

Research on the Development Strategy of Rural E-commerce Empowered by New Productive Force

Ji Hanlin¹ & Yang Fan¹

¹ University of Shanghai for Science & Technology, Business School, China

Correspondence: Ji Hanlin, University of Shanghai for Science & Technology, Business School, Shanghai 200000, China.

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Abstract

The rural e-commerce sector has entered the stage of high-quality development known as "Digital Commerce Promoting Agriculture" and it has emerged as a key driver of rural economic growth. As an advanced production momentum, New Productive Force drives the development of rural e-commerce with innovation, intelligence and efficiency. The acceleration of new productive force development serves as a crucial approach to promote the high-quality advancement of rural e-commerce, thereby facilitating their sustainable growth and further driving the transformation and upgrading of rural economy. Starting from the new productive force, this paper analyzes the development status quo, opportunities and challenges faced by rural e-commerce, and explores the basic path of new productive force enabling rural e-commerce to flourish, focusing on the development of new productive force from four aspects, including product upgrading, logistics intelligence, talent training and information security, to build a smart and efficient rural e-commerce platform.

Keywords: rural e-commerce, New Productive Force, rural economic transformation, high-quality development

1. Introduction

The issue of "agriculture, rural areas and the wellbeing of farmers" has always been an important issue in China's economic development, and the CPC Central Committee attaches great importance to the work of "agriculture, rural areas and the wellbeing of farmers". In the era of digital economy, the Internet and digital information technology are developing at a high speed, providing new strength for our country's agricultural rural modernization. Rural e-commerce is a new e-commerce model with digital technology as the carrier and Internet as the medium. It integrates new technologies such as Internet, big data and modern logistics system to break the geographical restrictions, provides broader sales channels for agricultural products, and changes the current situation of limited market coverage, high operating costs and poor flexibility of traditional business operation model. It has opened up new development space for the rural market and has become an important starting point for the work of "agriculture, rural areas and the wellbeing of farmers".

The development of rural e-commerce depends on advanced productivity and the support of national policies. In the tide of technological innovation, digital economy transformation and globalization, new quality productivity emerged. At present, there are many literatures on the new quality productivity, and different interpretations have been made on the connotation of the new quality productivity. A study believe that the connotation of new quality productivity mainly includes innovation in technology, economy and business form, emphasizing the new economic system based on knowledge, information and innovation, and encouraging the development of more flexible business models (Ren & Wang, 2023). There are also studies to grasp the connotation of new quality productivity from the two aspects of "new" and "quality", and believe that new quality productivity can achieve the organic unity of new technological breakthroughs, new economic development and new industrial upgrading with stronger innovation driving force (Zhou & Xu, 2023). Based on the new quality productivity and agricultural development, Some scholars further discussed the connotation of new quality productivity of agriculture, indicating that new quality productivity of agriculture is a qualitative transition of productivity led by scientific and technological innovation, and emphasized that the overall improvement of technology, model, industry and quality is the key factor to achieve high-quality and efficient development of rural agricultural economy (Ru & Liu, 2025). A recent study emphasized that the new quality productivity promoted the modernization process of agriculture and rural areas, enhanced the competitiveness of agriculture, and laid the foundation for narrowing the

gap between urban and rural areas and improving farmers' income (Hou Guangwen, Pang Honghongmei, He Xin, 2024).

In short, the new quality productivity with its "new" and "quality" to promote the transformation and upgrading of the rural economic structure, not only can integrate rural resource endowments, enable the development of rural e-commerce, but also stimulate the internal strength of the development of rural e-commerce industry, and contribute to the construction of modern rural areas.

Therefore, based on the connotation of new quality productive forces and characteristics of rural e-commerce, this paper attempts to analyze the difficulties encountered in rural e-commerce development, and explore the basic path of enabling rural e-commerce to flourish, providing theoretical reference for rural economic high-quality development and optimization of rural e-commerce in our country.

2. Rural E-Commerce and New Quality Productivity

With the rapid development of science and technology, new quality productivity is widely used in the field of rural electricity suppliers, which is profoundly changing the operation mode and market pattern of rural electricity suppliers, providing important support for the development of rural electricity suppliers.

