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Analysis on the Present Situation Problems and Countermeasures of Shanghai Port Collection and Distribution System

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Abstract

As a world port, Shanghai port enjoys a superior geographical position and is an important international shipping hub at home and abroad. Nowadays, with the growth of the throughput of Shanghai port, not only higher requirements are put forward for the port infrastructure construction, but also greater pressure is brought to the port collection and distribution system. Therefore, it is of practical significance to study the collection and distribution system of Shanghai Port for promoting the further development of the port. This paper first explains the port transportation system related theory, on the basis of the theory, mainly from the three of highway, railway, waterway in the face of the current situation of the transportation system in Shanghai port are analyzed respectively, and transportation system according to its existing problems put forward the corresponding countermeasures and Suggestions, in order to accelerate port development, enhance the competitiveness of port.

Keywords

Shanghai Port; Collecting and Distributing System; Analysis of the Situation.

1. Introduction

The port collection and distribution system is composed of railway, highway, urban road and corresponding handover station, which is connected with the port and is mainly used for the transportation system of port cargo concentration and evacuation port service. In order to develop smoothly, any modern port must first have a perfect and smooth transportation system. Only in this way can the port play an important role in the integrated transportation network.

The concept of port gathering and distribution system is defined by the international general description: the collection and distribution system consists of three parts: road, warehouse, airport, port, railway, yard and so on. The management of collecting and distributing transportation is mainly the management of making, organizing, controlling and coordinating transportation plan. "Collection" means the concentration of goods, mainly in the goods from the consignor designated place to the port, and concentrated in the wharf, wharf yard and warehouse; "sparse" mainly in the evacuation of goods, it is a variety of concentrated goods, through a certain mode of transport to the consignee designated destination activities.

The rapid development of port cargo throughput not only puts forward higher requirements for port infrastructure construction, but also brings greater pressure to port collection and distribution system. The contradiction between the collection and distribution system and the increasing cargo throughput of many ports in China is intensifying, and port collection and distribution has become a bottleneck restricting the development of ports. This paper mainly studies and analyzes the development of Shanghai port transportation, and analyzes its present situation and problems from three aspects:

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highway, waterway and railway. It is found that the road transportation in Shanghai Port is relatively high, the sea-rail transport is not developed, and the waterway transport function still needs to be improved. Therefore, it is necessary to put forward countermeasures and suggestions according to local conditions to improve the overall competitiveness of the port.

2. Current Situation of Shanghai Port Distribution System

Shanghai Port is located in the leading edge of the Yangtze River Delta, choke the Yangtze River into the estuary, with the characteristics of inland river port, estuary port and coastal port, is one of the main coastal hub ports in China. Shanghai Port is one of the most active, fast-growing and effective areas in China, relying on Shanghai, backed by the Yangtze River Basin, with superior geographical location and natural conditions and broad economic hinterland. Shanghai Port has convenient land and water transportation and smooth transportation channels, which can radiate the whole Yangtze River basin and even the whole country through highways and national highways, railway trunk lines and coastal transportation networks, and connect the global routes to the outside world. Shanghai port is mainly transported by road, accounting for more than 55% of the transportation volume, about 38% by waterway, and less than 17% by railway.

