Research on the Key Path of Digital Economy Empowering Rural Revitalization

Xiao Chen[1,*], Bingbing Wang[2], Guofeng Zhang[2]

[1]*School of Economics and Management, Taishan University, Tai'an, Shandong, 271000, China*
[2]*School of Information Science and Technology, Taishan University, Tai'an, Shandong, 271000, China*
[*]*Corresponding author*

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Abstract: Rural revitalization is related to the long-term sustainable development and modernization construction of the country. The digital economy has become a major engine of economy growth. How to use the digital economy to empower rural revitalization and improve quality and efficiency needs to be further explored and studied. This work takes Tai'an as an example to deeply discuss the framework of digital economy empowering rural economic development and revitalization, analyze specific and feasible effective paths, and propose the "Five in One" development path route of digital economy empowering rural revitalization. Further exploration and analysis are conducted on five development measures: digital new infrastructure, new media, digital talent, rural governance system, and digital culture construction. This provides practical and theoretical reference for the high-quality development of regional rural revitalization.

1. Introduction

Along with the advancement of information technique and the widespread popularity of mobile internet, digital information has become an important factor in production and daily life [2]. According to relevant research, in 2022, the size of China's digital economy achieved 50.2 trillion yuan, the rate 41.5% of GDP. In 2021, the digital economy in Shandong Province accounted for 43% of GDP. Digital technology is accelerating innovation, and digitization is penetrating into various domains of the society and economy. The digital economy is undoubtedly becoming a major engine for China's economic growth and good-quality development.

Research and practice have proven that big data can provide new means and tools for comprehensive rural revitalization, provide strong support for achieving comprehensive rural revitalization, and is a major way to achieve the integration of digital economy and rural revitalization, and enhance the quality and standard of rural revitalization [3]. Vigorously advancing rural digital construction can not only provide strong support for rural economic development, but also drive and advance the overall level of rural and agricultural modernization, thus smoothly achieving the strategic goals of comprehensive rural revitalization and agricultural - rural modernization [4].

2. Current Situation of Digital Economy Assisting Rural Revitalization and Development in Tai'an

2.1 Current Situation of Digital Economy Development

The supporting capacity of digital infrastructure has steadily increased. The 4G network is constantly improving, with a total of 602000 FTTH ports built, basically achieving full coverage of 4G networks in all administrative villages (residential areas). The user scale continues to grow, with the quantity of fixed broadband access users achieving 1.626 million, ranking among the top in the province in terms of growth rate.

The industrial digital transformation is accelerating. In recent years, the digital economy industry chain specialized team has accelerated its integration into the trend of the digital era, actively embraced the advancement opportunities of the digital economy, continuously optimized the industrial development environment, activated agglomeration effects, and focused on creating key parks such as the Eastern New City Innovation and Entrepreneurship Center and the New Generation Information Technology Industrial Park. It has also cultivated a group of advantageous enterprises in the fields of smart mining, smart power, and digital backend, allowing the digital economy to unleash greater efficiency. In 2022, Tai'an City ranked fourth in the index of Shandong digital economy development.

The level of digital industrialization has improved. There are a total of 37 enterprises in the digital economy industry, including 21 hardware manufacturing enterprises and 16 service oriented enterprises such as software development. As of the first half of 2022, digital enterprises above designated size have over 100 invention patents, over 250 utility model patents, and over 900 computer software copyrights. The development level and momentum are good.

2.2 Depth Fusion of Rural Industries and Data Technology

With the depth fusion of rural industries and digitalm technology, the digital level of rural industry development is increasingly improving, which has a systematic impact on the production efficiency, product quality, financial accessibility, and industrial structure of the industry. Technology empowers industries, and digitization and intelligence have become boosters for industrial development, giving 10000 acres of farmland a "brain". The inspection robot can monitor about a hundred acres of the ecological orchard; The water fertilizer integrated machine has basically achieved full unmanned operation; Automatic sorting equipment improves sorting efficiency while greatly saving labor costs. Through intelligent and technological construction, the park has formed a comprehensive industry Chain operation pattern that includes planting, sorting, transport, sales, production and sales integration. Each acre of orchard saves over 30% of water, fertilizer, pesticides, and labor investment annually, saving over 300 yuan. Smart agriculture has increased the sales price of a product by over 30%, resulting in a total cost saving and efficiency increase of over 50%.

