

Analysis on the Distribution System of Yangtze River Delta Port

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Abstract

With the continuous change of the global economic pattern, the development of the world's Port group Presents a new trend at the global level, the National level, The regional level and the port's own development level. Under the background of the Yangtze River Delta Integration, There are still some problems in the collection and distribution system of coastal ports in Yangtze River Delta, This paper analyzes the collection and distribution system of some large - scale coastal Ports in the Yangtze River Delta Port Group, And puts forward a series of optimization fissure and measures to provide a theoretical basis for the establishment and improvement of the port Collection and distribution system.

Keywords

Yangtze River Delta integration; Coastal container port; Port the collection and distribution.

1. Introduction

Our country to become the world trading power since 2013, more than 90% of the foreign trade in our country the goods are completed by water transport, port transportation system is the core of the transport of goods, but its development in the process of operation standard is not unified, poor information sharing such as dredging port road congestion, environmental pollution, overall transport efficiency is not ideal also become an important part of the transportation system needs to improve. Ministry of Transport, railway, China railway corporation jointly issued by the "much starker choices-and graver consequences-in" port transportation system construction plan has been clear about the vehicle purchase tax financial support in the transportation of railway, highway construction and investment standard, will focus on breakthroughs in railway, highway port "last one kilometer", quickening construction of port transportation system, to promote the development of the port transformation and upgrading, multimodal transport, logistics industry the authors efficiency and promote the transportation supply side structural reforms, the service "three big strategies" to provide support and protection.

Xi general secretary in 2019 in China (Shanghai) at the opening ceremony, points out that the first import expo "will support the development of the Yangtze river delta regional integration and rise as the national strategy, focus on the implementation of new development concept, build a modern economic system, to promote higher starting point of deepening reform and a higher level of opening to the outside world, with all the way ' 'area construction, the coordinated development of beijing-tianjin-hebei, the Yangtze river economic belt development, building a large bay area of guangdong to cooperate with each other, improve the space layout of China's reform and opening up." At the same time, the Yangtze river delta region carries a number of national strategic tasks such as "One Belt And One Road", the Yangtze river economic belt and the Shanghai international shipping center. This brings new development opportunities for the development of the Yangtze River Delta port group, and also puts forward new and higher requirements. First, the integration of The Yangtze River Delta

becomes a national strategy, which requires the coordinated development of the Yangtze River Delta port group to be based on the national strategic height. The Yangtze river delta region will coordinate with the "One Belt And One Road" initiative, the beijing-tianjin-hebei integration initiative, the Yangtze river economic belt initiative, and the guangdong-hong kong-macao greater bay area initiative to improve the spatial layout of China's reform and opening up. To build a world-class city cluster as the goal, to participate in the global competition of the main regional units. The Yangtze River Delta port group will become the important content of regional integration of the Yangtze River Delta and also the key factor of international competitiveness of urban agglomeration. In this context, it is particularly urgent to accelerate the coordinated development of the Yangtze River Delta port group. Therefore, the analysis and study on the collection and distribution system of coastal container ports appears to be very forward-looking.

2. Current situation of container port collection and distribution along the coast of Yangtze River Delta Port Group.

The Yangtze River Delta port group is composed of ports in three provinces and one city, namely Zhejiang province, Jiangsu Province, Anhui Province and Shanghai City. Ports in Anhui province are all inland river ports, so ports in Anhui are not considered in this study.

2.1 Status quo of coastal container port collection and distribution system in Zhejiang Province.

There are 4 coastal ports in Zhejiang province, including Ningbo Zhoushan Port, Wenzhou port, Taizhou port and Jiaxing port, among which Ningbo Zhoushan Port and Wenzhou port are the main coastal ports in China. By the end of 2018, the province has 1,109 seaport berths, including 242 berths above the 10,000-ton level. In 2018, the cargo throughput of coastal ports in the province reached 1.34 billion tons, and the container throughput reached 29.752,000 TEU, forming a new development pattern of "one main and two auxiliary ports", with Ningbo-Zhoushan port (including Jiaxing port) as the main port and Wenzhou port and Taizhou port as the auxiliary port. Among them, Zhoushan Port in Ningbo has a cargo throughput of 1.01 billion tons, ranking the first in the world for nine consecutive years since 2009. The container throughput has reached 26.351 million TEUs, ranking the third in the world. 240 international routes have been opened to the outside world, connecting more than 600 ports in more than 100 countries.[1]

