

# Analysis on the Development of China's Reefer Container Market

Qiong Wu<sup>1, a</sup>

<sup>1</sup>School of Transportation, Shanghai Maritime University, Shanghai, China

<sup>a</sup>201830610033@stu.shmtu.edu.cn

## Abstract

**In order to improve the reefer container transport market competitiveness, the paper explain the development status of reefer containers from the reefer container transportation demand, output and national cold-chain policy. Aiming at problems such as insufficient reefer container equipment and multimodal transport connections to be improved, the paper also put forward countermeasures for development of reefer container. It is necessary to strengthen infrastructure construction, strengthen cooperation between related parties, use information systems, and enhance the market competitiveness of reefer container transportation.**

## Keywords

**Reefer container; Cold chain.**

## 1. INTRODUCTION

Reefer container transportation refers to the process of transporting refrigerated and frozen goods from one place to another using reefer containers and transportation vehicles[1]. It has the advantages of low transportation cost, short transportation time, suitable for multiple vehicles, convenient intermodal transportation, fast loading and unloading speed, high efficiency, reducing pollution and loss, stable transportation temperature, reducing loading and unloading, and waiting for transportation exposure time, and flexible operation scheduling[2]. Increasing food and drug safety awareness, changes in consumption structure, rising income levels and urbanization rates, fresh food e-commerce expansion, policy support and other factors drive the development of China's cold chain equipment industry[3]. According to the latest data from consulting firm Eskesen Advisory, China has surpassed the United States to become the world's largest importer of reefer containers and reefer food.

## 2. THE REEFER CONTAINER MARKET

### 2.1. China Has A Huge Demand for Seaborne Refrigerated Cargo Transportation

With the continuous improvement of the material living standard of the Chinese people, the development of domestic Internet e-commerce and the continuous progress of cold chain technology and infrastructure, people's demand for imported fresh goods has increased significantly. According to customs statistics, China's imports of fresh products such as aquatic seafood exceeded 10 million tons in 2016 and 20 million tons in 2019. In addition, China is also a major exporter of vegetables and other fresh products to Japan, South Korea, Germany, Switzerland and other countries. Refrigerated goods are mainly imported and exported through ports such as Dalian, Tianjin, Qingdao, Shanghai, Guangzhou, Haikou, Xiamen. By 2022, China and the Asian region will be the top importer of refrigerators, according to Eskesen Advisory.