2.3 Improving the Digital Level of Agricultural Management

Data becomes the commander. In addition to the digital transformation in the production process, in the management process, it is also because of digital technology that agriculture has become more refined and efficient. Taking the development of agricultural and rural big data centers as the core, we have formulated county-level standards and plans for the development of "digital villages", and created a "1+N" digital platform. It has become a comprehensive public service platform that integrates collection, monitoring, sharing, analysis, prediction, early warning, decision-making, and

services. The construction of the platform not only enables data visualization, but also provides information support for the implementation of local policies and decisions.

2.4 Steady Progress in Digitalization of Rural Governance

In recent years, the "digital countryside" has gradually expanded its application in rural social governance, rural elderly care, ecological protection, and other fields. Informatization has played a basic supporting effect in promoting the modernization of rural governance structure and governance capabilities, allowing farmers to run less and data more, and continuously improving the level of equalization, inclusiveness, and convenience of public services.

This study establishes a business collaboration model among rural grass-roots organizations, government departments, market players and urban and rural residents, and constructs a "digital rural map" covering five fields of rural planning, rural management, rural environment, rural services and rural governance, as well as a digital life service platform and governance decision-making center. Relying on digital platforms, "One Map of Agriculture and Rural Areas" can eliminate information silos, unify data standards, improve data quality, achieve data exchange and sharing, and enhance data service capabilities.

The development of rural online culture benefits the public. At present, an education informationization service system that covers both rural and urban areas, has a reasonable design, and is fully functional has been established, achieving network sharing of educational resources between advanced and weak schools. This study implemented the standardization of township residents' convenience services, equipped with self-service terminals in the Party and mass service center, and realized 22 kinds of self-service services of more than 100 businesses such as policy inquiry, treatment declaration, assistance application, certificate issuance, social security payment, etc.

3. The Dilemma of Digital Economy Empowering Rural Revitalization

Although in recent years, the strengthening of digital empowerment in rural revitalization driven by digital technology has gradually shown more vitality and creativity, and rural industries have developed rapidly and achieved significant results relying on the digital economy, there are still many problems and obstacles in empowering rural revitalization with the digital economy.

3.1 Rural Digital Infrastructure Remains Weak

The report released by the China Internet Information Center shows that as of June 2022, internet audience in China was 1.051 billion, with an internet penetration of 74.4%, while the internet penetration in rural areas was 57.6%, far lower than urban ratio. The digital gap between rural and urban areas still exists. In the new era of vigorously popularizing 5G, many rural areas in Tai'an have unstable 4G signals, let alone the popularization and application of artificial intelligence and big data. The building of digital basic facilities urgently needs to be strengthened. The relatively lagging digital-infrastructure construction in rural areas greatly affects the establishment of an intelligent service system for industrial economy in rural areas, making it difficult to accurately obtain supply and demand information and logistics information of agricultural products. This also affects the quality of rural industry prosperity and villagers' prosperity in rural revitalization, greatly weakening the ability of data to empower rural revitalization.

3.2 Serious Shortage of High-tech Talents in Rural Digital Technology

Compared with cities, there is a significant gap in the number of high-end digital application talents in rural areas. The digital gap among urban - rural areas is currently the most prominent manifestation and the biggest obstacle to the development of rural digital economy. Compared to cities, rural areas are at a significant disadvantage in terms of salary treatment and work environment, making it difficult to attract talents and unable to leverage the support role of high-end digital talents. Especially in rural areas, there is a widespread phenomenon of "hollowing out". Due to the large influx of rural labor into cities for work, the age structure of the population left over from rural areas is unreasonable, and the aging population is severe and the cultural level is low. The information literacy and awareness of farmers in practical agriculture are relatively weak, and there is a gap in the existing information technology professionals in rural areas. It is difficult to meet the informatization requirements of data empowering rural governance. Due to the lack of corresponding technical personnel in rural areas, such as e-government, e-commerce, smart logistics and other fields of professional and technical personnel to assist rural revitalization. The information management and intelligent operation provided by rural areas are relatively immature, which directly increases the labor cost of data-enabled rural revitalization and the operation and management cost of smart rural construction. This is essential to promote the development of rural economy and the growth of farmers' income, as well as the overall construction of digital countryside.