According to the Statistical yearbook of Zhejiang Information Network, the throughput of ports in Zhejiang from 2011 to 2018 is shown in Table 1.[2]

Table 1 Throughput of major coastal ports in Zhejiang in 2017-2018

Zhejiang Province	18-year container capacity (10,000 TEU)	18 years cargo handling capacity (tons)	17-year container capacity (10,000 TEU)	17-year Cargo throughput (tons)
Total	Accumulated since the beginning of the year		Accumulated since the beginning of the year	
jiaxing	172.27	9689	144.2	9434
Ningbo-zhoushan	2635.08	108439	2460.7	100711
#ningbo	2509.51	57652	2356.6	55200
zhoushan	125.57	50787	104.1	45511
taizhou	24.41	7167	21.3	7056.6
wenzhou	66.71	8239	60.7	8925.6

Table 2 Three Scheme comparing

Numble	Scheme 1	Scheme 2	Scheme 3
1	456	456	123
2	789	213	644
3	213	654	649

From January to December 2018, haihe river transport volume of the province has reached 23.52 million tons, up 24.8% year-on-year. Jiaxing, Ningbo and Wenzhou completed a total of 15.741,000 tons, 5.482 million tons and 1.191 million tons, with year-on-year growth of 37.3%, 10.9% and 36.7% respectively.[3]

2.1.1 Status quo of collection and distribution system of Zhoushan Port of Ningbo.

The collection and distribution system of Ningbo-Zhoushan Port is mainly based on highway and railway transportation, supplemented by waterway transportation.

National Highway 329, Shanghai-Hangzhou-Ningbo Expressway, Tongsan-San highway and other trunk highways, as well as the Hangzhou Bay Corridor connect with ports. The Yangshan port area is connected to Shanghai by the Donghai Bridge, and the Zhoushan Island project connects Zhoushan island and Ningbo by land.

In 2018, Zhoushan Port of Ningbo vigorously promoted the construction of sea rail logistics channels from inland business points to ports. Nine sea rail lines were newly opened, including Chongqing, Pingdingshan, Wuhan, Bengbu, Fuyang and Zhuji, and the existing train service frequencies in Chengdu, Zhumadian and Xiangyang have been increased. The number of train lines with monthly container capacity exceeding 5,000 TEU has reached 7. Among them, The Yiwu freight train has been maintained at three shifts per day, the volume of boxes has been increased month by month, and the monthly business volume has exceeded 10,000 TWENTY-foot equivalent units (TEUS). By the end of December 2018, ningbo Zhoushan Port sea-rail combined transport service had been extended to 15 provinces (autonomous regions and municipalities directly under the Central Government) and 46 prefecture-level cities.[4-6]

The specific data of sea-rail combined transport traffic is shown in Table 2.

Table 3 Sea-rail combined Transport Business volume (10,000 TEU) of Zhoushan Port, Ningbo

year	2009	2010	2012	2013	2014	2015	2016	2017	2018
business	0.17	2.8	4.7	5.2	10.5	17.1	25	40	60.2

2.1.2 Current situation of jiaxing Port collection and distribution system.

Jiaxing port in the collection and distribution system of land and water transport are more developed. There are Shanghai-Hangzhou railway, Xuanhang railway and shenjiahu railway under construction three lines through the rear of the port. The Hangzhou-Ningbo, Zhejiang-Jiangxi, Shanghai-Hangzhou and Xuanhang railway lines converge in Hangzhou, forming the main hub station of Hangzhou Railway. The port is only 8 kilometers away from the railway freight station.

Highway through the first jia su, at first the king road, the fast channel and the construction of hangzhou bay bridge and shanghai-hangzhou-ningbo, HangJia su ning highway, more than 104, 320, 318 national highway and provincial highway, and the construction of ShenJiaHu highway is linked together, constitute the in hangzhou, jiaxing and huzhou city as the center to the road network extending in all directions, the inside and outside the province is occupying south region, southern jiangsu, Shanghai is the most important land route node.

Inland waterways crisscross. Waterways connect with the Beijing-Hangzhou Canal, Changhu-Shen Line, Hang-Shen Line and Liu-Pingshen Line through Zhajia-Su channel, forming a crisscrossing inland waterway shipping network. The coast is accessible by sea to ports all over the country and the world.[7]

2.1.3 Status quo of wenzhou Port's collection and distribution system.

The collection and distribution system of Wenzhou port is mainly based on railway and highway transportation, supplemented by waterway transportation.

