

# Situation Analysis on Combined Transport of Railway and Water in China

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**Abstract.** As an important part of multimodal transport in the international community, the combined transport of railway and water has been widely recognized in the world because of its comprehensive advantages, such as large volume, low energy consumption and bad weather. Due to the multi management of the combined operation of the railway and steel, there are a series of problems, such as low operation efficiency, lack of service level and low market share. Firstly, this paper analyzed the overall benefit of market. Secondly, it analyzed the development situation of combined transport of railway and water in containers. Thirdly, it analyzed the condition of combined transportation of bulk railway and water. Finally, the essay analyzed the policy system in recent years from the internal and external aspects of the system structure.

## 1. Introduction

As an important part of transportation development in today's world, the combined transport of railway and water has rapidly expanded to all parts of the world. As an efficient mode of combined transportation, it also develops rapidly in China with strong comprehensive national strength. Although railway and water transport have made great contributions to the transportation and turnover of goods in China, as a combined transportation mode, the combined transport of railway and water has a low market share and total transport volume in China. In developed countries, such as the European Union and the United States, the proportion of container railway and water combined transport accounts for 30% on average. However, China has always been within 3%, because China's containers are more inclined to the road transport with greater energy consumption and higher cost, which leads to a huge waste of transportation resources and transportation funds.

## 2. Analysis of the overall market benefit

In recent years, China has played an increasingly important role in economic globalization [1]. At present, China's water transport capacity ranks among the top in the world, among which COSCO shipping container fleet is the fourth largest in global transport capacity, and there are seven ports in the top 10 in the world. As the "backbone" industry of national transportation, the total amount of railway freight is in a downward trend. For one thing, the freight owner's choice of convenient and rapid road transport reduces the market share of railway transport. For another thing, it also reflects that the characteristics of railway freight transport mode have not fully adapted to the market economy system, so the railway still has a long way to go. Although the government gave the railway economic support and issued many policy provisions to solve the railway problems in China, In addition, railways have the property of public welfare, in terms of the nature of enterprises, the ultimate goal of railways is to pursue enterprise benefits and profits.



At present, China's railway and water intermodal freight volume takes a very low proportion in the multi-modal intermodal transport, and the railway intermodal transport takes about 1.5% of the total port container transport volume, which is greatly different from the proportion of over 20% in developed countries such as the European Union and the United States. To sum up, the combined transport of railway and water has great room for improvement in railway development and social and economic prosperity.

### 3. Analysis of combined transport of railway and water in containers

As the container port enterprises, railway, shipping companies, freight forwarding companies and other major markets for continuously nourish hot metal container multimodal transport, as well as container terminal, railway transportation, shipping, such as the constant improvement of infrastructure, molten railway transport by container shippers recognized gradually, molten railway transport internationally has risen steadily in the volume of sales, market share of molten railway transport also gradually improve. Container railway and water combined transport has begun to take shape in China, and there is a large space to rise. At present, China's eight major container railway and water intermodal transport channels have a certain scale, as shown in figure 1.



Figure 1. Schematic diagram of China's container railway and water transport channel

The first passage is the northeast region, starting from Dalian Yingkou to Manzhouli and then to all parts of Europe [2].

The second passage starts from Tianjin port and runs from north China to Xinjiang and then to the Eurasian land bridge.

The third passage is from Lianyungang Qingdao to the old Asian land bridge and then to Europe.

The fourth corridor starts from Shanghai, runs along the Yangtze river to Chengdu, and then from Chongqing, to Europe.

The fifth passage is from Ningbo port to Nanchang, Changsha and Chongqing.

The sixth channel is Xiamen.

The seventh passage is from Nanchang, Changsha to Shenzhen, then the coast to Kunming and then to Europe.

The eighth channel is from Chongqing and runs from Zhanjiang to Singapore.

There are three relatively long cross-border railway and water transport routes mainly to foreign countries.

The first is the trans-border Eurasian rail link.

The second is from Qingdao to Shanghai port, and then through the Eurasian land bridge to Europe, which belongs to the Central Line.

The third route crosses many countries, from Shenzhen and Guangzhou to Yunnan, then Pakistan, Afghanistan and Turkey.

The development and prosperity of these channels can respond positively to the implementation of One Belt And One Road strategy. The development of these channels can drive the economic prosperity of countries radiated along the routes, facilitate the transportation and trade between countries, and build a logistics information network of connectivity, which is more conducive to the promotion of the global village. The top 10 coastal ports in terms of container throughput of national ports in 2011-2017 are: Shanghai port, Shenzhen port, Ningbo Zhoushan port, Guangzhou port, Qingdao port, Tianjin port, Dalian port, Xiamen port, Yingkou port and Lianyungang port [3].

