

# Research on the Development Path of Zhoushan River-Sea Combined Transport

Yiyun Zhou<sup>\*</sup>, Haihao Xu, Jiahong Wang and Wanzheng Ai  
Marine College of Zhejiang Ocean University, Zhoushan 316000, P. R. China  
<sup>\*</sup>Corresponding author

**Abstract**—This paper uses SWOT analysis method to expound the internal advantages and disadvantages and external opportunities and challenges of Zhoushan's development of Jianghai Intermodal Transportation. It briefly analyzes the choice of feasible path for the development of Zhoushan Jianghai Intermodal Transport in the context of adapting to the national strategic development and the development trend of multimodal transport.

**Keywords**—component; River-Sea Combined Transport; SWOT Analysis; Strategy; Ningbo-Zhoushan Port

## I. INTRODUCTION

Under the background of economic globalization, countries around the world attach great importance to the development of the marine economy. China has also followed the trend of the times and put forward the development strategy of “One Belt, One Road” to promote the vigorous development of the marine economy. Zhoushan, Zhejiang, is located at the intersection of the golden coastline of the eastern part of China and the golden waterway of the Yangtze River. It is an important passageway of the ancient Maritime Silk Road. It is also located at the intersection of the Yangtze River Economic Belt and the 21st Century Maritime Silk Road. In April 2016, the State Council officially approved the establishment of the Zhoushan Jianghai Intermodal Service Center, which provided strong policy support for Zhoushan's development of Jianghai Intermodal Transportation. The emergence of this mode of transport by Jianghai Intermodal has solved the problem of “the ship is difficult to go out to sea and the ship is difficult to enter the river”. However, there are still some areas that need to be optimized and improved in the process of developing the river-sea combined transport in Zhoushan. The SWOT analysis method will be used to analyze the internal advantages and disadvantages as well as external opportunities and challenges of Zhoushan's development of river-sea combined transport, and propose a feasible path for the development of Zhoushan's river-sea combined transport.

## II. SWOT ANALYSIS OF ZHOUSHAN DEVELOPMENT OF JIANGHAI INTERMODAL TRANSPORTATION

### A. Strengths

- Geographic location: The Zhoushan Islands are made up of 1,390 islands and are the largest archipelago in China and the only deep-water island group in China. Located in the center of China's coastline, Zhoushan is

backed by Shanghai, Hangzhou, Ningbo and other large cities and the vast hinterland of the Yangtze River Delta. It faces the Pacific Ocean and has a strong geographical advantage. It is the junction of China's north-south coastal routes and the Yangtze River waterway. It is a maritime gateway and channel that is open to the outside world in the Yangtze River Basin and the Yangtze River Delta, and is fanned out by the Asia-Pacific emerging port cities.

- Channel route: Zhoushan's shoreline resources are very rich. The large-scale ships above 300,000 tons are unimpeded, and the deep water coastline is 280 kilometers long, accounting for 18.4% of the national shoreline resources. The waterway extending in all directions surrounds or passes through the Zhoushan Islands.
- Berth situation: Zhoushan has nearly 300 productive docks, of which nearly one-sixth of the berths are deep water berth above 10,000 tons. Together with the development of the Zhoushan Islands in recent years, the port infrastructure of Dinghai and Shenjiamen has been tend to perfection.
- Sufficient shipping: Ningbo-Zhoushan Port completed cargo throughput of 1.01 billion tons in 2017, becoming the world's first super-large port with a cargo throughput exceeding 1 billion tons. It has been the world's largest port for cargo throughput for nine consecutive years. The main cargoes of Ningbo-Zhoushan Port are bulk, bulk coal, crude oil, grain, etc. Before the merger of the two ports, the throughput data of Zhoushan Port continued to grow. After the merger of the two ports, Ningbo's location advantage was added, which made Zhoushan's development of river-sea combined transport with sufficient power.

TABLE I. NINGBO-ZHOUSHAN PORT CONTAINER THROUGHPUT AND CONTAINER TRANSFER IN WATER AND WATER FROM 2010 TO 2015

	2010	2011	2012	2013	2014	2015
<b>Container throughput (Million TEU)</b>	13.004	14.512	15.671	16.774	18.700	19.824
<b>Transfer volume in water (Million TEU)</b>	2.05	2.39	3.15	3.57	4.27	4.70
<b>Conversion ratio in water</b>	15.8%	16.5%	20.1%	21.3%	22.8%	23.7%

### B. Weaknesses

Although there are many high-quality waterways in Zhoushan, there are many islands in the surrounding seas. The navigation channels are complicated. If the crew is unclear about the navigation channel or unfamiliar with the sea area, it will affect the navigation safety of the ship. This is a huge challenge for the improvement of shipping efficiency.

