

The Study on the Supply Chain Construction of Tuliu Group's Agricultural E-Commerce Industry under the Sudden Outbreak of Public Health Events

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Abstract

Against the backdrop of sudden public health emergencies, the construction of the supply chain in the agricultural e-commerce industry becomes particularly crucial. Tuliu Group, as a leading player in the domestic agricultural e-commerce sector, offers valuable insights into addressing such events through its practical experience in the fresh food supply chain. This paper conducts an in-depth analysis of Tuliu Group's fresh food supply chain, exploring how it effectively responds to the challenges posed by public health emergencies and its role in supporting farmers and promoting the development of the agricultural e-commerce industry. Furthermore, it compares and analyzes the differences between Tuliu Group and other e-commerce platforms, proposing strategies for the wider application and optimization of Tuliu's approach. The aim of this paper is to provide valuable insights and methods for the construction of the agricultural e-commerce industry supply chain under public health emergencies and to offer references for the sustainable development of related fields in the future.

Keywords

Sudden Public Health Emergencies, Agricultural E-Commerce, Supply Chain Construction

1. Introduction

1.1. Research Background and Significance

In recent years, frequent global public health emergencies, such as COVID-19,

African swine fever epidemic, agricultural product safety incidents and avian influenza epidemics, have had a serious impact on the economic and social development of all countries, especially in the agricultural sector. These public health events not only directly affect agricultural production, but also put forward higher requirements for farmers' ability to obtain information and market response. For example, the pandemic has led to a decline in traffic restrictions and market demand, the African swine fever epidemic has caused a large number of pig deaths and agricultural losses, agricultural product safety incidents have affected market trust, and the avian influenza epidemic has affected poultry farming. In this context, it has become an urgent problem to study how to help farmers cope with the challenges of public health emergencies through new business formats such as e-commerce and innovative agricultural supply chain models, and it is also one of the important challenges faced by the agricultural sector. Due to the relatively weak information acquisition and market response capabilities of farmers, public health emergencies often impose significant challenges on agricultural production and the sale of agricultural products. Against this backdrop, how to innovate agricultural supply chain models through new formats such as e-commerce to help farmers cope with the challenges brought by public health emergencies has become an urgent issue. As a leading domestic agricultural internet enterprise, Tuli Group has rich experience and resources in the field of agricultural e-commerce. Therefore, this study aims to explore how Tuli Group, through the construction of the agricultural e-commerce industry supply chain, can provide better services to farmers, thereby promoting agricultural development and rural revitalization.

This study will delve into the innovative models of agricultural supply chains under public health emergencies, providing valuable supplements and improvements to the theoretical framework of agricultural e-commerce. Additionally, by comparing different development models of agricultural e-commerce in China, it can further enrich comparative studies of agricultural e-commerce and provide theoretical support for the development of agricultural e-commerce nationwide. Practical significance: Secondly, this research will conduct in-depth analysis of the specific practices of Tuli Group's assistance to agricultural e-commerce industry supply chain construction, summarizing experiences and lessons learned to provide reference and guidance for similar enterprises. Finally, through studying successful cases of Tuli Group's assistance to agricultural e-commerce industry supply chain construction, agricultural e-commerce models can be further promoted, facilitating agricultural modernization and rural revitalization.

1.2. Literature Review

In recent years, domestic scholars have conducted in-depth research on the vulnerability and coping strategies of agricultural supply chain under public health emergencies. For example, Zhang (2022) pointed out that public health emergencies such as the epidemic made the agricultural supply chain face serious challenges, such as logistics obstruction and low technical level of the supply

chain. He built a model to evaluate the vulnerability of the agricultural supply chain and proposed corresponding recovery strategies. Zhou (2023) further pointed out that the supply chain of fresh agricultural products is more susceptible to the impact and impact of emergencies, emphasized the importance and challenge of supply chain in responding to emergencies, and proposed corresponding emergency decision-making models and strategies. Ren et al. (2024) elaborated on problems such as difficult quality control of fresh products, imperfect logistics cold chain transportation, and large product consumption in the supply and marketing process, and proposed suggestions on optimizing the supply link, improving the level of cold chain and distribution efficiency, and formulating supportive policies for the government.

