

# The Development Model of Japanese Cold Chain Logistics: The Example of Seafood Transportation

Fangtao Ren<sup>1</sup>

<sup>1</sup> City University of Macau, Macau, China

Correspondence: Fangtao Ren, City University of Macau, Macau, China. Tel: 853-6598-3101. E-mail: dddxs@qq.com

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## Abstract

This paper mainly analyzes the value-added mechanism in the supply chain and the experience of cold chain logistics development based on the cold chain logistics transportation of seafood in Japan. The support and protection of the law for cold chain logistics, as well as the development of the degree of informationization and the construction of infrastructure facilities are studied from the government level. On this basis, certain problems are found, for example, the lack of management level, the lack of excellent talent reserve, the backwardness of infrastructure facilities, and the low degree of information technology, etc. Some rationalization suggestions are provided for the development of seafood transportation and the development of the supporting logistics supply chain system in China.

**Keywords:** seafood, logistics, supply chain

## 1. Introduction

With the development of China's strategy to build a strong marine state, how to make good use of China's abundant marine resources has become a topic of increasing concern in society, and some scholars have proposed that China should not only build a strong food country but also build a "blue granary", through seafood to alleviate the food crisis brought about by population growth. With the economic development and social progress, consumers are more in favor of seafood products with rich nutritional value, however, there are still certain shortcomings in China's fishing, distribution and processing, as well as product transportation. These factors have hindered the development of the overall upstream and downstream industrial chain of seafood in China. Therefore, this paper selects Japan, which has rich experience in the field of seafood, as the research object, and proposes some feasible suggestions for the problems encountered by Chinese seafood in the process of distribution and processing by drawing on the development of Japanese seafood transportation and processing mode.

Japan, an island nation located in East Asia, covers an area of about 378,000 square kilometers. It is the largest developed country in Asia in terms of area. The whole territory of the country is surrounded by the Pacific Ocean and land marginal seas such as the Sea of Okhotsk, the Sea of Japan and the East China Sea. Marine resources are extremely rich, and the demand for seafood in Japan is very strong, and the sufficient demand provides Japan with a rich industrial chain of seafood processing, distribution and transportation. The loss of marine products in the process of circulation is very serious, while the transportation process of marine products for logistics and transportation requirements are high, there is the phenomenon of decay and deterioration, so the cold chain transportation and refrigerated transportation has become the key to solve the loss of marine products. At present, China's seafood cold chain logistics circulation rate is only 22.8%, refrigerated transport is only 33.87%, while Japan's development in this field, the circulation rate of cold chain transport has reached 90%, so in the field of seafood circulation and transport, Japan's system has some reference significance.

## 2. Research Overview

Yang (2022) collated the development history of Japanese aquatic products industry, collated Japan's excellent and advanced experience in circulation, processing and transportation of seafood, and gave relevant suggestions to the development of cold chain logistics in China. Lv (2018) analyzed the development of cold chain logistics in China, and the fourth-party logistics model should be developed, and banks and investment institutions can

provide financial support in the operation of logistics companies to accelerate the development of cold chain logistics. Wang (2021) analyzes the main components of cold chain logistics costs, and the author believes that seafood is sensitive to the time factor, so cold chain logistics companies should accurately predict the demand and prepare cold chain transportation routes as well as transportation tools in advance. Qin (2016) argues that the value chain value-added system of cold chain logistics should provide a transparent as well as traceable system, and use the technology of RFID to realize the Internet of Things for seafood to ensure the health of consumers' food.

In general, the current articles on the distribution, processing and transportation of Japanese seafood are more focused on the development model and the development experience of Japan. There is a lack of attention to the overall development of the Japanese seafood industry and data to prove it. This paper focuses on the direction based on the data of Japanese seafood processing, distribution and transportation, and proposes relevant development suggestions by analyzing the overall development situation and the actual situation of China and Japan in the field of seafood.

### **3. Method**

#### *3.1 Development of Japanese Seafood*

In 1984, Japan's fishing industry reached a staggering figure of 13 million tons of annual production, making it the world's top fishery country at that time. However, with the impact of the financial crisis on various industries in Japan, the development of fisheries slowed down and all the development indicators related to fisheries showed different degrees of decline. 2006-2019, the gradual improvement of fishing technology in Japan, the average annual production was set at 4 million tons.