3.3 Digital Awareness still needs to be Improved in Rural Areas

Through research, it was found that although the speed of internet popularization in rural areas is fast, most farmers do not have the awareness of digital services for rural revitalization, and few people truly realize the potential impact of digitization on rural areas. Today, as urban residents have become accustomed to learning and working online, the majority of rural residents still only browses short videos and follows online dramas online, and their digital awareness lags far behind that of cities. The digital economy will undoubtedly bring earth shaking changes to rural areas, but many rural grassroots workers and farmers have a more traditional mindset, believing that the risks of virtual digitization are too high, their understanding of relevant policies is not deep, they do not understand and trust the digital economy, and their digital awareness in rural areas still needs to be improved.

3.4 The Promotion Effect of Digitalization on the Development of Economic Leading Industries is not Significant

In recent years, the digitalization of industries in Tai'an City has been continuously developing, and the permeability of the digital economy in the three industries has been continuously increasing. However, the conformity of the digital economy and the real economy has shown a trend of reverse infiltration, with a relatively low penetration rate in the primary industry. From the perspective of the degree of digitalization in its development process, the background of the digital economy and the application of digital related technologies in promoting industrial development are relatively low. Many rural residents do not even know about online sales channels and management models, and some villagers know that their vegetables can be sold through the internet, but they do not have a deep understanding of this method. This study is in the area of collecting supply and demand information, such as growing and picking products. There is also a lack of a systematic management system for logistics distribution, after-sales management, and other aspects, with a relatively low level of digitization. This not only affects the development speed and efficiency of

the leading economic industries in the region, but also hinders the realization of rural revitalization.

4. The Key Path and Countermeasures for Empowering Rural Revitalization with Digital Economy

Based on the experience of typical cases from other provinces and cities, through in-depth analysis of the problems in promoting rural revitalization, this article explores and proposes a "Five in One" development path framework for Digital Economy Empowers Rural Revitalization is shown in Figure 1.
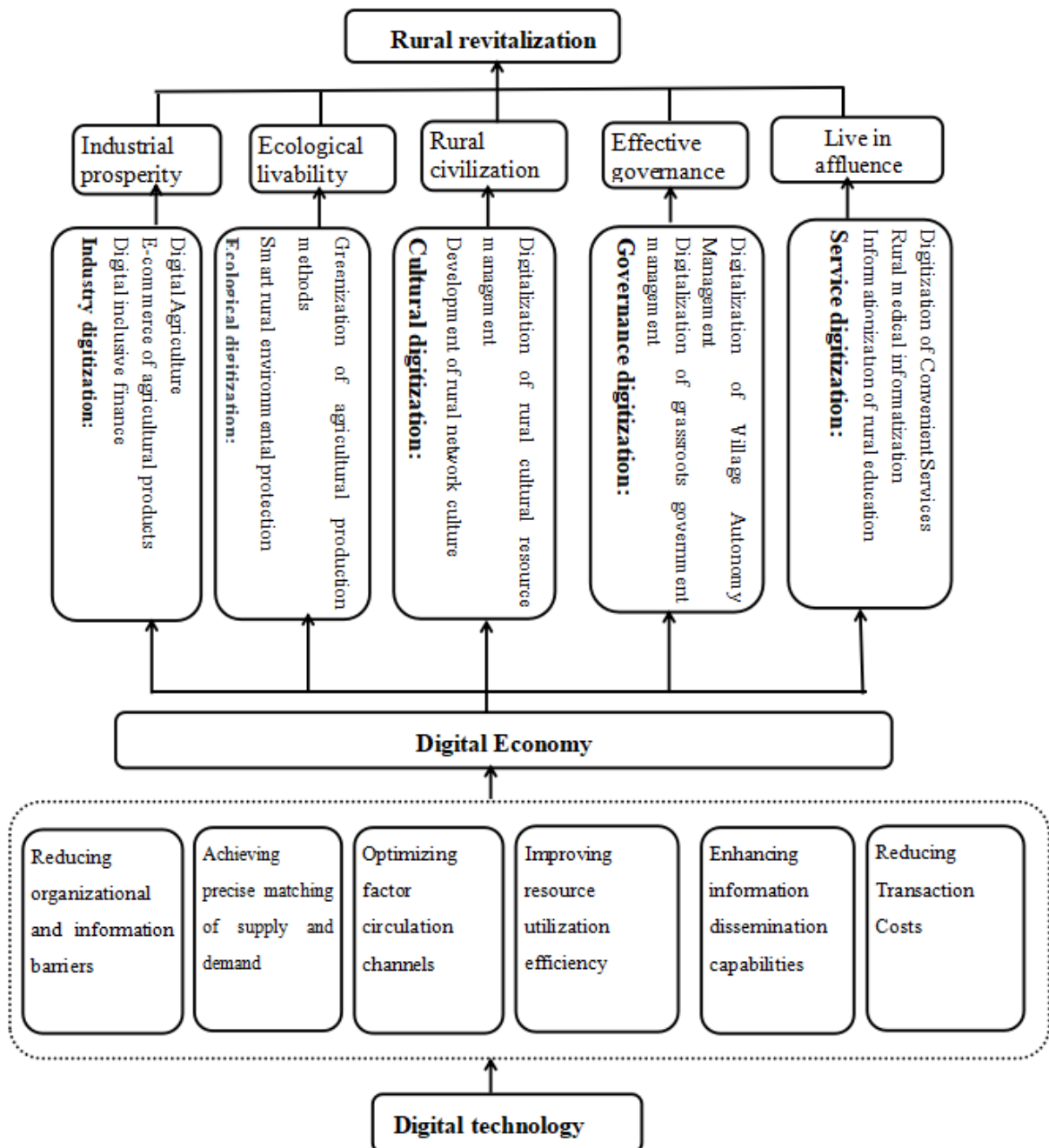