2.1 The Development Stage of Rural E-Commerce—From "E-commerce" to "Digital Commerce Promoting Agriculture"

In recent years, with the rapid development of Internet technology in China, more and more consumers have an increasing demand for commodity diversity and convenient shopping. Traditional offline purchasing mode has been unable to meet their consumption upgrading needs, and rural e-commerce has begun to rise rapidly. The development of rural e-commerce has gone through four stages from "e-commerce" to "Digital Commerce Promoting Agriculture". In the initial exploration stage from 2005 to 2012, the B2C model of agricultural products was opened, and later Taobao Village began to appear as a new business model connecting the rural market, marking the historic docking of rural economy and e-commerce. After years of exploration, rural e-commerce has gradually formed a preliminary development model and market foundation, and the state has put forward the "Internet +" strategy to encourage the combination of rural industry and the Internet, at which time it has reached the stage of rapid growth. In the four years after 2015, rural e-commerce has moved toward large-scale industry, not only carried out the rural e-commerce development model of "Internet + agriculture", but also created rural e-commerce demonstration counties nationwide, and the formal implementation of the rural revitalization strategy in 2018 is to further promote the large-scale development of rural e-commerce. After experiencing the above three stages, rural e-commerce has entered a stage of high-quality development in 2021, and the proposal of the "Digital Commerce Promoting Agriculture" project and the "Internet +" agricultural products out of the village process project has provided a new impetus for the development of rural e-commerce, and promoted the process of rural agricultural modernization and the digital transformation of rural economy.

2.2 Rural E-Commerce is Booming

The combination of new quality productivity and rural e-commerce has promoted the upward movement of rural economy and injected new impetus into the overall development of rural economy. The state supports the development of rural e-commerce and has put forward a series of projects such as the "Internet +" agricultural products out of the village and into the city project, which has led to the growth of sales data of rural e-commerce. As shown in Figure 1, both rural online retail sales and agricultural products online retail sales show an upward trend from 2019 to 2023. In 2023, China's rural online retail sales reached 2.49 trillion yuan, an increase of 12.9%. The online retail sales of agricultural products reached 587.03 billion yuan, an increase of 12.5% year-on-year, exceeding the target amount of 580 billion yuan in the Key Points of Digital Rural Development in 2023. Various e-commerce platforms are also vigorously deploying the rural market, and the development of projects such as "Tmall Farm" and "Pinduoduo Farm" has promoted the rapid growth of the rural e-commerce market. The vigorous development of rural e-commerce has become an important support for promoting local economic development and farmers' income growth.

