

Research on Logistics Management in Agricultural Product Supply Chain: A Case Study of Zhangqiu Scallion

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Abstract

Currently, with the rapid economic development in China, people have placed greater emphasis on healthy, safe, and eco-friendly agricultural products. This trend has fueled the expansion of the agricultural industry in China. As an important industry, agricultural products are experiencing increasing demand and quality improvements. However, the agricultural product industry also faces numerous problems and challenges. For instance, inefficiencies in the agricultural product logistics supply chain hinder sales, leading to significant product losses and increased costs for supply chain members. Therefore, this paper analyzes the current issues within the agricultural product supply chain, further explores methods for optimizing the agricultural product supply chain, and derives approaches for optimizing the agricultural product supply chain. It aims to contribute to the sound development of the agricultural product supply chain and better accelerate economic growth in the agricultural product industry.

Keywords

Agricultural products; supply chain; logistics.

1. Introduction

For farmers engaged in the cultivation and production of agricultural products, selling their produce is one of the ways to obtain income. Hence, from the perspective of rural economic development, agricultural products serve as a primary driver for promoting local economic growth. When selling agricultural products, it is essential to ensure good product quality, smooth information exchange, and efficient logistics. However, in reality, many agricultural production areas are often located in remote and inaccessible regions, and some places experience delays in information acquisition. Due to these conditions, product quality may not be adequately guaranteed. Consequently, many agricultural product supply chains are not smooth, with many merchants struggling to source good-quality agricultural products, while sellers fail to obtain corresponding earnings. Neither party can achieve maximum benefits. Therefore, the optimization of agricultural product supply chains deserves research to broaden the marketing channels for more high-quality agricultural products, provide consumers with superior agricultural products, and maximize the benefits for farmers, enterprises, and consumers within the agricultural product supply chain.

2. Literature Review

Currently, numerous scholars have conducted research on agricultural product supply chains, aiming to propose various suggestions for their progress and development. Zong Ping, from the perspective of supply chains and considering some typical issues within agricultural product supply chains, proposed methods such as establishing agricultural product futures trading mechanisms and building distinctive agricultural product supply chains to better achieve a win-win situation for all participants in the agricultural product supply chain [1]. Chen Youyi

conducted research on the cold chain logistics supply chain for fresh agricultural products. In his paper, he analyzed the creation ideas for the fresh agricultural product supply chain system, introduced the construction principles, elaborated on the construction plan, and finally introduced supply chain safety mechanisms such as dynamic monitoring and emergency handling systems [2]. The rapid development of the agricultural product industry is also inseparable from the development of the Internet, relying on "Internet +" to drive the sale of agricultural products through e-commerce models. Regarding this, Jiang Feng conducted research on the optimization of "Internet +" agricultural product logistics operation modes under the rural revitalization strategy, pointing out the current status of agricultural product logistics supply chains and proposing corresponding optimization methods and measures for logistics operation modes [3]. In terms of agricultural product prices, Wang Rundi and others analyzed the development status of fresh agricultural product supply chains and proposed seven measures, including regulating the prices of fresh agricultural products, enhancing the information technology level of the overall supply chain, strengthening the standardized development of the supply chain, and enhancing the integrity of order agriculture [4]. In terms of agricultural product quality, Zeng Mengling analyzed the quality collaborative control mode and mechanism of agricultural product supply chains, and proposed an optimization path for quality collaborative control in agricultural product supply chains [5]. From the perspective of supply chain collaboration, Wu Jihui and others, starting from the perspectives of agricultural product supply chain collaboration and food quality and safety, as well as the influencing factors of collaboration, used comparative analysis and inductive analysis to obtain three possible research directions for the future collaborative management of agricultural product supply chains in China, namely, the research on green and sustainable agricultural product supply chain collaboration, information technology application, and the development trend of diversified entities [6].

3. Definition of Agricultural Product Supply Chain

The agricultural product supply chain refers to a supply chain system that targets agricultural products. This supply chain system consists of agricultural product consumers, agricultural product processing enterprises, distributors, agricultural product producers and suppliers. The supply chain begins with agricultural producers and builds a vertical network system through various stages such as distribution, processing, and retail. This system encompasses multiple participants at different levels, namely agricultural producers, agricultural product processing enterprises, agricultural product distributors, and consumers.

