A Study on the Possibility of Inland Port Replacing Seaport —— A Case Study of Wuhan Port in China

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Abstract. Against the background of the global economic recession and the rise of trade protection, China has proposed and implemented the " the Belt and Road" strategy, and has set up a number of free trade test zones in China, including a number of free trade zones in inland provinces and tried to build free trade ports. This paper compares Wuhan port with Shanghai port, Hong Kong port and Singapore port, studies the gap between Wuhan port and world-class port by building a port competitiveness evaluation model, and looks for the possibility of breakthrough. It is found that the gap between Wuhan port and other ports is still huge, and the possibility of short-term replacement is unlikely, but the breakthrough can be made in infrastructure construction first.

1. Introduction

Since the U.S. financial crisis in 2008, the global economy has fallen into a low ebb, many countries have changed their foreign trade policies, the call for protective trade policy has become louder and louder, and the trade war has intensified. Against this background, China has implemented the "the Belt and Road" strategy and tried to open up the Eurasian continent. So whether the land silk road can replace maritime transportation is the key to the success of the "the Belt and Road" strategy, so whether inland ports can replace seaports becomes of great significance.

Wuhan, known as the "thoroughfare of nine provinces" in China, is an important transportation hub in China's interior. Its inland water transport and railway transport are the best in China's inland ports. Therefore, this paper selects Wuhan Port, Shanghai Port, Hong Kong Port and Singapore Port as the three world-class ports to compare by constructing a port competitiveness evaluation model to find the gap between inland ports and seaports and the possibility of replacement.

2. Case analysis

2.1 The construction of port competitiveness evaluation model

For regional economic development, the port has played a huge role. Therefore, in the evaluation of port competitiveness, it is necessary to conduct an all-round analysis in combination with factors such as port location, local economic situation and infrastructure configuration, and follow the principles of scientificity, comprehensiveness, systematicness, coordination and operability.

Port competitiveness is a comprehensive index to measure the actual operation capacity and development potential of a port, reflecting the impact of the port on the surrounding areas. In the process of economic globalization, the basic advantages that make up the competitiveness of ports come from two aspects: one is the endowment of the ports themselves, such as geographical environment; the other is the competitive advantage provided by the political and economic environment of the port. Based on this, when analyzing the competitiveness of ports, we can start with five basic elements: macroeconomic indicators, port scale facilities, port annual throughput, port capacity and government support.

As Wuhan Port is an inland port, it is far from other world-class ports in terms of endowment. Simply considering the elements of the port itself cannot reflect the advantages of Wuhan's own railway transportation. This paper takes Wuhan as a railway-river combined transportation port for

statistics in terms of port throughput and cargo throughput. Therefore, the above indicators are revised as follows, as detailed in Table 1.

Table 1 Selection of Port Competitiveness Model Indicators after Adjustment

Elements	Index
Macroeconomic situation	per capita GDP (RMB 10,000)
	Total imports and exports ($100million)
Port capacity	Cargo annual throughput capacity (10,000 tons)
	Container annual throughput capacity (10,000 TUE)
Port annual throughput	Cargo throughput (10,000 tons)
	Container throughput
Government support	Customs efficiency
	The length of application for entry to the Customs
	Tariff rate

2.2 Data sources

The data are from the 2017 China Port Statistics Yearbook, 2017 Singapore Statistics Yearbook and related government websites. The three subjective indicators "Customs efficiency", "The length of application for entry to the Customs" and " Tariff rate" are converted into " 1 - 10 points" by the results released by the economic forum. Finally, the data obtained are collated as Table 2.

Table 2 Indicator data list

Elements	Index	Wuhan Port	Shanghai Port	Hong Kong Port	Singapore Port
Macroeconomic situation	per capita GDP (RMB 10,000)	11.06	11.65	30.21	34.99
	Total imports and exports ($100million)	226.26	4338.05	75966	87022.6
Port capacity	Cargo annual throughput capacity (10,000 tons)	22630	75000	30000	62000
	Container annual throughput capacity (10,000 TUE)	506	4186	2000	4000
Annual throughput	Cargo throughput (10,000 tons)	20000	70176	25680	5.93
	Container throughput	293.3	3713	1981	3090
Policy support	Customs efficiency	5.4	4..46	3.87	3.9
	The length of application for entry to the Customs	7.8	3.2	3.4	5.7
	Tariff rate	11.1	11.1	0.8	0.8

2.3 Factor analysis

Using SPSS software to factor analysis the data, the extracted values are all greater than 0.5, and the extracted information is more sufficient.

