

Innovation Research on Digital Transformation of Agricultural Supply Chain Under Live Streaming Sales Model

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Abstract: This paper focuses on the innovation of digital transformation of agricultural supply chain under the live streaming model. It systematically sorts out the agricultural supply chain, live streaming e-commerce marketing and digital transformation theory, and analyzes the problems and countermeasures of agricultural supply chain under the live streaming model.

Keywords: Live Selling; Agricultural Supply Chain; Digital Transformation

1. Introduction

In the era of booming global digital economy, digital transformation has become the core driving force for industrial upgrading in various countries and profoundly reshaping the development pattern of various industries. As an innovative product of the deep integration of digital economy and e-commerce, live-streaming sales is a new business model developed through internet platforms, especially social platforms. It provides new services such as product display, consultation, and shopping guidance through live-streaming technology on these platforms.

As a vital pillar for rural revitalization, the agricultural supply chain has long grappled with challenges including inefficient distribution, high losses, and information gaps. Live-streaming e-commerce, an innovative model born from the deep integration of digital economy and e-commerce, has revolutionized the relationship between consumers, products, and markets through its "what you see is what you get" immersive shopping experience. This groundbreaking approach has not only redefined sales strategies for agricultural businesses but also unlocked new opportunities for market expansion. However, the explosive growth of live streaming sales has also exposed the deep contradictions in the supply chain of agricultural products, such as the conflict between the suddenness of orders and the lack of flexibility

of the supply chain, the contradiction between quality control and large-scale production, and the gap between the demand for instant delivery and the weak logistics infrastructure. It is urgent to realize the transformation and upgrading through systematic digital transformation.

2. A Systematic Review of Theoretical Foundations in Agricultural Supply Chain Management under the Live-Streaming E-Commerce Model

2.1 Agricultural Supply Chain Theory

The digital transformation of agricultural supply chains refers to the process where core enterprises in the "farm-to-table" circulation of agricultural products, centered on consumer demand, leverage next-generation information technologies to empower traditional supply chains. This drives supply chain processes to become visible, responsive, and intelligent, transforming weakly integrated, loosely structured systems into fully connected, integrated ecosystems. The resulting network and ecosystem achieve three key objectives: open-source (full-process connectivity, end-to-end management, and customer engagement), cost-saving (reducing operational and logistics expenses), enhanced experience (prioritizing consumer satisfaction), and efficiency improvement (boosting supply chain performance) [1]. The core concepts encompass the management of supply chain structures, information flows, logistics, capital flows, as well as collaboration and coordination among supply chain members. Under the live-streaming e-commerce model, the agricultural supply chain structure has evolved from traditional linear long chains to short chains centered around live-streaming platforms, reducing intermediate links and directly connecting producers with consumers.

2.2 Live Streaming E-Commerce Marketing Theory

The theory of live streaming e-commerce marketing is developed based on Internet marketing and consumer behavior theory, focusing on the marketing rules in the special scene of live streaming. In live streaming, the three elements of "people, goods and field" are redefined and integrated. The concept of "people" encompasses not only consumers but also emphasizes the influence and sales capabilities of live streamers. Serving as a bridge between products and consumers, live streamers' professional expertise, personal charisma, and interactive skills directly impact purchasing decisions. The "products" aspect requires agricultural goods to possess distinctive features, standardized quality, and brand recognition to meet consumers' demands for quality and personalization. The "scene" element utilizes live streaming platforms to create immersive shopping experiences, leveraging real-time interactions and scenario-based presentations to enhance consumer engagement and purchasing motivation. At the same time, the research on consumer behavior in the theory of live streaming e-commerce marketing indicates that consumers are more likely to be stimulated by emotional factors, social interaction, limited-time promotion and other factors during live streaming shopping, resulting in impulsive consumption behavior.

2.3 Digital Transformation Theory

The application of digitalization in agriculture is reflected in the systematic process of transforming the whole process of traditional agricultural production, circulation and consumption into quantifiable data, and realizing precision management and decision optimization with the help of information technology [4]. In the field of agricultural supply chain, digital transformation involves the application of technologies such as Internet of Things, big data, artificial intelligence and blockchain. Internet of Things (IoT) technology enables comprehensive monitoring of agricultural production environments, tracking of growth processes, and real-time logistics tracking, providing essential data support for precision farming and smart logistics. Big data analytics, through examining consumer purchasing patterns, market demand trends, and supply chain operations, helps businesses optimize production schedules, implement targeted marketing strategies, and reduce inventory levels. Artificial intelligence

(AI) applications include quality inspection systems, AI-powered customer service, and intelligent supply chain decision-making. Blockchain technology ensures tamper-proof information integrity and full traceability throughout the supply chain, thereby enhancing consumer trust and elevating the brand value of agricultural products.