Secondly, due to the influence of monsoon instability, Zhoushan sea area is vulnerable to typhoon (tropical storm) during summer and autumn. It has a wide range of influence and strong destructive power, which often causes severe weather phenomena such as huge waves, squally winds and heavy rains. It has seriously affected the safety of navigation and port security in the Zhoushan sea area.

More importantly, if we want to vigorously develop the river-sea combined transport, we need a large number of high-quality talents to enter. In recent years, although the economic growth rate of Ningbo-Zhoushan Port has been fast, it has become the super-large port with the world's first cargo throughput. The progress in the development of Jianghai intermodal transportation is still short and there is not enough talent resources to introduce.

### C. Opportunities

With the support of national policies, the construction of the Zhoushan Jianghai Intermodal Service Center is not only the construction within the Zhoushan area, but also part of the State Council's major strategic deployment of the "Belt and Road" and the Yangtze River Economic Belt. After the establishment of the China (Zhejiang) Free Trade Zone, with the international green petrochemical base, international oil storage and transportation base, international maritime service base, Northeast Asia bonded fuel oil refueling center and other projects in Zhoushan successfully, Zhoushan once again became "The important thrust of the construction of the Maritime Silk Road. The 242 routes of Ningbo-Zhoushan Port are now connected to more than 600 ports around the world and become the international hub port of the 21st Century Maritime Silk Road.



FIGURE I. 21ST CENTURY MARITIME SILK ROAD MAP

In addition to the support of national policies, the support of science and technology is also indispensable. The use of Jianghai Zhida Ship No. 1 means that we bid farewell to the sea boat cannot enter the river, the river boat cannot get out of the history of the sea. Jianghai Zhida Ship No. 1 took 36 hours and was loaded with more than 22,000 tons of iron ore. It crossed the sea and crossed the bridge. It successfully passed through the Nanjing Yangtze River Bridge and connected the entire inland river road between Zhoushan Port and Maanshan Port. The logistics cost of the Yangtze River Economic Belt and even the whole country has provided strong technical support for Zhoushan's development of Jianghai Intermodal Transportation.

Under the development trend of multimodal transport, multimodal transport goods are mostly long-distance transported goods, and mainly transported by sea. But if they want to enter the inland, they need to be transported by road, rail or even air. This is not only costly, but also the cargo volume is not as large as the waterway. It also requires more loading and unloading time, resulting in more cargo damage. As a transit storage base for bulk cargo, Zhoushan develops the Jianghai Intermodal Transport, which is highly effective and economical.

### D. Threats

Zhoushan needs to have a smooth sea route and inland waterway to develop the river-sea combined transport, but the Ningbo-Ningbo Canal is still in a state of "passing through and not being smooth". The net height of most bridges is small. The ship cannot pass smoothly. It is prone to collision accidents or the ship with a large load tonnage cannot be navigable, which greatly limits its development.

Zhoushan vigorously develops the cause of river-sea combined transport, which still faces the problem of many incomplete factors. In order to realize the linkage between port and port, port trade and port workers, a large amount of investment in infrastructure and supporting factors is required. In addition, the surrounding services in the development of Jianghai Intermodal Transportation are still not perfect, such as insurance, finance, taxation, finance, etc. There is no corresponding supporting policy. The development of Jianghai intermodal transportation not only needs the support of government policies, but also needs to be led by leading enterprises. However, at the current stage of development, leading enterprises have not yet formed and Zhoushan has to face the situation of small and relatively loose enterprises.

Under such circumstances, enterprises have poor ability to withstand market risks and have a greater impact on macroeconomic development and changes in the shipping market, which is not conducive to the development of the surrounding industries of Jianghai Intermodal Transportation.

