

Study on the Optimization of Container port distribution System in China under the background of Yangtze River Delta Integration

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Abstract

At the central economic work conference, general secretary xi jinping once again stressed that the coordinated development of the beijing-tianjin-hebei region, the integrated development of the Yangtze river delta, the Yangtze river economic belt, and the guangdong-hong kong-macao greater bay area should be promoted to build a world-class innovation platform and growth pole. To vigorously promote the integration and high-quality development of the Yangtze river delta region is a major decision and deployment made by the CPC central committee with comrade xi jinping at the core based on the international and domestic situation. It is a major development opportunity and leading project for the Yangtze river delta region, as well as a major political responsibility and historical mission of party committees and governments in the region. This paper firstly introduces the research background and significance of the Yangtze river delta integration, summarizes the current situation and existing problems of the collection and distribution system of Shanghai port and tianjin port, and analyzes the optimization countermeasures and measures of the collection and distribution system of coastal container ports.

Keywords

Yangtze River Delta integration; Container port; Collection and distribution system; Optimization measures.

1. Introduction

The Yangtze River Delta region is the center of waterway, railway and highway transportation in China. It has a good location advantage. It is of great significance to the development of China to optimize the construction of the transportation system in the Yangtze River Delta region. In recent years, the container port throughput of Yangtze River Delta has increased rapidly year by year. However, rely on the transportation of highway transportation system is facing congestion problems, resulting in a decline in the efficiency of the transportation turnover, along with our country entered the stage of comprehensive development of shipping, in order to strengthen the strength of Shanghai and its surrounding areas shipping, promote the city's economic development, solve the problem of container transportation in Yangtze river delta is imminent.

2. Background and description of the topic

2.1 The research background

With the continuous development of waterway transportation, the continuous rise of cargo throughput and the continuous progress of science and technology at the wharf, all places hope to strive for the upper reaches, and make future development strategies based on this goal. Container ports as the amphibious transportation hub, important link is the development of local economy and speed up the transport of goods, all in an effort to find method of giving full play to the advantages of the port, the

importance of the port development strategy, the development of port specific strategy has a positive guiding significance, trade of intermediate products and final product has different requirements. This requires more efficient, integrated facilities, better collection and transportation systems to meet the different needs of different regions, and improved network technology facilities to combine different modes of transportation, such as waterways, roads, railways, pipelines and aviation, so as to improve the efficiency of collection and distribution.

2.2 Research Status at home and abroad

2.2.1 On the integration of the Yangtze River Delta

The Yangtze river delta region is one of the regions with the most active economic development, the highest degree of openness and the strongest innovation ability in China. It is the intersection point of "One Belt And One Road" and the Yangtze river economic belt, and plays an important strategic role in the overall situation of national modernization and the pattern of all-round opening up. Prime minister in 2015 in his government work report clearly pointed out: to actively adjust the industrial structure, promote the services, including logistics, speed up the development, promote the construction of infrastructure and the regional harmonious development, the "area" construction combining with regional opening-up, pushing forward the construction of the Yangtze river economic belt extended scope of Shanghai free trade zone. Highlights the logistics industry more and more attention by the government. In 2018, in order to better play the important role of Shanghai and other regions in opening up, the State Council decided to support the promotion of regional integration of the Yangtze River Delta into a national strategy, and set up a demonstration zone of integration of the Yangtze River Delta in the border region of Jiangsu, Shanghai and Zhejiang. At present, the integrated development of the Yangtze River Delta has entered the stage of accelerated development. To promote the integrated development of the Yangtze River Delta with higher quality, we must attach great importance to the coordinated development of regional economy.

2.2.2 About the port collection and distribution system

The main function of the port is to complete the turnover of goods between different modes of transport, to complete the loading, unloading and storage of goods to the port. It is the expansion of land and water transport, which helps to keep the port smooth and improve the overall port transport efficiency. ^[1] The collection and distribution system mainly includes collection and distribution channels, collection and distribution nodes, port docks and port hinterland. Yin Chuanzhong and Zhang Yi ^[2] concluded that the port wharf is the interface between goods entering the waterway transport system by land or transferring from the water to the land transport system. According to the characteristics of the port operation organization, ports can be generally divided into hub ports, trunk ports and branch ports. Port hinterland refers to the area around the port that focuses on developing and meeting the port demand. As an important part and function of urban development, the function and area of the port as well as the port also have a certain influence on the port and the city relying on the port. The hinterland of the port has promoted the economic development of the port and its influence on the surrounding area. ^[3]

