

Collaborative Development of Cross-border E-commerce and Agricultural Product Supply Chain: Opportunities, Challenges and Solutions

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Abstract: The development of science and technology and the deepening of globalisation have opened up new directions for developing the agricultural industry. With the gradual expansion of the scope of “Internet +”, traditional trade has gradually evolved into e-commerce, and relatively simple domestic trade has gradually expanded into cross-border transactions. With the help of e-commerce platforms, sales channels can be expanded, and the share of agricultural exports can be increased. The development of cross-border e-commerce is highly valued and mutually supportive of the agricultural product supply chain (APSC), which promotes the international trade of agricultural products. Optimised APSC provide high-quality produce to meet consumer demand. Technological innovations such as big data and the Internet of Things (IoT) bring smart and efficient optimisation solutions to APSC, improving the efficiency of product distribution. This paper reviews the research on cross-border e-commerce and APSC by some scholars in recent years, summarises the current development of cross-border e-commerce, describes the problems of APSC, and proposes solutions. Reviewing and summarising the relevant research literature aims to help scholars understand the development of cross-border e-commerce and APSC more systematically and comprehensively, and to provide strong support for future research and practice.

Keywords: Cross-border e-commerce, Agricultural product supply chain, Global trade

1. Introduction

In recent years, the rapid development of science and technology and the deepening of globalisation have opened up a new direction for developing the agricultural industry. With the gradual expansion of the scope of “Internet +”, traditional trade has gradually evolved into e-commerce, and relatively simple domestic trade has gradually expanded into transnational transactions. Expanding sales channels and improving agricultural product export share are possible under the assistance of e-commerce platforms, and the development has been highly appreciated. The mutual support between cross-border e-commerce and the agricultural supply chain promotes the international trade of agricultural products. Cross-border e-commerce has made agricultural products more accessible, and the audience has expanded. Furthermore, the optimised APSC provides high-quality agricultural

products to meet consumer demand. Technological innovations, including the web of things and big data, bring intelligent and efficient optimisation solutions to the APSC, improving the efficiency of product circulation. This injects new vitality into the development of the rural economy and shows great potential. China has set up multiple pilot agricultural opening-up cooperation zones to encourage the growth of cross-border e-commerce APSC. Optimising the cross-border e-commerce APSC, improving circulation efficiency and reducing costs has become a necessary trend of the times and the development of society. Governments, enterprises and academic circles have extensively studied it.

Through the review of previous literature, we learned that there are many literatures on cross-border e-commerce and agricultural products supply chain. Despite this, it is still essential to review and summarize the current literature in a systematic and framework-based manner. This research examines the work of a few scholars on cross-border e-commerce and agricultural product supply chains over past few years, provides a succinct overview of the current progress in cross-border e-commerce, describes problems about APSC and clarifies solutions. Reviewing and summarising the relevant research literature aims to assist scholars in gaining a broader understanding of the development of cross-border e-commerce and APSC, as well as providing strong support for future research and practice.

2. The Impact of Cross-border E-commerce on the APSC

2.1. Optimising the Circulation of Agricultural Products in Worldwide E-commerce

Logistics is a crucial aspect of e-commerce operations. The proliferation of e-commerce has given rise to a greater variety of availability of agricultural products, and customers' demands for better service are driving up the need for the logistical content for agricultural products to be expanded and extended. Thus, optimising and coordinating the synergy between e-commerce and logistics has become particularly important. The growing popularity of world-wide e-commerce has also been very helpful in streamlining the logistics of agricultural products.