Digital agriculture is an important way of agricultural modernization. Gong and Zhao (2023) took Roxburgh pear in Longli County, Guizhou as an example, aiming at problems such as low degree of agricultural product intensification, low level of improved processing technology and narrow sales channels, and put forward suggestions for the construction of the national agricultural product industry chain, such as strengthening agricultural product quality supervision, strengthening the introduction of talents and high-tech, and expanding product sales channels by means of we-media. We will rationalize the development and management of the national industrial chain for agricultural products. Shao (2023) emphasized the importance of digitalization of agricultural product chain and its application in practice, and proposed to build a digital agricultural talent team to enhance agricultural transformation. Zhang & Gao (2023) conducted an in-depth analysis of the value advantages of digital agriculture in helping rural revitalization, and believed that it effectively promoted the industrialization development of digital rural areas through technical means such as data sharing, changing the production mode of agricultural products and cultivating rural e-commerce platforms, and provided stable market channels for farmers. Huang (2023) using “e-commerce live streaming + agricultural products” as a case study, this research explores how to optimize marketing strategies in the new media era to adapt to the new market environment. However, Yu (2023) pointed out that, although e-commerce live streaming offers new opportunities for agricultural product sales, it also presents challenges. Capturing and retaining consumer attention is a significant hurdle.

Compared with domestic scholars, foreign scholars have studied the agricultural supply chain under public health events earlier. Dani & Deep (2010) emphasized the importance of predictive methods and reactivity strategies in food supply chain management, and proposed the direction for further research, that is, to further analyze the importance of various factors in incident response and test their correlation with recovery. Hao et al. (2024), aiming at the limited transportation resources brought about by the epidemic and the difficulties in distribution, and ensuring the demand for fresh agricultural products of isolated residents, designed distribution models and analyzed and compared algorithms, providing a scientific basis for government departments to make decisions on opti-

mizing the emergency supply and distribution of fresh agricultural products in public health emergencies. Jiang et al. (2021) focused on the emergency supply of fresh agricultural products in the context of large-scale epidemics. Considering the massive demand and limited transportation resources, this paper proposes an integrated multi-item packaging and vehicle routing planning method to improve the emergency supply capacity. In response to the impact of major public health emergencies, Lopez-Ridaura et al. (2021) clearly pointed out that the agricultural supply chain should implement a series of coping mechanisms, including the development of alternative value chains, the establishment of food and agricultural distribution systems, the use of digital means of communication, and relying on farmer actions and organizations to cope with uncertainties.

Overall, domestic and international scholars generally agree that public health events have had a significant impact on agricultural supply chains, while also highlighting the critical role of technology application and innovation in addressing these challenges. The practice of Tuli Group in China has been widely noticed and recognized, providing valuable experience for other regions. However, how to apply these experiences to the broader agricultural field, as well as how to further optimize and improve the supply chain system, is still an important direction of future research.

2. Analysis of Tuli Group's Fresh Supply Chain

Tuli Group has started comprehensive layout and upgrading from the production end, logistics end, and retail end, implementing diversified professional division of labor from products to market to brand construction. It has built a fresh supply chain, enabling precise epidemic prevention and ensuring fresh supply, as shown in Figure 1.

2.1. Production End

Tuli Group has partnered with Countryside Fresh to take over more than 400 offline physical stores under Countryside Fresh. Firstly, it started to implement logistics services for packaging and procurement of vegetables from multiple planting bases to the factory. Then, through offline stores and online platforms, it conducted low-profit sales through multiple channels. It timely adjusted the inventory of vegetables in planting bases, swiftly sorted them, and solved issues such as untimely supply. For impoverished households in rural areas, Tuli Group also established volunteer service teams, penetrating various communities. Through investigations, they provided free vegetable care packages one-on-one. According to incomplete statistics, the event has distributed over 1000 kilograms of vegetables for free, covering more than 100 households of farmers.