Jinwen railway was put into operation in 1998. There is a special port line directly to Longwan port area of Wenzhou Port. In May 2015, the Yueqingwan Port Area Railway spur line began construction, starting from Yueqingwan Port Area in the east, heading west to Yongjia, Lucheng and Sanyang to accommodate the Jinwen Cargo line, with a total length of 76.71 kilometers, with bridge and tunnel taking up 76.6%, and 8 cargo stations including Huangtian and Yueqing Port. MTR is an important link for Wenzhou port to transform and upgrade, and to build a major radiation port in southern Zhejiang, Fujian and eastern Jiangxi. It is also an important measure for Wenzhou to take the initiative to integrate into the Yangtze River Economic Belt and seek integrated development by relying on the geographical advantages of Tongjiangda Sea. The railway extension of Yueqing Bay port area undertakes the important task of combined transportation of Wenzhou port and railway. Coal transshipment through Yueqing Bay terminal is expected to increase by 30 percent to 1.3 million tons after opening.

Wenzhou Shugang Expressway connects the main port area and the airport of Wenzhou Port, directly connects Yongtaiwen (National Expressway) and Yongtaiwen (double track), and connects Jinliwen (National Expressway) and Zhuyong Expressway through the north route of the Ring Expressway, which is the main channel of Wenzhou Port collection and distribution.[8]

2.1.4 Summary.

Zhejiang faces the east sea in the east, Fujian in the south, Anhui and Jiangxi in the west, and Shanghai and Jiangsu in the north. It has a long coastline and many excellent ports. At present, the state is accelerating the implementation of the "One Belt And One Road", Yangtze river economic belt construction and other major strategies, which has brought rare historic opportunities for the development of ports. A general survey of Zhejiang coastal container ports shows that road transport always takes up a large proportion in the collection and distribution system. Among them, Zhoushan Port in Ningbo has seen its sea-rail combined transport ratio increasing year by year, but its proportion in the total volume is still very small. According to the instructions in the 13th Five-Year Plan for the Construction of port collection and Distribution System, the proportion of sea-rail combined transport should be greatly increased.

2.2 Status quo of container port collection and distribution system in Coastal Jiangsu Province.

By the end of 2018, the province had 5,480 port production berths and 497 berths above the 10,000-ton level. The comprehensive port passing capacity reached 2.02 billion tons, and the container passing capacity reached 16.136 million teu. In 2018, the province's ports handled 2.58 billion tons of cargo. The throughput of Suzhou port, Lianyungang Port, Nanjing Port, Nantong Port, Taizhou port, Jiangyin port, Zhenjiang Port and Yangzhou port has exceeded 100 million tons. The port cargo passing capacity, the number of berths of 10,000-ton class and above, the cargo handling capacity, the number of large ports of 100 million tons and other indicators ranked first in China.

Table 4 Coastal ports of Jiangsu Province

The port name	Cargo throughput (tons)	Container throughput (ten thousand TEU)
Lianyungang port	21443	473.14
Yancheng port	9808	20.93

2.2.1 Current situation of collection and distribution system of Lianyungang Port.

According to the news released by China Shipping News, Lianyungang completed the cargo throughput of 122.216 million tons from January to June 2019, among which the foreign trade throughput of 60.2591 million tons. Containers completed 2412,500 teus. In the past six months, Lianyungang Port has increased the number of inland river routes to five, carrying 7.6 million tons and 13,000 teu containers. Tieshui Combined Transport opened new freight trains in Gongyi of Henan

province and Houma of Shanxi Province, opened the international channel from Zhengzhou to Southeast Asia for the first time, and completed 190,000 teu.

The collection and distribution system of Lianyungang Port is mainly based on railway transport and road transport, supplemented by inland river transport.

Lianyungang depends on the Longhai railway. Lianyungang East railway station is the east of the longhai railway starting station, the station class for the second class passenger freight station, for the whole vehicle, less load, container goods to send. With the help of the new Eurasian land bridge policy, iron and water combined transportation plays an important role. But Lianyungang port railway network is not dense enough, relatively simple.

The highway collection and distribution system of Lianyungang Port is composed of three expressways (S72, G30 and S73), one high-grade highway (G310) along the port area and one senior coastal highway (G228).

