

## Cold Chain Logistics Model in the Development of Fresh Food e-Commerce

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**Keywords:** Fresh e-commerce, Logistics mode, Yiguo fresh e-commerce, Shihangshengxian fresh e-commerce

**Abstract:** The rapid development of e-commerce and fresh e-commerce undoubtedly puts forward higher requirements for modern logistics operation mode. And the logistics mode plays an important role in fresh e-commerce. A cold chain logistics system that adapts to the company and its current development plays a decisive role in the future development of the company and the progress of the whole industry. In order to explore the relationship between fresh food e-commerce and logistics, this paper selects Yiguo fresh E-commerce, which was reorganized in November 2020, and Shihangshengxian fresh e-commerce, which has achieved full profits in Suzhou, to make a comparative analysis on the logistics mode. For the subsequent expansion of the national market scope, to build a more perfect fresh e-commerce and cold chain logistics market to provide some more valuable reference.

### 1. Introduction

With the development of society and the progress of science and technology, China's consumer goods market has maintained an active situation, and the consumption upgrading is still continuing. New consumption modes such as online consumption and “contactless distribution” are developing rapidly, especially in China's more developed eastern coastal areas. Take Jiangsu Province as an example, the annual online retail sales of Jiangsu Province reached 1060.24 billion yuan, an increase of 10.0% over the previous year<sup>1</sup>. Among them, fresh e-commerce industry based on the late development of cold chain transportation has great development potential. Studying the relationship between fresh e-commerce and cold chain logistics industry is conducive to the further development of fresh e-commerce industry.

At present, the supply-demand relationship of the whole market has not reached a balanced state. China is a large agricultural country, and the output of fresh agricultural products in 2018 has exceeded 1.11 billion tons. However, according to the food consumption standard of the State Council in 2020<sup>2</sup>, the total demand for fresh food in China is only 420 million tons, and it is mainly concentrated in the eastern coastal areas. Therefore, China's fresh food market is entering a stage of structural surplus, forming a consumer centered buyer's market. However, in 2019, China's per capita annual GDP will reach 64600 yuan, officially entering the ranks of 10000 US dollars. Under the influence of the growth of consumption expenditure, the consumption structure is changing correspondingly, and the concept of fresh food of individual consumers has also changed greatly, from the original “luxury” to the necessity after meals. Similarly, according to the State Council's 2020 physical consumption standard, the per capita fresh consumption demand of the whole people will reach 299kg in 2020, an increase of 34% compared with 2010, which also implies a huge space for the development of the fresh market. It is to see such a huge market space, China's fresh e-commerce is showing a momentum of explosive growth. The scale of the market is growing rapidly, and many models are coexisting. However, under the continuous expansion of demand, the decoupling of China's cold chain supply and fresh food market development is exposed. According to the statistics of the cold chain logistics professional committee of China Federation of logistics and purchasing, the demand scale of China's fresh food cold chain will reach 189 million tons in

<sup>1</sup> Source: Jiangsu Provincial Bureau of Statistics [http://stats.jiangsu.gov.cn/art/2021/1/29/art\\_4031\\_9658985.html](http://stats.jiangsu.gov.cn/art/2021/1/29/art_4031_9658985.html)

<sup>2</sup> Source: [https://www.guancha.cn/society/2014\\_02\\_10\\_204908.shtml](https://www.guancha.cn/society/2014_02_10_204908.shtml)

2018 and 233 million tons in 2019, but the quality and efficiency of the corresponding cold chain logistics are far from meeting the market demand. Generally speaking, there are still some problems in China's agricultural products cold chain logistics, such as low automation level, high logistics cost, low cold chain circulation rate, loose policy environment, and imperfect system, which have become important factors restricting fresh e-commerce to upgrade with the consumption level of residents.

