

Digital Economy and Rural Revitalization: Driving Mechanism, Real Dilemma and Research Prospects

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Abstract

Under the background of the rapid development of the digital economy and the continuous promotion of the rural revitalization strategy, rural e-commerce has gradually become an important force to promote the development of rural industries, increase farmers' income and optimize the rural economic structure. This article focuses on the empowerment of rural areas by the digital economy, and combines the Long Tail Theory to analyze the role mechanism of rural e-commerce in expanding agricultural product sales channels, promoting the restructuring of the agricultural industry chain, promoting brand upgrading, and driving rural employment. The study found that rural e-commerce can not only break through the geographical restrictions of traditional agricultural product sales and improve its market competitiveness, but also promote the transformation of rural industries through e-commerce platforms and supply chain optimization. However, at present, the high-quality development of rural e-commerce is still facing the real dilemmas of digital divide, shortage of composite talents, imperfect logistics system, homogeneous competition of products and uneven distribution of platform traffic. Therefore, this article proposes that the application research of artificial intelligence, big data and other cutting-edge digital technologies in the rural e-commerce supply chain should be strengthened in the future, and pay attention to cross-regional coordination and the construction of a national unified large market for agricultural products. In general, rural e-commerce plays an important role in rural revitalization, but its sustainable development still needs to be promoted in many aspects such as infrastructure construction, talent training and platform governance.

Key words

digital economy; rural revitalization; rural e-commerce; industrial upgrading

1. Introduction

Since the rollout of the rural revitalization strategy, it has evolved into a core policy driving rural development across China. This strategy covers five core dimensions: industrial, talent, cultural, ecological and organizational revitalization. Among these pillars, industrial revitalization serves as the fundamental driver for sustained rural economic growth. It can lift farmers' disposable income and activate regional rural economies by fostering featured agriculture, rural leisure tourism, and online farm produce sales channels.

Driven by the digital village initiative, the deep convergence of digital economy and rural sectors is forming a new impetus to advance sustainable agriculture [1]. Benefiting from internet demographic dividends and targeted policy support, mainstream e-commerce platforms including Taobao, TikTok and JD.com have gradually penetrated rural consumer markets. Mass premium agricultural goods are delivered nationwide via online retail channels and even exported to overseas markets. Live-stream e-commerce, fueled by the explosive expansion of short-video platforms, delivers particularly remarkable outcomes. For one thing, it expands marketing channels for farm products, raises rural residents' earnings, and facilitates local employment alongside industrial upgrading in countryside sectors. For another, it empowers rural industries to build distinctive proprietary brands and fuels long-term steady growth of local economies. Nevertheless, the fast expansion of rural online retail also brings prominent bottlenecks: a severe shortage of digital commerce practitioners and incomplete rural logistics support systems, which further leads to unbalanced growth within rural economies.

Therefore, the study of e-commerce is of great significance to the development of rural industry in the context of rural revitalization policy support and digital economy. Relying on relevant literature, this study will analyze the development background of rural e-commerce, the impact of policy support on the development of rural industries and rural society, and the existing problems of rural economic development, so as to further explore the practical role of rural e-commerce in promoting rural revitalization and the future development direction of rural economy.

2. The Theoretical Basis of Digital Economy to Promote Rural Revitalization

The long tail theory was proposed by Chris Anderson [2]. Its basic principle is that in the context of the digital economy, Internet platforms can expand commodity sales channels by reducing inventory costs, transaction costs and information search costs, so that individual niche goods can also open up the sales market at a lower cost. The core key assertion of Anderson's Long Tail Theory is that the total sales volume of a vast number of niches long-tail products can be comparable to that of the popular leading products. This core logic establishes the intrinsic connection between the Long Tail Theory and rural e-commerce. For rural industries, the production scale of many special handicrafts and agricultural products is relatively small and scattered, and the price fluctuations of agricultural products are always closely related to the fluctuations of the local market. However, such dual constraints can be broken with the help of Internet e-commerce platforms and live streaming, that is, niche agricultural products can rely on the Internet platform to break geographical restrictions and link to a wide range of sales groups, thus opening up national and even global markets and forming considerable economic benefits and market visibility. Therefore, the long tail theory provides theoretical support for the digital economy to promote rural revitalization.