Lianshen Line is an important vertical channel network approved by the Ministry of Transport of the Yangtze River Delta and jiangsu Trunk channel network. It starts from Lianyungang Port in the north and runs through Lianyungang, Yancheng, Nantong, Suzhou and Shanghai in the length of 558 kilometers. It connects Guanhe river, Tongyu River, Yanhe River, Beijing-Hangzhou Grand Canal and Yangtze River, etc. The planning grade is three.[9]

2.2.2 Summary.

As a coastal province along the Yangtze River, Jiangsu has not only seaports facing the Yellow Sea for international shipping, but also inland ports along the Yangtze River. Some ports have assumed the role of coastal ports as well as inland ports. According to the Yangtze River Delta City Cluster Development Plan approved by the State Council, the Yangtze River Delta city cluster is planned to cover Nanjing, Wuxi, Changzhou, Suzhou, Nantong, Yancheng, Yangzhou, Zhenjiang and Taizhou in Jiangsu Province. Observation of its coastal ports shows that the proportion of water and rail combined transportation in its collection and distribution system is also small, and highway traffic is still the main way of collection and distribution.

2.3 Current situation of Shanghai port collection and distribution system.

Table 5 Shanghai port collection and distribution conditions

In Shanghai port	Collection and distribution conditions
	Beijing-shanghai, Shanghai-Hangzhou and Shanghai-Nanjing trunk Lines; Kaiping, Beipiao, Zhanghua Bang and Jungong Wharves in the port area all have special railway lines and Huhang wharves.
The railway	Shanghai-nanjing railway is connected to the main line; The Shanghai-Nanjing line is connected with the Jinpu line, and the east runs from north to south. The Shanghai-Hangzhou line is connected with the Zhejiang-Jiangxi line and The Xiaoyong line, reaching central and southern, southwest and eastern Zhejiang
Highway	Shanghai-nanjing, Shanghai-Hangzhou, Shanghai-Qingping, Shanghai-Zha, Jialiu and other highways;
Aviation	Four national highways: 204, 312, 318 and 320; Shanghai Hongqiao Airport; Shanghai Pudong International Airport
River road	The Yangtze River and the Grand Canal; 225 inland waterways, 8 provincial trunk waterways;

Located at the intersection of the Yangtze River economic belt and the coastal economic belt, Shanghai port is a major national comprehensive transportation channel and an important node of domestic and international logistics. It has the geographical advantages of internal and external radiation. It mainly includes the south bank of the Yangtze River estuary, both sides of the Huangpu

River, the north bank of Hangzhou Bay, Chongming Island, Changxing Island, Hengsha Island, Yan 'an, Yangshan Deep Water Port area, and Shanghai Inland River Port area. In terms of natural conditions, Shanghai has a subtropical maritime monsoon climate, which is alternately affected by winter and summer monsoon. The four seasons are distinct and the whole year is warm and rainy. In terms of location conditions, the collection and distribution conditions of Shanghai Port are shown in the table above.

