

# Resilience Optimization of Agricultural Product Supply Chain from the Perspective of Digital Economy

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## Abstract

Under the background of digital economy promoting social development, optimizing the resilience of agricultural product supply chain has become an important part of promoting the economic modernization of agricultural products. Starting from the particularity of agricultural products, this paper discusses the situation of external impact on the supply chain of agricultural products from the perspective of digital economy, and analyzes the ability of supply chain to resist risks. The analysis results show that the main problems of the supply chain are as follows: weak basic capacity, prominent "information island" and lack of governance system, which highlight the lack of resilience of the agricultural supply chain. Therefore, relying on digital economy to promote digital technology innovation, accelerate the construction of digital platform, and focus on digital dynamic evaluation can improve the risk resistance ability of supply chain and optimize its resilience.

## Keywords

Digital Economy; Agricultural Product Supply Chain; Resilience.

## 1. Introduction

With the acceleration of globalization and the continuous improvement of consumers' requirements for food quality and safety, the management of agricultural supply chain has become an increasingly important research topic. Agricultural product supply chain management is an important management activity, which is related to the efficiency and cost of the whole supply chain. At present, the supply chain management of fresh agricultural products, as one of the main components of agricultural products in our country, faces some challenges. Among them, there are not only internal characteristics of fresh agricultural products such as perishability, vulnerability, deterioration, difficult transportation and difficult preservation, but also external environmental factors such as poor supply chain information flow, more quality control loopholes and low degree of logistics specialization[1][2]-[3]. These internal and external factors threaten the supply chain security of fresh agricultural products, and sudden risk changes will occur in the supply side and demand side, which exposes the vulnerability of fresh agricultural products supply chain. If these problems are not handled well, fresh agricultural products will face the hidden danger of "broken chain". At the same time, in the face of the impact of sudden safety accidents such as the novel coronavirus pneumonia epidemic, it is easy to occur regional blockade, logistics disruption and other special circumstances, often easy to cause problems in some key links of the supply chain of fresh agricultural products, some farmers and marketing individuals with weak disaster resistance will suffer major losses, and in serious cases, there will be a wave of closures. This will not only affect the safety of People's Daily food supply, but also affect the healthy development of the agricultural product industry, and then bring adverse effects to the social economy. It can be seen that the risk of supply chain vulnerability seriously restricts the sustainable development of agricultural products industry, and the supply chain risk is mainly reflected in the lack of supply chain resilience. Therefore, the improvement of supply chain resilience should be taken

as the focus of work, and the improvement of supply chain resilience is an important content of China's current stage to achieve rural revitalization, but also the basis for ensuring food safety of residents, and it is a necessary measure to achieve high-quality economic development in China.

However, the existing research on supply chain resilience has some limitations. The research on supply chain resilience is mostly set for developed countries with relatively complete development, and the research direction of supply chain resilience is mostly industrial supply chain. Existing research on supply chain resilience pays little attention to the perishable, vulnerable and metamorphic agricultural supply chain. Therefore, studying the resilience optimization of agricultural supply chain can help agricultural supply chain resist more risks, and provide a new opportunity for the subsequent development of agricultural supply chain. The original meaning of the term resilience is the ability of a system or individual to recover from an external shock[4]. In today's economic globalization, the concept of resilience has been more widely applied to various disciplines in the information society. In the economic management of agricultural products, supply chain resilience has received extensive attention. In the supply chain resilience, it refers to the ability of the supply chain to be subjected to external shocks, especially in the face of market emergencies, to respond quickly, recover from and adapt to events in a timely manner, so that the supply chain system can still maintain sustainable operation when it encounters risks[5].

From the perspective of digital economy, it is of great significance to study the issues related to the optimization of agricultural supply chain resilience. In recent years, scholars at home and abroad have studied the concept of digital economy from different angles and gained a deeper understanding. Especially after 2000, with the iteration and upgrading of the Internet and other digital technologies, the influence of the digital economy has been deepening, and new business forms have been continuously spawned. The digital economy in the new era, such as platform economy and sharing economy, has begun to provide economic value for social development[6]. From the perspective of economic value, on the one hand, the digital economy can provide the supply chain with efficient, high-quality and accurate production and supply; On the other hand, the digital economy can meet the individual needs of different consumer groups and help consumers obtain more product value and service benefits. Fundamentally, the digital economy can maximize the economic value of the supply chain through the new characteristics of the new business forms on the basis of the formation of new business forms. Specifically, with the help of digital technology, such as the digital platform of social e-commerce industry, the supply chain of agricultural products can achieve information transparency, supply chain cost optimization, market group expansion, consumer personalized needs to meet the building of brand culture, improve the operational efficiency of the supply chain, and ultimately form the ability to respond to emergencies. Therefore, for the supply chain of agricultural products, we should seize the opportunity of the digital economy, achieve resilience optimization, and provide guarantee for the sustainable development of the fresh agricultural products industry.