2.2. Logistics End

To ensure that fresh products are delivered to consumers as quickly and freshly as possible, Tuli Group has partnered with JD.com to address the weak link in its logistics system construction. Through this e-commerce industry collabora-

tion model, leveraging JD.com’s powerful logistics system, the circulation links of agricultural products are reduced, improving the transportation efficiency of agricultural products. This ensures that agricultural products reach consumers faster and fresher, thereby guaranteeing the freshness and quality of the agricultural.

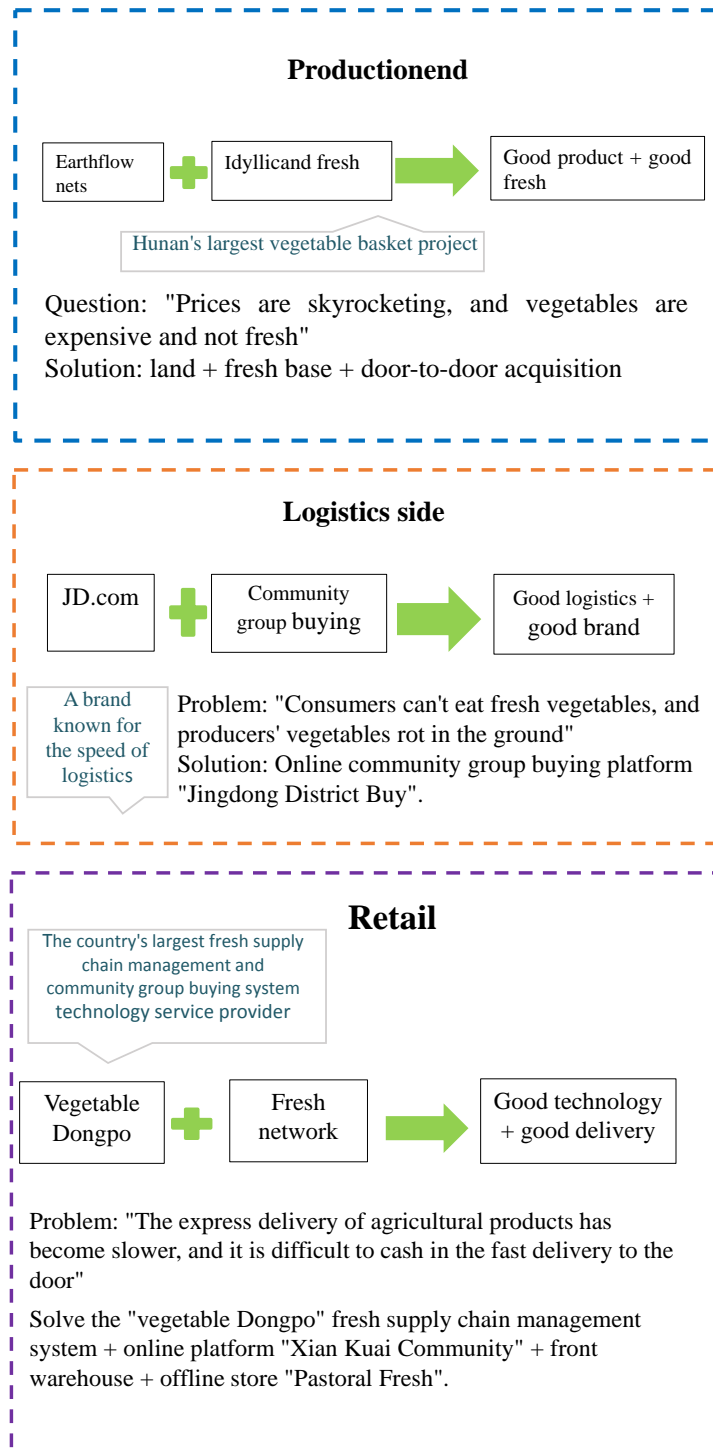


Figure 1. Fresh supply chain network—“anti-epidemic” matrix.