In addition, the gradual maturation of aquaculture technology is another point of development of the Japanese aquaculture industry, the 21st century, the development of Japan's aquaculture industry is relatively stable, but received the Fukushima nuclear meltdown, as well as the impact of the New Crown pneumonia epidemic, aquaculture industry received a huge impact, the year's production plummeted to 900,000 tons.

#### *3.2 Current Development of Seafood Processing in Japan*

The development of seafood processing in Japan is mainly focused on meat condiments, frozen food, frozen aquatic products, and canned food. Due to the impact received from production, the processing volume of most seafood products showed a decreasing trend, with 248,000 tons of frozen foods, 505,000 tons of fish condiments, and 1.37 million tons of frozen raw products as of 2017.

#### *3.3 Development of Cold Chain Logistics in Japan*

After the Second World War, with the recovery of Japan's post-war economy and the upgrading of residents' consumption levels, the number of frozen enterprises showed in addition to an amazing growth, and the value-added chain of seafood was sufficiently developed. After the 1960s, Japan's economy entered a period of rapid development, and the consumer market demand for seafood showed growth, and after reaching a peak in 1982, in 1985 Japan's seafood market has developed very mature. With the expansion of the international market, Japanese cold chain enterprises have reformed for their own cold chain technology. The industry reduced production costs by forming a scale effect, and on the logistics end, Japanese companies began to form their own independent logistics and distribution systems.

Cold chain truck and cold chain storage warehouse are the most basic facilities in cold chain logistics, seafood has high requirements for freshness, so cold chain logistics does not agree with other basic logistics business, cold chain logistics places great emphasis on the establishment of supporting facilities, so attention should be paid to the construction of basic supporting facilities in cold chain logistics.

The value-added model of seafood is similar to the value-added chain of traditional food products, in which manufacturers, retailers and consumers are the main subjects of the whole value-added chain of seafood. The current value-added system of seafood mainly starts from two aspects, firstly, positive value-added and secondly, reducing negative value-added. In the cold chain logistics, on the one hand, the new technology can improve the efficiency and shorten the transportation time in logistics and distribution, and on the other hand, it can reduce the unnecessary loss of seafood during transportation. Therefore, the development of cold chain logistics is of great significance to the overall improvement of the value of the seafood sector.

Japan's seafood cold chain logistics attaches importance to information management, and among many countries in the world, Japan became the first country to combine Internet technology with cold chain logistics. The model of seafood through the Internet + seafood provides certain economic significance for the development of seafood.

A scholar once tracked and analyzed the value-added of seafood circulation in Japan, and the value-added of the price at the place of sale and the price at the place of origin in Japan was about 2.5 times.

### *3.4 The Current Situation of China's Cold Chain Logistics and the Existing Problems*

At present, China's seafood import and export scale has reached hundreds of billions of dollars, cross-border seafood trade has been developed in China's 17 free trade zones, cold chain logistics as an indispensable supporting facility, received the attention of local governments.

As the economic level of society continues to improve, as well as the increase in consumer demand for food, so the type of seafood processing and comprehensive utilization level also increased, China's cold chain transport started late, the cold chain supporting infrastructure is poor. Consumers' consumption level is gradually improving, the market and enterprises are paying more and more attention to seafood products with high added value, and at the same time, China's cold chain supporting infrastructure is constantly following up, coupled with the cooperation with various types of processed food industries, China's cold chain logistics level and cold chain logistics response speed has been developed significantly.

At the same time the rise of the Internet, the continuous development of e-commerce, the traditional sales model is gradually replaced by network stores, seafood on the high requirements of timeliness, the advantages of network stores for the rapid response to orders, to ensure the freshness of seafood, the development of cold chain transport, improve the efficiency of seafood transport, greatly reducing the loss of products in the process of transport.

It is worth noting that China does not have a unified cold chain product quality evaluation system, and for logistics enterprises, cold chain logistics as a new logistics business, enterprises in the management of cold chain logistics also has certain deficiencies, which not only affects the government departments for the supervision of cold chain food, while the chaotic seafood market is prone to damage to consumer rights.

Not only in logistics and transportation, but also in seafood breeding and fishing, there is still a big gap between China and Japan. China has a large base of fishery development, but the lack of a sound evaluation index system has led to too much reliance on the role of distributors.