Figure 1: The "Five in One" development path framework for empowering rural revitalization through digital economy

4.1 Using Digital New Infrastructure as the Engine to Consolidate the Development Foundation of Digital Agriculture and Rural

The construction of digital infrastructure is an important foundation for empowering rural revitalization in Tai'an through the digital economy, and is the key to building a digital countryside [8].

Firstly, we will continue to increase the coverage of information infrastructure projects such as mobile internet and broadband networks in rural areas, especially in remote areas. We will achieve full 4G coverage, gradually increase the coverage of 5G networks, vigorously promote the acceleration and cost reduction of rural networks, further improve rural digital infrastructure, and take the lead in laying out new digital infrastructure such as artificial intelligence, big data, IOT, and blockchain in rural areas with strong demand and good infrastructure, Promote the sharing and co construction of rural digital infrastructure [5].

The second is to establish an integrated information service platform for agriculture, strengthen the function of serving agriculture, encourage the advancement of information technology products and application software that adapt to the advancement of agriculture-rural economy, improve the service system, and improve the quality of service supply.

Thirdly, we need to accelerate the digital reformation of traditional rural infrastructure, promote the digital reformation and intelligent upgrading of infrastructure such as water conservancy, highways, electricity, cold chain logistics, and agricultural production and processing in rural areas, accelerate the implementation of express delivery projects in villages, focus on improving the level of digitalization, networking, and intelligence of infrastructure, and build a firm foundation for the development of digital rural areas.

4.2 New Media E-commerce Helps Digital Transformation of Rural Industries

Industrial prosperity is the fundamental support point for rural revitalization. In the "Internet plus" era, new media agriculture related e-commerce, as a new economic form and entrepreneurial engine, has realized the reconfiguration, integration and correlation of agricultural resources and products, and effectively promoted the revitalization of rural industries. Therefore, it is necessary to adapt to local conditions and fully leverage the role of new media e-commerce in digital rural construction and rural industry revitalization [6].

Rural areas should strengthen the construction of logistics distribution network, give full play to the leading role of local areas, and integrate the rural industry chain. Rural areas should improve the rural distribution network supported by county-level logistics distribution centers, township (town) distribution nodes and village-level public service points. Rural areas should build county, township and village three rural logistics network; effectively improve the connectivity and coverage of rural logistics network. Rural areas should improve the cold chain logistics system and e-commerce express logistics system, support express logistics enterprises to settle in industrial clusters, agricultural products distribution centers, commodity distribution centers, and provide "warehouse distribution integration services."