3. Research on Problems and Countermeasures in Agricultural Supply Chain under Live Streaming Sales Mode

In recent years, China has accelerated the digitalization of agricultural supply chains. However, challenges persist due to insufficient technological adaptation to agricultural scenarios and inadequate data sharing across the entire supply chain. Moreover, the lack of effective cost-sharing mechanisms, integrated technical frameworks, and support systems for small-scale farmers' participation continue to hinder sustainable digital transformation [3]. The rapid growth of live-streaming e-commerce has exposed long-standing systemic challenges in agricultural supply chains, including digitalization gaps in production, logistical bottlenecks, and operational inefficiencies in livestreaming. These issues severely hinder supply chain efficiency and sustainable development. A thorough analysis of these problems within the live-streaming model, coupled with targeted solutions, is crucial for driving supply chain modernization and supporting rural revitalization initiatives.

3.1 Existing Problems

The production process is not digitalized: it relies on traditional experience, the coverage of Internet of Things devices is low, and it is difficult to collect and analyze production data in real time, resulting in the imbalance between supply and demand; the standardization of agricultural products is insufficient, and there is no unified quality grading system, which affects the sales conversion.

The logistics distribution system is not perfect: live streaming orders are scattered, rural logistics outlets are not covered, the "last mile" problem is prominent, and the delivery time is poor; Cold chain logistics lags behind. Taking Zibo city as an example, the cold chain transportation rate of fresh food in Zibo city is less than 40%, and the loss rate of perishable agricultural products is 25%-30%, resulting in resource waste and

economic losses.

Weak live-streaming sales capabilities: the operational team's professional level varies, and the streamers lack product knowledge and sales skills; the live-streaming content is homogeneous, with no differentiated advantages; the sales channels are single, overly dependent on a few platforms, and the ability to resist risks is weak; the brand building of agricultural products lags behind, and the consumer awareness and loyalty are low.

Poor supply chain coordination: information asymmetry in each link, lack of effective collaboration in production, processing, logistics and sales, production plan adjustment is not timely, low efficiency of order processing; unreasonable profit distribution mechanism, easy to cause conflicts, reduce the overall efficiency of the supply chain.

High data security risk: Live streaming involves a large amount of user information, transaction and production data. Enterprises have weak awareness of data security, and there is no effective encryption protection for storage and transmission, which is prone to data leakage. Supply chain systems are threatened by network attacks and virus intrusion, which affects normal operation.

A shortage of professionals: There is a lack of interdisciplinary talents who understand both agriculture and digitalization. the live streaming sector lacks talent in planning, operations, and data analysis, making it difficult to create high-quality content and strategies. the scarcity of talent in technologies such as the Internet of Things, big data, and blockchain is hampering the digital transformation of supply chains.

3.2 Policy Research

Promote the digital upgrading of production: increase equipment subsidies, promote the Internet of Things equipment; build digital demonstration farms to achieve intelligent management of production; formulate agricultural product quality grading standards to improve product consistency.

Enhance the logistics distribution system by strengthening rural logistics network development to resolve the 'last mile' challenge, increasing cold chain investments to boost fresh produce transportation rates, adopting smart technologies for optimized delivery, and establishing a logistics information sharing platform.

Enhance live streaming capabilities: Train teams to develop versatile professionals; innovate content by exploring product cultural depth; diversify sales channels; strengthen brand development to establish regional public brands.

Strengthen supply chain collaboration: build a supply chain information sharing platform to realize real-time data exchange; establish a collaborative mechanism to optimize the distribution of benefits; introduce collaborative management software to improve the response efficiency of the supply chain.

Strengthen data security protection: strengthen enterprise data security awareness education; formulate management systems to standardize data flow; introduce blockchain and other security technologies; build a network security protection system to monitor and deal with security threats.

Strengthen the training and introduction of talents: introduce policies to attract external talents; cooperate with colleges and universities to open majors and train local talents; promote industry-university-research cooperation and build talent bases; strengthen the training of existing personnel and improve their skills.

4. Conclusion

This paper focuses on the innovation of digital transformation of agricultural supply chain under the mode of live broadcasting, deeply analyzes the current situation and problems of digital transformation of agricultural supply chain, and provides specific and feasible paths.

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