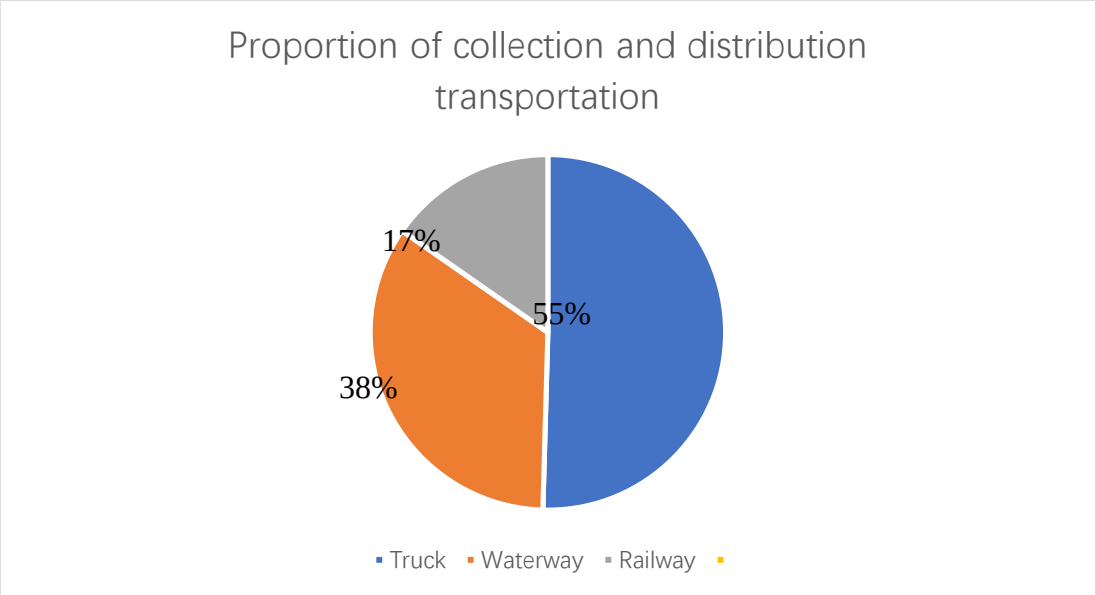

Figure 1. Proportion of Shanghai Port Transportation

The present situation of Shanghai port transportation system is analyzed from the highway, railway and waterway transportation subsystem.

2.1 Road transportation subsystem

The proportion of highway transportation of container cargo in Shanghai Port has always been the highest among all modes, accounting for more than 55%. In recent years, with the expansion of water and water transfer business and the continuous optimization of Shanghai collection and distribution structure, the proportion of highway collection and distribution is decreasing year by year.

At present, there are more than ten port areas in Shanghai Port along the Huangpu River, three of which have special container terminals, and the more mature ones are Yangshan Port area and Waigaoqiao Port area. Shanghai Expressway is connected with Zhejiang and Jiangsu provinces, and has many high-speed lines, such as Shanghai-Hangzhou Expressway, Hangzhou-Pu Expressway, Shanghai-Jia-Xiao Expressway, Shenjia-Hu Expressway, etc. In addition, Shanghai Port also has four national roads, namely ,204 National Road to Yantai ,312 National Road to Urumqi ,318 National Road to Lhasa and 320 National Road to Kunming.

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During the 12th Five-Year Plan period, the Shanghai Port Highway Collection and Transportation System has basically completed the requirements of appropriately increasing the highway passage, the highway continues to be built rapidly, the highway layout is constantly improved, and the capacity of the highway collection and transportation passage has been further improved. At the same time, the excessive proportion of road transport mode also brings a series of problems, which also affects the efficiency of road transport to some extent.

2.2 Railway Transport Subsystem

Since the 1990s, Shanghai Port has attached great importance to the development of sea-rail intermodal transport, including COSCO, Sinotrans, OOCL, China Railway and other shipping companies, as well as Tieyang, Road Port, Shanghai Railway Collection and Transportation three railway contracting agencies.Because of the long distance and large capacity of railway transportation, the hinterland of Shanghai port and sea iron transport is more than 400 km from Shanghai and far from the Yangtze River golden waterway, such as Henan, Shaanxi, Sichuan, Jiangxi, Hunan and so on [1] At present, the main railway stations in Shanghai are Yangpu Port Station and Luchao Port Central Station. From the point of view of the collection and distribution route of container railway to Hong Kong, the sea-rail combined transport box of Waigaoqiao Port is mainly loaded from the wharf through the short barge of highway to Yangpu Port Station, and then connected to the Beijing-Shanghai-Shanghai-Kunming railway trunk lines through the railway branch line to the mainland provinces and cities. The sea-rail transport box of Yangshan Port is transported by container truck from the port through the East China Sea Bridge to the central station of Luchao Port to complete the loading and then enter the national railway network through the Pudong Railway.

In recent years, with the continuous development of China's high-speed railway network system, Shanghai Port already has the railway line transportation capacity to the main economic hinterland. Although the proportion of railway in Shanghai Port is still small, the volume of collection and distribution is still on the rise. However, in the face of a large-scale highway transportation system, sea-rail transport is facing a lot of problems to be solved.