The total volume of container throughput of these ports in 2011-2017 was 129.64 million TEU, 138.98 million TEU, 146.90 million TEU, 155.07 million TEU, 172 million TEU, 196.00 million TEU and 209.85 million TEU respectively. The container throughput of coastal ports in China in 2011-2017 is shown in figure 2.

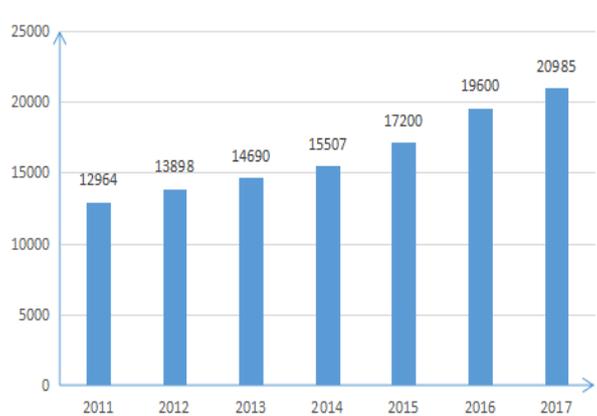


Figure 2. Container throughput of the National Coastal Ports in 2011-2017 (10000 TEU)

From the point of the data and trends in the graph, China's coastal port container throughput increased year by year, the momentum of rapid development, it is due to the stimulation of some developed countries such as the European Union and the United States, along with eight channels of exemplary role and the government of the molten railway intermodal attaches great importance to and constantly introduce the result of a lot of relevant policies and subsidies. The proportion of container throughput and combined transport of railway and water at coastal ports in 2017 is shown in table 1.

Table 1. The proportion of container throughput and combined transport of railway and water in 2017

Port	Container throughput (Ten thousand TEU)	Container volume of railway and water (Ten thousand TEU)	Combined transport of railway and water accounts for %
Shanghai Port	4018	10.45	0.26
Shenzhen Port	2525	15.66	0.62
Ningbo-Zhoushan Port	2464	15.52	0.63
Guangzhou Port	2010	14.27	0.71

Qingdao Port	1830	2.20	0.12
Tianjin Port	1504	30.92	2.06
Xiamen Port	1040	30.68	2.95
Dalian Port	970	1.65	0.17
Yingkou Port	627	29.28	4.67
Lianyungang Port	472	24.92	5.28

It can be seen from table 1 that only Tianjin port, Xiamen port, Yingkou port and Lianyungang combined transport account for more than 2% of the top 10 coastal ports. Although the container throughput of other ports is large, the combined transport of railway and water accounts for less than 2%.

Table 1 shows that the development of China's combined railway and water transport is quite backward. Figure 2 shows that although the overall scale of China's combined railway and water transport is relatively low, the growth rate is very fast, which indicates that there is great room for development and rise.

#### **4. Analysis of combined transport of bulk railway and water**

##### *4.1 Main cargo of combined railway and water transport*

Coal, grain, railway ore and other bulk commodities are the main cargo of China's combined railway and water transport, with the proportion of consolidation, distribution and transportation reaching an average of more than 60%. The pattern of railway and water transport system for grain, railway ore and coal has been basically formed, with nearly 600 million tons of coal being transported through the railway and water transport system every year. Combined transport of railway and water also plays a vital role in grain transport and imported railway ore.

The imported railway ore from coastal ports is transported to inland steel plants, the coal from Shanxi is transported through railway channels to regions where the coal demand is high, and the grain from northeast China is sent to the southern market.

##### *4.2 The backward quality of railway service*

The poor quality of railway services, the imperfect information network and the rapid growth of the bulk cargo volume of China's ports, the expansion of port infrastructure, which affect the efficiency of bulk cargo turnover. This also increases unnecessary loading, unloading, and handling, as well as the time and cost of transportation, which will result in the phenomenon of goods loading and unloading port and gathering port. Some port goods have been diverted by water or road. For example, in 2005, Zhanjiang port constructed the 200,000-ton railway ore terminal transfer system. In order to solve the problem of insufficient railway transportation capacity, foreign trade ships arrived at the port and transferred to domestic trade ships along the Yangtze river.

The shortage of coal transport capacity of Shanxi railway forced the rise of coal cross - provincial road transport. In May 2011, due to the overhaul of the Daqin line, highway coal transport market share reached 51% and drove up coal prices. After the railway capacity of Qingdao port was significantly improved in 2010 and 2011, the railway transportation volume of ore was also significantly increased.