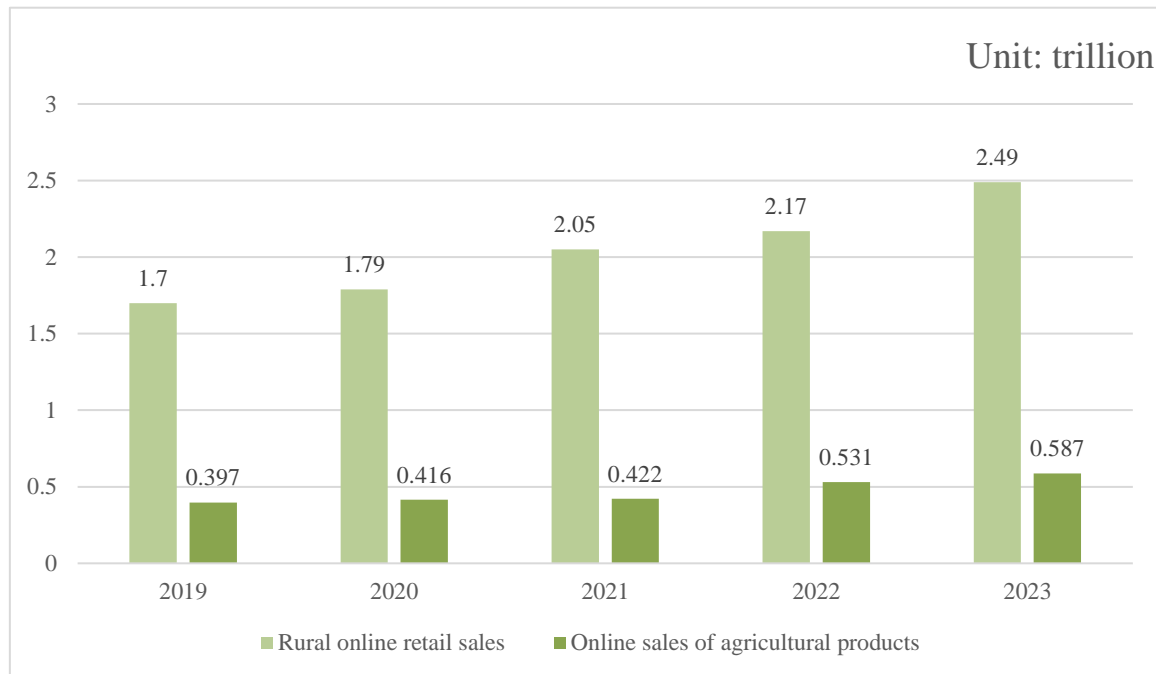


Figure 1. Statistical table of online retail sales of rural and agricultural products in China from 2019-2023

2.3 New Quality Productivity Brings Opportunities to the Development of Rural E-Commerce

New quality productivity is an advanced productivity form that achieves efficient production and sustainable development by integrating innovative resources and optimizing factor allocation in a new round of scientific and technological change. The concept of "new quality productivity" was first proposed in September 2023. The essence of new quality productivity is advanced productivity, characterized by innovation, which is generated by revolutionary technological breakthroughs, innovative allocation of production factors, and deep industrial transformation and upgrading. New quality productivity is the product of the combination of traditional productivity and high-tech. It takes innovation as the leading role, gets rid of the traditional economic growth mode and productivity development path, and drives economic development with high technology, high efficiency and high quality. It is an advanced productivity quality that has undergone qualitative changes.

Driven by the new quality productivity, rural e-commerce enterprises actively carry out the development of characteristic agricultural products, using the Internet platform and new technology to better connect producers and consumers, and promote rural organic products to urban markets and even foreign markets. The development of technologies such as artificial intelligence and the Internet of Things is constantly optimizing the industrial chain and supply chain of rural e-commerce, not only creating intelligent logistics to improve distribution efficiency, but also optimizing marketing strategies to improve operational efficiency to meet the preferences of different consumers. In addition, the new quality productivity is conducive to the integration of agriculture and scientific and technological innovation, promote the development of agricultural modernization, and realize the transformation and upgrading of agricultural industry. At the same time, it can promote the development of the "number of commercial agriculture" project and the "Internet +" agricultural products out of the village into the city project, give full play to the scale effect of rural electricity suppliers, and drive the innovation and development of upstream and downstream enterprises in rural electricity suppliers.

3. Challenges Encountered in the Development of Rural E-Commerce

With the in-depth promotion of e-commerce into rural areas and the work of poverty alleviation through e-commerce, rural e-commerce has made remarkable achievements and played an important role in promoting farmers' income and driving rural economic growth. Driven by innovation as the core, new quality productivity enables high-quality development of rural e-commerce through technological change, model innovation, resource sharing and industrial integration (LI Xin, LI Zan, ZHAO Huimin & XIA Jing, 2024), which can not only smooth the sales channels of agricultural products and expand urban and rural markets, but also improve the quality of agricultural products and ensure the increase of farmers' income through scientific and technological development,

research and development and innovative products. The emergence of new quality productivity provides new opportunities for the development of rural e-commerce, but it also brings many challenges.

3.1 Low Added Value and Lack of Differentiation of Agricultural Products

The product offerings on the rural e-commerce platform are diverse, primarily comprising agricultural produce, local specialties, and agricultural supplies. Among these, agricultural products hold a predominant position on rural e-commerce platforms, particularly unprocessed fresh vegetables and fruits, which constitute over 50% of the e-commerce transactions aimed at assisting farmers. The production links of these agricultural products are simple, mostly in the primary processing stage, lack of fine processing, and often have the characteristics of low added value.

Compared with some developed rural areas, most rural areas have relatively blocked information, lack of infrastructure, and lack of farmers' awareness of new technologies and technologies, which also leads to a low utilization rate of intelligent agricultural technology and equipment in agricultural production. According to statistics, the penetration rate of smart agricultural applications in China is less than 1%, and the penetration rate of smart agricultural equipment in rural areas is less than 20%.

The lack of funds and the lack of technology limit the allocation and use of intelligent equipment by rural enterprises and farmers. On the one hand, the production process of agricultural products depends on labor, resulting in low production efficiency and increased production costs. This traditional production mode is difficult to meet the current market demand for high output and high quality. On the other hand, the deep processing capacity is insufficient, and the quality of agricultural products produced is not high, which weakens the market competitiveness of rural e-commerce. In addition, the types and quality of most agricultural products sold by rural e-commerce are similar, and the products lack differentiation and uniqueness, which can not meet the diversified and personalized needs of consumers, reducing the profit margin of rural e-commerce platforms.