Collection and distribution node node is an important part of the collection and delivery system. The connection of nodes can form a complete transport channel, thus forming a structured transport network. The main forms of nodes are transportation hubs, logistics parks, container terminals and bonded areas. Transportation hub^[4] is a transportation line and an important part of the transportation network, as well as the transportation and transportation network. It is mainly composed of passenger and freight stations. Passenger and freight stations were established primarily to provide passenger services and freight organizations between states and cities. A bonded area^[5] is a warehouse area. It refers to a place where goods can be stored for a long time in an area. Long-term storage of goods, further processing of export goods and completion of trade between the two ports.

Transportation channels include hub equipment and means of transport ^[6] Transportation channels have various forms and are mobile and convenient. In the face of different transportation scenarios, suitable transportation modes can be easily selected. Transport channels include transport vehicles

and relevant important equipment. In more complex traffic situations, different modes of transport can be freely combined and connected. The modes of transport mainly include land, railway, inland and ocean waterways, pipeline and air transport [7].

2.2.3 About the optimization of collecting and distributing system

Zhang Shengxian [8], on the basis of studying the optimization of the container system of Zhoushan Port, carried out a comprehensive optimization design for the collection and distribution system of Zhoushan Port. This paper puts forward the design flow and method of zhoushan port collection and distribution system. It is meaningful to the optimization research of the collecting and distributing system of Wuhu port.

Lin Jianxin [9] combined the layout of container terminals with the container throughput, industrial layout and road collection and transportation system of Tianjin Port to create favorable conditions for the establishment of a reasonable spatial layout and hub layout of container transportation hub in Tianjin Port.

Shi Liangqing, Feng Xiangmin, Zhang Yaming^[10]. This paper mainly shows the competitive advantages and disadvantages of some ports in China's collection and distribution system, enabling the world to have a deeper understanding of these ports in China. In this way, China's ports have been improved and promoted, making the external construction related to ports more complete.

Tang Guosheng, Dou Bin and Li Lei^[11] proposed to study and analyze the optimization of container collection and distribution system from Yangshan Port to relevant ports along the Yangtze River from different perspectives through the calculation model, and put forward relevant development Suggestions.

3. Introduction of container port distribution system in Yangtze River Delta

3.1 Overview of Shanghai Port

3.1.1 Highway collection and distribution system

Shanghai port is located at the T-shaped junction of The Yangtze River and the coast of the mainland, facing the Pacific Ocean, and at the mouth of the Yangtze River. Shanghai-nanjing and Shanghai-Hangzhou railway lines are connected to the national trunk railway lines from north to south. There are four national highways, including 204, 312, 320 and 318, as well as Shanghai-Nanjing and Shanghai-Hangzhou expressways. Hongqiao Airport and pudong International Airport have created a good hardware environment for container cargo distribution in Shanghai port. 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 regional division of road collection and distribution, it can be further divided into the sub-system of road collection and distribution of goods from other provinces into Shanghai, the sub-system of road collection and distribution of goods from Shanghai and the sub-system of road collection and distribution around the port area.

3.1.2 Water collecting and distributing system

There are about 210 inland waterways in Shanghai, with a navigable length of about 2,100 kilometers. Inland river docks are mainly distributed on more than 170 inland waterways in the city, and the concentrated ones are main waterways such as Yunzaojing, Dazhihe, Chuanyanghe and Pudong Canal. Shanghai inland waterway takes "one ring and ten shoots" trunk waterway as the skeleton. "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 which the Huangpu River, Zhaojiagou Line, Dalu line, Dapu Line, Suzhou Outer Port line, Taipu River and Hangzhou Inner Port line have been listed as the main channels of national water transportation.

Jianghai transport subsystem mainly refers to the waterway transport system through the Yangtze River to realize container distribution at Shanghai port, which mainly includes river-sea combined transport, river-sea direct transport and other transport modes. The main route of Jiang-Sea combined transport is the provinces in the middle and upper reaches of the Yangtze River after loading on board through the port, all the way down the river, or through taicang shuttle bus transshipment to Yangshan, or directly connected to waigaoqiao port area. The main direct line from The Yangtze River to the Sea is to reach Yangshan Port for loading and unloading through the Golden Waterway of the Yangtze River in the upper and middle reaches of the Yangtze River.

