

Problems and explorations of the fresh supply chain in China context

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Abstract. Through the study and comparison of the literature of many countries, the literature review and integration of the three aspects are mainly focused on the development of the operating mode of the fresh supply chain, the causes of the loss, and the research on the improvement of the loss of fresh products. Finally, through the comparative analysis of the research content, it points out the shortcomings of current research in China and the direction of future research. The research of fresh product loss management has been paid close attention to by scholars all over the world. This study has great significance to increase the total value of the fresh supply chain and the development of the fresh cold chain.

Keywords: Fresh Products, Supply Chain Management, Loss Rate.

1. Introduction

With the rapid development of the economy, the consumption level of residents has improved, and the pursuit of quality “eating” has become more and more important. Fresh products are welcome, due to the pursuit of fresher, higher quality food. The fresh supply chain provides a complete industrial chain from the upstream which provides raw materials, to the intermediate, the cold chain transportation links, and then to the terminal consumer market. In recent years, fresh delivery services have greatly facilitated the lives of urban office workers and met the needs of contemporary young people. It is favored by more and more consumers. At the same time, a series of problems have emerged in supply chain management.

In this field, there have been many studies written by previous scholars. Their views are very mature. Meanwhile, their methods are well completed. But they just focus on one or two ways to solve the problem in supply chain management. In this paper, we aim to collect excellent methods or practical ways and sort them out. Our purposes are to give corporate decision-makers targeted ways to respond to different situations.

Firstly, this paper will be an overview of periods of the fresh supply chain management of development, from the beginning to now. Present the whole of fresh supply chain management of developments of operation mode and the that of loss. The subsequent paper will present the problem from the fresh supply chain management of developments of operation mode at tow levels, technology. And then we will find solutions based on these problems. Finally, we will look into the future of the main direction of research. To provide reference, for the digital era of fresh supply chain management reform.

2. Method

The referenced data in this paper is mainly from CNKI and Web of Science. And 1376 articles were retrieved by using keywords such as operation mode, loss and some technical problems in the fresh supply chain. Then we will use a line chart to help you see more clearly the changes in the quantity of relevant literature on the fresh supply chain in the past ten years.

By using the confession clustering method, we analyzed the above literature and extract some keywords as the secondary subject. The number of papers is shown in Figure 1.

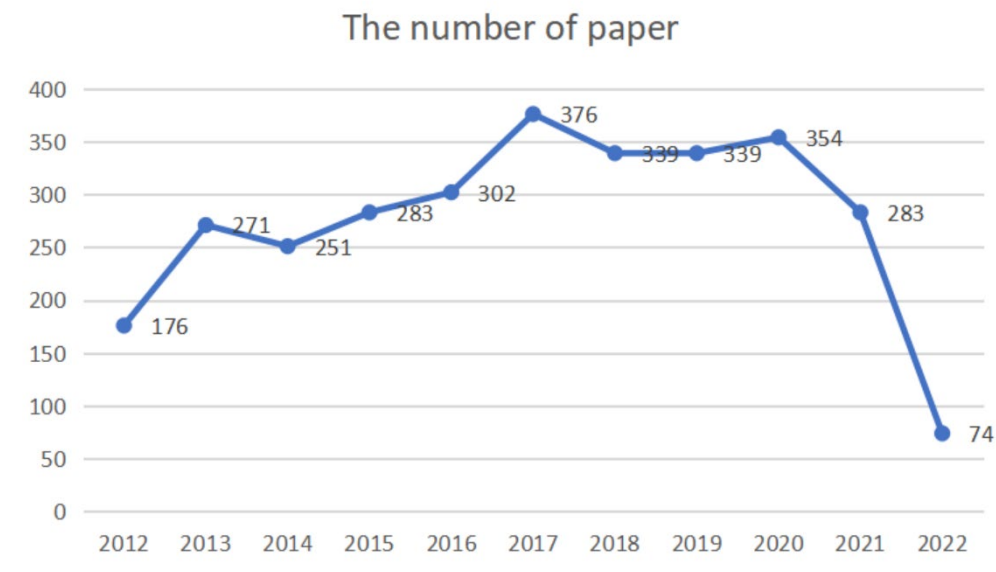


Figure 1. The number of papers

3. Discussion

3.1 The development so far

3.1.1 The operation mode

Up to now, the operation mode in the fresh supply chain has been relatively perfect and most of them have a complete system at the theoretical level. Zhao Yuzhen analyzed the operation mode from the perspective of fresh electricity supplier[1]. In understanding the consumer satisfaction of the fresh electricity suppliers, points out that the main problem with fresh electricity is purchasing logistics and warehousing, the “C2B + O2O” model was put forward to improve the way they operate. Zhou Hang studied the all-channel operation mode of the fresh edible fungus supply chain and pointed out that online and offline sales should be differentiated so that it can not only show their unique advantages but also strengthen management, and ensure that customers’ needs can be realized at any time[2]. As for Zhao Fan, from the perspective of rural e-commerce for fresh edible fungus in the supply chain operation mode, he points out that rural e-commerce should reduce the damage and pay attention to the trend of the market demand changes in real time[3].

