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Value Element System and Development Path of Free Trade Port Location

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Abstract

This paper gives the elements system of location value of Ningbo-Zhoushan Port Free Trade Port, analyses the elements and influencing factors affecting the location value of Free Trade Port, and constructs the evaluation system of location value of Free Trade Port. With the help of SPSS 22.0 software, the location value of Ningbo-Zhoushan Port and nine major domestic ports is empirically analysed by factor analysis. Finally, the specific path of Ningbo-Zhoushan port development is given.

Keywords

Free Trade Port, Location Value, Development Path, Factor Analysis

1. Introduction

Free trade port (FTP) located on the border of different economies, has a special position and important value and has become an important national space resource and regional economic development important growth resource, which has been risen to the national strategy. Ningbo is one of the most important ports in the Yangtze River Delta. To speed up the process of exploring free trade ports, it is urgent to establish a method to evaluate the location value of free trade ports. The paper put forward relevant strategies for the development of free trade ports, to enhance the location value of free trade ports.

2. Literature Review

The development of the port is related to six factors, namely, the operating environment, the demand environment, the production factor environment, the support environment, and the opportunity and the government (Wang, 2009a). The five factors affecting the location value of the port are the hinterland economy of the port, the development of the composite port, the port function, the

port logistics, and the complex network of the port area (Wang, 2009b). Natural factors, economic and social factors, and scientific and technological factors interact with each other to determine the location nature and value of the port (Dong et al., 2006).

The ten indicators of scale, ship docking, operational efficiency, finance, equipment and facilities, logistics, safety, environment, enterprise management and socio-economic impact have the highest frequency (Wu, 2015). Chen (2017) analysed the information entropy weight method with the data from 2005 to 2015 and evaluated the comprehensive index value of Ningbo port economic circle development (Chen, 2017).

Sun et al. (2018) calculated the opening degree of Hainan from 1988 to 2016 by entropy method and tested the robustness by factor analysis (Sun et al., 2018). Yang (2011) used factor analysis to calculate the comprehensive score and ranking of each port economy, and the results showed that the selected indicators had a high degree of internal correlation, which could effectively evaluate and recommend the port economy (Yang, 2011).

Lan et al. (2018) believed that free trade ports should establish linkage management mechanisms within and outside the region (Lan et al., 2018). Wang (2018) proposed that the Pilot Free Trade Zone should be fully authorized to form the new impetus for reform and development, establish flexible institutional mechanisms and cultivate industrial clusters (Wang, 2018).

The innovation of this paper is as follows:

Firstly, we recognize the era characteristics of the location value of FTP, note the objective existence of the location value of free trade port and the importance and urgency of its development and utilization, and put forward the location value of FTP.

Secondly, this paper studies the development of the location value of FTP from the perspective of the location value elements system.

Thirdly, this article melts location value and development perspective, thinking and methodology of FTP into practice.

3. Evaluation Index System

This paper selects 16 indicators to establish the evaluation index system of Ningbo-Zhoushan port location value elements as shown in **Table 1**.

The basic purpose of factor analysis is to use several factors to describe the relationship between multiple indicators or factors. That is, several closely related variables are divided into the same category, and each category of variables becomes a factor. The advantage is that it can reflect most of the original data information with fewer factors. Factor analysis is a dimension reduction method, which can simplify complex factors.

Its basic idea is to express the characteristics of the original data with the sum of unmeasurable and few common factors and special factors. It has two core issues: constructing factor variables; defining factor variables and making reasonable explanations. Its main initiatives and basic ideas are generally based on the

above two. Factor analysis is widely used in the important analysis because it is scientific, and has easy and objective evaluation results.

This paper selects Ningbo-Zhoushan Port, Shanghai Port, Tianjin Port, Guangzhou Port, Shenzhen Port, Qingdao Port, Yingkou Port, Dalian Port, Fuzhou Port, and Xiamen Port for research, and summarizes the main indicators and data in Table 2.

Table 1. Evaluation index system.

Primary Indicators	Secondary Indicators	Tertiary Indicators
Location value elements	Natural location conditions	Number of berths (individual)
		Number of berths above ten thousand tons (individual)
		Annual capacity (billion tons)
		Length of berth shoreline (m)
	Production capacity	Goods throughput (billion tons)
		Container throughput (10,000 TEU)
		Foreign trade throughput (10,000 tons)
		Passenger throughput (10,000 people)
	External economic environment	Annual GDP of cities (billion yuan)
		Total urban foreign trade imports and exports (billions of USD)
		Foreign direct investment in cities (billions of dollars)
		Total Retail Sales of Consumer Goods in Urban Society (billion yuan)
	Development and competitive environment	Freight throughput growth rate (%)
		Container throughput growth rate (%)
		Urban GDP growth rate (%)
		Urban foreign trade import and export growth rate (%)

Table 2. Original values of indicators.