TABLE II. ZHOUSHAN DEVELOPMENT JIANGHAI INTERMODAL SWOT ANALYSIS TABLE

<b>Strategy choice</b>	<b>Strengths(S):</b> Excellent geographical location; Abundant route resources; Large number and good quality berths; Good cargo volume and high throughput.	<b>Weaknesses(W):</b> Complex routes; Poor climatic conditions; Shortage of talent resources.
<b>Opportunities(O):</b> National policy support. Jianghai Zhida Ship No. 1 is put into use. The development prospects under multimodal transport are good.	<b>SO strategy:</b> Accelerate the construction of Zhoushan Jianghai Intermodal Service Center.	<b>WO strategy:</b> Improve the establishment of navigation safety regulations.
<b>Threats (T):</b> The inland waterway is restricted. The lack of leading enterprises. The surrounding services for the development of rivers and seas are not perfect. The input of infrastructure and supporting elements is large.	<b>ST strategy:</b> Improve the layout of the network of rivers and seas and accelerate the construction of shipping infrastructure.	<b>WT strategy:</b> Integrate human resources and strengthen collaboration between government and capital.

### III. STRATEGY CHOICE

#### A. SO Strategy

Integrate the comprehensive advantages of Zhoushan's location, shoreline and shipping, accelerate the construction of Zhoushan Jianghai Intermodal Service Center, and put the national major strategy in place.

#### B. WO Strategy

Coordinated consideration of the Zhoushan route and the operation of the ship, and improved the establishment of navigation safety regulations, so that the navigation safety of the ship can be effectively improved.

#### C. ST Strategy

Improve the layout of the Jianghai intermodal network, accelerate the construction of shipping infrastructure, improve the quality of shipping services, and broaden the supply market.

#### D. WT Strategy

Integrate human resources, strengthen cooperation between government and capital, promote the formation of leading enterprises, and form a chain of river and sea transportation service industry with distinctive characteristics.

### IV. FEASIBILITY ANALYSIS

#### A. Economic Feasibility

By integrating human resources and strengthening cooperation between the government and capital, we can more effectively introduce the inflow of professional and technical talents and funds needed for the development of Jianghai Intermodal Transportation. The employment position has been increased, and the Jianghai Intermodal Service Center has been built better and faster, which has improved the water-to-water transfer rate of Ningbo-Zhoushan Port and significantly improved the efficiency of loading and unloading operations. More economical and environmentally friendly.

#### B. Technical Feasibility

With the help of the network information service platform, the integration of shipping information materials and the improvement of the layout of the Jianghai intermodal network will make the exchange between Ningbo-Zhoushan Port and other inland ports closer, avoiding unnecessary time, resources, and economic losses due to incomplete symmetry of information.

The successful voyage of Jianghai Zhida Ship No. 1 means that it is completely feasible to enter the river from the sea and enter the sea by the river. In the near future, more high-quality Jianghai direct ships will be developed and put into use, which will certainly become a major boost for Zhoushan's development of rivers and seas Combined Transport.

#### C. Social Feasibility

The construction of Zhoushan Jianghai Intermodal Service Center is in line with China's "One Belt, One Road" development strategy and is an important part of the economic development of the Yangtze River Delta region. Accelerating the construction of this center will allow China to seize the opportunity to make global arrangements and give full play to the advantages of Ningbo Zhoushan Port. It plays an important role in accelerating the pace of integration into the modern Maritime Silk Road.

Perfecting the construction of navigation safety regulations can improve the navigation safety of ships, reduce the occurrence of ship collision accidents, and ensure the safety of seafarers and the safety of shipping companies.

### V. CONCLUSION

In recent years, with the rapid development of Ningbo-Zhoushan Port, the goal of becoming an international transit hub is to put forward higher requirements for port production operation mode. At present, the operation status of some ports in Ningbo-Zhoushan Port still has defects, such as insufficient modernization of some ports and slow operation of ports. Therefore, in order to achieve the development goals, it is necessary to realize a modern port operation system, realize a specialized and multi-functional port production operation system and improve the corresponding collection and distribution system, infrastructure and quality services to attract more sources of supply in order to improve throughput. It is necessary to draw on the case of port integration and

coordinated development in the successful areas of rivers and seas, absorb experience, and combine the actual situation with them to establish a more perfect river-sea combined transport system. This will improve the competitiveness of Ningbo-Zhoushan Port, complete the seamless connection between the coastal inner branch line and the international transit trunk line, strive to create a demonstration area for port integration reform and development, and contribute Zhoushan's strength to realize the strategy of maritime power.

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