The novel coronavirus pneumonia, which broke out in early 2020, has increased the demand for fresh market in a non-contact network to a certain extent, and has also brought great opportunities for the cold chain transport market on objective conditions. Although the fresh e-commerce market still has the characteristics of unbalanced development in different regions, it is imperative for fresh demand to further penetrate into low development cities, and the cold chain transportation market is also expected to achieve regional coverage. At present, fresh e-commerce is mainly concentrated in China's economically developed areas, such as many first tier cities in the Beijing, Shanghai, Guangzhou and Shenzhen, especially in the Yangtze River Delta of Jiangsu, Zhejiang and Shanghai. This paper aims to study the relationship between *Shihangshengxian* and *Yiguo* fresh e-commerces and cold chain logistics in Shanghai and Jiangsu, so as to build a more perfect fresh e-commerce and cold chain logistics for the subsequent expansion of the national market. The market provides some valuable references.

## **2. Brief Introduction of Fresh e-Commerce Samples and Analysis of Its Logistics System in Shanghai and Jiangsu**

### **2.1 Yiguo Fresh e-Commerce, Who Lives by Burning Money and Will Eventually Go Bankrupt.**

In 2005, the establishment of *Yiguo fresh E-commerce* was also considered as the first year of Chinese fresh e-commerce. The Yiguo fresh will combine fresh products with e-commerce to provide one-stop shopping service for consumers. From 2005 to 2015, the product range was successfully expanded from a single fruit category to a whole fresh category. Meanwhile, the development of Chinese fresh e-commerce has also entered the right track. In 2016, fresh e-commerce entered the adjustment period, and many fresh e-commerce failed because of their difficulty in profit. However, the *Yiguo fresh E-commerce* industry began to carry out strategic upgrading - from *Yiguo fresh E-commerce* to *Yiguo Group*, and committed to transforming from vertical integration of fresh e-commerce to whole chain fresh food operation platform, and to create "one-stop service platform for cold chain logistics with all categories, whole scenes and whole links". In 2019, *Yiguo Fresh*, which lost its main sales terminal, suspended its clean vegetable distribution service platform, laying the groundwork for the collapse of 2020. As of June 30, 2020, according to the financial report of *Yiguo fresh E-commerce*, its total assets are 3.43 billion yuan (including 2.106 billion foreign investment) and total liabilities of 2.3 billion yuan. In November 2020, *Yiguo Group* applied for bankruptcy and reorganization, and the first fresh e-commerce enterprise in China was also declared to be closed.

In contrast, the logistics system behind *Yiguo Fresh's* operation period, in 2015, the logistics department of *Yiguo Fresh* was upgraded to *Anxianda Logistics Company*, focusing on cold chain logistics. And adhere to the company's development concept - "the whole categories, the whole scene, the whole link. Cold chain logistics one stop service platform. " "the whole categories, the whole scene, the whole link. " means that *Anxianda(Yiguo)* has not been a logistics company in strict sense from the source of product supply, and it is more like a vertical supply chain company, which replaces all intermediate links with platform, and only keeps upstream suppliers and downstream buyers. It is such a grand goal that lays the foundation for the *Yiguo fresh e-commerce* to bear huge cost, and means that the *Yiguo fresh e-commerce (Anxianda)* needs to bear all the costs in the whole fresh food supply chain, including storage, packaging, quality inspection, distribution, after-sales and other costs; Because the fresh products are very easy to lose in the transportation and storage of our country, the logistics companies that participate in the fresh e-commerce generally

only take part in the supply chain, so as to disperse the risk. Specifically, *Yiguo fresh E-commerce's* self-built cold chain logistics mainly needs to face four costs:

(1) Warehousing: according to the three-level logistics planning of *Anxianda*, it needs to build warehouses in the origin, regional distribution center and terminal distribution point. But the requirements of fresh storage are very strict, and the temperature requirements of each fresh product vary, and even some fruits with the same temperature requirements will ripen each other.

(2) Packaging: from agricultural products procurement to distribution, a large number of screening and repackaging are needed. The current cold chain logistics in China is mainly passive refrigeration, that is, putting dry ice or ice bag in the foam box to cool down, so the cost of packaging in transportation will be greatly increased compared with the general product.