3. The Multi-Dimensional Influence Mechanism of Rural E-Commerce in Promoting Rural Revitalization

3.1 Economic Dimension: Broaden Marketing Channels and Boost Farmers' Income Growth

The facilitating value of rural online commerce is distinctly manifested in wider circulation paths for farm goods and the elevation of rural residents' earnings. Consistent with the core logic of the Long Tail Theory, rural e-commerce platforms break through geographical

limitations, reduce transaction costs and information search costs, enabling scattered niche specialty agricultural products to reach the national long-tail demand market that the offline trading system is unable to cover. Previously, the sales of agricultural products often needed to rely on the offline market, but the development of online platforms has reduced the link of this intermediary [3]. In this process, farmers often face the influence of weak bargaining power and market fluctuations. Digital trading platforms remove such shackles for farm product circulation and enable direct dialogue between suppliers and buyers; producers are thus able to reach broad consumer groups and strengthen the competitive edge of agricultural goods.

Meanwhile, rural online commerce shortens the supply chain connecting agricultural producers and end consumers to a certain extent. Specifically, the e-commerce direct sales model reduces the cost loss of intermediaries, so that farmers have higher profit margins [3]. In this model, farmers can analyze through e-commerce platforms and consumer purchasing habits, so as to capture market trends and fluctuations more keenly. Therefore, rural digital commerce is not only a change in sales mode, but also an essential path to raise farmers' earnings and optimize the rural economic framework.

3.2 Industrial Dimension: Accelerate the Reconstruction and Brand Optimization of the Agricultural Industrial Chain

The sound advancement of rural online commerce transforms the trading mode of farm produce, while reconstructing rural industrial chains simultaneously. From the perspective of the Long Tail Theory, the construction of distinctive brands can enable scattered niche agricultural products to gain sustained competitiveness in the long-tail market after breaking through geographical barriers. In the past, it was difficult for agricultural products to gain a foothold in the fierce market competition, and the fundamental reason was the lack of systematic brand building and publicity [4]. Without unified production criteria, standardized packaging and brand-building strategies, farm produce could hardly sustain longterm market advantages. The prevalence of e-commerce encourages individual farmers and agricultural enterprises to prioritize product standardization, quality

supervision, packaging iteration, and supplychain management.

In the e-commerce environment, the restructuring of the rural industrial chain is not only reflected in the sales end, but also in the production side. E-commerce platforms can help farmers predict market demand through consumer data analysis, promote the deep integration of agriculture and secondary and tertiary industries, and improve the added value of agricultural products [5]. Relying on such digital channels, local regions can cultivate GI agricultural brands, regional public brands and featured farm product brands to lift market recognition of local specialties. Meanwhile, cooperation between local industrial entities and e-commerce platforms facilitates unified quality benchmarks and the launch of regional industrial brands. In this way, ordinary farm goods can be upgraded into branded commodities carrying distinctive local characteristics and higher market value.

In addition, the continuous development of the e-commerce model is also forcing agricultural production to be more standardized and market-oriented. In order to meet consumers' requirements for quality and logistics time limit, rural areas need to improve cold chain logistics, product testing and after-sales service.

3.3 Social Dimension: Reconstruction the Rural Population Structure and Accelerating Employment

The evolution of rural digital commerce exerts remarkable influences on the social framework of countryside regions. Based on the analytical perspective of the Long Tail Theory, rural e-commerce breaks through geographical limitations and activates decentralized long-tail consumption demands. The continuously expanding long-tail market gives rise to local business demands in rural areas and generates diversified employment scenarios. For a long time, rural areas have faced problems such as labor force outflow and aging, which results in insufficient talent reserves for local development. However, rural online commerce generates abundant employment posts. These positions not only cover positions closely related to the e-commerce industry, but also include supporting jobs such as logistics and packaging [6]. The expansion of employment opportunities breaks

the single agricultural-dominated job structure shaped by traditional rural development. This trend relieves the outflow of rural residents to a certain degree and revives the endogenous driving force of rural society.

Rural e-commerce creates new chances for young laborers to return to hometowns and launch businesses. Due to the low-threshold entrepreneurial characteristics of e-commerce platforms, it has attracted returning young people and other groups to devote themselves to the development of rural industries and brought new technologies, business concepts and management experience back to the countryside [7]. This process has not only injected new vitality into rural industries, but also changed the traditional employment structure in rural areas to a certain extent. For those who return to their hometowns, returning to their hometowns is no longer just returning to traditional agricultural labor, but can participate in agricultural product sales and brand building with the help of the Internet platform to realize the combination of personal development and rural industrial development. Accordingly, the booming digital economy refreshes the operation logic of rural social frameworks. The continuous inflow of talents will further energize rural regions and guarantee long-term balanced growth of rural economy and society.