Port	X1	X2	X3	X4	X5	X6	X7	X8
Ningbo-Zhoushan Port	730	167	2.32	86,789	10.09	2461	42,106	325
Shanghai Port	1121	223	5.26	126,921	7.05	4023	37,797	225
Tianjin Port	160	123	4.59	37,634	5.01	1507	29,852	52
Guangzhou Port	570	80	4.13	51,722	5.9	2037	11,869	61
Shenzhen Port	155	74	2.2	30,627	2.41	2521	18,363	587
Port of Qingdao	121	84	3.13	25,859	5.1	1831	31,901	11
Yantai Port	107	68	1.66	21,734	2.88	270.2	8589	368
Dalian Port	223	104	3.2	43,956	4.55	971	13,023	548
Fuzhou Port	186	56	1.5	24,031	1.48	301	5492	15
Xiamen Port	166	76	1.78	29,309	2.11	1038	10,291	984

Data source: China Port Yearbook 2018.

Because the dimensions of the original 16 indicators data are different, we must ensure comparability of indicators for subsequent effective comparative analysis. First, it is necessary to standardize the original data, that is, to standardize the processing to remove the impact of different dimensions. The paper uses SPSS 22.0 to standardize the original index data, and the processed data are shown in Table 3.

4. Evaluation of Elements Indicators

4.1. External Economic Environment Assessment

4.1.1. Suitability Test

Before the next specific analysis, it is necessary to test the applicability of the external economic environment factor to determine whether it is suitable for factor analysis. Its KMO and Butterlit test results are shown in Table 4.

Table 3. Original values of indicators.

Port	X1	X2	X3	X4	X5	X6	X7	X8
Ningbo-Zhoushan Port	1.10133	1.17327	−.49902	1.15211	2.07112	.66841	1.59436	.02336
Shanghai Port	2.24628	2.24161	1.73403	2.33977	.91203	2.03322	1.26996	−.29236
Tianjin Port	−.56779	.33386	1.22514	−.30257	.13421	−.16516	.67182	−.83856
Guangzhou Port	.6328	−.48648	.87575	.11434	.47355	.29793	−.68203	−.81015
Shenzhen Port	−.58243	−.60094	−.59016	−.50994	−.85712	.72083	−.19313	.85056
Qingdao Port	−.682	−.41017	.11621	−.65104	.16853	.11794	.82608	−.96801
Yantai Port	−.72299	−.71541	−1.00031	−.77311	−.67792	−1.24582	−.92896	.15912
Dalian Port	−.38331	−.02862	.16938	−.11548	−.04118	−.63349	−.59515	.72743
Fuzhou Port	−.49166	−.94434	−1.12184	−.70514	−1.21171	−1.21891	−1.16212	−.95538
Xiamen Port	−.55022	−.56279	−.90917	−.54894	−.97151	−.57495	−.80083	2.10398
Port	**X9**	**X10**	**X11**	**X12**	**X13**	**X14**	**X15**	**X16**
Ningbo-Zhoushan Port	−.48089	.01814	−.39883	−.33786	.79457	1.7393	.44754	1.41295
Shanghai Port	1.90878	2.3063	1.63009	2.06086	.36588	.39209	−.17213	−.16376
Tianjin Port	.5252	−.59784	2.01363	.36676	−2.22279	−.65317	−2.44424	−.11001
Guangzhou Port	.85941	−.5187	−.2394	1.23265	.6132	.3224	−.10328	.05124
Shenzhen Port	.97285	.73245	−.08498	.13428	1.32715	−.34424	1.13606	−1.69748
Qingdao Port	−.34351	.70679	−.05731	−.35707	−.44205	−1.21063	.24098	.40959
Yantai Port	−.76859	−.86123	−.74179	−.74706	.64618	−.62994	−.44754	−1.27463
Dalian Port	−.76572	−.83811	−.62938	−.59434	−.06282	−1.23386	−.03443	1.48462
Fuzhou Port	−.79559	−.22403	−.77577	−.44197	−.40908	1.29797	1.0672	−.25335
Xiamen Port	−1.11194	−.72377	−.71627	−1.31626	−.61023	.32008	.30983	.14083

Table 4. KMO and Butterlit test.