3.1.3 Railway collecting and distributing system

The economic transport distance of the railway is generally within 500 kilometers, and the indirect economic hinterland of Shanghai port is in the upper and middle reaches of the Yangtze River, including Jiangxi, Hunan, Hubei and other western inland areas. With the expansion of Shanghai port's economic hinterland and the development of foreign economy in the central and western regions, the railway collecting and distributing subsystem will become a collecting and distributing mode with great development potential in Shanghai Port's collecting and distributing system.

3.2 Shanghai port collection and distribution system development status

The construction of road collection and distribution facilities has been accelerated, and the road collection and distribution network has been constantly improved. Road collection and distribution has formed the layout form of "two rings", "nine fire", "one vertical", "one horizontal" and "multiple links". The traffic volume of Shanghai port has remained stable on the whole, but the growth rate has gradually decreased. With the continuous optimization of Shanghai's collection and distribution structure, the proportion of Shanghai port's highway collection and distribution has been decreasing. With the continuous dredging of the Yangtze River waterway, the development of river-sea direct ships and the improvement of Shanghai's inland river shipping infrastructure, Shanghai's waterway transport has been developing steadily and the proportion of waterway collection and distribution has been greatly increased. In terms of railway transport development, Shanghai Port railway has been developed rapidly to meet the development demand of railway collection and distribution. Although the proportion of railway in Shanghai port collection and distribution is still small, the total amount of collection and distribution is still on the rise.

3.3 Problems faced by Shanghai port collection and distribution system

3.3.1 Road collection and distribution is almost saturated, urban traffic pressure is greater

Shanghai port container transportation structure optimizing in recent years, the proportion of highway in transportation is declining, but due to lack of container in Shanghai port railway transportation conditions, the level is relatively low in inland river channels, the slow development of inland waterway transportation, and the yangshan harbor area is located in the east China sea, inland waterway homework, call cannot direct navigation and for the Shanghai rail and water transportation is still under certain constraints. In 2014, the proportion of road collection and distribution in Shanghai port still reached 54%, and roads still played a leading role in the whole collection and distribution system. But the system of external expressway in the port area is extremely weak. At present, there are few external highways in the port area. Only S2, G1501, S20 and A30 connect the inter-provincial expressway network of the Yangtze River Delta through the urban expressway network. Moreover, both S2 and A30 are toll roads, which increases the transportation costs of enterprises and affects their agglomeration and development.

3.3.2 Due to the serious shortage of inland river infrastructure, there is a large room for improvement in water and water transfer

The conditions of Shanghai waterway collecting and distributing channels are insufficient, most of which are low-grade channels, and the third-grade and above channels are only 175 kilometers. The progress of waterway regulation projects such as Hangshen Line and Dalu Line ii and the construction projects of high-grade inland waterways such as Changhushen line, Pingshen line, Dapu line, Youdun

Port, Sooshen Inner Port line and Zhaojiagou Eastern section needs to be accelerated. The construction schedule of inland river container port area does not match the construction of inland river channel; The degree of docking between inland port and outer port is poor; Ships have a low degree of standardization; Although taicang to Yangshan shuttle bus has been opened, but there is still the Yangtze River upstream container transport secondary transit problem; Although the water transfer rate of containers in Shanghai reached 45.8% in 2014, fulfilling the target set in the 12th Five-Year Plan ahead of schedule, there is still much room for improvement.

3.3.3 The railway is separated from the wharf, and the proportion of sea-rail combined transport is too small

There are too few container terminals connecting Shanghai port to railway. At present, there are only two container berths with railway lines at the front edge of the military road terminal, and 16 container ship berths, 6 feeder berths and large container berths in The Phase 1-5 of Waigaoqiao Port and Yangshan Deepwater Port are not directly connected by railways. The construction of Pudong Railway lags behind the development of Container terminal of Shanghai port, and the resulting short shuttle fee leads to the total cost higher than that of domestic surrounding ports. The railway department and other departments are in the state of division and management, poor coordination, low awareness of market and service. The separation of Shanghai port railway and wharf objectively results in the increase of import and export cost of sea-rail intermodal boxes in Shanghai port and weakens the competitive advantage with other ports.