##### *4.3 The lack of logistics network system*

There is a lack of systematic logistics network system in the transportation of bulk goods by rail and water combined transportation. The information system is not developed and the infrastructure

construction is not perfect, which makes the customers unable to pay attention to their goods in real time and worry about the safety of the goods.

Enterprises lack effective means to maintain customer relations, customers do not really enjoy the advantages of seamless railway and water transport. With the improvement of the management level, the improvement of service quality, the improvement of infrastructure, and the perfection of logistics network, the capacity of railway transportation of bulk groceries such as coal, railway ore, grain and fertilizer will be further improved, and the freight volume of the combined transport of railway and water will be further improved.

## **5. Analysis of the policy and system of the combined transport of railway and water**

As a large multi-party system, the combined transport of railway and water contains many subsystems, and the participants are mainly divided into transport demand, transport service and government management.

### *5.1 Imperfection on laws, regulations and policies of the combined railway and water transport*

The railway and water intermodal transport involves multiple government authorities. The management system, management system, management means, management measures and policies and regulations vary greatly. Each management department wants to fight for more rights within its own jurisdiction and ignores the whole interest. There are still some deficiencies in international policies, regulations and related policies on the combined transport of railway and water, as well as the popularity and implementation of the policies.

### *5.2 Imbalance of government support*

The support and coverage of the government of the country and the port are obviously not enough to promote the development of the railway and water transport. Although Ningbo Port and Dalian Port have both issued supporting policies for the combined transport of railway and water, which give some subsidies to the actual operators of the combined transport of railway and water, and the port station short-barge container transport company, the supporting policies are limited and cannot promote the overall development of the combined transport of railway and water [4].

In addition, there is a lack of government-led departments to take the lead in handling the work related to the combined transport of railway and water, formulate relevant laws, regulations and policies, and allocate funds for infrastructure construction to complete the seamless connection of the combined transport of railway and water to promote the long-term development of the combined transport of railway and water.

At the same time, the supporting policies enjoyed by various ports are not balanced: first, the same source of goods in the same region will be sent to different regions, and there will be different preferential policies on freight rates. Second, the different policy support of local governments also results in different development environments for the combined railway and water transport in various regions [5].

### *5.3 Relative lack of special regulations for multi-modal transport*

At present, the international regulations related to multi-modal transport of containers mainly include *the uniform rules of multi-modal transport documents* and *the United Nations convention on international multi-modal transport of goods*. This part is mainly covered in the relevant chapters of *The Maritime Law*, *The Contract Law* and *The Customs Law*. Since China is not a party to *the United Nations convention on international multi-modal transport of goods*, generally the multi-modal transport activities involving Chinese consignor, consignee and carrier are mainly carried out with reference to the maritime law. China lacks special laws and regulations on multimodal transport, and it is difficult to deal with such problems as the combined transport of railway and water under the strategy of global economic integration.

#### *5.4 Continue to increase on policy promotion*

In recent years, policy promotion has been intensified. In 2014, the state council promulgated the medium - and long-term plan to promote logistics industry (2014-2020). The plan calls for accelerating the construction of logistics channels connecting major domestic and international economic ports and vigorously developing multi-modal transport, with the goal of reducing logistics costs and simplifying logistics operations. In 2016, 18 departments, including the ministry of transport, jointly issued a notice on further encouraging multi-modal transport.

The circular promotes multi-sectoral coordination and linkage, promotes the accelerated development of multi-modal transport, guides the practice of multi-modal transport industry and speeds up the supply-side structural reform of the transportation industry. The national development and reform commission has also published 《the development plan for china-europe railway construction (2016-2020)》, which will deploy the construction and development tasks of china-europe railway in the next five years [6]. Driven by these policies, various regions have successively implemented the construction of water free ports, the construction of railway and water intermodal transport channels, and the project of convenient customs clearance to promote the development of multi-modal transport.

#### **6. Conclusion**

Global economic integration, the implementation of the "One Belt And One Road" strategy and China's reform and opening-up have brought opportunities to the development of the railway and water transport. The combined transport of railway and water has formed a great climate in China's coastal ports and inland waterless ports. Ports, shipping companies, railways and the government are also actively promoting the development of combined transport of railway and water, which has achieved preliminary results. The construction of Lianyungang railway and water transport electronic port, Tianjin inland port and Ningbo port government's subsidy to the railway and water transport, etc.

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