2.3 Water Transport Subsystem

Waterway transportation has the characteristics of low cost, high efficiency, large transportation capacity, less energy consumption, less pollution and less occupation. It is estimated that the same transportation capacity is formed in terms of capital investment. The proportion of capital investment in waterway, railway and highway is 1:3:7. Water transportation does not occupy cultivated land; in terms of energy consumption, water transportation can consume only 1/10 per horsepower unit of highway and 1/2 of railway; in terms of transportation cost, waterway is only 1/7 of highway and 1/3 of railway. Therefore, water transportation is the most sustainable resource-saving and environment-friendly low-carbon green transportation mode. But its turnover time is longer, the timeliness is poor, easy to be affected by the weather.

With more than 200 channels and more than 2,000 kilometers of mileage, Shanghai has convenient waterway connection with the cities along the Yangtze River. The hinterland of container waterway is mainly distributed in the Yangtze River basin, such as Jiangsu, Zhejiang, Hubei, Hunan, Chongqing and other provinces and cities.

In the aspect of water and water transfer in Shanghai, the river and sea reach a breakthrough, the existing ships can be transformed from the Yangtze River to the deep water port of Yangshan, and the ship type standard of the ship on a specific route from the Yangtze River to Yangshan is also being planned. In terms of inland waterway, the construction of Zhaojiagou, Dalu Line I and Su Shen Waigang Line has been started, and the construction of Hangzhou Shen Line, Dalu Line II and Huangpu River riveting Port Section has also been started in 2009. Shanghai Port's water transfer business continues to develop, from 2010 to increase the proportion year by year. Shanghai Port's main transit volume still comes from ports along the Yangtze River, with an annual capacity of about 10 million TEU. But Shanghai Port's international, coastal and domestic trade transfer radiation

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capacity is not strong, especially the construction of international shipping center focus on the international transit volume and coastal transit volume is still slightly inadequate, China's coastal and surrounding Japan and South Korea and other international ports radiation capacity is relatively limited. On the other hand, the freight volume through the Yangtze River Delta is not much, the proportion is only 1.76% of the total water and water transfer. Due to the lack of waterway conditions in the development of inland navigation in Shanghai, most of them are low-grade waterways, and there are some deficiencies such as backward construction of inland navigation areas, backward transportation vessels and non-standard inland waterway transportation market.

Although the development of water and water transfer in Shanghai port is relatively slow, with the continuous dredging of the Yangtze River waterway, the development of river and sea direct ship type and the improvement of Shanghai inland navigation infrastructure, Shanghai waterway transportation has developed steadily. The proportion of waterway collection and distribution is also gradually increasing.

To sum up, the economic hinterland of Shanghai Port is vast, the collection and distribution system is mainly highway, waterway is auxiliary, sea-rail transport is in the ascendant. The development situation of highway transportation system is good, but it affects the development of waterway transportation system instead, and the railway transportation is almost useless in the port transportation system, and the development is slow.

3. Existing Problems of Shanghai Port Transportation System

As a world-class port, it is very important to have an efficient collection and distribution system. Compared with Rotterdam port, Hamburg port and other big ports, there is still a certain gap in Shanghai port. Although the intermodal transportation modes such as "public water","hot metal" and "water and water" in Shanghai Port are complete, the contradiction between demand and supply capacity, the rational distribution of various modes of transportation, and the layout of distribution network make the system one of the obstacles to the establishment of international shipping center in Shanghai. The main problems are as follows.

3.1 Over-reliance on roads, heavy burden of road transportation

Shanghai port highway collection and distribution volume in all modes of transport far ahead. Although the characteristics of "door to door" of road transportation make this mode of transportation irreplaceable to some extent, the excessive proportion of road transportation does not adapt to the current development trend, which will aggravate urban road congestion. Greatly increase the burden of urban highway transportation in Shanghai. More serious road such as the outer ring tunnel, outside Qingsong highway and other sections of the container truck ratio is even more than 40, seriously affecting the normal operation of urban roads, resulting in environmental pollution and many other problems [2] And the high cost of road transport directly affects the economic benefits of road transport enterprises, and will eventually affect the interests of cargo owners. The high proportion of road transportation leads to the unbalanced development of each branch system of port collection and distribution system, and it is difficult to form an effective comprehensive collection and distribution system.