(3) Quality inspection: by 2020, relevant departments have issued a series of policies and regulations to promote the development of cold chain logistics industry, which greatly promotes the standardization and rapid development of domestic cold chain logistics industry. However, there is no systematic fresh product standard in China. All enterprises also formulate some inspection standards of their own company according to the development opinions issued by the Central Committee. Therefore, in this aspect of quality inspection, *Anxianda* can only establish its own special quality inspection team.

(4) Distribution: *Anxianda* has established a self-distribution team, covering the cities with large order volume and high density. If it is cold chain logistics, in the distribution process, we also need foam boxes, ice bags and other materials.

Each cost mentioned above is a difficult problem for any enterprise, but the choice of *Yiguo fresh E-commerce* is faced by itself. According to *Tianyan* inspection, since 2010, the *Yiguo fresh E-commerce* has obtained seven rounds of financing. Between 2013 and 2016, Alibaba appeared on the list of investors for three times, involving a, B and C rounds respectively. In August 2017, Yiguo completed the round D financing of USD 300million, invested by Tmall. According to the statistics of e-commerce research center, the accumulated financing amount of *Yiguo fresh E-commerce* exceeds 5.93 billion yuan. Burning so much money, cannot save the Yiguo fresh, it can be seen that the fresh e-commerce relying on burning money is not able to survive.

## 2.2 Shihangshengxian Fresh e-Commerce, Who Meeting the Regional Demand

In August 2014, Suzhou *Shihangshengxian fresh e-commerce* Ltd was formally established and operated, and it created a brand new O2O business mode with the help of “Internet +” thinking and modern new cold chain logistics. The “C2B2F” mode (from consumer to enterprise and then to farm / factory) is the first operation mode of “reservation system + whole cold chain + freezer self-pickup”. *Shihangshengxian* does not store fresh products in advance. It realizes “zero inventory” through reverse customization, purchase by sales and order purchase. At the same time, through large-scale base direct procurement and intensive cold chain distribution, it directly connects agricultural production bases and consumers, reducing losses and distribution costs. By the end of 2020, *Shihangshengxian fresh e-commerce* has completed four rounds of financing of 764 million yuan. In 2017, it took the lead in making profits from its own business in Suzhou. In December 2018, fresh food has covered more than 3000 communities in Suzhou, Shanghai and Wuxi, serving nearly 2.7 million families.

The logistics system of *Shihangshengxian fresh e-commerce* can be summarized as whole cold chain and intelligent storage. Users only need to submit orders before 21:00 by mobile phone application, WeChat public number or official account of *Shihangshengxian*, and then they can extract fresh food from second days to nearby smart refreshing cabinet. Hongliang Zhang, founder and CEO of *Shihangshengxian fresh e-commerce*, called it “the first O2O mode of fresh C2B in China (users provide daily food demand, and enterprises purchase according to the demand)”. Through the reverse customization route, after receiving the orders from the users, the fresh food will be directly purchased from the cooperative vegetable base according to the order quantity, and then transported to the distribution and sorting center for sorting and packaging. The next day, the fresh food will be intensively distributed by refrigerated trucks to their respective containers. This

model can effectively save the circulation link of fresh supply chain and ensure the fresh safety of fresh products. Of course, such a logistics system also determines that there are few kinds of fresh food on the supply side of the food industry, and customers cannot buy all kinds of the fresh food that are separated from the cooperative base. If this happens in the long run, it is likely to cause a sharp drop in consumer viscosity, which is a fatal blow to enterprises.