3.2 The Intelligent Logistics Storage System is not Perfect

The development of rural e-commerce relies on the development of logistics and warehousing industry. The current increase in consumer demand for high-quality agricultural products has led to a strong demand for intelligent and efficient logistics services. However, the insufficient development level of new quality productivity in the field of rural economy leads to the weak degree of digital intelligence of rural e-commerce logistics and warehousing system, which cannot be coordinated with the rapid development of rural e-commerce, causing logistics and warehousing bottlenecks, and seriously hindering the efficient operation of rural e-commerce.

First of all, the low penetration rate of intelligent and digital technologies in rural areas, the relatively backward digital construction of rural logistics infrastructure, insufficient investment in intelligent modern logistics equipment (LIU & JIN, 2024), and slow logistics distribution of agricultural products not only increase the transportation cost and product loss rate, but also reduce the timeliness of agricultural products supply. Otherwise, for fresh products with the characteristics of perishable and perishable, strict transportation time and appropriate temperature are crucial. Rural e-commerce often needs to be equipped with intelligent cold chain logistics storage facilities to reduce the loss of agricultural products and reduce costs. However, intelligent cold chain equipment is mainly concentrated in first-line developed cities and coastal areas, and the construction of cold chain logistics facilities in rural China is backward. The general shortage of intelligent transportation facilities such as refrigerated transport vehicles, cold storage, pre-cooling equipment, and cold chain monitoring systems in rural areas seriously restricts the transportation and storage efficiency of fresh agricultural products. Finally, cold chain logistics construction informatization level is low. Rural logistics storage facilities are generally traditional equipment, lack of intelligent information management systems such as temperature and humidity monitoring systems, logistics tracking systems, and can not monitor the warehousing environment in real time and timely record transportation and storage data, which has a negative impact on logistics efficiency and food safety.

3.3 Lack of Rural E-Commerce Professionals

Talent is the key factor to promote economic development, and the development of rural e-commerce cannot be separated from the support of professional talents. Driven by science and technology, the scale of the rural e-commerce market continues to expand, and the demand for e-commerce professionals continues to grow. According to the "2023 China E-commerce Talent Status Survey Report", nearly 60% of enterprises are in urgent need of operation direction and compound direction talents, of which 33% of enterprises lack platform operation talents, 27% of enterprises lack compound talents.

Affected by salary, employment opportunities, educational resources and other factors, e-commerce professional talent resources tilt to the city, resulting in a siphon effect. Rural e-commerce is facing a crisis of shortage of

professionals. On the one hand, rural e-commerce is a new sales model formed by the combination of information technology and the Internet, and the demand for high-quality and skilled e-commerce professionals is increasing, requiring e-commerce professionals to have a higher level in e-commerce operation, digital marketing and information technology application. At this stage, the distribution of e-commerce is uneven, and high-quality e-commerce serves more urban e-commerce, resulting in limited development of rural e-commerce, affecting its overall competitiveness and innovation. On the other hand, the training model of rural e-commerce professionals is not perfect. Most of China's educational resources are concentrated in cities, and resources such as colleges and universities in rural areas and e-commerce vocational training institutions are scarce, which cannot provide systematic e-commerce knowledge and practical skills for rural e-commerce practitioners. The current situation of weak teachers and limited practical opportunities in rural areas has caused major obstacles to the training of rural e-commerce professionals.

In addition, the rural e-commerce market is relatively small and competitive, and the salary is often low, coupled with the lack of systematic career development planning and promotion space of rural e-commerce enterprises, brain drain is an inevitable result.