2.3. Retail End

Solving the issue of transportation capacity doesn't imply the supply chain is complete. In response, Tuli Network initiated a collaboration with Shudongpo, integrating resources from both parties, forming a strong alliance, and transforming the retail end of the supply chain. Adopting the fresh supply chain management system provided by "Shudongpo" addressed the efficiency concerns within the supply chain. With the support of intelligence and automation, the sorting efficiency of its automatic sorter increased by 60%.

3. Comparison Analysis between Tulin Group and Alibaba

Alibaba owns a plethora of products and holds a leading position in the Chinese internet industry. As early as 2009, the first "Taobao Village" emerged, with its core being to mobilize the resources of a "village" through the aggregation effect of e-commerce, forming a relatively complete industrial chain. For instance, Dongfeng Village in Shaji Town, Suining County, Jiangsu Province, has developed a relatively complete furniture industry chain through clustered development, earning it the title of the "Xiaogang Village" of the information age. The number of Taobao Villages increased rapidly within a few years, driving the flourishing development of rural e-commerce in China.

In 2014, when Alibaba began to embark on its own agricultural ecosystem construction, Tuliutong Group was just getting started and had only established a presence in the land transfer industry. Meanwhile, Alibaba started to layout the rural e-commerce industry chain by integrating data platform sharing, merging information flow, capital flow, and logistics into one stream, strengthening information dissemination, shortening the capital operation cycle, and supporting the construction of rural infrastructure and logistics systems to promote retail of agricultural products in rural areas.

In the information flow part, internal API, B2B platform and RT-Mart and other channels play a key role in realizing the information transmission and matching from market demand to agricultural production, making the supply and demand information of agricultural products more transparent and efficient. In terms of capital flow, it is realized through payment internal API and Ali Finance and other platforms, which includes the circulation process from customer payment to farmers' access to funds, effectively shortening the capital operation cycle and improving the utilization efficiency of funds. The logistics part relies on platforms such as Ali Mom, Ali Cloud and Cainiao to achieve fast and safe distribution of agricultural products from production to consumption, providing a reliable logistics guarantee for agricultural product retail, as shown in **Figure 2**.

Alibaba and Tuliutong Group operate in different domains and their agricultural assistance models and construction philosophies also emphasize different aspects.

3.1. Assistance to Agriculture Model

In the "Alibaba Report on Rural Revitalization", Alibaba promotes the development of "unmanned retail" technology to support rural revitalization. Since

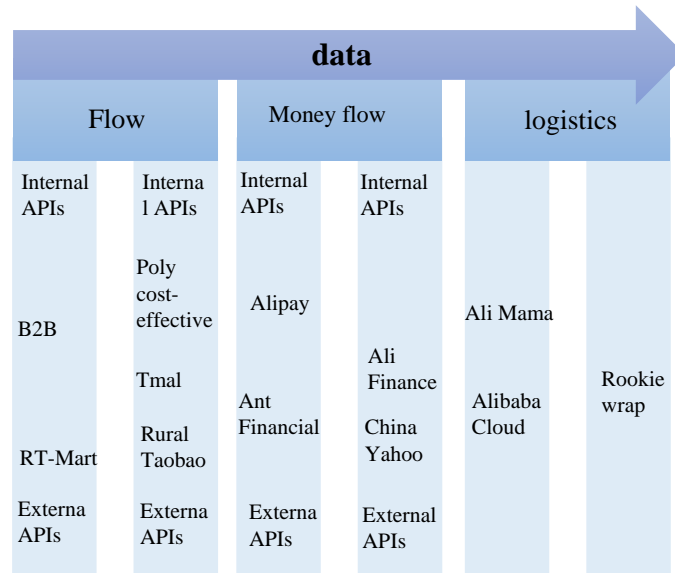


Figure 2. Data flow diagram of Alibaba's agroecological aid (<https://dp.alibaba.com/exchange/article/132>).