The development of cold chain information is an important issue in the construction of modern logistics system. In Japan, the whole value-added chain of seafood is transparent and traceable from capture to final entry into the consumer market, which not only facilitates supervision by the government and relevant departments, but also helps consumers' confidence in food safety. However, in China, the development of logistics started late and the traceability mechanism of cold chain logistics is still under construction, and the whole industry chain lacks relevant data records.

The cost of seafood cold chain logistics is composed of procurement cost, transportation cost, loading and unloading cost, storage cost and packaging cost, at present, China's cold chain transport basically relies on road transport, railroad and waterway transport level still needs to be improved, no matter the number of cold chain vehicles or the volume of the vehicle load, China's cold chain logistics transport vehicles are different from the world's top level. At the same time, as a new business of logistics enterprises, the low proficiency of personnel operation and the lack of technical talents have led to high management costs, and the packaging of seafood is highly differentiated, which makes it difficult to unify the logistics packaging standards and increase the packaging costs of enterprises.

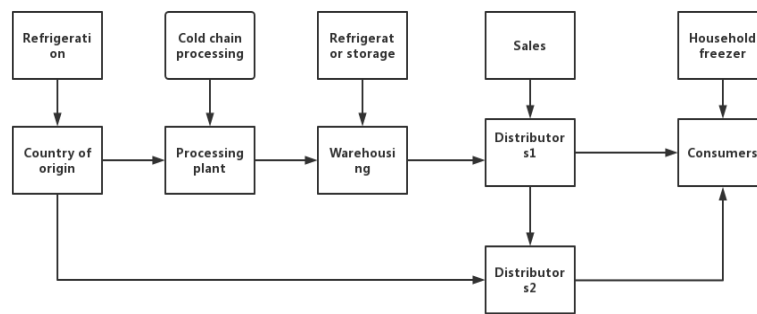


Figure 1. Cold chain logistics conduction path

#### 4. Results

First of all, China should improve the legislative work of fisheries, establish a sound legal guarantee system, strengthen the supervision of seafood and improve the quality evaluation system of seafood. Having a good market environment and a complete legal guarantee certificate system will improve the development of China's seafood logistics cold chain.

At present, China has established the "Assessment Standards for Cold Chain Service Requirements of Logistics Enterprises", which clearly stipulates three types of logistics cold chain regarding transportation type, storage type and comprehensive type, but it should still be noted that the development of China's cold chain logistics is generally still at a lower level, and the enterprises with cold chain logistics qualification are small in scale, while the development of cold chain logistics in the western region of China receives the constraints of economic development, and the industry concentration is not high enough, the transportation cost is large, the first party, the second party of self-owned cold chain logistics accounted for a high proportion, only covering part of the core cities. In the context of new retail mode, China should integrate logistics resources and improve services. The government continues to increase the construction of cold chain warehouses, cold chain logistics transportation laws and regulations, and in transportation, financial subsidies for cold chain logistics enterprises to keep the development of cold chain logistics vehicles. Logistics enterprises should increase cooperation with road authorities to build exclusive channels for cold chain logistics and improve transportation efficiency. The government cooperates with universities to guarantee the reserve of cold chain logistics talents, while seafood should be big data public service platform, using big data as well as Internet technology to precisely match the demand and ensure the market demand.

At the same time the development of China's seafood traceability mechanism is slow, only some large enterprises have increased the traceability mechanism, the market is full of substandard seafood, the healthy operation of the market has a certain impact on the consumer's food health issues is also a test.

On the consumer side, the sustainable use of logistics packaging should also be strengthened, and the government should establish a standard system on logistics packaging as well as a logistics packaging recycling system to increase the recycling rate of packaging.

In the context of the new crown pneumonia, the safety of cold chain logistics is also concerned by the society, which reflects the poor health and safety concept and low level of disinfection of cold chain transportation in China. Therefore, the government should improve the fast track about the cold chain logistics of seafood, which can not only ensure the shortening of logistics transportation time, but also ensure the food safety of seafood.

#### 5. Discussion

China's economy is developing rapidly, and consumers' demand for seafood is gradually increasing. However, the cold chain logistics cost of seafood is too high and the profitability of enterprises is weak, which seriously affects the development of cold chain logistics. This requires that all enterprises in the value-added chain of seafood should actively cooperate and share the benefits. On the other hand, seafood should actively use new technology at the sales end to reduce the pressure of refrigerated food storage and actively return capital for the enterprises. Through the cooperation between the government, seafood companies and cold chain logistics companies, the development of Chinese seafood as well as Chinese cold chain logistics can be promoted.

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