In the traditional sales methods of agricultural products in our country, there are many circulation links, such as farmers, wholesalers, retailers, and consumers, leading to price increases and consistency in quality between the place of production and the place of consumption. Utilising cross-border e-commerce platforms, transactions can be carried out over the Internet without restrictions on location and time in any country, allowing agricultural products to enter the international market more conveniently. This expands the routes via which agricultural products can be sold, improving their circulation and export proportion. [1]. Cross-border e-commerce platforms connect producers and consumers directly through software, reducing intermediary links and lowering costs, thus making prices more transparent [2]. This can achieve the goal of delivering agricultural products directly from the place of production to the consumers, greatly improving circulation efficiency. Distribution of agricultural commodities is now more efficient because to the ongoing growth of international e-commerce. In the new technology era, agriculture and e-commerce have steadily been affected by technologies like big data, the Web of Things, and artificial intelligence. Zhang believes that e-commerce platforms can calculate the optimal delivery method to consumers through big data analysis, thereby ensuring the freshness and timeliness of agricultural products [3]. It is also beneficial for platforms to monitor the transportation status of agricultural products in real time, thereby raising the standard of agricultural goods' quality, lowering the rate of damage, and raising the level of overall logistics. This achieves full-process tracking management of agricultural products from planting and processing to transportation, raising the level of intelligence in circulation.

2.2. Cross-border E-commerce Promotes the Upgrading of Agricultural Products Industry

Agriculture product circulation and sales can be promoted through cross-border e-commerce, along with the upgrading and development of the agricultural products industry. First of all, the international trade sales channels for agricultural products have been broadened by cross-border e-commerce, which has widened the scope of consumer groups. Traditional sales of agricultural products are often subject to geographical spatial and temporal constraints, and cross-border e-commerce breaks this bondage through the advantages of low threshold, intuitiveness, interactivity, real-time, and extensiveness, which offers domestic companies a route to send farm produce overseas and enter into a broader market [4]. The cross-border e-commerce platform allows Agro-products to be sold worldwide, expanding sales scope and diversifying sales channels. Furthermore, the complete fusion of the agricultural industry chain is fostered by cross-border e-commerce. Agricultural products' production has been processed, and sales have begun to be closely connected, forming a complete industrial chain under the impetus of cross-border e-commerce. This not only improves the production efficiency of agricultural products but also reduces costs, bringing more affordable prices to consumers.

Meanwhile, Zhang argues that the deep integration of the industrial chain enables the data of the whole industrial APSC to be integrated and then data-mined, stored and analysed, which is further provided to agricultural practitioners, the government and the e-commerce platform, allowing them to make better decisions on industrial adjustment and upgrading based on the data [5]. Secondly, cross-border electronic commerce continues to improve the effectiveness of agricultural industry clusters. Agriculture products' quality has become a crucial factor in the intense competition in the international market. The quality and taste of products are more important for consumers on cross-border e-commerce platforms, leading agricultural enterprises to be more aware of new varieties, new production technologies, and new consumer preferences in the international market [6], and based on this to continuously improve the condition and appearance of agricultural products in order to satisfy the consumer's demand, thereby enhancing the competitiveness of agricultural products in the international market. Internationalizing agricultural product brands is also promoted by cross-border e-commerce. On cross-border e-commerce platforms, consumers' choices are influenced by the brand of agricultural products. Through the cross-border e-commerce platform, traders carry out effective marketing as well as brand promotion, and the brand of agricultural products can increase its popularity, which in turn enhances the international competitive power of agricultural products.

2.3. Cross-border E-commerce Improve the Quality and Safety of Agricultural Products

The growth of international e-commerce has increased the standard of agricultural output. Many investigation findings indicate that export learning effects are widely present in export trade [7]. Zhou et al. discovered that China's agriculture export quality has greatly increased as a result of the CBEC's industrial initiatives [8]. Through mechanism testing, it was discovered that export competitiveness and learning effects are the primary ways in which CBEC's industrial policies support China's export-quality agricultural products [8]. International e-commerce networks can provide more detailed and transparent information on agricultural products, including production processes, processing methods, quality testing, etc. This helps consumers understand agricultural products quality and safety and choose better agricultural products. In addition, to further guarantee that agricultural products fulfill applicable criteria for safety and quality the platform can be used to test and certify agricultural products. Regarding how international e-commerce advances the agriculture goods sector, the development of cross-border e-commerce depends on upgrading the agricultural products industry. Driven by this, the agricultural products industry can achieve standardised, modern, and professional production and improve production efficiency and product quality [9]. Niu et al. believe that

international e-commerce networks can offer more accurate market information and customer demand for the agricultural products industry and help enterprises develop more scientific and effective business strategies and supply volume decisions [10].