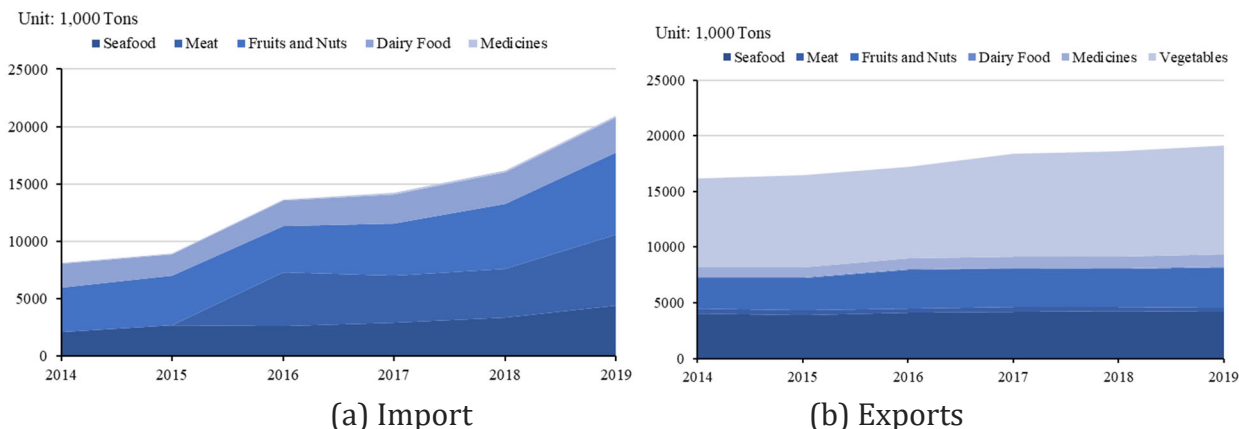


Figure 1. China's Imports(a) and Exports(b) of Fresh Goods from 2014 to 2019

### 2.2. China Is A Major Producer of Reefer Containers

A reefer containers is a container that have refrigeration or insulation functions and can be used to transport frozen or low-temperature goods. Compared with the reefer vessel, the reefer container has the advantages of high transportation efficiency, flexible loading and unloading operations and low transportation loss. In recent years, the mode of refrigerated cargo transportation based on reefer vessels is rapidly and steadily changing to a mode based on reefer container transportation. As of the end of 2018, the global container fleet of reefer containers was approximately 2.9 million TEUs. Since 1993, China's container production has consistently ranked first in global container production and sales for 26 consecutive years. China produced 96 percent of the world's standard containers in 2018. China's container manufacturers are mainly composed of CIMC, Singamas Containers, Qingdao Maersk, etc. The production bases of reefer containers are mainly distributed in Shanghai and Qingdao. CIMC's global share of reefer containers exceeds 30%. In 2019, CIMC's sales volume of reefer containers was 137,500 TEU.

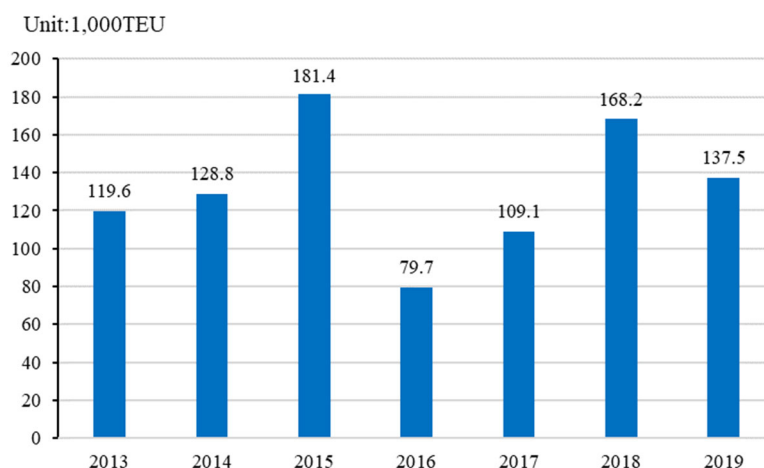


Figure 2. CIMC's sales volume of reefer containers from 2013 to 2019

### 2.3. Liners Increase Investment in Reefer Container

Traditional reefer vessels are gradually withdrawing from the market, the demand for reefer container transportation is rising, the freight rate of reefer containers is high, and the profits are considerable. Liners actively invest in the reefer container transportation market. In 2016, Maersk ordered 14,800 TEU reefer containers. In 2018, Hapag-Lloyd announced an order for 11,100 reefer containers and an additional 13,420 refrigerators in 2019. In 2018, ONE announced an investment to build 14,000 reefer containers. In 2020, Zim increased by 1,000 containers. Maersk is the world's largest in terms of reefer container capacity and controls more

than 25 percent of the reefer box market. The top six lines by reefer container capacity control more than 75% of the reefer container market, followed by CMA CGM, MSC and COSCO shipping, together with ONE and Hapag-Lloyd.