3.4 Rural E-Commerce Information Data Security Risks

In the digital age, information transparency is constantly improving, and data access becomes more convenient, which promotes the dissemination and sharing of knowledge, but at the same time aggravates the risk of information and data security leakage. Rural e-commerce, as a sales model for online transactions with the help of the Internet, digital technology and information technology, involves a large amount of user data, transaction information and other private data. The application of some new technologies such as big data and blockchain in rural e-commerce lags behind, resulting in relevant enterprises facing information data security problems.

commerce enterprises need to collect and analyze a large number of sales data in the operation process to improve operational efficiency and customer system, but rural e-commerce enterprises are small, generally lack a complete information security management system, and the technical investment in data security protection is relatively weak, the firewall mechanism is not perfect, easy to cause information leakage security risks, affecting the normal operation of rural e-commerce. The shortage of network security protection ability in rural areas and the lack of data security awareness of rural e-commerce practitioners will increase the risk of cyber attacks in the operation process of rural e-commerce. The leakage of information and data may cause direct economic losses of rural e-commerce, and may also reduce the trust and recognition of consumers, and ultimately reduce the market competitiveness and profitability of rural e-commerce. Therefore, ensuring the security of rural e-commerce information and data is an important basis for promoting the development of rural e-commerce economy and ensuring its sustainable development.

4. Countermeasures and Suggestions for the Vigorous Development of Rural E-Commerce Enabled by New Quality Productivity

New quality productivity is a transition from traditional productivity. Driven by innovation, it breaks away from traditional economic growth mode and productivity development path, and serves strategic new fields and industries with high technology content. It has the characteristics of high technology, high efficiency and high quality. The new quality productivity promotes the upgrading of rural industrial structure and has a strategic driving effect on the development of rural e-commerce industry. In view of the development of rural e-commerce under the background of new quality productivity, we can start from the four aspects of product upgrading, logistics intelligence, personnel training and information security, and promote the vigorous development of rural e-commerce with new technologies and new models.

4.1 Improve the Agricultural Intelligent Production System and Create High-Quality Products

With the help of science and technology, high-quality products have become a key factor in promoting the vigorous development of rural e-commerce. In response to the current low added value and serious homogenization of rural e-commerce products, the following measures can be taken.

To begin with, promote the formation of intelligent production lines to reduce dependence on manual production. Increase investment in intelligent agricultural production equipment, and actively use new quality production technologies such as the Internet of things and big data in agricultural production to optimize production decisions. Later, automatic intelligent equipment is introduced to form intelligent production lines, accelerate intelligent production equipment to replace labor, and improve the quality of agricultural products. For example, the vegetable planting base built in Liuba County, Hanzhong City, Shaanxi Province, is known as the "agricultural smart factory", which has introduced a variety of automation equipment to create a fully automatic intelligent production line,

saving labor costs by 70%, while increasing the annual green vegetable production capacity to 250%, greatly improving production efficiency. Then, optimize the deep processing system to increase the added value of agricultural products. The core of new quality productivity is "promoting quality with new". Rural e-commerce enterprises should further promote the application of new quality productivity, introduce advanced technologies such as artificial intelligence, establish intelligent modern deep processing industry. And combined with the individual needs of consumers, we will vigorously promote the research and development of new products, and develop high value-added and differentiated products with market competitiveness to meet the high-quality individual needs of consumers for agricultural products. Subsequently, rural e-commerce enterprises should dig deep into local characteristics in order to create regional characteristics of products to enhance product differentiation^[11], and use high-tech strictly standardized production to ensure the personalized and high-quality needs of consumers.

4.2 Improve the Intelligent Logistics and Warehousing System, and Smooth the Rural E-Commerce Transport Chain

Rural logistics system must maintain coordinated development with rural e-commerce in order to form a virtuous cycle and promote the comprehensive development of rural economy. It is necessary to establish and improve the intelligent logistics storage system and smooth the transport chain of rural e-commerce products to promote the high-quality development of rural e-commerce.

First, we must increase the construction of intelligent logistics infrastructure in rural areas. Regional governments should vigorously invest in the use of intelligent modern logistics equipment, digital warehouse distribution centers and other infrastructure in order to boost the digital construction of rural logistics infrastructure, and then optimize the rural transportation network, to ensure the timeliness of rural e-commerce product distribution. Second, we need to improve the construction of intelligent cold chain facilities in rural areas. Cold chain facilities are an important basis for ensuring the quality of agricultural products and enhancing the competitiveness of rural e-commerce markets. The government should actively invest in the construction of standardized agricultural products cold chain logistics facilities to create cold chain productivity, and introduce automated equipment such as unmanned trucks, robot picking systems to improve handling efficiency and install infrared sensors and numerical control systems in cold chain equipment to ensure the freshness and quality safety of agricultural products in transportation and storage. Third, it is necessary to build an integrated cold chain logistics management platform for rural e-commerce to achieve effective management of cold chain logistics transportation and inventory. Meanwhile, we should help build an information and intelligent agricultural transportation ecosystem, realize the information sharing of all links of the supply chain, and ensure the smooth flow of all links of rural e-commerce.