KMO Sampling appropriateness quantity.		.765
Sphericity test of Bartlett	Last read Chi-square	24.519
	Degree of freedom	6
	Significance	.000

According to Table 4, the KMO value of the external economic environment factor is .765, and the Bartlett test shows that the significant level is less than .05, indicating that the factor is suitable for factor analysis. Through the same test, the other three factors of hairstyle affecting the location value of free trade port (natural location conditions, production and management capabilities, and development and competitive environment) are suitable for factor analysis, and the test results will no longer be displayed here.

4.1.2. Identification of Public Factors

According to the running results of SPSS 22.0, we get the total variance explanation of external economic environmental factors, as shown in Table 5.

The determination principle of common factor is generally: all components contained in eigenvalues greater than 1. In this case, the eigenvalue of component 1 is 3.124 > 1, and its variance contribution rate is 78.109%, indicating that it can reflect 78.109% of the information of the external economic environment elements, and the loss of information is relatively small. So, we select the first component as the common factor for this example. The factor load matrix is shown in Table 6.

Since only one principal component factor was extracted in this case, factor rotation was not necessary. According to the above table, the load of component 1 on the four indicators was greater than .8, which was a high level. Taking the first variable as an example, .964 represents the correlation coefficient between the total annual GDP of the city and the principal component. The factor load of total foreign trade import and export is the lowest at .803. This shows that component 1 can well explain the four variables of the total annual GDP of the city, the total import and export of foreign trade, the real amount of foreign direct investment, and the total retail sales of social consumer goods. These four indicators can also well reflect the external economic environment capacity of the free trade port.

4.1.3. Factor Scores

We calculate the factor score, factor weight is its variance contribution rate. The total score in the external economic environment evaluation can be calculated and sorted, and the results are shown in Table 7. Total score = Σ(factor score * weight).

Table 5. Total variance explanation.

module	Initial eigenvalue			Extraction of the square sum of loads		
	Total	Percentage of variance	Cumulative %	Total	Percentage of variance	Cumulative %
1	3.124	78.109	78.109	3.124	78.109	78.109
2	.509	12.724	90.833			
3	.311	7.768	98.601			
4	.056	1.399	100.000			

Table 6. Component matrix.

	module
	1
Total annual GDP of cities	.964
Total import and export of urban foreign trade	.803
Real Urban Foreign Direct Investment	.819
Total retail sales of urban social consumer goods	.938

Table 7. Port factor scores and total scores.

Port	FAC1_1	comprehensive score FAC1	ranking
Shanghai Port	2.22756	1.74	1
Tianjin Por	.64632	.5	2
Shenzhen Port	.50633	.4	3
Guangzhou Port	.43933	.34	4
Qingdao Port	−.04664	−.04	5
Ningbo-Zhoushan Port	−.34968	−.27	6
Fuzhou Port	−.63904	−.5	7
Dalian Port	−.795	−.62	8
Yantai Port	−.87716	−.69	9
Xiamen Port	−1.11203	−.87	10

The average factor score and a comprehensive score of Shanghai port, Tianjin port, Shenzhen port, and Guangzhou port are greater than zero, indicating that the external economic environment capacity of these four ports exceeds the average level. The external economic environmental capacity of the other six ports is below average. The total score of Shanghai port's external economic environment is the highest, 1.74, while Ningbo-Zhoushan port only ranks sixth, indicating that its external economic environment strength needs to be improved.

4.2. Evaluation of Natural Location Conditions

4.2.1. Determination of Public Factors

According to the operation results of SPSS22, the total variance explanation of natural location conditions is obtained, as shown in Table 8.

The determination principle of common factor is generally: all components contained in eigenvalues > 1. In this case, the eigenvalue of component 1 is 3.339, which is greater than 1, and its variance contribution rate is 83.465%, indicating that it can reflect 83.465% of the information of natural location conditions, and the loss of information is relatively small. Therefore, we select the first component as the common factor of this example. The factor load matrix is shown in Table 9.

Table 8. Total variance explanation.

Module	Initial eigenvalue			Extraction of the square sum of loads		
	Total	Percentage of variance	Cumulative %	Total	Percentage of variance	Cumulative %
1	3.339	83.465	83.465	3.339	83.465	83.465
2	.527	13.187	96.652			
3	.131	3.275	99.927			
4	.003	.073	100.000			

Table 9. Component matrix.

	module
	1
Number of berths	.946
Number of berths above ten thousand tons	.957
Annual passing ability	.755
Length of berth shoreline	.979

Since only one principal component factor is extracted from this example, it is unnecessary to rotate the factor. According to Table 9, it can be concluded that a load of component 1 on four indicators is greater than .7, and the other three are greater than .9, which belongs to a higher level. It indicates that component 1 can well explain the four variables, namely, the number of berths, the number of berths above ten thousand tons, the annual throughput capacity, and the length of the berth shoreline.