3.2 Separation of railway from wharf and excessive proportion of sea-rail intermodal transport

There are too few container terminals in Shanghai Port through the railway, and there are only two external channels of the Shanghai Railway: the Shanghai-Nanjing Railway and the Shanghai-Hangzhou Railway, which are very tight in transport capacity and unable to bear the requirements of the rapid growth of containers for the collection and distribution of railway containers. At present, only two container berths at the front of the military road terminal are equipped with railway lines. There are 16 container berths and 6 branch berths and large container berths in Yangshan Deep Water Port in the first to fifth phases of Waigaoqiao Port area without direct railway connection. The

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construction lag of Pudong railway is out of sync with the development of Shanghai port container terminal, and the resulting short barge fee leads to the total cost higher than that of the domestic peripheral port. The railway department and other departments are in a piecemeal management state, poor coordination, low market and service awareness. The separation of Shanghai port railway and wharf objectively leads to the increase of import and export cost of sea-rail combined transport box in Shanghai port and weakens the advantage of competition with other ports.

3.3 The inner river infrastructure is severely inadequate and there is a large space for upgrading the water-water transfer

The second phase of Hangshen Line and Dalu Line and the high-grade waterway construction projects such as Changhu Shen Line, Pingshen Line, Dapu Line, Yau Dun Port, Su Shen Neigang Line and Zhaojiagou East Section need to be accelerated; the construction progress of inland container port area does not match the construction of inland waterway; the low standardization degree of inland container ship type also restricts the development of water and water transfer. It is difficult to navigate the Xiaonei River if the container ship is too large, and the progress of waterway construction, the scale of waterway construction and the standard of waterway construction are different, so it is difficult for large container ships to enter and leave smoothly [2] Because most of them are low-grade waterways, there are some problems such as the backward construction of inland navigation areas and the backward transportation of ships. To give full play to the advantages of waterways and develop green shipping, these problems must be solved.

4. Analysis of Countermeasures for the Development of Shanghai Port Distribution System

According to the experience of foreign container hub port construction and operation, combined with the actual objective conditions of Shanghai port port development, the following countermeasures are put forward to promote the development of Shanghai port container collection and distribution system: coordinating the proportion of three modes of transport of public water and iron, perfecting Shanghai port collection and distribution system, focusing on promoting port infrastructure construction, improving highway passage and highway collection and distribution system, paying special attention to railway construction, inland waterway construction, Yangtze River "golden waterway" construction, promoting sea-rail transport, river-sea transport infrastructure construction, and improving waterway transport function.

Shanghai Port should pay attention to the rational allocation of the proportion of the three main modes of public, water and iron transportation, give play to the advantages of water transport, actively support and develop container waterway branch lines, constantly increase the proportion of inland and coastal transport, and speed up the development of container sea-rail transport.

4.1 Mitigation of the Highway Collection and Transportation System and development of preferential policies

From the point of view of the supply situation of Shanghai port and the present situation of collection and distribution, road transportation plays a leading role in the system of Shanghai port collection and distribution, and this situation will not change fundamentally in the near future. Therefore, in the process of speeding up the development of "water-rail" and "water-water" combined transport, we should continue to optimize the highway transportation system and improve the efficiency of highway transportation on the basis of the original road network, so as to reduce the pressure of highway transportation and allocate resources reasonably. In policy, you can also learn from the foreign port of Rotterdam issued a "reduce peak traffic" policy, or give appropriate subsidies. The morning and evening peak does not pass through a certain highway passengers to reward, alleviate road traffic congestion, but also reduce transport pollution to the environment. For transport enterprises, some financial subsidies can be given to enterprises, and unnecessary taxes and fees can be reduced to improve the economic benefits of enterprises.

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4.2 Fostering the railway transport market and establishing a water-rail transport mechanism

The economic hinterland of Shanghai Port is mainly concentrated in the Yangtze River Delta region, and the "water-rail" transport does not have an advantage in short- and medium-distance transportation. Shanghai Port has also made a lot of efforts to "water-rail" intermodal transport, but the effect is not good, such as Luchao Port Railway Container Center Station far from its target effect. Therefore, its railway transport capacity restricts the development of sea-rail transport. Speeding up the construction of railway lines is of great significance to promote the development of Shanghai port sea-rail transport.