### **3. Based on the Comparison of Sample Logistics Systems, Suggestions for Future Fresh Food e-Commerce**

#### **3.1 Comparison of Origin and Production Area, Reducing Upstream Participation in the Supply Chain**

Both *Yiguo* and *Shihang* choose to purchase directly from the place of origin in order to ensure the quality of their products, but there is a big difference in the “place of production” of the two. *Yiguo fresh E-commerce* built its own cold chain logistics. *Yiguo* (later changed to *Anxianda*) put forward a “full link” strategy, which means that a group needs to face the problem of the distribution of the vast fresh food area alone. The origin of fresh produce in my China has obvious geographical distribution characteristics: poultry and eggs are mainly concentrated in East China; milk is mainly produced in Inner Mongolia, Heilongjiang, and Shandong; deep-water aquatic products are distributed in the coastal areas of East China; freshwater aquatic products are mainly from Hubei, Jiangsu, and Guangdong; Fruits have seasonal characteristics. In the first half of the year, southern fruits are the main ones, including Guangdong, Fujian, and Hainan. In the second half of the year, northern fruits are the main ones, including Shandong, Shaanxi, and Hebei. The current operating scope of *Shihangshengxian* is mainly concentrated in Jiangsu, Zhejiang and Shanghai, so its procurement base adopts the principle of proximity; for example, Shanghai *Shihang* fresh branch chooses to cooperate with Dongbang vegetable bases in Changshu and Tongli vegetable bases in Wujiang, which can meet the requirements of the next day from the place of production. Correspondingly, the category of fresh food will be reduced.

Obviously, *Shihang* industry is still in a regional and early stage fresh e-commerce. Although its logistics system is more efficient, it will be difficult to meet the market demand for different types of goods in the long run, and even face the risk of being merged by large fresh food industry. The operation mode of *Yiguo* fresh logistics does bring consumers a better shopping experience to a certain extent, but behind it is the huge operating costs that enterprises need to bear. At the same time, the particularity of fresh products leads to the strict correlation between the quality and logistics efficiency. Product quality is an important factor for a fresh e-commerce platform to retain customers (the other is timeliness). But at present, the improvement of the quality of fresh products is bound to bring a substantial increase in logistics costs, but the additional benefits are difficult to match the costs. Taking packaging materials as an example, in order to improve freshness of fresh transportation, enterprises usually pack foam bags with ice bags or dry ice for the products, and the cost of these foam boxes will need about 5 yuan. But in the competitive fresh market, it is bound to let consumers bear a small part. If consumers are allowed to bear all the responsibilities, it is difficult to occupy a favorable market in the industry. In the end, it is difficult for the extra revenue to match the cost brought by the improvement of quality. This contradiction will also be a common challenge for fresh e-commerce.

Based on such a complex situation, and the fresh e-commerce is looking forward to expanding to the national market, it puts the policy of “taking big data as the technical core and reducing taking participation in the upstream of the supply chain as the center” . The specific operation is that the fresh e-commerce outsources some of the fresh bases in the upstream of the supply chain, or cooperates with some fresh bases to remove the participation of the upstream of the supply chain and reduce the enterprise's expenses. However, in order to ensure the quality of fresh products, enterprises need to send quality auditors to coordinate the quality contradiction of fresh products. At the same time, enterprises use big data technology to provide upstream suppliers with real-time market changes and future forecasts, and provide partners with better decision-making technical

support.

### **3.2 Intermediate Link Comparison, Coordination between Self-Built Logistics and Third-Party Logistics**

The main manifestation of the intermediate link of the fresh food e-commerce industry refers to the various links of production, transportation, sales and ultimately to consumers of refrigerated and frozen products, so that the items are always in a prescribed low temperature environment. This guarantees the sales quality and performance of the product. From the source to the terminal, general fresh food e-commerce companies need to establish at least three levels of inventory-source production, regional distribution centers, terminal distribution points, and a large number of mobile refrigeration equipment such as refrigerated trucks, aircraft and air transport are required for transfer between storage centers. Even though the *Shihangshengxian fresh e-commerce* appropriately reduced capital investment in the form of “self-operating + outsourcing” in the link of origin, the company still chose to implement most of the intermediate links. Like *Yiguo Fresh Food e-commerce*, they choose to build their own cold chain logistics system instead of outsourcing to reduce the cost of intermediate links. The business philosophy of the two companies coincides, and through the analysis of the current market form, consumers have extremely high requirements for the logistics response speed, and the fresh food enterprises are trying to develop in the longer term. The self-built logistics system is bound to help the future Market development.