4.2.2. Factor Scores

Through the software generation factor score, the total score in the evaluation of natural location conditions can be calculated and sorted. The results are shown in Table 10.

The average factor scores and comprehensive scores of Shanghai port, Ningbo-Zhoushan port, Guangzhou port and Tianjin port are greater than zero, indicating that the natural location capacity of these four ports is above the average level. The natural location capacity of the other six ports is below the average level. Shanghai has the highest score of 1.97 in a natural location. Ningbo-Zhoushan port ranked second with a score of .73, and its ports were lower than .3, indicating that the two ports occupy an absolute advantage over other ports in natural location conditions.

4.3. Evaluation of Production and Operation Capability

4.3.1. Determination of Public Factors

According to the operation results of SPSS 22.0, the total variance explanation of production and operation ability factors is obtained as shown in Table 11.

Table 10. Port factor scores and total scores.

Port	FAC1_2	comprehensive score FAC2	ranking
Shanghai Port	2.35707	1.97	1
Ningbo-Zhoushan Port	.87337	.73	2
Guangzhou Port	.27139	.23	3
Tianjin Port	.12303	.1	4
Dalian Port	−.11239	−.09	5
Qingdao Port	−.47544	−.4	6
Shenzhen Por	−.62022	−.52	7
Xiamen Port	−.68371	−.57	8
Yantai Port	−.86275	−.72	9
Fuzhou Port	−.87035	−.73	10

Table 11. Total variance explanation.

module	Initial eigenvalue			Extraction of the square sum of loads		
	Total	Percentage of variance	Cumulative %	Total	Percentage of variance	Cumulative %
1	2.562	64.046	64.046	2.562	64.046	64.046
2	.937	23.424	87.470			
3	.345	8.637	96.107			
4	.156	3.893	100.000			

The determination principle of common factor is generally as follows: the eigenvalues of all components contained > 1. In this case, the eigenvalue of component 1 is 2.562 > 1, and its variance contribution rate is 64.046%, which shows that it can reflect 64.046% of the information of production and operation ability elements, and the loss of information is relatively small. So select the first component as the common factor for this example. The factor load matrix is shown in Table 12.

In this case, only one principal component factor was extracted, so the factor rotation was not needed. According to Table 12, the load of component 1 on the first three indicators was greater than .8, which belonged to a high level, but the load of the fourth indicator was negative. This shows that Component 1 can well explain the three variables of cargo throughput, container throughput and foreign trade throughput, and these three variables can also well show the production and operation capacity of free trade ports.

4.3.2. Factor Scores

The total score in the evaluation of production and operation ability can be obtained by calculating the score of factors by software, and the results are shown in Table 13.

Table 12. Component matrix.

	Module
	1
Cargo throughput	.905
Container throughput	.839
Foreign trade throughput	.943
Passenger throughput	−.388

Table 13. Port factor scores and total scores.

Port	FAC1_3	Comprehensive score FAC3	Ranking
Ningbo-Zhoushan Port	1.53377	.98	1
Shanghai Port	1.49954	.96	2
Port of Qingdao	.5486	.35	3
Tianjin Port	.36743	.24	4
Guangzhou Port	.13646	.09	5
Shenzhen Port	−.26655	−.17	6
Dalian Port	−.55104	−.35	7
Yantai Port	−1.01336	−.65	8
Fuzhou Port	−1.11032	−.71	9
Xiamen Port	−1.14452	−.73	10

The average factor score and a comprehensive score of Ningbo-Zhoushan port, Shanghai port, Qingdao port, Tianjin port and Guangzhou port are greater than zero, indicating that the production and operation ability of these four ports is above the average level. The other six ports are below average. Ningbo-Zhoushan Port has the highest total score of .98, which is similar to that of Shanghai Port, ranking second with a score of .96. The two ports have absolute advantages over other ports in terms of production and operation capacity.

4.4. Development and Competitive Environment Evaluation

4.4.1. Determination of Public Factors

According to the calculation results of SPSS 22.0, the total variance explanation of the development and competitive environment is obtained as shown in Table 14.