2014, it has been committed to improving rural infrastructure and transforming rural areas. Through products such as Rural Taobao, Cainiao, Ant Financial, Fliggy, and Alibaba Cloud, Alibaba has introduced a comprehensive and diversified assistance model for rural development. Starting from rural retail, it focuses on aspects like logistics, finance, tourism, and technology to build the “Alibaba ecosystem” and create a “win-win” model of “ecology + poverty alleviation” with its own characteristics.

The assistance to agriculture model of Tuli Group tends to be specialized, deeply rooted in the land transfer industry. Relying on its own land information resources, it has constructed its own big data system for land transfer. With the advantage of big data, in recent years, Tuli Group has gradually extended its development to the agricultural supply chain system and land finance direction. Its main feature is cooperative assistance to agriculture. For example, cooperating with JD.com to build a modern logistics system, ensuring that agricultural products are delivered to consumers quickly and fresh; cooperating with Ant Group to develop Tuli Inclusive Finance, which plays a role in solving the problem of insufficient funds for farmers in spring plowing; and cooperating with Shudongpo to create the retail end of agricultural products. The forms of cooperative assistance to agriculture are diverse, but the goal is to create a new ecology of land transfer assistance to agriculture.

3.2. Building Thinking

Alibaba's construction thinking is “how to achieve long-term thinking”, to maintain the advantage of enterprise intellectual resources, to grasp the trend of development in the Internet data era, and to build an “Ali ecosystem” through digital technologies such as unmanned retail and cloud farms, so as to drive rural

income generation and wealth.

And Tuli Group is thinking about “how to collaborate and share”. Tuli Group operates on an open and inclusive platform, and is more willing to cooperate and achieve win-win results among enterprises in many fields, such as digital agriculture and the construction of fresh food supply chain systems, to make up for weak links. Under the cooperation between enterprises, the linkage effect of the upstream, midstream, and downstream of the e-commerce agricultural industry chain will be triggered, creating economies of scope and regional economies of scale. This will promote the construction of China’s e-commerce agricultural industry ecosystem at lower costs and higher efficiency.

4. Promotion and Optimization Strategies

4.1. Vertically Promote Supply Side Structural Reform and Build a Supply Chain System That Integrates the Loop and Chain

In the construction of the supply system for fresh products of Tuli Group, we will vigorously promote agricultural supply side reform, create a new service for its full value chain of “supply chain + warehousing logistics + operation”, improve the efficiency of agricultural product picking and distribution, and expand product sales channels.

We need to continuously improve the supply chain system that integrates the production end, logistics end, and retail end. Firstly, based on market demand and policy guidance, we need to go deep into the local area and build a platform for both supply and demand through online and offline docking to solve the problem of information asymmetry. Further integrate e-commerce into overall planning, establish a long-term mechanism for production and sales coordination, focus on market demand, and emphasize the coexistence of consumption upgrading and consumption degradation to meet the needs of different consumers.

Secondly, strengthen the construction of logistics support system of e-commerce information platform, create an Internet platform for two-way feedback of market information, provide convenient services for enterprises, open up the last two kilometers of agricultural products in the field of agricultural products circulation, save costs, improve the efficiency of agricultural products circulation, enable the government and agricultural enterprises to achieve rapid and effective agricultural products trading, and improve the market core competitiveness of agricultural products.

4.2. Linking Upstream and Downstream, Building a Multi Enterprise Compound Symbiotic Industrial Chain

The ecological industrial chain is a product of the combination of industrial ecology theory, circular economy theory, symbiosis theory, and industrial chain theory. Its core is to standardize upstream channels, refine midstream management, and provide convenient downstream services, as shown in **Figure 3**.