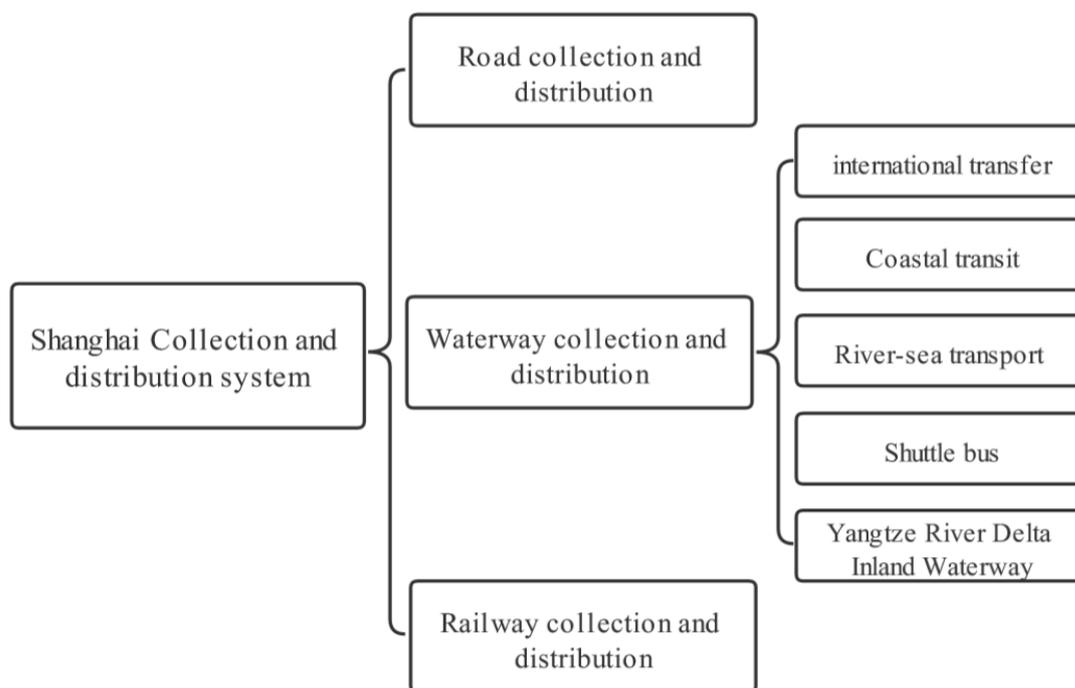


Fig. 1 Shanghai port collection and distribution system structure

Table 6 Collection and distribution capacity of Shanghai port

In Shanghai port	18 years container capacity (TEU)	18 years cargo handling capacity (tons)	17 years container capacity (TEU)	17-year Cargo throughput (tons)
		4201.02	68392	4023.3

In 2017, the cargo collecting and distributing system of Shanghai Port is stable and orderly. Last year, 988 million tons of goods were collected and transported, an increase of 6.4 percent over the previous year. Hong Kong continued to focus on the organization of cargo gathering and distribution in the harbour. The cargo gathering and distribution volume reached 915 million tons, an increase of 8.6% over the previous year, accounting for 92.6% of the total. Inland Port completed the cargo collection and distribution of 73 million tons, 15.5% lower than the previous year, accounting for 7.4% of the total of the whole territory's collection and distribution. The main mode of operation of the collection and distribution system is highway and waterway transport, and the collection and distribution network is constantly improved. Various modes of transport account for the following table. [10]

Table 7 Proportion of Shanghai port collection and distribution capacity in 2017

Cargo class	The total	Railways and others	Water transport	highway
Total amount of collection and distribution (tons)	9.88	/	7.5	2.4
The proportion	/	0.1% or less	76%	24%

2.3.1 Highway collection and distribution system.

Located in the lower reaches of the Yangtze River, Shanghai port is an important port for China to participate in the international economic cycle. The collecting and distributing system of Shanghai port is relatively perfect, forming a collecting and distributing system with expressway and inland river transportation as the main part and railway as the auxiliary part. Shanghai port has basically formed a high-speed road network with "two rings, nine shoots, one vertical, one horizontal and two links". There are still 14 trunk roads, among which 5 lead to Zhejiang province and 9 to Jiangsu Province. In recent years, the collection and distribution system of Shanghai Port has been continuously optimized, and the proportion of roads has been continuously reduced, but it still dominates, accounting for more than 55%.

Table 8 Road collection and distribution system of Shanghai Port

In Shanghai port	Collection and distribution roads
Two ring	S20 outer ring highway, G1503 ring highway
Nine shot	S1 Welcome guests, S2 Hulu, S4 Hujin, S5 Hujia, S26 Huchang, G2 Hujing, G40 Hushan, G50 Huyu, G60 Hukun
A longitudinal	G15 Shen Hai
A horizontal	S32 ShenJiaHu
Two couplet	S19 new wei, S36 pavilion Maple

Road transport has the characteristics of mobility and flexibility, its transport network crisscross, combined with trunk and branch, more dense than other transport networks. According to the division of the scope of highway collection and distribution, it can be further divided into the sub-system of highway collection and distribution of goods from other provinces into Shanghai, the sub-system of highway collection and distribution of goods from Shanghai and the sub-system of highway collection and distribution around the port area.

2.3.2 Waterway collection and distribution system.

There are about 210 inland waterways in Shanghai, with a total length of about 2,100 kilometers. Inland river wharves are mainly distributed on more than 170 channels in the city, and the concentrated channels are main channels such as Yunzaojing, Dazhihe, Chuanyanghe and Pudong Canal. "One ring" is Huangpu River-Dapu line -- Zhaojiagou -- Zaobang -- Youdun Port -- Huangpu River; The "ten shoots" refer to the Hangshen Line, Taipu River, Suzhou Outer Port Line, Suzhou Inner Port Line, O River, Chuan Yang River, Dalu Line, Jinhui Port, Longquan Port and Pingshen Line. Among them, Huangpu River, Zhaojiagou, Dalu line, Dapu line, Suzhou Outer Port line, Taipu River and Hangshen line channel have been listed as the main channels of national water transport.

