continuously adapt

to technological advancements. Jeffre Roy [7] highlighted that in the process of government digital transformation, cross-sectoral governance, organisational culture, and personnel within the government play a significant role; leaders must possess relevant digital technological skills and be able to create the conditions for their initial trials. Akerman et al. [8] discovered that digital technology has a skill bias; the widespread use of broadband technology has largely replaced low-skilled and unskilled people and complemented high-skilled workers in completing non-routine intellectual jobs. By analysing the conceptual model of e-commerce in rural Iran, Jalali et al. [9] concluded that, for farmers, the education level, degree of information technology, and knowledge of the relevance of e-commerce are important elements directly influencing rural e-commerce development. Rotz et al. [10] found that rising land costs and data control issues have an impact on digital agriculture and rural construction and suggested that attention should be paid to the impact of new technologies on increasing labour exploitation and deepening the marginalisation of labour and space.

4. Three Ways for Digital Economy Measuring

It is a common practice worldwide to establish a digital economy evaluation index system by constructing multidimensional indicators. The United Nations International Telecommunication Union ICT (2018) constructs a multidimensional evaluation system from three dimensions: ICT use, ICT access, and ICT skills. The EU (2015) constructs a digital economy and society index from five dimensions: broadband access, human capital, digital technology, internet application, and digital public services. Meanwhile, the China Academy of Information and Communications Technology selects indicators from four levels: macroeconomy, converged application, basic industries, and basic capabilities to build the Digital Economy Index (DEI). Myovella et al. [11] constructed an evaluation index system from seven dimensions, including self-employment, technological innovation, human capital quality of life, ICT, economic development, and economic structure, to measure the development level of the digital economy. While the index measurement method can reflect the development level of the digital economy in a specific region according to the actual situation of the digital economy development, there may be potential instability in data sources due to the subjective nature of index construction.

The satellite account method is a commonly used measurement method, and the Digital Economy Satellite Account (DESA) considers the entirety of digital economic activities to ensure the comprehensiveness of statistics in the field of the digital economy. This method provides more accurate insights into the operation and development of enterprises under the digital economy. In 2017, the OECD established the “Expert Resource Group for Measuring GDP under the Digital Economy” and proposed the basic framework of a digital economy satellite account. The digital transaction in the digital economy satellite account framework includes four elements: producer, product, transaction characteristics, and user. The framework aims to prepare the supply and use table of DESA. While the digital economy satellite account can systematically reflect the characteristic activities of the digital economy in various industries of the national economy, it is still in the research stage, and its development is relatively immature. The framework needs to be constantly adjusted according to the actual situation of the development of the digital economy.

The value-added method is used to measure the total worth of the digital economy. Ahmad et al. [12] established a supply and use table of the digital economy to determine this amount. In 2018, the U.S. Department of Commerce's Bureau of Economic Analysis (BEA) divided the digital economy into three categories: infrastructure, e-commerce, and other chargeable digital services. Additionally, the Department for Digital, Culture, Media and Sport (DCMS) divided the digital economy into nine sub-sectors, including electronics and computer manufacturing, wholesale of computers and electronic products, publishing (excluding translation and interpretation), software release, film, television, video, radio, and music, telecommunications, computer programming, consulting, and related activities, information service activities, and computer and communication equipment maintenance. The China Academy of Information and Communications Technology divides the digital economy into industrial digitalisation and digital industrialisation. The digital economy accounting method is included in the G20 Digital Economy Measurement Toolbox. The value-added method relies on the pre-investment national economic accounting system, which is relatively mature. However, due to the limitations of indicators, it is difficult to entirely demonstrate the latest characteristics associated with digital economy development.

5. Impact of the Digital Economy on Economic Development and Social Well-Being

Using data from OECD countries from 1997 to 2007, Czernich et al. [13] found that the installation of broadband infrastructure enhanced economic growth. André Jansson [14] presented the interdependence between digital networks and rural communities through the study of Swedish network society and rural communities and highlighted the functions of digital networks in connecting farmers' interests, enhancing farmers' sense of belonging, and promoting the stability of rural society. Singh et al. [15] found that digital technology has played a significant role in fostering the development of high-quality agricultural and precision irrigation and recommended using digital platforms to measure the soil, environment, and other essential aspects, conducting analysis, and implementing visual charts and reading for agricultural precision monitoring and control. Xie et al. [16] studied the long-term practises of China, Japan, and South Korea since the digital economy is included in the framework of economic growth considerations together with a sustainable environment, natural resources, and political globalisation. They found that a high level of digitalisation may lead to a decline in the economic welfare of various countries by increasing the uneven distribution of technological facilities and rent-seeking behaviours. Kupiryanova et al. [17] found that rural areas suffer from severe digital discrimination, which contributes to a decline in their profitability. To increase the competitiveness and profitability of the agricultural sector, strengthening the construction of rural digital infrastructure, eliminating the digital divide between urban and rural areas, and narrowing the quality of life gap between urban and rural areas are necessary. Marco Haenssgen [18] analysed cross-sectional data from rural India and found that the spread of mobile phones has made health care easier for people with mobile phones but has exacerbated the deterioration of those without mobile phones in poor areas.

Academics have fully studied the construction of a digital village and its influencing factors, which has laid a good foundation for the measurement of digital villages and studying the factors influencing digital village construction; however, some problems are yet to be solved. Most studies considered the impact of digital rural construction from

a single dimension or variable and lacked a systematic analysis of multidimensional digital rural construction, leading to an insufficient mechanism analysis of the level of digital rural construction. Additionally, existing research mainly focused on cluster analysis of the construction level of the digital countryside; however, a few researchers focused on the dynamic evolution of the construction level of the digital countryside across the country.

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