2.4. Cross-border E-commerce Drives the Development of the Rural Economy

Cross-border e-commerce provides entrepreneurial opportunities for residents in rural areas. Through the Internet platform, rural residents can access the global market, sell local speciality products or engage in various related businesses to increase their income. The rise in the sales of agricultural products on international e-commerce platforms has fueled the growth of e-commerce supporting sectors like packaging, shipping, and warehousing, which has improved the local economy [11]. Cross-border e-commerce can further drive employment in rural areas, increase employment opportunities in various related industries, and promote the optimisation of rural employment structure.

By effectively operating a fresh agricultural product export logistics system, Ho successfully reduces logistics costs, include the gathering, removing, sorting, packing, customs assertion, and complete logistical services for agricultural products [12]. Andrew Higgins examined infrastructure investment using the TIST model and came to the conclusion that raising infrastructure investment and changing policy may drastically save costs [13]. Through the information management and intelligent technology of the e-commerce platform, the information sharing and optimisation of the production, processing and circulation of agricultural products can be realised, the supply chain's effectiveness and transparency. can be improved, and the optimisation of the agricultural products supply chain can be promoted.

3. Dilemma and Solutions

3.1. The Dilemma of APSC in the Cross-border E-commerce Environment

Cross-border electricity has brought a broader market for agricultural products. Still, international e-commerce has to have a more beneficial effect on China's export of agriculture-related goods. Because of the short agricultural and industrial chain, Products made from agricultural products also find it difficult to attract public attention. It can achieve smaller returns than other goods, so investors' investment may be relatively less. The following main factors currently lead to the supply chain for agricultural commodities needing to use the international e-commerce platform to enhance even more.

The distribution logistics system of agricultural products needs to be completed more. There is a huge gap between agricultural products and other products with large sales on the market, such as industrial products. Because agricultural products are perishable and are sold through cross-border e-commerce, distribution requirements are relatively high. A considerable portion of high-value products have strict requirements for transportation conditions; fresh drinks in the process of transportation speed requirements also need to advance equipment for logistics in the cold chain to guarantee the agricultural commodities' quality. However, the development of facilities in the countryside lags behind, and better investment in resources is required.; the standardisation of agricultural product distribution could be improved, and the quality of transportation could be better guaranteed [14]. In addition, the lack of cold chain transportation and storage facilities and supporting facilities increases product loss during transportation and seriously affects the international trade of agricultural goods [15]. These issues restrict China's agricultural items for export.

As international e-commerce has grown, the agricultural products supply chain is also developing rapidly. However, faced with the current situation of fewer talent or uneven talent quality, it will be challenging to meet the needs of the supply chain development if it can be solved. However, our country's cultivation of corresponding professional talents must catch up. In 2018, the first

undergraduate program in Supply Chain Management was established. Although many schools joined in the later period, there are still relatively few senior talents in the supply chain compared to the existing supply chain development. The corresponding training process for talents is also quite difficult because the supply chain talents need a strong knowledge reserve. Still, the reality is that it is difficult for industry practitioners to master the required knowledge fully in a short time.

Domestic, international e-commerce agriculture businesses frequently work with agricultural production bases or domestic procurement to guarantee the supply of their products [16]. Nevertheless, these businesses are unable to ensure the standard of agricultural products. However, agricultural products are the main energy source needed for people's daily lives; as the standard of living of people rises, so do the demands placed on agricultural products in terms of quality. However, some international e-commerce enterprises of agricultural products export poor-quality agricultural products, hoping to lower the price to seize the market [16]. However, this behaviour easily reduces consumers' credibility of relevant brands and products, which will seriously hinder the subsequent growth of agricultural items on the market.