Inland waterway infrastructure is weak, and the proportion of "water-water transfer" needs to be increased. The inland waterway of Shanghai is mostly low-grade waterway, and the degree of docking between inland port and seaport is poor, so the organization form of Jiang-Sea combined transport and Jiang-Sea direct transport needs to be strengthened.

2.3.3 Railway transport system.

Although Shanghai is connected to China's railway network through freight trunk lines such as Shanghai-Hangzhou railway and Beijing-Shanghai Railway, there is only a railway branch line in Luchao Port area of Shanghai Port. Yangshan Port is separated from Luchao Port container center station, so railway freight cannot enter the port directly, leading to multiple transshipment. Therefore, Shanghai port does not have the real meaning of "sea rail" combined transport, the share of railway distribution has been very small.

2.3.4 Summary.

In the collection and distribution system of Shanghai port, roads and waterways account for the majority, and the serious imbalance of the collection and distribution system is very unreasonable.

Moreover, there is no real sea-rail combined transport in Shanghai, and the goods from the railway need to go through multiple transshipment before entering the port, which has caused a great burden on the highway of the port.

3. Summary

The above data show that the Yangtze River Delta coastal container ports currently have the following problems: unbalanced port collection and distribution system structure, low proportion of railway and waterway. Except Shanghai port's waterway collecting and distributing mode is more developed, other coastal container ports still take road transportation as the main collecting and distributing mode. Besides, the proportion of railway collection and distribution mode in the collection and distribution system of each port is very small, so Shanghai port can be said to have no real sense of "sea-rail" combined transportation.

Secondly, the collection, distribution and transportation system of coastal ports in the Yangtze River Delta region has not been completed, and each port is still "in its own way". There is no sharing of resource data and "integration of ports in the Yangtze River Delta" has not been achieved.

4. Relevant Suggestions and measures

4.1 Complete the integration of the collection and distribution system of the port group in the Triangle region.

Strengthen the top-level planning of the collection and distribution system, optimize the layout of transit hubs, and give full play to the economic characteristics of different ways. For port collection and distribution, road transport should be used for short distance transport, while multi-modal transport of sea-rail, public-rail and public-water related to railways and waterways should be selected for long distance transport. It is necessary to grasp the key points and make breakthroughs in sea-rail combined transportation and water-water transportation, so as to do a good job in the demonstration of advanced planning, and strive to be fully reflected in the planning of national railway departments and water-transport departments..

4.2 Build the comprehensive information system of collection and distribution.

Large or larger port along the coast of China's transportation system because of its contact with the hinterland transport scale, commodity is complicated and long distance of the transportation structure and distribution pattern is relatively complex, can be set up online real-time information system to realize data information sharing, shipment, loading and unloading, customs clearance, settlement and other information utilization integration path of ascension, reasonable save natural resources and human output, save costs and reduce obstacles to transport of goods in all aspects of the occurrence of adverse factors.

For the ports of the Yangtze River Delta, a Shared comprehensive information system for collection, distribution and transportation should be established to realize the integration of the coastal ports of the Yangtze River Delta. Data sharing can make better use of data to carry out cooperation and combined transportation between ports.

4.3 Increase the proportion of railway transportation in the transportation structure.

Combined with national "area" development strategy and policy of the integration of Yangtze river delta, to strengthen the cohesion between and among water, road and rail efficiency, make full use of the inland waterway transportation advantage in order to make up for the inadequacy of railway transport development lags behind, give full play to the leading role of railway and inland transportation to port, pushing forward the construction of the hot metal transfer at the same time to build the railway transport station, for combining transportation capacity and distribution of goods transportation.

4.4 Promote the standardization of infrastructure construction.

Unified, standardized operating rules and standards, promote standardization of infrastructure construction, establish intelligent transportation system, realize the maximum information sharing, from the technical level to the side of the multimodal transport equipment, transport, distribution services, make full use of existing resources in the effective time to reduce the difference between supply and demand, strengthen the cohesion between inland waterway, highway, railway, shipping, alleviate "the last kilometer" problem.

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