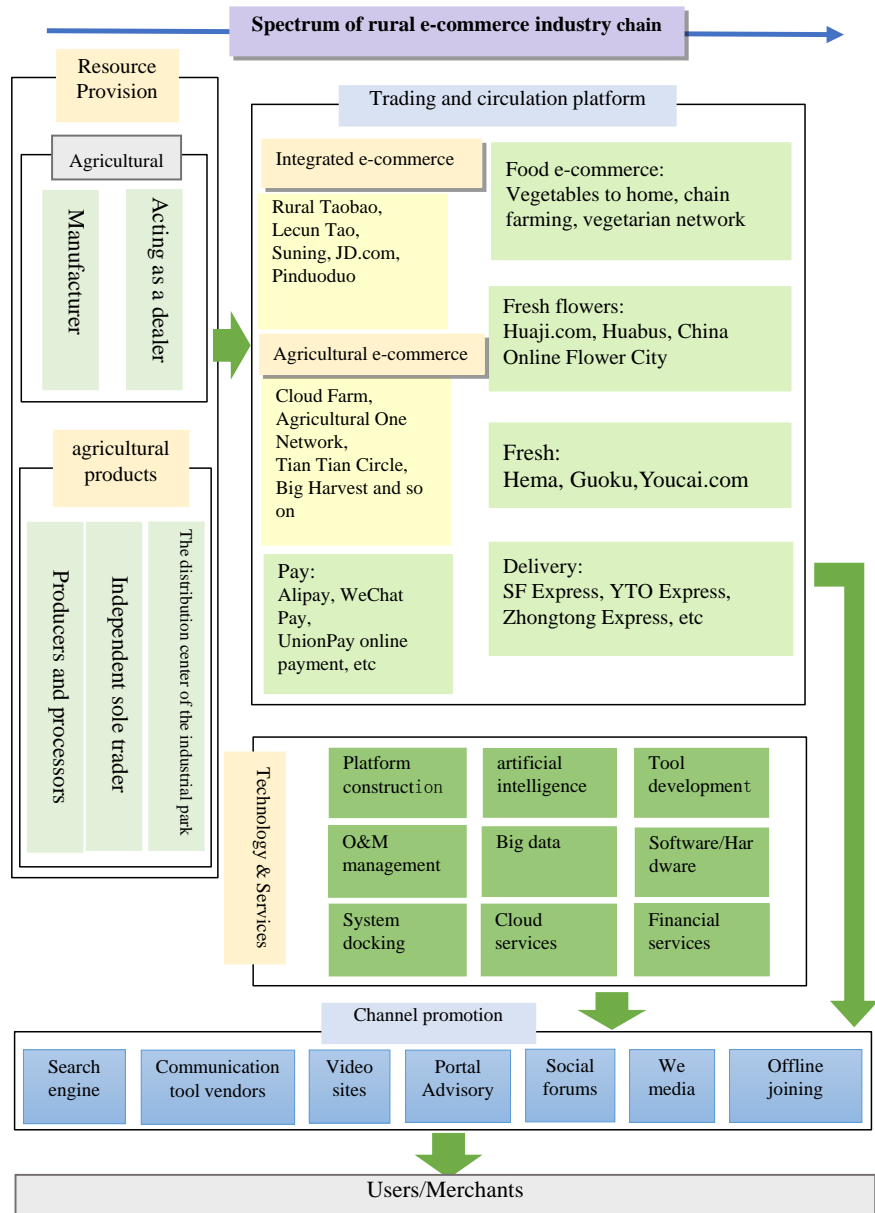


Figure 3. Spectrum of the ecological chain of the rural e-commerce industry.

Each e-commerce platform should link upstream and downstream, jointly build a composite symbiotic industrial chain with regional characteristics, bridge the barriers between e-commerce platforms, strengthen cooperation and communication between enterprises, and leverage the advantages of major e-commerce platforms in the construction of agricultural product supply chain system, rural infrastructure construction, and rural logistics system construction, forming a joint force for poverty alleviation.

Through cooperation with enterprises such as JD.com and Caidongpo in the logistics system, Tulu Group has enhanced its e-commerce competitiveness through complementary advantages. At the same time, it has achieved industrial specialization, comprehensive utilization of agricultural, rural and farmers resources,

promoted the development of regional intensive economy, promoted the transformation of traditional e-commerce industry to “ecological”, and assisted in the healthy construction of e-commerce industry ecology.