At present, there are generally two distribution methods in the e-commerce market: self-built logistics and third-party logistics. Among them, JD Logistics is a typical representative of my country's self-built logistics. In 2007, JD Group established its own logistics-JD Logistics. After more than ten years of hard work, JD Logistics has become a mature and systematic logistics system, which can bring initial profits to the group. In realizing this process, a large amount of capital injection is bound to be required, which requires the group to have a large amount of follow-up capital investment to enable the self-built logistics system to operate normally. Even though the distribution scope of JD Logistics can basically cover more than 400 large and medium-sized cities across the country, for the suburbs of cities or the vast central and western rural areas, JD Logistics still uses the means of cooperation with third-party logistics for delivery.

However, fresh food has high requirements for food freshness and speed. The self-built cold chain logistics system needs higher investment than the general normal temperature logistics system. In the process of transportation, China is facing the problems of backward cold chain technology, high loss, high cost and difficult profit. According to the current stage, fresh e-commerce in China can consider the means of cooperation between self-built cold chain logistics and third-party cold chain logistics for commodity distribution. Adhering to the self-built cold chain logistics system is to comply with the development of the times. The response speed of logistics in the future is related to the user adhesion of consumer groups. So the huge investment in the early stage is for the sustainable development in the future. Of course, there is a huge gap between China and the developed countries in cold chain transportation. So if we want to further reduce the cost of cold chain logistics transportation, we need to optimize the whole cold chain system. The way of optimization can draw on the successful experience of foreign countries and apply it to the market of our country according to the actual situation. At the same time of self-exploration, we also need to learn relevant experience to accelerate the development of cold chain logistics industry.

### **3.3 Comparison of Terminal Distribution and Promotion of Fresh Self-Pickup Counters**

Whether it is ordinary e-commerce or fresh e-commerce, the last mile of terminal distribution is always a problem for the express industry. *Yiguo Fresh* chooses the traditional delivery method of a single order delivery, while *Shihang Fresh* chooses to adopt the method of community delivery and self-pickup. Two different terminal distribution methods are also commonly adopted by ordinary e-commerce companies today.

According to the terminal distribution situation of the ordinary e-commerce which has developed more mature, at present, due to the existing business model of the express company and the poor supervision of the express personnel, the last mile distribution link is very weak, and the customer's

dissatisfaction with the express industry is reflected in this aspect. In February 2015, the State Post Office and the postal administrations of all provinces (autonomous regions and municipalities) accepted 55186 consumer complaints through the “12305” postal industry consumer complaint telephone and complaint website. Among the complaints, 2456 involved postal service problems, accounting for 4.5% of the total number of complaints; 52730 involved express business problems, accounting for 95.5% of the total number of complaints. It can be seen that the management of terminal distribution is difficult and there are many problems, so it is difficult to undertake the shopping festival. According to the general e-commerce industry, the self-service cabinet mode advocated by fresh food industry is feasible. Self-lift cabinet has the advantages of high delivery efficiency, low cost, high safety factor and so on. Although the cost of fresh self-service cabinet will be significantly higher than that of ordinary self-service cabinet, it is still economical in the long run.

## **4. Clarify the Role of Logistics for Fresh Food e-Commerce**

### **4.1 Respond to User Needs**

Logistics is the circulation of entities from one point to another; in the case of fresh e-commerce, fresh food is delivered to customers immediately from the origin to ensure the quality and freshness. Based on this, it is easy to understand that one of the most important roles of logistics for fresh e-commerce (or all e-commerce) is to respond to the needs of customers. But at the same time, it can be found that different logistics modes can respond to the demand with different capabilities and time limit, and the time span of the distribution link can vary from half an hour to two days.

### **4.2 Determine Operating Costs**

Fresh e-commerce is not a direct producer of fresh products, and its role is basically a bridge between the production end and the end consumer. Therefore, the daily operation activities are around the transportation, storage, sorting, packaging and distribution of goods, more like a vertical logistics enterprise. In this case, the logistics system of a fresh e-commerce undoubtedly determines the operating cost of the enterprise, and it is also the key to its profit. Compared with the e-commerce market, logistics companies with good operation system and mode can not only speed up the flow of e-commerce information, goods and capital, improve the efficiency of capital use, but also improve the recognition of e-commerce enterprises in the hearts of consumers. This situation is still applicable to the fresh e-commerce industry.