4.3 Upgrade the Training Mode of Compound Talents and Build a Scientific Education System

Talent is an important resource endowment for the rapid development of rural e-commerce, and it is also the most active factor in the new quality productivity. To achieve high-quality development of rural e-commerce, it is crucial to upgrade the training mode of rural e-commerce talents, consolidate the technical human resource base of rural e-commerce, and build a scientific and high-quality e-commerce talents training system.

First of all, optimizing the talent training mechanism of "government + enterprise + university" and promoting the generation of new brain workers is the driving force to promote the transformation of old and new kinetic energy of rural e-commerce professionals. Most colleges and universities are supposed to set up professional courses on rural e-commerce for e-commerce majors to cultivate high-quality professionals with diversified skills such as e-commerce operation, digital marketing, and data analysis, and allow rural e-commerce enterprises to participate in the training of professional talents, providing some internship opportunities and simulation operation scenarios.

Secondly, a resource-sharing platform should be established to connect rural and urban areas and change the traditional talent training model. The creation of this resource-sharing model can not only help rural e-commerce practitioners learn professional operation and technology application, but also provide farmers with e-commerce training, business consulting and technical support to help them learn systematic rural e-commerce operation knowledge and practical skills. In the example, a number of colleges and universities and e-commerce platforms jointly went to the countryside to conduct e-commerce teaching, among which the relevant team of Hunan Normal University carried out training for rural e-commerce talents in Liulin Village, Yuanling County, explaining the basic knowledge of e-commerce for farmers, teaching farmers live broadcast skills, and contributing to the exploration and cultivation of skilled local e-commerce talents.

Finally, the rural e-commerce enterprises can improve the salary treatment and retain high-quality e-commerce talents, which can clarify the future development path and opportunities for rural e-commerce professionals, so that the talent engine can empower rural e-commerce.

4.4 Improve the Information Security Mechanism and Standardize the Platform Operation

With the increasing application of digital information technology in rural e-commerce, information and data security problems also follow. The Government Work Report 2023 has called for strengthening network, data security and personal information protection. Actively build a rural e-commerce security system, ensure the security of rural e-commerce information and data by promoting the reasonable application of high-tech, so as to promote the high-quality development of rural e-commerce.

To started with, in view of technical defects, rural e-commerce should create an information security platform, standardize the information management of rural e-commerce enterprises, increase and accelerate the application of blockchain, cloud computing and other technologies, and use the decentralization, transparency and immutable characteristics of blockchain to ensure the data security of rural e-commerce platforms.

And then, the government departments improve the network security infrastructure, regularly conduct data security training for e-commerce practitioners, and establish an effective firewall mechanism and data encryption mechanism to identify potential security risks and reduce information security risks, so as to improve the overall security level of e-commerce platforms.

In addition, information data security needs to be coordinated by rural e-commerce, government and technology companies. The government should formulate clear information security policies and standards to support the safe operation of rural e-commerce. Technology companies provide advanced technical support for e-commerce platforms to help establish efficient information security mechanisms. And the e-commerce platform itself actively participates in the learning and application of security technology to improve its own security protection capabilities. We will create a safe and reliable operation link for rural e-commerce and promote the healthy development of rural e-commerce through the close cooperation of the three parties.

5. Conclusion

The rise of rural e-commerce has opened up new channels for the sale of agricultural products, which is an important means to promote the transformation of rural economy. The generation of new quality productivity has injected new vitality into the rural economy and has become a strong support for the high-quality development of rural e-commerce. This paper analyzes the problems existing in the development process of rural e-commerce, including low added value of products, imperfect intelligent logistics and warehousing system, lack of professional talents in rural e-commerce, and risks of information and data security in rural e-commerce, and proposes strategies to enable high-quality development of rural e-commerce with new quality productivity in view of the above problems. Combined with the strategy of " Digital Commerce Promating Agriculture ", new quality productivity is used to improve the quality of agricultural products, smooth the transport chain of agricultural products, upgrade the training mode of e-commerce merchants, and optimize information management. And then vigorously promote the intelligent development and sustainable development of rural e-commerce, providing a strategic direction for rural revitalization.

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