In this paper, by using the method of maximum variance to rotate the component matrix, we can get the rotating component matrix in, from which we can see two indexes with higher contribution of common factors. The indexes that have great influence on the common Factor one are: container throughput, container annual throughput, cargo annual throughput and cargo throughput. Therefore, the common Factor one can be named as the port's infrastructure capacity and cargo throughput. The indicators that have a greater impact on the public Factor two are: GDP per capita and total import and export, which is the regional macroeconomic situation.

According to the proportion of factor variance contribution rate to total variance contribution rate as the weight, the weighted summary is carried out to obtain the common factor scores and final competitiveness comprehensive scores of each port, as shown in Table 3.

Table 3 Port Common Factor Dividing and Final Competitiveness Comprehensive Score Table

Port	Cargo annual throughput and throughput	Macroeconomic situation	Comprehensive Competitiveness
Wuhan Port	-1.264656546	-0.739129216	-1.028169247
Shanghai Port	1.150795535	-0.961958227	0.200056342
Hong Kong Port	-0.129926784	0.648708234	0.220458974
Singapore Port	0.243787795	1.052379209	0.607653931

According to the competitiveness score of each port calculated by factor analysis, using cluster analysis, the following tree-like result chart is obtained (See Figure 1 and Figure 2): 1 stands for Wuhan port, 2 stands for Shanghai port, 3 stands for Hong Kong and 4 stands for Singapore port.

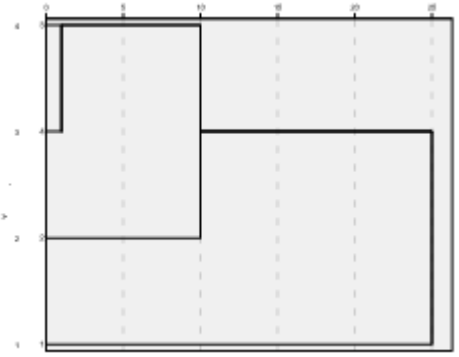

Fig. 1 Clustering results of annual throughput and throughput of port cargo

Fig. 2 Clustering results of macroeconomic situation of ports

To sum up, through the establishment of port competitiveness evaluation index, factor analysis and cluster analysis using SPSS software, the following conclusions can be drawn:

First, according to the evaluation index and analysis, Singapore's port has the first comprehensive score among several ports in terms of competitiveness, Shanghai's port has the highest cargo throughput, and Wuhan's port still lags far behind the world's first-class ports.

Second, the port's annual cargo throughput and capacity are the important basis for evaluating competitiveness and the factor with the largest proportion. In this respect, compared with other ports, Wuhan has a big gap, which is also the direction that needs to be completed and pursued, that is, to continuously strengthen the infrastructure construction of Wuhan free trade port and improve the related hardware supporting capacity.

Third, the macro-economic situation in the port area is another major factor affecting the competitiveness of the port. This shows that the development of the port and the macro-economy

influence and promote each other. The development of Wuhan free trade port can drive economic development. At the same time, the prosperity and development of the regional economy will continuously enhance the economic radiation and influence of Wuhan free trade port.

3. Summary

There is still a huge gap between a very good inland port like Wuhan and a world-class port, even after considering Wuhan's advantages in land transportation. Of all the gaps, the most important thing to be filled is infrastructure construction. Compared with infrastructure construction, other influencing factors are not so important. In a word, inland ports do not have the advantages to replace seaports at present.

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References

[1] Lulu, Research on the Function and Policy Evolution of European Free Port Area, Tianjin University of Finance and Economics.

[2] Hu Fengqiao, Evolution and Institutional Research of World Free Port, Zhejiang University.

[3] Circular of the State Council on the Issuance of the Overall Plan for the China (Shanghai) Free Trade Pilot Area.

[4] Circular of the State Council on the Issuance of the Overall Plan for the China (Hubei) Free Trade Pilot Area.

[5] Ye Xin, Cheng Hui, Zhang Dan, Cui Weijie, Zhang Wei and Gu Xueming, Reflections on the Construction of China's Free Trade Pilot Zone, *International Trade*, vol.11, pp.13-20, 2015.

[6] Wang Zhenzhen. A comparative study on the construction of four free trade pilot zones: generality, individuality and focus, *Southeast Academy*, vol.05, pp. 96-103, 2015.

[7] Huang Jing. Research on Harbour and Regional Economic Cooperative Development in Wuhan. *Journal of Wuhan Shipping Vocational and Technical College*, vol. 13 (02), pp.46-50, 2014.