## 2.4. China's Reefer Container Sea Rail Combined Transportation Has Great Development Potential

**Table 1.** Development of China's Cold Chain Freight Trains

Start Time	Train	Cargo	Station	Distance	Spending Time	Volume	Frequency	Have Sea Transportation or not
2013.12.11	Guangxi-Beijing special reefer container train	fruit and vegetable, frozen seafood	Fangchenggang - Nanning, Guangxi - Beijing	2800	60 hours	25*45ft reefer containers	--	yes
2016.8.13	Yingkou reefer container train	Fresh fruit and garlic	Yingkou Port - Moscow	8198	9 days	--	1 train every two weeks	no
2016.9.18	Chang-Man reefer container train	Fruits and vegetables	Changchun International Land Port - Manzhouli - Russia - Germany	7000	12 days	--	--	no
2017.6.25	"China Food Valley" Railway Cold Chain Train	Fresh Agricultural Products, Deep Processing Food, Livestock and Poultry Products	Weifang West Railway Station - Wangjiaying West Railway Station, Kunming, Yunnan	3249	3 days	24TEU	1 train per week	no
2017.8.31	X9006 China Europe International Freight train	Garlic	Zibo Nongzhong Railway Station - Almaty, Kazakhstan	4657	12 days	40 reefer containers	--	no
2017.11.20	The southbound channel of China-Singapore connectivity project International cold chain experimental train	Apple, Onion and so on	Lanzhou Dongchuan Railway Freight Center - Chongqi-Guangxi Xin southbound channel	--	--	--	--	yes
2018.4.19	Weifang to Urumqi Railway Cold Chain Train	Fresh Agricultural Products, Frozen Poultry Products	Weifang West Station - Urumqi	3412	5 days	--	--	no
2018.6.26	China -- Singapore Interconnection southbound corridor cold chain transport freight train	fresh food such as fruits, frozen aquatic products	Beibu Gulf port of Guangxi - Chongqing West Logistics Park Tuanjie Village Central Station	--	--	8 reefer containers	--	yes
2018.6.26	Shengnong Cold Chain Train	Frozen Chicken	Guangze Railway Station, Fujian-Chengdu/Chongqing/Guiyang/Kunming	--	3-4 days	32*40ft reefer containers	--	no
2018.7.20	Yangtze River Delta Railway Cold Chain Special Train	Frozen meat and other frozen, fresh goods	Shanghai Yangpu Railway Station - Chengdu International Railway Port	--	38 hours	40 reefer containers	every week 2 lines	yes
2019.2.22	China-Vietnam container cold chain freight trains	Southeast Asian fruits such as pitaya and longan	Guangxi Pingxiang - Shanghai Minhang	2331	70 hours	25 reefer containers	15 trains per month	no
2019.4.10	"Jinxiang Garlic" international container cold chain train	mainly uses garlic, seasonings, drinks and food	Jining West Station - Huangdao Port - Southeast Asia	--	8 days	35*40ft reefer containers	2 trains every week	yes
2019.4.26	"Fangchenggang, Guangxi - Guang'an, Sichuan" direct cold chain train	Southeast Asian fruits such as Thai coconut and Vietnamese dragon fruit	Fangchenggang -- Guang'an	--	84 hours	8 reefer containers	1 train per month	yes
2019.10.22	Sino-Vietnamese "Ho Chi Minh City-Wuhan" cold chain train	frozen basa fish	Vietnam - Pingxiang - Nanning - Wuhan	1478	50 hours	--	--	no
2019.12.3	Ronghu cold chain train	High-quality fruits and vegetables such as navel orange, kiwi fruit and sweet apple	Chengdu-Yangpu Station	--	--	--	--	no
2020.4.8	Dalian-Harbin reefer freight train	imported fruits, vegetables and meat	Dalian container center station-Harbin Xinxiangfang station in Heilongjiang province	--	--	--	2 trains every week	yes

With the gradual narrowing of the economic differences between the eastern and western regions of China's economy, the trans-regional long distance refrigerated cargo volume will increase significantly, which lays the cargo source foundation for the development of reefer container sea-rail combined transportation. Although a large number of long distance reefer transport is completed by road transportation, the quality of road refrigerated transportation can not be guaranteed because of the serious overloading and high fuel consumption in medium

and long distance transportation. From an economic point of view, railway is more suitable for medium and long distance reefer container transportation than road. Since 2013, China has successively opened cold chain freight trains, and the main route of sea rail combined transport of reefer containers is to transport them from Southeast Asian countries to Beibu Gulf ports in Guangxi, such as Fangcheng Port, and then to Chongqing, Shanghai, Beijing and other places through Nanning Railway.

## **2.5. Years of Continuous Policies to Support the Development of Cold Chain**

China's cold chain logistics industry began to develop gradually after the Beijing Olympic Games. Since 2008, China has launched a series of relevant policies to strengthen the construction of the cold chain system and create a benign policy environment for the development of the cold chain industry. In 2008, the Ministry of Commerce issued the Guiding Opinions on Accelerating the Development of Modern Logistics in China's Circulation Field, which mentioned to strengthen the overall planning of China's fresh food cold chain logistics. In 2009, the implementation of the Food Safety Law further emphasized the role of cold chain logistics in guaranteeing food safety, and a large number of cold chain enterprises have sprung up. In 2010, the State Council issued the Development Plan for Cold Chain Logistics of Agricultural Products, established the CCLC, and launched the China's Cold Chain Logistics Development Report. In 2017, the State Council issued the "Opinions on Accelerating the Development of Cold Chain Logistics, Guaranteeing Food Safety and Promoting Consumption Upgrade", requiring that by 2020, a cold chain logistics service system with full temperature control, standards and specifications, efficient operation, safe and green will be initially formed. 2018 is the year of cold chain policy. The government attaches great importance to the development of cold chain logistics, the State Council, the Ministry of Commerce, National Development and Reform Commission, the Ministry of Agriculture and Rural Affairs, the Ministry of Transport, Ministry of Finance and other ministries have successively introduced policies. The document puts forward that cold chain logistics is an industry that the country strongly encourages development. It provides clear support in planning guidance, financial support, industry standards and food safety regulations, and leads cold chain logistics with the highest level of deployment from different levels. The healthy development of the industry. In 2019, "cold chain logistics" was held at the meeting, requiring the implementation of urban and rural cold chain logistics infrastructure projects to strengthen the weak points.