3.4 Overview of Tianjin Port

3.4.1 Highway collection and distribution system

The collection and distribution of highways in Hong Kong is mainly connected with the external Jingjintang highway and the coastal road through the main road in Tanggu city, and then depends on the Beijing-Fuzhou branch, the trunk road of the national highway outside Hong Kong, the main road of the city and the local trunk road to connect with the national road network. Tianjin Port road collection and distribution channel, mainly by the national highway trunk road, urban trunk road and local roads at all levels. The tianjin Port rear highway mainly relies on the Beijing-Tianjin-Tanggu Expressway and Jingtang Highway (National Highway 103), the main trunk line of the national highway, and the main lines of the city, Jinguu, Gangtang, Yangbei, Jinbei, Jinbin, Jinyu, Jinqi and Danla highways. According to the urban transportation planning, tianjin binhai new area will be built or rebuilt han, JinGu second-line (eastern jin highway), tianjin, north road, haiphong road, the haihe river bridge and pond port of han, tang and han south road, such as: accelerate Yang north road, haiphong road, JinGu second-line, black without a river road tanggu outer ring road construction, and through the city of jingjintang expressway, TieXi Road form "tian" glyph traffic network.

3.4.2 Railway collecting and distributing system

In terms of tianjin Port railway collection and distribution, there is no railway connecting the northern Port area of Tianjin Port with the outside at present. There are two passageways leading to the Southern Port: one is called the northern passage; The other is called Nantong Road. External railway transport is mainly connected with Tianjin railway hub through Tianjin Port, and then connected with the economic hinterland of Tianjin Port. The main railway transportation channels from Tianjin to the economic hinterland of Tianjin Port are The Tianjin Ba connection line from Jingjiu to Shuohuang (Shitai) to Shanxi, and from Jingshan to Fengsha to Inner Mongolia or Datong. And the railway behind Tianjin port mainly has passageway: Jingshan to Fengsha and northeast passageway, Jingjiu Yishuo Yellow passageway, Ji Port passageway and Jin-Pu passageway. At present, the railway transportation of Tianjin Port is mainly composed of three parts: Tianjin Port - Tianjin railway hub - hinterland. The main routes from the Tianjin Port railway hub to the hinterland include Jingshan, Jinpu, Jingjiu and Jinji, which lead to North China and east China through Beijing, Shanhaiguan, Jinan, Jixian and Bazhou, and lack of direct access to the northwest and central and western regions.

3.4.3 Water collecting and distributing system

Tianjin Port has more than 140 berths of various types and 76 public berths, including one 200,000-ton deep-water berth and 55 10,000-ton deep-water berths. The total length of the wharf is 9.8 kilometers, the storage yard area is 1.36 million square meters, and the average density of ships arriving at the port is 6,750 per year. At present, Tianjin Port has 89 liner routes, among which 6 are near ocean routes and 5 are ocean routes. In recent years, tianjin port has added 12 new liner routes to Japan, the Persian Gulf, Southeast Asia and South Korea, and vigorously developed the operation of internal branch routes around the Bohai Sea.

3.5 Problems faced by tianjin Port collection and distribution system

3.5.1 Roads in and outside Hong Kong are not connected smoothly, and roads in and outside Hong Kong develop slowly

During the transportation, it is obvious to feel the problems in the connection between the roads inside and outside the port, and bottlenecks occur, which often cause traffic jams. The annual growth rate of Tianjin port's throughput is far higher than that of tianjin port's railways and highways, which cannot meet the needs of the sustained and rapid growth of bulk cargo volume. There is a lack of north-south trunk lines inside and outside the port area, the external collection and distribution channels cannot form a network, and the internal main high-grade highways are not connected to the port area. With the rapid economic development, No. 4 road has been widened to eight lanes in both directions, but mixed with urban roads, it still cannot meet the actual demand of transportation roads.

3.5.2 The railway transport corridor is insufficient

Rail as one of the main mode of transportation in tianjin port, although there is a wide road transport network, but ShuYun present situation is not ideal, the main transportation channel capacity is insufficient, capacity are saturated or close to saturation, external channel transport capacity meets the requirement of transportation, in addition to the line capacity is insufficient, the interval between also have capacity can not meet demand.