4. Analysis of Agricultural Product Supply Chain Management — Taking Zhangqiu Scallion as an Example

The main producing area of Zhangqiu scallion is Zhangqiu District, Jinan City, Shandong Province. The climate in Zhangqiu is very suitable for scallion growth, being located in a temperate monsoon region with distinct seasons, where the rainy season coincides with the hot season. This results in Zhangqiu scallions with a mild spicy flavor, sweetness, crispness, large white stems, and high nutritional content [7]. Currently, there are three main ways for agricultural product supply chains to supply the market: self-production and self-marketing by agricultural producers, from agricultural producers to intermediaries to end consumers, and direct procurement by supermarkets and other entities from agricultural producers to end consumers. These three different agricultural product supply chains have different main participants. Each supply chain model has its own advantages and disadvantages. For the self-production and self-marketing model by agricultural producers, its disadvantage is the inability to conduct large-scale sales due to limited consumers faced during self-marketing, leading to

limited demand. Therefore, relying solely on this method can result in excess supply over demand in the supply chain, causing a decrease in sales prices and reduced profits. For the consumption model from agricultural producers to intermediaries to end consumers, its disadvantage is that the price increases with each intermediary level, resulting in relatively higher prices for agricultural products obtained by end consumers. Additionally, to prevent excessively high final sales prices, intermediaries may pressure agricultural producers to lower their selling prices. Therefore, in this supply chain model, one party in the supply chain often fails to maximize profits. The disadvantage of the third model, where supermarkets and other entities directly procure from agricultural producers to end consumers, lies in the problems of organizing vehicles and transportation when supermarkets conduct procurement at the origin due to scattered farmers, and potential communication issues due to language barriers. The above are the disadvantages of these three product supply chains.

4.1. Specific Issues in Agricultural Product Supply Chains

4.1.1. Upstream Supply Chain Issues

Some scallion farmers have low levels of education. According to the 6th National Population Census, approximately 70.2% of the agricultural population has an education level below junior high school [8]. Since few young people are engaged in farming at home, most farmers in rural areas are middle-aged and elderly. Many agricultural products face many problems during cultivation. Many farmers, lacking knowledge and culture, may only rely on their own experience for planting. When pests and diseases occur, pest and disease control becomes difficult, and many farmers only blindly spray pesticides. For example, Zhangqiu scallions are affected by pests and diseases both above and below ground during their growth. Although farmers also adopt physical and biological control methods such as "insecticidal lamps" and "biological bacteria," the costs of these methods are high, so pesticides are still primarily used for pest control, leading to issues such as excessive pesticide residues. Therefore, it is difficult to ensure the quality of agricultural products at the source. Agricultural products themselves are relatively fragile and prone to significant losses and damages. Improper storage can cause vegetables to lose a lot of moisture and become less fresh. Therefore, agricultural products lack safety guarantees, posing safety hazards to their quality and affecting their sales.

4.1.2. High Costs

The logistics costs of agricultural product supply chains are high. Costs in the entire logistics process include transportation costs, warehousing costs, and all expenses related to manpower and material resources generated during the entire logistics process. For agricultural product logistics, the main reason for high costs is determined by the nature of the products themselves. Agricultural products are fragile and difficult to preserve, so they have higher requirements in transportation, warehousing, distribution, and other logistics links, thereby increasing logistics costs.

4.1.3. Low Fresh Agricultural Product Logistics Levels in Supply Chains

When transporting fresh agricultural products such as scallions, cold chain logistics are required to transport these perishable products from the supply location to the demand location. Due to the product's unique nature and seasonal influence, to prevent spoilage of agricultural products during transportation, cold chain transportation is required, and it must be ensured that the products maintain an appropriate temperature and humidity environment during transportation. Therefore, to ensure product quality, a complete and mature cold chain logistics system must be established. However, currently, China's cold chain system supplies products that meet 20%-30% of market demand, but the cold storage transportation rate is only 15%-20%. More than 80% of fresh food is still processed, circulated, and stored under normal temperature conditions. For Zhangqiu scallions, the circulation of fresh agricultural

products in Shandong Province still mainly relies on normal temperature logistics without a perfect cold chain logistics system guarantee. Therefore, to ensure the freshness of agricultural products when delivered from their origin to the consumer destination, a complete fresh cold chain logistics system is required.

4.1.4. Lack of Corresponding Supply Chain Management Talent

The purpose of agricultural product supply chain management is to maximize overall benefits, which means minimizing costs in logistics supply chain links including transportation, warehousing, and distribution. Moreover, supply chain management also needs to deliver agricultural products to the designated location on time, with guaranteed quality and quantity, while meeting the service level required by consumers. However, currently, many logistics enterprises are still mainly small and medium-sized, lacking high-end talent capable of engaging in supply chain management [9]. Many high-end talents prefer to develop in developed areas and are reluctant to work in underdeveloped areas such as rural areas engaged in supply chain management. Therefore, the lack of management talent in agricultural product supply chain management makes it difficult to carry out smoothly.

4.1.5. Information Asymmetry

Currently, many farming industries are decentralized and dominated by small-scale farming. Scallion farmers mostly engage in land contracting and planting on their own as individual farmers. Therefore, many scallion farmers' planting sites are scattered and difficult to concentrate, making it very difficult for intermediaries to procure in the supply chain. Thus, buyers cannot obtain many high-quality sources, and scallion farmers do not receive and respond to market information in a timely manner. Therefore, farmers cannot timely convey their product information. So, there is a significant information asymmetry between the two. According to surveys, nearly 60% of farmers neglect the use of the internet when communicating with other farmers and only exchange information face-to-face in real life. Additionally, many farmers have been deceived. When selling products to intermediaries, due to information asymmetry, many farmers obtain unrealistic market prices for their products, but they lack the ability to discern the authenticity of information. Without an effective and reliable information exchange platform, they are susceptible to deception by false information.