During the COVID-19 pandemic, the operation mode in the fresh supply chain has been affected to varying degrees. To help the operation mode become better, LuYang, JunZhang and XiutianShi did some research on the blockchain [4]. They set an analytical model to evaluate block-chain implementation in food supply chains and found that if the platform and supplier can be built on a block-chain, the optimal profits of both the platform and supplier are improved to achieve an all win situation. Meanwhile, block-chain Pankaj Dutta, Tsan-Ming Choi, Surabhi Somani and Richa Butala considered that block-chain is an emerging technology and it can improve supply chains in multiple areas to meet the challenges of different situations [5]. Maxim Rozhkova , Dmitry Ivanov , Jennifer Blackhurst and Anand Nair developed a method of triangulation which is network architecture, process adaptation, and different popular scenarios to reduce the negative impact of COVID-19 on supply chains and related disruptions[6].

3.1.2 Losses in the fresh supply chain

Nowadays domestic and foreign articles mainly explore how to improve the fresh supply chain in terms of fresh product loss and its causes. At present, fresh products consume a lot in the domestic market. As they are not easy to be transported and preserved, fresh products have a great loss in

logistics, which hurts the value-added of fresh products in circulation and also affects the income of suppliers. We think that the loss of fresh products in circulation is mainly by the improper operation of suppliers, transport channels are imperfect and backward factors such as supply chain management from suppliers to retailers because of the packing damage, deterioration and corruption of physical loss and the customer to the product through the peel, remove, broken, etc. substantive loss. Chen Jun and Dan Bin believed that the root cause of the loss of fresh products in circulation in China was caused by the imperfect market mechanism, immature industrial organization, complex circulation channel level, narrow information network laying surface, and poor information transmission[7]. Zhang Zhonglei pointed out that there are many problems in China's supply chain, such as weak direct procurement, weak supply chain concentration and opaque supply channels[8].

These problems are the main reason for the high consumption of fresh products in China. The opinions of these scholars and the author are roughly the same. The problem of loss in the domestic fresh market is becoming increasingly significant, which needs to be solved at the level of logistics and supply chain to effectively alleviate the current situation.

Li Lin and Fan Tijun started from retailers and used RFID technology to process wastage data in real time, aiming at studying the pricing strategy of selling single varieties of perishable goods represented by fresh products to reduce wastage of fresh products in circulation [9]. A.K. and J.P.E established the enhanced regression tree (BRT) model by controlling the temperature of each link in the blueberry supply chain, and applied the simulated supply chain with different temperatures-time scenarios, to study which model could minimize the loss in the blueberry supply chain[10]. Ali and Chunping Xia believed that the use of a short supply chain, collective marketing, cold transportation and storage services can maintain product quality and prolong its shelf life, and reduce the loss of fresh products in the supply chain[11].

3.2 Technical issues in the fresh supply chain

China's fresh produce supply chain has many types of products, large logistics, and high demand. In recent years, the supply chain of fresh products in China has been greatly developed. From the scattered smallholder farmers of the past, to today's larger and larger scale, more and more professional cooperatives. In recent years, China's cold chain warehousing and preservation technology has made great progress, and cold chain logistics has developed rapidly nationwide. Lin Yue believes that the problem of information islands in the supply chain management of fresh products and the lack of information between trading entities have not been fundamentally solved, there are many participants in the supply chain of fresh agricultural products, the information systems of each participating entity are isolated from each other, and the information interaction between the participating entities cannot meet each other's actual needs, and it is difficult to form a synergy of the entire supply chain management, which leads to the low efficiency of the entire fresh agricultural products supply chain[12]. China's fresh products because of their low labor costs, in the international has a considerable number and price of comparative advantages, however, after the 21st century, with the rapid development of high and new technologies, the continuous shortening of commodity life, consumer demand is also more and more emphasis on personalization, global economic activities show an unprecedented trend of integration, making the market competition more intense. In the case of market changes and complexity, China's fresh products enterprises can not rely on their own ability to make flexible responses, but also will bring huge investment and long construction cycles to enterprises. In order to achieve its own survival and development, it is necessary to use the external resources of the enterprise to maximize the core competitiveness of the relevant companies. Li Jifang pointed out that the biggest problem facing the supply chain management of fresh agricultural products in China at present is the contradiction between "small production" and "large market" [13]. China's fresh agricultural products supply chain system is basically spontaneous, there is no unified force, no unified supply chain, can not grasp the real needs of customers and market changes in a timely manner. It can be seen that the current national conditions have higher technical and personnel requirements for the supply chain. In terms of technology, Chen Zhifei believes that blockchain can be used to help

the coordinated development of the fresh e-commerce supply chain and break through the current dilemma of the fresh supply chain [14]. Blockchain technology involves multi-party collaboration, high data authenticity, high information transmission efficiency, data sharing, data traceability, therefore, blockchain technology can be widely used in the field of fresh e-commerce supply chain logistics.