3.5.3 Sedimentation and channel drafts are inadequate

The construction and development of Tianjin port change with each passing day, but the history of Tianjin port was once by sediment deposition problem. This makes it more expensive for ports to invest in deep-water berths. At the same time, the completed port should adhere to the perennial dredging and dredging work, so as to attract large tonnage of ocean container liner ships will have a negative impact. In addition, the haihe of Tianjin Port is connected to the operation area of the Port's Nanjiang wharf. However, for many years, haihe has been unable to sail 10,000-ton ships, so the shoreline of the wharf operation cannot extend to the coast of haihe.

4. Optimize countermeasures and measures

4.1 We will improve the inland river shipping infrastructure of container ports in the Yangtze River Delta and build aquatic expressways

The Yangtze estuary deepwater channel width of navigable all widening engineering, Shanghai as the center need to continue to push the big reed line phase ii (rectification of) ", "line, long lake line and zhao ditch east waterway regulation project, construction of oil pier Su Shen inside the east port, Hong Kong and Luo Yunhe inland high-grade waterway, such as complete" shot "one ring and ten ring structure, through connection suxichang regional high-grade inland waterway in jiangsu province, to speed up the dock with the Yangtze river network, implement to waigaoqiao port yangshan deepwater port inland waterway transportation channels, namely, high standard, A high - grade container distribution network connecting the Yangtze River Delta region is established. We will accelerate the standardization of specialized inland water transport vessels, and strengthen research, development, and application of low-carbon green technologies in key areas of inland water. Pay attention to the connection between inland river port area and seaport area, solve the problem of short

and transshipment, realize the effective connection between inland river transport and other modes of transport, and enhance the competitiveness of inland river transport.

4.2 Continue to promote the construction of inland ports (waterless ports).

We will improve the construction of inland ports and related service facilities in the Yangtze River Delta, and pay attention to and extend the radiation and services to inland ports in the upper and middle reaches of the Yangtze River, mainly including the economic hinterlands of northern Jiangsu, Anhui, Henan, Hubei, Shaanxi, Sichuan and Chongqing. Through the construction of inland ports (waterless ports), the service scope of the hinterland of ports in the Yangtze River Delta will be continuously expanded, and the attraction to ports along the Yangtze River and cargo flows in the vast central and western regions will be enhanced, so as to enhance the resource concentration and port and waterway radiation capacity of Shanghai's ports.

4.3 We will support the development of inland waterway shipping and improve the water-water transfer system

We will accelerate the formation of a mechanism for maintaining inland waterways in the ports of the Yangtze River Delta, standardize the types of specialized inland waterway transport vessels, and strengthen research, development, and application of low-carbon green technologies in key areas of inland waterways. Pay attention to the connection between inland river port area and seaport area, solve the problem of short and transshipment, realize the effective connection between inland river transport and other modes of transport, and enhance the competitiveness of inland river transport. Encourage enterprises to develop inland river shipping, and give certain policy support and economic subsidies to enterprises engaged in inland river shipping. We will further support the development of inland river container transport enterprises and comprehensively optimize the container port distribution and distribution system in the Yangtze River Delta through specific preferential measures such as reducing charges for inland river shipping enterprises, providing financial subsidies, interest-free loans and so on.

4.4 Formulate preferential policies for expressway tolls of The Port.

In order to attract containerized goods to gather in the port and reduce the cost of collecting and distributing in the port, it is suggested to exempt the toll of container vehicles passing through the expressway to and from Shanghai port or give appropriate subsidies. In hebei province in 2012 formulated the "hebei province in and out of the port container transport vehicle preferential measures for the implementation of pay tolls, article 2 of measures for the implementation points out, in and out of the port of qinhuangdao, tangshan port of jingtang harbour area, tangshan caofeidian port area, oil drilling, container transportation vehicles in traffic toll roads, the province exempt from tolls. On the basis of the original scheme, 50% discount will be given to container transport vehicles entering and leaving Shijiazhuang inland port when passing through provincial toll roads.