4.3. Using “5G + Blockchain” Technology to Promote the Construction of Rural E-Commerce Infrastructure

For fresh agricultural products, we will strengthen the construction of 5G base stations in rural areas, narrow the digital divide between urban and rural areas, and use 5G technology to promote the upgrading of agricultural production to consumption. Accelerate information communication and sharing, utilize “5G + cloud computing + blockchain” technology, build a quality monitoring and traceability system for agricultural products throughout the entire process of “seed management, storage and transportation, and sales”, solve the rigid centralized management mode of agricultural production, as well as the problems of large spatiotemporal span, information redundancy, and asymmetry in rural e-commerce supply chains, and achieve the monitoring of the entire process of agricultural products from planting to consumption.

Secondly, we need to strengthen the construction of rural logistics systems, increase the construction of logistics warehouses, build good supply chain terminals, and achieve rapid procurement, sorting, packaging, and other operations of fresh agricultural products in both production and sales areas. The key lies in “fast collection”; In the last mile, we need to break through the cold chain technology of agricultural product storage and preservation, increase infrastructure project construction, and the key is “preservation”.

5. Conclusion

5.1. Value and Innovation

By analyzing the development history of e-commerce and the current situation of e-commerce under sudden public health emergencies, it can be seen that sudden public health emergencies are both opportunities and challenges for the development of e-commerce. People can promote the development of e-commerce and logistics without going out too much. If e-commerce is used to assist poverty alleviation in agriculture, it will have great potential.

In this study, Tuli Group proposed an overall plan for rural digitization based on its relatively complete big data system and online service system; the second is to leverage its leading position in the domestic land transfer industry, actively share data, share agricultural experience, and provide society with reference and solutions for epidemic prevention and agricultural assistance; the third is to build a fresh food supply chain system under sudden public utilities; These innovative measures have certain thought-provoking value for e-commerce poverty alleviation.

This article highlights the importance of agricultural e-commerce industry supply chain construction, with special emphasis on the challenges and coping strategies in the context of public health emergencies. By taking Tuli Group as

an example, the paper reveals its successful practice in the whole fresh supply chain, which provides a useful reference for other enterprises. The paper also makes a comparative analysis between Tuli Group and other e-commerce platforms, and puts forward the strategy of promotion, application and optimization, which points out the direction for the development of agricultural e-commerce industry. Most importantly, this paper provides valuable ideas and methods for the sustainable development of related fields in the future, and injects new vitality and momentum into the progress of the industry.

5.2. Enlightenment

After the comprehensive analysis of the above research, we have identified the following areas that need to be noted and implemented in building an e-commerce poverty alleviation industry ecosystem:

First, e-commerce poverty alleviation should first be based on local conditions, adapt measures to local conditions, combine local characteristics, and make full use of big data and the Internet to implement targeted policies in relevant regions. At the same time, it is also necessary to have innovative thinking and not blindly follow and imitate. It is necessary to be able to innovate independently, develop new products, and strengthen cooperation and win-win with other platforms. Tuli Group's win-win cooperation in the supply chain with enterprises such as JD.com and Caidongpo is a good example.

Secondly, science and technology are the primary productive forces. E-commerce platforms are in line with the trend of the times, accelerating the development of their own big data, cloud computing, and blockchain, improving their information collection, processing capabilities, and customer service capabilities, and adhering to the direction of global and future development.

Thirdly, e-commerce platforms should integrate their service system, fully leverage the linkage and cooperation between national social organizations, improve their service support system, increase the construction of logistics services, financial services, online services, and shared services, and create their own service system. For Tuli Group, building its own big data service system has opened up the "last mile" of poverty alleviation. We need to know that enterprises must adhere to the unity of economic and social benefits, and e-commerce enterprises must also consider social benefits. Tuli Group contributes to the revitalization of rural areas and the construction of a new socialist countryside. In addition, poverty alleviation in the rural e-commerce industry cannot be achieved without the guidance, encouragement, and support of government policies. It is necessary to continuously improve the relevant policies for e-commerce poverty alleviation in China, improve the e-commerce talent training system, promote development with talents, and create a good e-commerce ecological environment.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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