The above analysis shows that under the ideal operating conditions, rural e-commerce can promote rural revitalization from multiple dimensions of economy, industry, and society. However, this kind of positive empowerment effect will not be realized spontaneously. Relying on the theoretical potential of activating the long-tail market and releasing rural development dividends revealed by the long-tail theory, multiple conditions such as improving infrastructure, sufficient talent resources, and improving industrial support are needed. If the relevant preconditions are missing, the expected empowerment effect of rural e-commerce will be constrained. Based on these insights, the following further identifies the real dilemma that hinders the high-quality development of rural e-commerce.

4. The Practical Predicaments Restricting High-Quality Advancement of Rural Online

Commerce

4.1 Digital Divide and Shortage of Composite E-Commerce Talents

Although rural online commerce delivers fresh growth chances for rural revitalization, it still faces the problems of digital divide and talent shortage in the actual promotion process. For some rural areas, although the Internet infrastructure is constantly improving, the digital literacy of farmers is relatively limited. Many farmers can use smartphones and social software, but they do not necessarily have the professional ability required for e-commerce operation. For example, platform rule understanding, live broadcast operation, data analysis, product promotion and after-sales service, etc. Besides, farmers' digital proficiency significantly aggravates the intention-behavior disparity of rural residents who start online agricultural businesses [8]. Low digital literacy among villagers greatly dampens their willingness to engage in digital retail startups, thereby limiting the spillover effect that digital economy exerts on rural revitalization.

Rural e-commerce does not merely market farm commodities online, but involves production, marketing, logistics, brand and service and other links. Therefore, if countryside digital commerce wants to seek high-quality growth, it needs composite talents who both understand agricultural production and are familiar with e-commerce platform operation and marketing. However, some rural areas are still facing problems such as shortage of professional talents, incomplete training system and difficulties in retaining talents. Under this dilemma, although some rural areas have high-quality premium farm commodities, it is difficult to achieve brand influence and economic benefits. Therefore, the scarcity of skilled practitioners acts as a core barrier limiting digital economy's empowering effect on rural rejuvenation.

4.2 Shortcomings of Logistics Infrastructure in the "Last Kilometer"

Flawed logistics frameworks also act as major barriers restraining the high-standard advancement of rural online commerce. The traffic network in many remote rural areas is not perfect, and it cannot accommodate

large freight vehicles, resulting in a sharp increase in logistics and distribution costs [9]. Under such a backdrop, farm commodities transported from villages to market terminals bear higher delivery costs and suffer low operational efficiency. This severely weakens the competitive strength of agricultural goods and lowers rural residents' willingness to engage in online retail ventures.

In addition, the acute lack of cold-chain delivery facilities hinders the digital economy from empowering rural revitalization. A large volume of fresh fruits, vegetables, and distinctive farm produce imposes strict standards on transit temperature, storage environments, and delivery lead time. [10]. However, in some rural areas, the refrigerated storage and cold chain transportation systems are still not perfect, resulting in problems such as massive spoilage of farm goods during transit. This not only raises commodity circulation expenditures, but also erodes the price edges and market competitiveness of farm goods on digital retail platforms. Therefore, upgrading rural logistics infrastructure, especially optimizing the "last kilometer" cold chain transportation and storage framework, is a core foundation for boosting the high-standard growth of rural online commerce.

4.3 Product Homogeneous Competition and Platform Traffic Monopoly

In addition to the shortage of logistics infrastructure, product homogeneous competition is also an important problem facing the high-standard development of rural online retail. At present, when developing countryside digital commerce, many regions mainly concentrate on cultivation of primary agricultural products such as grain and oil, although these products have a large consumer market. However, in the lack of deep processing, branding and differentiated positioning, agricultural products are easy to fall into the situation of "mass competition of similar products". In order to grab more market share, some merchants can only attract consumers to buy through price reduction and promotion, which not only compresses the profit margin of farmers, but also impedes the quality improvement of agricultural products long-term brand cultivation.

At the same time, the traffic allocation mechanism of e-commerce platforms also puts certain pressure on ordinary farmers and local small-and-medium-sized ven-

dors. In digital retail platforms, head anchors, large merchants and mature brands are often likely to get more traffic and attention. Due to the scarcity of operational know-how, capital input and content creation capacity, it is difficult for ordinary farmers to continue to get stable exposure. Consequently, although some farm commodities have landed on digital retail channels, they still face the problem of "easy to put on the shelves and difficult to sell". Therefore, the growth of rural online commerce needs to improve the degree of differentiation of farm goods, improve the brand building and platform support mechanism, and avoid the dilemma of low-price competition and traffic dependence in rural product sales.