## **3. PROBLEMS**

### **3.1. Insufficient Supply of Reefer Containers**

The production cost of reefer containers is high. Take the 40ft reefer containers as an example, the price ranges from 140,000 to 200,000RMB. In 2016, liners slashed spending on refrigeration equipment in order to control costs and survive, which only gradually recovered in 2018. According to Drewry's estimation, the compound annual growth rate of the refrigerated container fleet will remain at 4.5% in the next five years, which is slightly higher than the expected growth rate of the demand for refrigerated container freight, but it is still not enough to achieve a balance of supply and demand.

### **3.2. Insufficient Plugs for Port Reefer Containers**

The refrigerator needs to be connected to the special plug of the refrigerator. The voltage is generally 400V level voltage of three-phase four-wire system. Storage capacity close to saturation of the port area is mainly cooler plug spare less. Tianjin Port is China's main cold chain hub and the largest import port of frozen products, with a storage capacity of 16,000 TEU in reefer containers, half of which were expanded between epidemics. There are more than 5,000 reefer container plugs in the first, second and third phases of the Nansha Port Area of

Guangzhou Port, with a storage capacity of nearly 8,000 TEUs. There are more than 11,000 reefer container plugs in the Qianwan Port Area of Qingdao Port, Shandong Port.

### **3.3. Reefer Container Multimodal Transport Is Not Smooth Connection**

One of the most important advantages of reefer container transportation is that it is easy to organize multimodal transportation. However, due to the existence of railway infrastructure, system, and the customs policy issues, the existing multimodal transport of reefer containers basically follows the traditional port and rail transportation organization method, and the transportation organization is relatively extensive, which can achieve a close connection between liners and trains. Less, easily cause transportation delays and container detention, increase costs, and weaken the inherent advantages of refrigerated container multimodal transport.

### **3.4. Reefer Container Transportation Is Greatly Affected by the Covid-19 Epidemic**

Influenced by the epidemic of Covid-19, the transportation channels of ports have been blocked to varying degrees, and reefer containers are difficult to be stored and transported in some areas. With the detection of Novel Coronavirus in many imported frozen products, the port has increased the inspection of reefer containers. In Tianjin port, reefer container must complete a locally required Novel Coronavirus test before they can be released, and the backlog has led to a severe shortage of reefer container plugs at the docks and delayed berthing times for ships.

## **4. SUGGESTION**

### **4.1. Strengthening Facilities Construction**

According to the flow and direction of reefer container cargos, reefer container handling stations and port receiving stations, the overall plan for the development of reefer container transportation should be made. In accordance with the development plan of the railway cold chain logistics network layout, a cold chain logistics base should be established in the production of refrigerated goods or/and concentrated consumption or large-scale distribution centers. The construction of railway private sidings and supporting loading and unloading capabilities should be accelerated. A cold chain logistics park should be built, effectively to integrate railways, highways, ports, and aviation resources, and to realize the smooth flow of the cold chain logistics chain.

### **4.2. Establishing Cooperative Alliances**

In order to realize the rapid development of multimodal transport of reefer containers, railways, ports, liners, freight forwarders, road transport companies, cold storage companies and other parties should be organized to build a strategic alliance of enterprises when building a full logistics network and developing refrigerated transportation equipment. Cooperate in various aspects such as business connection, facility leasing, and joint investment to achieve mutual benefits, and enable the maritime sector and the railway sector to form a more stable resource complementary relationship through cooperation, and quickly form a multimodal transport network for reefer containers. Container multimodal transport provides comprehensive solutions.

### **4.3. Development of Information Systems**

To strengthen the construction of the reefer container information system, make full use of modern technologies such as automatic identification, global positioning system and radio frequency identification to realize the coastal and inland across the land, ports, railways and shipping companies across departments, cross-industry information resource sharing and

information systems interconnection, railway and port reefer container electronic documents information exchange and automatic processing, cold storage container dynamic information effective tracking and temperature monitoring system of butt each other, as well as the railway reefer container and integration management of Marine reefer container.

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