### **4.3 Provide User Stickiness**

The epidemic situation in 2020 has brought heavy losses to people all over the world, but it is good news for e-commerce platforms. Because of the virus, people reduce unnecessary travel, which means reducing the probability of consumption in a large number of offline stores. An epidemic is quietly changing people's living habits and consumption habits. The change of people's living habits under the epidemic situation has prompted people to contact online shopping more frequently, and part of the offline demand is transferred to online shopping. This is both an opportunity and a challenge for the e-commerce industry. When the attention and traffic continue to rise, how to retain users and occupy an advantage in this traffic competition is the key, and the core is whether their own logistics system can be better satisfied meet the needs of consumers. With more and more transparency in terms of product performance and price, the commodity prices of major platforms are almost the same. Therefore, consumers will pay more attention to the response speed of logistics. The faster the logistics response, the easier it is for users to rely on it. In real life e-commerce, a logistics company cooperating with e-commerce may affect consumers' decision-making. Compared with the mobile phone counters on Taobao and Jingdong platforms, most of them have the same mobile phone and the same price. The sales volume of Jingdong is significantly higher than that of Taobao platform. The only difference is that JD has the option of delivery on the same day and delivery on the next day. Therefore, it is not difficult to find that

consumers are more willing to choose a business cooperating with a logistics company with better service quality to purchase goods, such as Shunfeng, the leader of the industry, or JD logistics. For consumers, these logistics companies with better service quality can not only enjoy better service and obtain more real-time shipping information, but also obtain the purchased goods more quickly. Specifically, logistics is the core competitiveness of a fresh e-commerce enterprise. Users are mainly obtained through marketing means, but in the long run, the activity of users depends on the logistics strength of the enterprise.

## 5. Conclusion

In recent years, with the change of shopping methods and habits, online shopping has become a convenient way for people to live. Therefore, fresh e-commerce, as an industry to make up for the market vacancy, must be a competitive place for future strategists, and the cold chain logistics industry is the top priority for fresh e-commerce. By comparing the two cases in Shanghai and Suzhou, this paper deeply discusses the relationship between fresh e-commerce and cold chain logistics system. A logistics system that adapts to the current development of the company determines the future development of the company. According to public reports, in 2018, Ali adjusted its organizational structure and transferred the fresh operation of Tmall, which is in the charge of *Yiguo fresh E-commerce* to *Hema fresh E-commerce*. *Yiguo fresh* further strengthens the positioning of digital driven fresh food industry chain cooperation platform, and its business turns from consumer to business. From the perspective of transformation itself, *Yiguo* still has the opportunity of development, but the real problems are the incomplete infrastructure and loose logistics system of *Yiguo*. After breaking away from Ali group, its competitiveness has declined seriously. Compared with vertical e-commerce such as fresh e-commerce, China's comprehensive e-commerce has obvious advantages. For example, Ali, Jingdong and other comprehensive e-commerce occupy about 80% of China's terminal market share, which is a huge consumer group that many traditional enterprises can't match in the short term. In the early stage, fresh e-commerce has to rely on Tmall supermarket and Wechat app to a large extent, that is, its own sales end is in the hands of other enterprises. Meanwhile, the Cr5 of fresh e-commerce industry in 2019 is 57.2%, with obvious head effect. Therefore, the future development of China's small and medium-sized fresh e-commerce industry needs a long way to go.

As far as the current situation of fresh e-commerce in China is concerned, there are still some problems in the cold chain logistics of agricultural products in China, such as low automation level, high logistics cost, low circulation rate of cold chain, loose policy environment and imperfect system. If it cannot be improved, it will seriously restrict the development of fresh e-commerce industry in the future. But it is these problems that show that the fresh e-commerce industry has not yet formed a complete commercial barrier, which is a good news for small and medium-sized fresh e-commerce. In a word, under the condition that all operations of e-commerce platform are reasonable and proper, logistics system is an important factor that ultimately determines the market share.

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