5. Discussion on the Limitations of Existing Research

5.1 Insufficient Panel Data Proof for the Long-Run Impact of Live-Stream Retail and Short-Video Marketing

In the analysis of the mechanism of rural e-commerce, Existing studies often treat rural areas as a relatively homogeneous whole, seldom comparing the actual differences in rural e-commerce across regions with varying resource endowments. However, significant differences exist among rural areas in China. Rural areas in the developed eastern regions have stronger advantages in infrastructure, human resources reserves, and market distance. While rural areas in the central and western regions face problems such as high logistics costs and lagging market information.

Particularly amid the fast expansion of live-stream retail, some agricultural products may rely on short-term traffic, anchor influence or platform promotion to increase sales, but whether this growth can form a stable consumer group and long-term brand value needs to be further verified. Therefore, future research needs to use more long-term data and long-term tracking methods to continuously assess the sustained influences of rural online commerce from multiple aspects.

5.2 Insufficient Heterogeneity Analysis

When analyzing the operational logic of rural on-

line retail, existing research often treats rural areas as a relatively unified whole. Currently, few studies have compared the actual disparities in rural digital trade across different regions with varying resource endowments. In fact, there are significant differences between urban and rural areas in China. Rural market towns in the developed eastern regions enjoy obvious advantages in terms of infrastructure layout, talent reserve, and proximity to consumer markets. In contrast, rural areas in the central and western inland regions face obstacles such as high logistics costs and outdated market data channels.

Accordingly, the driving influence of rural e-commerce in different territories is not exactly the same. For instance, inside eastern and central zones, digital finance has the most prominent driving role; while in the western regions. The promotion effect of digital agricultural sales and rural e-commerce on cultivation is more significant [11]. The differentiated characteristics of this regional development effect fully illustrate that the model that cannot be adopted by various places to promote digital empowerment rural revitalization must be adopted. Differentiated policies of zoning policies and classification promotion must be implemented according to local conditions. If researchers ignore these regional differences, it is easy to accurately assess the general role of developing countryside online trade on rural revitalization, and may also conceal the risks in the digital industry expansion in certain territories. Future research should further strengthen heterogeneity analysis and pay attention to the differences between different regions, different farmer groups and different categories of farm goods, so as to more accurately understand the real effect of rural e-commerce rural revitalization.

6. Conclusion

Based on the existing literature, it can be observed countryside online trade has become a crucial force in promoting rural revitalization in the context of the digital economy. At the economic level, rural e-commerce has facilitated the sales of agricultural products and increased farmers' income by expanding the sales channels of agricultural products, reducing intermediate circulation links, and improving market matching efficiency. At the industrial level, e-commerce platforms

leverage consumer data insights, brand cultivation, supply chain refinement, and product standardization to propel the agricultural industrial chain's shift from the sale of conventional primary goods to a model centered on branding, scale expansion, and enhanced value addition. At the social level, rural e-commerce has generated abundant employment positions, injecting new vitality into young people's return to entrepreneurship and the adjustment of the rural population structure.

Alongside the continuous advancement of artificial intelligence, future research can further pay attention to the utilization of cutting-edge digital tools such as AIGC, BD, intelligent recommendation and so on in the rural e-commerce supply chain. The advancement of the artificial intelligence model not only involves accurate analysis and prediction of market orientation and fluctuations based on data, but also involves intelligent customer service, content generation, accurate video generation, and supports the seamless switching of dozens of languages. In addition to substantially lowering promotional expenses, such technology employs the strengths of linguistic technology to tap into overseas markets and broaden distribution channels and market reach.

Future research can also examine the functions of rural e-commerce in cross-regional coordination and the construction of a national unified large market. From the analysis of the current research, although the agricultural products in some areas have local characteristics. However, due to the imperfect logistics system, brand standards and market channels, it is still difficult to enter the wider consumer market. The Internet provides a new fresh carriers cross-regional commodity flow of farm goods, it is necessary to form a more coordinated mechanism covering quality standards, cold-chain delivery, regional brands, platform rules and market supervision. Therefore, future research can further explore how different regions can achieve resource complementarity through e-commerce platforms. Expanding the agricultural market through cross-regional coordination also helps agricultural products to move from local sales to national and even global circulation.

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