The second is to actively promote and apply the "Internet + short video + live broadcast", "live broadcast + landmark brand + supply chain upgrade" agricultural aid model, take the local online celebrity live broadcast as the starting point, expand the online marketing channels of high-quality agricultural products, and promote the development of "live broadcast economy".

Thirdly, regular e-commerce live streaming training and competitions are held to promote and cultivate talents through competitions. This not only provides a platform for new media practitioners, new professional farmers, and private enterprise management and technical personnel in rural areas to participate in rural revitalization, but also cultivates a group of live streaming

marketing talents.

4.3 Digital Talent Cultivation to Enhance the Skills of "New Farmers"

Talent is the key to development, and the era of big data empowered by data cannot do without high-quality digital talents. In the new era of rural revitalization, farmers are the main body, and talent is the key. The key is to establish a mechanism for rural talent revitalization - combining external introduction with internal training [7].

Rural areas should give full play to the main role of the first secretary, village work team, college students and village officials, and encourage and guide college students with digital skills, returnees and e-commerce elites to actively participate in the construction of digital countryside. Local governments actively guide and leverage the technological advantages of universities and research institutions, carry out research and application of key technologies in digital agriculture, strengthen the cultivation and training of "agriculture + information technology" composite talents.

Second, the rural interior should pay attention to improving farmers' digital literacy. We can carry out farmers' vocational training, technical training and other digital skills training through multiple forms and channels, strive to cultivate new professional farmers, improve the skills of new farmers, create a "Internet plus" modern agricultural construction talent team based on rural inherent talents, let them play an important role in rural e-commerce and other service fields, and help develop digital villages, Promote rural revitalization.

4.4 Improving the Digitalization Level of Digital Rural Governance System

We should fully leverage the fundamental support role of informatization in promoting rural governance, focus on improving the digital level of rural governance, better promote good governance in rural areas, and better promote rural revitalization.

First, we should vigorously promote "Internet plus party building", explore and promote the "cloud" of party building platform, the "online" of party affairs and village affairs, and the "online" of party activities, further improve the rural smart party building system, strengthen the role of grass-roots party organizations as a battleground, and let farmers get better organizational guidance.

Second, we will vigorously promote the extension of "Internet plus government services" to towns and villages, and move administrative approval, convenience services and other matters closely related to farmers' production and life online to provide more convenience for farmers and further promote the equalization of essential public services in urban - rural areas.

The third is to forward the extension of "Internet plus community" to rural areas, and try to create exclusive WeChat groups and official account using the new media function, so that villagers can fully understand government information, engineering construction information, etc. in a timely manner, guide the majority of villagers to actively participate in the discussion topic of agricultural and rural development, build a digital supervision platform, make information access more open and transparent, and improve the scientificity of rural governance decisions.

4.5 Promoting Rural Civilization through Rural Digital Culture Construction

Cultural revitalization is an important content, strong support for rural revitalization. Promoting the digitization of rural culture is an indispensable means to activate the potential of traditional cultural elements, prosper rural culture, and empower the revitalization of rural culture.

One is to utilize modern technological means such as digital technology, artificial intelligence technology, and VR technology to build a digital public cultural service system and platform, expand the supply of high-quality public cultural products and services, and enrich the spiritual life

needs of farmers [1].

The second is to support the creation of high-quality online cultural content on the theme of "agriculture, rural areas, and farmers", such as excellent traditional culture in rural areas, the rural folklore, featured cuisine and beautiful scenery. We will continuously launch works of excellence that show the new farmers and new country, creating high-quality works with height, depth, temperature, grounding, increasing confidence, and gathering popularity.

The third is to actively promote the construction of rural cloud libraries to match the multi-level cultural needs of villagers in the era of technological development, while also optimizing the allocation of cultural assets and expanding the dissemination of excellent cultural assets, in order to promote the vigorous advancement of digital rural areas.

5. Conclusion

This work focuses on leveraging the important engine role of digital economy on the background of the strategy of rural vitalization. Taking Tai'an as an example, it delves into the current development status and difficulties of digital economy promoting rural revitalization, and elaborates on the mechanism of digital economy empowering rural revitalization. Based on typical cases from other provinces and cities, it proposes practical and feasible effective paths for digital economy empowering rural revitalization, and provides effective countermeasures and suggestions.

Acknowledgments

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