3.3 Study on reducing fresh product loss

In recent ten years, the research on the improvement of fresh loss is mainly focused on three aspects: the improvement of the information flow of the whole supply chain network, so as to ensure the correctness and sharing of the information flow in the supply chain network; Research on the transportation and storage management of fresh products in cold chain logistics; The establishment of a model for the control of inventory quantity game to avoid Bullwhip effect.

3.3.1 Traceability of product information

The traceability of product has always been a hot research topic for some scholars at home and abroad. At present, more and more consumers are concerned about the quality of the products they buy, especially the quality and safety of fresh food. The development of traceability of fresh products is necessary in the future. Through the development of traceability technology, the problem of supply chain information circulation and sharing can be solved, so as to shorten the transaction time and reduce the loss of fresh products in the supply chain[15].

Weixia Xue and Zhiduan Xu think that traceability is an effective way to reduce the loss of fresh agricultural products[16]. A traceable speculative decision model under centralized and decentralized supply chain is established. The order quantity and profit under three retrospective scenarios are analyzed and compared in the model. In the traceability context, wholesalers and retailers share their relevant information throughout the supply chain, thus improving operational efficiency, reducing product wastage during circulation, and realizing residual value identification and recycling.

Liang Liu and Hatou Li introduced blockchain technology in their traceability research and described it with the CVaR method[17]. Blockchain technology is characterized by openness, autonomy, information impossible to falsify and anonymity. Using this technology, it has great help to supply chain information traceability and supply chain transparent management. Moreover, blockchain technology also has "Smart contract technology" to shorten the transaction time, thus reducing the loss of fresh products in the supply chain circulation.

3.3.2 The inventory quantity.

Lin Li and Tijun Fan studied the retailers in the fresh supply chain and used RFID technology to manage the information of fresh products and control the loss [18]. They studied the pricing strategy of selling single varieties of perishable goods represented by fresh products to reduce the loss of fresh products in circulation. The decision-making model of a single cycle retailer is constructed, and the optimal pricing and ordering strategies are obtained under three different pricing models, so as to reduce the wastage of fresh products at the retailer level.

Bo. Yan. et. al. established a model, a two-period news vendor, to depict the markdown-and-waiting game in the fresh produce supply chain[19]. With this model, the supply chain members can better grasp the relationship between the optimal decisions of the supply chain and the risk attitude of strategic consumers. This model is based on the integrated total view of both consumers and suppliers, to get optimal order quantity.

3.3.3 Improvement of transportation and storage.

The development of cold chain logistics in foreign countries started earlier than that in China. Onwude, D. I. et al. concluded that in the past ten years, many foreign scholars have studied the packaging and storage of fresh products in the cold chain after harvest [20]. The products studied include apples, carrots, strawberries, tomatoes, peppers, oranges, avocados, grapes, etc. Most of the studies applied the HMT model to study the effects of different packaging designs on fruit and its

surrounding convection and heat transfer rate in cold chain logistics. And there are several studies based on the MGS model, most of which are to improve the influence of air composition in the enclosed space of packaging on the loss rate of fresh products.

Abdelrahman Ali et al. established the enhanced regression tree (BRT) model by controlling the temperature in each link of the blueberry supply chain[21]. The transportation of blueberries in the supply chain was simulated under different temperature-time scenarios, and the loss of blueberries in the supply chain was minimized under which temperature mode was studied.

3.3.4 Other studies

In addition, part of the research is based on the existing fresh supply chain system design improvement. The supply chain is longer, and the intermediate links more are one of the causes of the loss of fresh products in the supply chain, Anastasia Ktenioudaki. et. al. put forward a fresh supply chain to improve the existing model, short supply chain model is presented in that paper, the collective marketing, transportation and storage service, and cold can maintain the product quality and extend the shelf life, reduce the loss of the fresh products on the supply chain [22]. Advocate the intervention of government and enterprises, to improve the cold chain logistics system and achieve the purpose of reducing losses. Xiaobo Sun. et. al. suggested that the country vigorously promote infrastructure construction and improve the cold chain technology level [23]. The state increases the training of cold-chain logistics professionals; Improves the cold chain standard system of fresh products related laws and regulations.

4. Conclusions

China's fresh supply chain is not yet particularly sophisticated, this paper analyzes the fresh supply chain in China still has many problems in the business model, loss, human resources, and other aspects, and combined with the literature review method to get some solutions. Chinese fresh food companies still need to learn from other countries how to build fresh supply chains, in the future, the development of the fresh supply chain should pay more attention to the quality of products and the time spent in the supply chain, and delivery the products to consumers faster. In conclusion, Chinese fresh enterprises should choose their own way to build fresh supply chain according to their own advantages and disadvantages, and promote the effective circulation of products.

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