## **2. The Resilience of Fresh Agricultural Products Supply Chain**

The characteristics of fresh agricultural products are mostly small batch and multiple varieties, which are reflected in the supply chain of fresh agricultural products: the degree of production organization is too low, the circulation links are too large, the number of individual merchants and fresh supermarkets is too large, temporary supplementary procurement and centralized procurement coexist, and the consumption areas involved in the supply chain are numerous and scattered[7]. In addition, due to the particularity of different industrial products such as non-standard, perishable, vulnerable, metamorphic, seasonal, regional, cyclical, etc. of fresh agricultural products, it is more stringent requirements for the supply of fresh agricultural

products. Therefore, the study of the lack of toughness of the fresh agricultural products supply chain can avoid the threat of chain break, improve the risk resistance of the supply chain, and ensure the adaptability and stability of the supply chain to market changes.

### **2.1. The Basic Capacity of the Supply Chain is Weak, and the Digitalization Level of Each Link is Unbalanced**

There are many links of fresh agricultural products, but its main links are production end, processing end, circulation end and consumption end, the digitalization degree of these four links is different, and its basic ability and anti-market risk ability are also very different. On the circulation side, the main enterprises are mostly large and medium-sized logistics and warehousing enterprises, while on the consumption side, the main enterprises are commercial enterprises. These enterprises are more sensitive to the operating costs of enterprises, often have relatively perfect internal business process management, and have a higher degree of acceptance of digitalization as a new thing, and can apply digital technology to actual operations. Help enterprises to improve their own economic strength, and have a high ability to resist risks. However, in terms of the production end, most of the main bodies are local small farmers, family farms and small cooperatives. For the production end, the main management of agricultural seedling planting, management and fertilization, disease and pest monitoring, drug record and other aspects still stays in the manual mode. For the processing end, as the link between the upstream and downstream of the supply chain, processing enterprises have small scale and low degree of digitalization, and there are common problems such as the processing transformation of agricultural products and the low value added rate. It can be seen that there is a large gap between the main enterprises in the supply chain of agricultural products in each link, and the unbalanced digital level restricts the development of enterprises in each link.

### **2.2. The "Information Island" of Supply Chain is Prominent, and the Degree of Factor Marketization is Low**

The supply chain of agricultural products takes the procurement of raw materials for agricultural products as the starting point, passes through the subdivision links of planting, procurement, processing, transportation and distribution, sells agricultural products through various channels, and takes the delivery of agricultural products to consumers as the termination point, running through the multi-node network structure of multiple enterprises and organizations such as capital flow, information flow, business flow, logistics and business flow. However, in today's explosive growth of consumption level, combined with unexpected health and safety events, in such a dynamic and complex new era environment, the supply chain of agricultural products is often unable to meet the new consumer demand and ensure the stability and safety of agricultural products. The main reasons are: The supply chain of agricultural products is long and complex, and different links of the supply chain often involve different subjects, and each subject generally only focuses on the data information related to its own interests, which makes it difficult to form cross-link communication and information exchange. This will have two consequences: first, it is difficult to effectively trace the source and quality of agricultural products, and it is difficult to guarantee the safety and quality of agricultural products; Second, the perfect balance between supply and demand cannot be achieved. Driven by the interests of resources, there will often be misallocation of production factors, lack of factor mobility, limited scope of factor allocation and other situations.

### **2.3. The Governance System of the Supply Chain is Deficient, and the Efficiency of the Supply Chain Needs to Be Improved**

The governance system of supply chain is the key factor to ensure the efficient operation of supply chain. If the governance system of supply chain is not perfect, it will lead to low efficiency of supply chain. The supply of agricultural products lacks a complete set of supply chain

evaluation index system, and it is difficult to carry out comprehensive evaluation and management of all links of the supply chain, resulting in low overall stability and security of the supply chain, unable to form routine monitoring and early warning in daily life, and difficult to timely adjust and deal with emergencies. This reflects the lack of governance system of the supply chain of agricultural products, mainly due to two factors: first, the governance system of the supply of agricultural products mainly relies on external pressure, and it is often in the serious situation of oversupply that the production, procurement and other links are adjusted after the meeting. This kind of passive development mode is more unable to cope with external shocks; Second, most of the links in the supply chain of agricultural products are small and medium-sized enterprises.

### **3. The Resilience of the Digital Economy to Supply Chain Optimization**

The resilience optimization of agricultural products supply chain refers to enhancing the ability of agricultural products supply chain system to cope with various external shocks and changes, and ensuring the stability and sustainability of agricultural products production, processing, circulation and sales. In the general trend of digital economy, which promotes the optimization and innovation of supply chain, it relies on the progress of digital technology, including cloud computing, big data, artificial intelligence and blockchain, etc., to build a powerful system to improve supply chain operations.