The determination principle of common factor is generally: all components contained in eigenvalues > 1. In this case, the eigenvalues of component 1 and component 2 are greater than 1, which are 1.916 and 1.144, and the cumulative variance contribution rate is 76.497%, indicating that it can reflect 76.497% of the information of development and competitive environment elements, and the loss of information is relatively small. Therefore, the first two components were selected as the common factors of this example. The factor load matrix is shown in Table 15.

Table 14. Total variance explanation.

Module	Initial eigenvalue			Extraction of the square sum of loads			The square sum of the rotation load		
	Total	Percentage of variance	Cumulative %	Total	Percentage of variance	Cumulative %	Total	Percentage of variance	Cumulative %
1	1.916	47.905	47.905	1.916	47.905	47.905	1.916	47.904	47.904
2	1.144	28.592	76.497	1.144	28.592	76.497	1.144	28.593	76.497
3	.648	16.211	92.708						
4	.292	7.292	100.000						

Table 15. Component matrix.

	Module	
	1	2
The growth rate of cargo throughput	.866	−.220
Container throughput growth rate	.572	.570
Urban GDP growth rate	.896	.035
The growth rate of total foreign trade imports and exports of port cities	−.189	.877

Usually, after the initial factor is extracted, the factor cannot be effectively explained. To make the practical significance of the factor easier to understand, the factor load matrix is rotated to change the load of each factor on each variable and make it close to the poles 0 and 1. By using the maximum variance method, the component matrix after rotation is shown in Table 16.

It can be seen from Table 16 that component 1 has a higher load on the growth rate of cargo throughput and urban GDP growth, which are .868 and .896, respectively, and the variance contribution rate of this component is 47.904%. Component 2 has the largest load on the growth rate of urban foreign trade import and export trade, reaching .876, and the variance contribution rate is 28.593%. It shows that the influence of component 1 is greater than that of component 2, and the two components jointly affect the development potential of the port.

4.4.2. Factor Scores

The score of each factor is generated by software, and the total score in the evaluation of development and competitive environment can be calculated and sorted. The results are shown in Table 17.

The average factor scores and comprehensive scores of Ningbo-Zhoushan port, Fuzhou port, Shanghai port, Guangzhou port, Shenzhen port, and Xiamen port are greater than zero, indicating that the development and competitive environmental capacity of these three ports are above the average level. The development and competitive environment camp capacity of the other three ports are below the average level. Among them, Ningbo-Zhoushan Port has the greatest development potential and is in a dominant position.

Table 16. Composition matrix after rotation.

	Module	
	1	2
Growth rate of cargo throughput	.868	−.216
Container throughput growth rate	.569	.572
Urban GDP growth rate	.896	.039
The total growth rate of urban foreign trade imports and exports	−.193	.876

Table 17. Port factor scores and total scores.

Port	FAC1_4	FAC2_4	Comprehensive score FAC4	Ranking
Ningbo-Zhoushan Port	.93912	1.81524	.97	1
Fuzhou Port	.72348	.56682	.51	2
Shanghai Port	.9	−.00488	.43	3
Guangzhou Port	.31971	.08027	.18	4
Shenzhen Port	1.20445	−1.68869	.09	5
Xiamen Port	−.0514	.39407	.09	6
Dalian Port	−.56162	.53237	−.12	7
Port of Qingdao	−.48775	−.19888	−.29	8
Yantai Port	.02775	−1.42923	−.4	9
Tianjin Port	−2.33183	−.06708	−1.14	10

4.5. Comprehensive Evaluation

To get an overall evaluation of the location value elements of Ningbo-Zhoushan port, it is necessary to combine and synthesize the evaluation of each port in the natural location conditions, production and operation ability, external economic environment and development and competition environment, and get the summary score as shown in Table 18.

4.5.1. Determination of Public Factors

According to the results of SPSS 22.0, the total variance of port location value is explained as shown in Table 19.

In this case, the eigenvalues of Component 1 and Component 2 are greater than 1, which are 2.554 and 1.072, and the cumulative variance contribution rate is 90.659%, indicating that he can reflect 90.659% of the information of the location value of the free trade port, and the loss of information is relatively small. The factor load matrix is shown in Table 20.

To understand the practical significance of factors more easily, it is necessary to rotate the factor load matrix to change the load of each factor on each variable and make it close to the poles 0 and 1. By using the maximum variance method, the factor load matrix after rotation is shown in Table 21.

Table 18. Port location value summary score table.