The development of "water-rail" intermodal transport can start with cultivating railway transportation market and establishing water-rail intermodal transport mechanism. It can be carried out from the aspects of optimizing railway management mode, strengthening the construction of railway network and eliminating the "bottleneck" of transit transport energy. Moreover, it is necessary to establish the coordination mechanism of sea-rail intermodal transport, promote the communication and coordination among the participants of sea-rail intermodal transport, give railway container companies more right to adjust freight rates, construct advanced multimodal transport information system, and form an open, fair and transparent sea-rail intermodal transport environment. In addition, it is suggested that the Shanghai municipal government increase the subsidy for sea-rail intermodal transport and formulate a detailed subsidy policy for sea-rail intermodal transport [4].

4.3 Improvement of inland river shipping infrastructure and construction to promote water and water transfer

Shanghai Port has unique conditions in developing coastal and river-river road transportation, and a large part of the supply of Shanghai Port comes from the Yangtze River coastal areas, so the hidden supply is sufficient. As long as it can improve the waterway transportation function, it can attract the supply of goods along the Yangtze River. Increase the "water-water" combined transport ratio.

First of all, it is necessary to further dredge the Yangtze River, Huangpu River and other inland waterways, so that the main river channels can meet the requirements of the third class waterway, can pass through thousands of tons of barges, and establish a transit network, especially in the golden waterway of the Yangtze River, directly link the most active and developed large cities along the Yangtze River with Shanghai, and carry out business transactions more conveniently and efficiently[3]At the same time, Shanghai's radiation effect and influence on the Yangtze River basin will be further enhanced.

To study the widening of the navigation width of the Yangtze River Estuary deep water channel, continue to promote the second phase of the Dalu Line (Dazhi River reach), the Pingshen Line, the Changhu Shen Line and the eastern section of Zhaojiagou, start the construction of high-grade inland waterway such as Youdun Port, the eastern section of Su Shen Neigang and Luoyun River, complete the ring structure of "one ring and ten shots ", open the high-grade inland waterway connecting the Suxi Chang area of Jiangsu Province, speed up the docking with the Yangtze River Delta inland river network, realize the high standard connection of the inland river collection and distribution channel to the Waigaoqiao port area and the Yangshan deep water port area, and construct the high-grade inland river container collection and distribution network connecting the Yangtze River Delta area.

We will speed up the standardization of specialized inland transport ship types, unify waterway construction standards, develop and promote direct river and sea ship types, and strengthen the research and application of low-carbon green science and technology in key areas of inland rivers. We should pay attention to the connection between inland river port area and seaport port area, solve the problem of short barge transshipment, realize the effective connection between inland river transportation and other transportation modes, and enhance the competitiveness of waterway transportation.

In addition, the policy can encourage enterprises to develop inland navigation, and give certain policy support and economic subsidies to enterprises engaged in inland navigation. We will further support

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the development of inland river container transport enterprises through specific preferential measures such as fee reduction, financial subsidies and interest-free loans, and comprehensively optimize the Shanghai International Shipping Center's collection and distribution system.

5. Conclusions

In today's world, the competition of major ports in various countries is very fierce, and any modern port must have a perfect and smooth collection and transportation system in order to become an important water and land transportation hub in the integrated transportation network.

This paper first expounds the definition of collecting and distributing system, and then discusses the development status and problems of collecting and distributing system in Shanghai Port on the basis of this theory. Mainly from the road, railway and waterway transport subsystem of these three aspects. As far as Shanghai Port is concerned, the proportion of road transportation is too high, and the proportion of railway transportation is too low, which leads to the imbalance of collection and distribution system.

According to the present situation of Shanghai port transportation system, the corresponding development countermeasures are put forward, which are mainly to coordinate the proportion of three modes of transportation, reduce the burden of road transportation, actively promote the work of water-rail transport, give full play to the role of port, improve the capacity of waterway transportation, and develop the system in a more energy-saving and green direction. Shanghai Port should make full use of its geographical advantages, combine its own opportunities, coordinate the development of three modes of transport, give full play to the advantages of various modes of transport, formulate development strategies according to local conditions, and improve its ability to collect and transport. Improve the overall competitiveness of the port.

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