#### **3.1. Digital Technology Innovation, Strengthen the Risk Management Ability of Supply Chain**

First of all, digital technology innovation lays a foundation for supply chain construction. By integrating digital innovation capabilities, key breakthroughs will be achieved in technology, system and operation model to improve supply chain resilience. First, accelerate research on digital infrastructure, which is the key to data production, recording, aggregation and analysis in all links of the supply chain. It can rely on industry associations and local governments to give priority to the establishment of universal digital infrastructure, such as: Agricultural products Internet of Things, sensor network technology, big data, etc., to achieve the record and application of information in each link of agricultural products supply chain. Secondly, in view of the weak links of the supply chain, we will carry out cooperative research with scientific research universities and enterprises, arrange intelligent control of origin, intelligent classification and inspection, intelligent processing of processing place and other work, so as to effectively make up for the shortcomings of the supply chain. Finally, we should establish a digital innovation system with independent research and development as the main and external introduction as the auxiliary, adhere to digital innovation to lead the development of supply chain, and improve the comprehensive anti-risk ability system of agricultural product supply chain. These digital technological innovations can realize real-time monitoring, data analysis, intelligent forecasting and risk identification of the supply chain, improve the efficiency of supply chain management and the accuracy of decision-making, and strengthen the ability to manage and respond to risks. Thus, the resilience of the supply chain can be improved, risks can be reduced, and the sustainability and competitiveness of the entire agricultural product supply chain can be enhanced.

#### **3.2. Digital Platform Construction, Improve the Scientific Allocation of Supply Chain Elements**

We should accelerate the digital transformation of agricultural product supply chain and promote the construction of digital platform. To build a demonstration digital platform, take the network platform enterprises in the market as the main body, strengthen the supervision and governance of government departments, deepen the exchange of resource elements and

mutual benefit between enterprises on different platforms, and form an open and coordinated digital platform. This can break the "information island" and accelerate the integrated development of capital flow, information flow, business flow, logistics and business flow. On the one hand, the traceability system of agricultural product quality can be improved. By forming a state-province-city-district-county multi-level traceability system to ensure the openness and transparency of the supply chain, it can not only standardize the production and processing process of agricultural products, but also supervise the logistics and sales of agricultural products and other key links, so as to build the security and resilience of the supply chain of agricultural products. On the other hand, elements can be allocated scientifically. By monitoring the dynamic consumption trend of consumers, the supply chain resource allocation system is established, and the market changes of agricultural products are understood through big data analysis and prediction model, so as to provide the latest information on both supply and demand for each link subject, so as to scientifically allocate supply chain elements to the urgently needed links in time and ensure the stability and resilience of the supply chain. Through the construction of digital platforms, the benefits of rapid information flow, accurate and real-time decision-making, and efficient capital allocation can be realized in the supply chain, improving the efficiency and adaptability of the entire supply chain. At the same time, the construction of digital platforms also needs to consider data security and privacy protection, to ensure the legitimate rights and interests of all participants in the supply chain.

### **3.3. Digital Dynamic Evaluation to Improve the Efficiency of Supply Chain**

Construct the digital dynamic evaluation mechanism of agricultural product supply chain. The supply chain of agricultural products should follow the market rules, establish short-term, medium-term and long-term quality and safety assessment plans of the supply chain of agricultural products according to the seasonal changes of agricultural products, carry out periodic assessment work in a targeted manner, and quantify the assessment results into executable targets, so as to improve the resilience of the supply chain. To be specific, in the short term cycle, timely discover the weak links in the supply chain, increase capital investment, and tilt resources, strengthen the repair of the short links in the supply chain, and help the supply chain get rid of the constraints of the "barrel effect". In the medium term cycle, promote the deep integration of digital technology and agricultural product supply chain, accelerate the digital transformation of supply chain, simulate the application scenarios of agricultural product supply chain through digital technology, and deduce the optimal supply chain operation mode. In the long-term cycle, carry out digital transformation and upgrading of supply chain, establish supply chain alliances with multi-party participation, set up economic agreements for regional cooperation, promote internal management of supply chain with digital technology, eliminate internal barriers of supply chain alliances through digital technology, regularly evaluate the benefits of all links of supply chain, achieve information exchange, benefit sharing and risk sharing, and improve the resilience of supply. It can facilitate real-time collaboration and communication between various players in the supply chain. This can enhance cooperation and coordination, improve information sharing and decision-making efficiency in the supply chain. Supply chain participants can share data, communicate problems and solutions to quickly respond and resolve bottlenecks in the supply chain. Through digital dynamic evaluation, supply chain managers can conduct real-time monitoring, data analysis and optimization of the supply chain to improve the efficiency and flexibility of the supply chain. This real-time and agile performance can help the supply chain better respond to changes in demand, market fluctuations and risk challenges, thereby improving the competitiveness and sustainable development of the supply chain.

## 4. Conclusion

As a special branch of the supply chain, the operation and management of the supply chain of agricultural products are affected by the characteristics of agricultural products themselves, and are more vulnerable to the influence of the external market environment, which is quite different from the supply chain of industrial products. However, there are practical problems in the supply chain of fresh agricultural products. By taking multiple measures into account, the resilience of the agricultural supply chain can be improved to ensure the stability and sustainability of the agricultural supply. Optimizing the resilience of agricultural product supply chain can not only improve the risk resistance ability of agricultural product supply chain, but also adapt to changes in market demand and enhance the competitiveness of agricultural product supply chain.

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