5. Suggestions for the Development of Agricultural Product Supply Chain Management

5.1. Cultivate Farmers' Knowledge and Abilities

There is a saying that those who are skilled have specialized knowledge. Farmers are directly connected to agricultural products, so to improve upstream agricultural product safety guarantees in the supply chain, it is necessary to strengthen farmers' knowledge of planting and their legal awareness. Only by doing so can farmers rely on professional knowledge to solve problems that arise during planting rather than blindly relying on experience. Additionally, strengthening legal awareness not only protects farmers' own interests from harm but also safeguards consumer rights and interests. When farmers understand legal knowledge, they will not excessively use pesticides, thereby providing safe and green agricultural products. Therefore, without interfering with farmers' planting, timely lectures on planting knowledge and legal knowledge should be held, and farmer promotion should be carried out, such as using mobile phones and the internet to push videos promoting knowledge to farmers. For large-scale farmers, field guidance work can be carried out to cultivate their knowledge and abilities.

5.2. Strictly Control All Logistics Links to Reduce Losses

There are many logistics supply chain models, but regardless of the model, goods are received from suppliers or origins and delivered to consumers, passing through many links in between.

Therefore, it is necessary to strictly control all links in the supply chain logistics to minimize loss costs. Additionally, strict control should also be exercised over products at the source. As the first step in the supply chain, if product quality issues arise due to the product itself, no matter what is done during the logistics process, product quality cannot be guaranteed. Therefore, it is essential to strictly control the quality of products at the source. This can greatly reduce product losses, provide a guarantee for the subsequent cold chain logistics link operations, and better control costs. Thereby reducing losses of cold chain items during subsequent transportation, warehousing, distribution, and other links.

5.3. Promote the Development of Cold Chain Logistics Enterprises

To ensure product freshness, local logistics enterprises in Zhangqiu, Shandong, are encouraged to reform their logistics operations, vigorously develop technology, and establish specialized departments for the transportation of fresh agricultural products such as produce. This will promote the development of local logistics enterprises, cultivate employees within outstanding enterprises, and assist them in becoming leading enterprises in the industry. Meanwhile, cooperation with well-known enterprises in the logistics industry can be considered, leveraging their professionalism to drive the development of local logistics chains. Additionally, to minimize cargo loss during transportation, the transportation department should vigorously support the construction of roads in areas where local agricultural products are grown, providing convenient transportation. This will not only save time for the transportation of agricultural products but more importantly, ensure their freshness. At the same time, it will also effectively meet the demand for agricultural products to be delivered to consumers in a timely and high-quality manner, thereby improving consumer satisfaction.

5.4. Cultivating Talent in the Agricultural Product Supply Chain

The development of the local agricultural product supply chain necessitates comprehensive and professionally trained talent. Therefore, logistics enterprises must increase their focus on recruiting and cultivating professionals in the agricultural product supply chain. When hiring professionals, it is essential to assess their professional knowledge and abilities as much as possible. Professional talent with their own ideas can provide corresponding development suggestions for the future development of the enterprise, contributing to innovative operations within logistics enterprises. They can also facilitate the upgrading and transformation of the supply chain in the later stages. When facing practical problems, they not only understand the theoretical concepts but also engage in practical operations, grasp the characteristics of the agricultural product supply chain, understand its differences from other supply chains, and optimize it. Due to the complexity of the agricultural product supply chain, there are conflicting areas between different links, so professional talent in the agricultural product supply chain is indispensable.

5.5. Establishing an Information Database for Agricultural Product Growers

Currently, many farming industries are fragmented and dominated by small-scale farming. Many onion farmers choose to contract land from others for large-scale planting, but these planting areas are generally not very large and relatively scattered, which is unfavorable for both the farmers and the market. Due to information asymmetry, information cannot be effectively transmitted between them in a timely manner. Therefore, establishing an information database can comprehensively present information such as planting locations and planting conditions, which is beneficial not only for market procurement but also for onion farmers to promptly match their products with the market. By establishing such an effective and reliable information database, onion farmers can more easily obtain accurate information, significantly improving efficiency and accuracy.

6. Conclusion

With rapid economic development and increasingly stringent safety and quality requirements for agricultural products by the people, the requirements for the agricultural product supply chain are also increasing. However, overall, China's agricultural development model is still mainly small-scale. [10] Although China's agricultural product supply chain has made some progress, there are still many issues. Taking Zhangqiu green onions as an example, this paper analyzes some problems in the agricultural product supply chain and proposes several corresponding suggestions. It is hoped that based on these, China's agricultural product supply chain can be continuously improved, effectively promoting the development of China's agricultural economy.

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