4.5 We will establish a coordination mechanism for sea-rail combined transport and increase government subsidies

To establish the coordination mechanism of sea-rail transport, promote the communication and coordination among the participants of sea-rail transport, give railway container companies more right to adjust freight rates, build an advanced multimodal transport information system, and form an open, fair and transparent environment of sea-rail transport. In addition, it is suggested that Shanghai municipal government increase the subsidy for sea-rail combined transport and formulate detailed subsidy policies for sea-rail combined transport.

4.6 Building an integrated transport connectivity infrastructure

The integration of the Yangtze River Delta needs interconnected infrastructure, and the construction of integrated connectivity infrastructure network is particularly important. Aviation, jointly plan to build the Yangtze River Delta world-class airports; In terms of railway, we should speed up the planning and construction of railway network in the Yangtze River Delta region and plan intercity

railway. For highways, we will continue to plan and build expressways, abolish some toll stations on expressways, implement full coverage of fast ETC identification on expressways, and start connecting provincial-level roads. Water transport, continue to promote the development of ports in the Yangtze River Delta, promote the construction of the Beijing-Hangzhou Grand Canal channel. In this way, a variety of transportation means have units to combine intensive channel, promote the speed of port collection and distribution in the Yangtze River Delta region.

5. Conclusion

The container throughput of Yangtze River Delta container port will continue to grow rapidly in the next few years. With the increase of container throughput, the burden of container distribution system in The Yangtze River Delta container port will be increased, and a series of measures should be put forward to optimize the container distribution system in the Yangtze River Delta according to the surrounding ports. Through literature collection and multi-party comparison, Shanghai port and Tianjin Port are taken as examples. In the author's opinion, by perfecting the inland river shipping infrastructure of container ports in the Yangtze River Delta, we can build the aquatic expressway. Continue to promote the construction of inland ports (waterless ports); Supporting the development of inland waterway shipping and improving the water-water transfer system; Formulate preferential policies for expressway tolls. We will establish a coordination mechanism for sea-rail combined transport and increase fiscal subsidies. Building an integrated transport connectivity infrastructure. We will improve the container port collection and distribution system in the Yangtze River Delta and promote better and faster economic development in the Yangtze River Delta and its hinterland.

References

- [1] Beckmann M J,Mcguire C B,Winsten C B,et al.Studies in the economics of transportation[J]. Journal of Political Economy, 1959,26(Vohume 67,Number 5):820-821.
- [2] Yin Chuanzhong and Zhang Yi, Port Logistics (Shanghai Jiao Tong University Press).
- [3] Huang Pingping research on the Hinterland Generation of Foreign Trade Container sea-rail transport in Ningbo Port --Based on the cost perspective of international trade [D]. Ningbo University, 2015.
- [4] Li Xia-Miao, Modern Railway Freight Transport Organization Theory Research [D] Beijing Jiaotong University, 2002.
- [5] Research on Wuming Regional Comprehensive Transportation Network Planning Theory and Method [D]. Nanjing: Southeast University, 2011.
- [6] Klink H.A.Towards the borderless mainport Rotterdam:an analysis of functional spial and administrative dynamics in port systems[[J].1995.
- [7] Luo Hao. Research on the Development Strategy of Zhoushan Port Logistics [D]. Zhoushan: Zhejiang Ocean University.
- [8] Yang Jinhua. Theories, Methods and Cases of traffic planning.
- [9] Zhang Shengxian. Study on Optimization of Longkou Port Distribution system [D]. Dalian: Master thesis of Jiaotong University.2008(1).
- [10]Lin Jianxin. Research on the Layout of Container Transport Hub facilities and Highway Collection and Distribution Planning [D]. Beijing: Master thesis of Beijing Jiaotong University.2006 (12).
- [11]Shi liangqing,Feng xiangmin,Zhang yaming,Analysis of Consolidation and Distribution System of Chinese Contianer Trunk Line Ports[J].Port Preview,2006.
- [12]Tang Guosheng, Dou Bin, Li Lei. Yangshan Port -- Container collection and distribution Mode of Yangtze River Port [J]. Water Transport Management.2005 (11): 1-4.
- [13]Geng Jingjuan, Analysis and Evaluation research of tianjin Port collection and Distribution System
- [14]Xu Leling, Liu Bo, Development status and countermeasures of Shanghai Port collection and distribution system.