3.2. Solutions

A major challenge in the supply chain for agriculture-related goods has always been optimizing the administration of the distribution circuit because the special characteristics of agricultural supplies require sophisticated requirements for logistics that utilize cold-chain innovation. To guarantee agricultural products arrive on time, minimize waste in transportation and consumption, and foster fresh products, cutting-edge cold chain technology is essential. Chen made improvements and innovations by constructing an "e-commerce + logistics distribution" ecological chain, focusing on areas such as whole chain infrastructure support, comprehensive service provision, enhancement of cold chain technology levels, and optimisation of end delivery experiences, thereby increasing logistics efficiency and reducing losses [14]. Yue & Cheng believe that building overseas warehouses is also essential. Global warehouses can assist in resolving cross-border export logistics concerns when both governments and companies seek to promote cold-chain logistics for agricultural goods transport while enhancing transportation development [16]. Wang and Lan suggested that by improving and providing contracts for international logistics companies, logistics companies could achieve lower logistics prices and faster logistics speeds, thus reducing the logistics cost of agricultural products and enhancing the overall logistics distribution speed [17].

On the other hand, rural e-commerce enterprises should strengthen the research and development of cold chain technology and create new logistics distribution platforms for agricultural products. Moreover, the government ought to combine resources for supply and demand, improve the use of AI, the Web of Things, and other technologies in the administration of e-commerce, equip intelligent detection systems, establish up tracking gadgets with GPS so that vendors on the internet can retain an eye on the farming items' dynamics in contemporaneous fashion. In the field of aptitude, China's international electronic commerce for agricultural commodities is expanding, and there is an increasing marketplace for talent that is both broad and of excellent quality. Talents should possess knowledge of international trade, internet technology, and innovation consciousness. Meanwhile, the government and relevant departments must actively intervene, ensuring quality talent cultivation and professional training. To offer customized guidance to companies operating in overseas agricultural product trade and address possible challenges in cross-border agricultural product trade, Zhao and Li suggested establishing up international e-commerce advisory service stations for specialized agricultural products.[18].

In education, universities should understand that cross-border e-commerce talents are composite talents, meaning that throughout their cultivation period, they need to have a wide range of knowledge beyond simply e-commerce. They also need to pay attention to understanding the market's needs and

integrating theory and practice. Enterprises can collaborate with universities, allowing students to gain practical experience. On the one hand, enterprises can also attract talent. Merchandise from agriculture is by nature volatile and difficult to store. While optimising cold chain technology and logistics distribution, attention should also be paid to the product's quality during production, as concerns about quality are among the major obstacles impeding the growth of international e-commerce in the agricultural sector. Yang proposed establishing a quality standard system for agricultural products, strictly monitoring according to international agricultural product quality inspection standards, and ensuring full-process monitoring and supervision from the source of planting to the dining table through internet technology, ensuring that agricultural products are green, natural, and harmless during cultivation and preventing substandard agricultural products from circulating in the market [19]. Zheng suggested that standardisation is necessary to raise the caliber of agricultural commodities offered through international e-commerce, especially regarding export cost management and network infrastructure standards, and establishing related pilot projects to promote agricultural products' quality and process standards [20].

Peng indicated that in addition to strict quality control, it is also necessary to establish a strict agricultural product grading system based on different qualities and reduce homogenisation and malicious competition [21]. Conversely, the government ought to implement pertinent rules to unify the quality standards of e-commerce agricultural products, promote the standardisation process of fresh agricultural products, and jointly build uniform standard requirements with related industry departments.

4. Conclusion

In the current environmental context, extensive research has been conducted on developing cross-border e-commerce and optimising agricultural product supply chains. Numerous studies have explored the function of cross-border e-commerce in enhancing APSC efficiency from various perspectives. A comprehensive literature review reveals a strong correlation between these two domains. As cross-border e-commerce continues to evolve and agricultural product supply chains are further optimised, their collaboration will become even more intertwined, jointly fostering global agricultural trade prosperity and development. However, it is worth mentioning that presently, the development and operation of cross-border e-commerce within agricultural product supply chains still need to be improved, thus necessitating further research and exploration for achieving sustainable growth in this area. Consequently, leveraging domestic e-commerce experiences can provide valuable insights into addressing current challenges while selecting comprehensive solutions for optimising future developments in cross-border e-commerce within agriculture.

Authors Contribution

All the authors contributed equally, and their names were listed alphabetically.

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