Port	FAC1	FAC2	FAC3	FAC4
Ningbo-Zhoushan Port	−.27	.73	.98	.97
Fuzhou Port	−.5	−.73	−.71	.51
Guangzhou Port	.34	.23	.09	.18
Shanghai Port	1.74	1.97	.96	.1
Shenzhen Port	.4	−.52	−.17	.09
Xiamen Port	−.87	−.57	−.73	.09
Dalian Port	−.62	−.09	−.35	−.12
Port of Qingdao	−.04	−.4	.35	−.29
Yantai Port	−.69	−.72	−.65	−.4
Tianjin Port	.5	.1	.24	−1.14

FAC1, FAC2, FAC3, and FAC4 are used as new variables for factor analysis to obtain the comprehensive location value of each port.

Table 19. Total variance explanation.

module	Initial eigenvalue			Extraction of the square sum of loads			The square sum of the rotation load		
	Total	Percentage of variance	Cumulative %	Total	Percentage of variance	Cumulative %	Total	Percentage of variance	Cumulative %
1	2.554	63.862	63.862	2.554	63.862	63.862	2.541	63.536	63.536
2	1.072	26.797	90.659	1.072	26.797	90.659	1.085	27.122	90.659
3	.243	6.069	96.727						
4	.131	3.273	100.000						

Table 20. Component Matrix.

	module	
	1	2
Comprehensive score FAC1	.879	-.316
Comprehensive score FAC2	.955	.068
Comprehensive score FAC3	.923	.084
Comprehensive score FAC4	.138	.980

Table 21. Component Matrix after rotation.

	module	
	1	2
Comprehensive score FAC1	.905	−.232
Comprehensive score FAC2	.944	.158
Comprehensive score FAC3	.911	.170
Comprehensive score FAC4	.046	.988

Table 22. Port factor scores and total scores.

Port	FAC1_5	FAC2_5	Comprehensive score FAC5	Ranking
Shanghai Port	2.21	−.01337	1.4	1
Ningbo-Zhoushan Port	.67523	1.93847	.95	2
Guangzhou Port	.29999	.21602	.25	3
Shenzhen Port	−.13895	−.06897	−.11	4
Port of Qingdao	.01858	−.44999	−.11	5
Tianjin Port	.47881	−1.97977	−.23	6
Dalian Port	−.5229	−.05639	−.35	7
Fuzhou Port	−.97553	.79161	−.41	8
Xiamen Port	−1.07025	.23993	−.61	9
Yantai Port	−.97497	−.61754	−.79	10

It can be seen from the above table that component 1 has a higher load on FAC1, FAC2, and FAC3, which are .905, .944, and .911, respectively. The variance contribution rate of this component is 63.536%. The maximum load of component 2 on FAC4 was .988, and the variance contribution rate was 27.122%. It shows that the influence of component 1 on location value is greater than that of component 2, and the two components jointly affect the location value of the port.

4.5.2. Factor Scores

Through the software generation factor score, the total score in the port location value evaluation can be calculated and sorted, as shown in Table 22.

The average score of each port factor and the comprehensive score is 0, if the score is greater than zero, it shows that the location value is above the average level. Otherwise, it indicates that its locational value is below average. It can be seen from Table 22 that Ningbo-Zhoushan Port takes the second place with a comprehensive score of .95, which has a high score on the second principal component representing the development and competitive environment and has obvious advantages. However, the score is at a disadvantage in the first principal component representing natural location conditions, production and operation capabilities, and external economic environment.

5. Conclusion

Ningbo-Zhoushan port has some advantages over other ports in natural location conditions, production and operation capacity, development, and competitive environment conditions, while the external economic environment is in the reciprocal position.

The construction of port infrastructure should be strengthened, and government departments should increase capital investment in the construction of port facilities and equipment to achieve the integration of logistics transportation,

transportation insurance, and ship maintenance. However, it should follow the principle of balanced economic development and ecological balance, and it is necessary to make good planning and rational use of natural resources to enhance the carrying capacity of ports. Ningbo-Zhoushan Port should provide more bulk transit services, accelerate investment attraction, attract international suppliers, and enhance the location value of the port.

Ningbo-Zhoushan port should speed up the construction of port electronic information, improve the utilization rate of berths, update terminal equipment, and develop more effective methods to improve the efficiency of terminal operation. Ningbo-Zhoushan Port should actively introduce corresponding supporting policies, innovate its management system, attract world-class large enterprises to invest in the port or set up regional headquarters, and build a one-stop service system port area for trade, transportation, and customs declaration services.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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