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Impact of Ningbo Port Logistics on Regional Economic Development of Zhejiang Province

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Abstract In related academic circles, the research on port logistics industry and regional economic development has become a hot topic in recent years, and there are already extensive studies about this topic. Taking Ningbo Port as an example, this paper analyzed its logistics development status, and discussed the existing problems. Besides, taking the time series data of Ningbo Port from 2007 to 2016 as sample data, and using the quantitative analysis methods such as correlation analysis and regression analysis, it systematically studied the interaction between the port development and regional economic development. Finally, on the basis of the problems, it came up with some recommendations.

Key words Port logistics, Regional economic development, Impact, Empirical study

1 Introduction

1.1 Background With the acceleration of economic globalization, the logistics industry has gradually emerged in economic development, and port logistics in the logistics industry has become an essential part of the global economic supply chain. The port functions have been gradually improved. Port has changing from a single loading and unloading place to a trade development booster, and it plays a great role in driving the economic development. In 2015, Zhejiang Province issued the *13th Five-Year Plan for the Development of Zhejiang Ocean Ports*, which proposes that Zhejiang Province's rapid development largely depends on the advantage of being close to the ocean. Since the port logistics is part of the marine economy, making effort to build the functional platform for the port economy is favorable for promoting the common development of port logistics and economy. While the logistics industry promotes regional economic development, the regional economy also drives the development of the logistics industry. The rapid economic development has laid a material foundation for the development of the logistics industry, which reflects the interrelationship between the port logistics economy and regional economic development.

With many years of development, Ningbo Port has made remarkable achievements, and the rapid development of the logistics industry has also attracted wide attention. Ningbo Port has many natural advantages, such as abundant deep water resources. Its own strength has fully met the conditions for competing for a world-class deep water hub.

1.2 Study significance Through collecting extensive studies and references, we first made clear the study space. Then, we conducted an in-depth analysis, studied their correlation, to further deepen the theory of logistics industry and regional economic development. We made clear the concept system of port logistics,

to provide a theoretical support for regional logistics development. This paper studies the relationship between Ningbo Port logistics and regional economic development of Zhejiang Province. Since Zhejiang Province takes a great position in the economic status, it is expected to provide a reference for the development of economic development and logistics development in other regions.

2 Empirical test

2.1 Variables

2.1.1 Explained variables: Gross domestic product GDP (Y) is a widely accepted variable for measure of economic growth. Thus, we referred to the processing methods of the literature and took GDP of Zhejiang Province as a measure of economic growth.

2.1.2 Explanatory variables: Cargo throughput (X_1), logistics industry (X_2), total volume of import and export trade (X_3).

2.2 Data source In this study, we took the time series data of Ningbo City from 2007 to 2016 as samples, in which GDP data were selected from the *Statistical Yearbook of Zhejiang Province* (2007–2016); the data of port cargo throughput was derived from the *Traffic Statistics Yearbook of Ningbo City*; the added value of logistics industry and total volume of import and export trade data were selected from the *Statistical Yearbook of Ningbo City*. Generally, there is a certain relationship between the port cargo throughput, the added value of logistics industry, the total volume of import and export trade, and the GDP. The higher the first three variables, the higher the GDP. Through analysis on the collected logistics data of Ningbo Port and regional economic data of Zhejiang Province, we obtained the statistical results (Table 1).

2.3 Regression results We imported the port logistics indicators and regional economic indicators into SPSS software to conduct the linear regression analysis. The output results are as follows. The R^2 of the model was 0.965, and the adjusted R^2 was 0.948, which is close to 1, indicating that the linear fitting is good. The Durbin Watson test reports a test statistic, with a value of 2.032, close to 2, indicating that there is no autocorrelation. According

Table 1 Statistical data of Ningbo Port logistics and regional economic development of Zhejiang Province during 2007 – 2016

| Year | $Y//10^8$ yuan | $X_1//10^4$ t | $X_2//10^8$ yuan | $X_3//10^8$ yuan |
|------|----------------|---------------|------------------|------------------|
| 2007 | 18 754.40 | 33 467.53 | 110.99 | 2 450.89 |
| 2008 | 21 463.89 | 36 997.14 | 112.48 | 3 073.24 |
| 2009 | 22 990.22 | 38 456.66 | 113.48 | 3 115.13 |
| 2010 | 27 722.58 | 41 277.79 | 157.28 | 5 639.47 |
| 2011 | 32 319.19 | 43 219.94 | 179.42 | 6 028.77 |
| 2012 | 34 665.15 | 45 322.90 | 188.99 | 6 144.52 |
| 2013 | 37 757.28 | 51 434.71 | 190.30 | 6 237.87 |
| 2014 | 40 154.59 | 52 646.44 | 211.77 | 6 403.46 |
| 2015 | 42 886.33 | 51 004.55 | 222.09 | 6 390.19 |
| 2016 | 46 485.57 | 92 209.24 | 281.67 | 6 334.14 |

to Table 2, the F statistic of the model was 55.328, the sig value was 0.000, and the critical value was less than 0.05, indicating that the regression model is significant. According to Table 3, the t -test statistic of cargo throughput was 3.407, sig was 0.014, less than the critical value of 0.05, and it enters the model; the t -test statistic value of the added value of the logistics industry was 2.406, sig was

Table 3 Linear coefficient of the port logistics and regional economy

| Mode | Nonstandardized coefficients | | Standardized coefficients Beta value | Collinearity statistics | | | |
|---|------------------------------|------------|--------------------------------------|-------------------------|-------|-----------|-------|
| | B | Std. error | | t | sig | Tolerance | VIF |
| Constant | 1.949 | 1.106 | – | 1.762 | 0.128 | | |
| Cargo handling capacity | 0.402 | 0.118 | 0.363 | 3.407 | 0.014 | 0.511 | 1.956 |
| Added value of logistics industry | 0.129 | 0.075 | 0.137 | 2.406 | 0.032 | 0.919 | 1.088 |
| Total volume of import and export trade | 0.559 | 0.086 | 0.675 | 6.513 | 0.001 | 0.541 | 1.849 |

2.4 Results and analysis Through analyzing the results of the linear regression model, it can be known that the regression coefficients of GDP and cargo throughput, added value of logistics industry, and total volume of import and export trade are 0.402, 0.129, and 0.559, respectively, all are positive values, showing a positive correlation. The changes in the regional economy of Zhejiang Province and Ningbo Port logistics are basically consistent with each other, showing very obvious relationship of coordinated development. Port logistics play a great role in promoting the regional economic development, and the regional economic development of Zhejiang Province has also played a good role in promoting the development of Ningbo port logistics. The relationship between the two shows a coordinated one.

3 Recommendations for coordinated development between Ningbo Port logistics and regional economy of Zhejiang Province

3.1 Measures based on interactive development of regional economy

3.1.1 Adjusting the urban development planning. From the above analysis, we can know that the regional economic development is very important in the overall economic planning, and it is closely connected with the coordinated development of port development and regional economy. In the urban planning of Zhejiang coastal cities, the integration project from Ningbo Port to Zhoushan Port can be utilized to plan the urban belt around the sea and form

0.032, less than the critical value of 0.05, and it enters the model; the t -test statistic of total volume of import and export trade was 6.513, sig was 0.001, less than the critical value of 0.05, and it enters the model; the constant t -test statistic was 1.762, the sig was 0.128, greater than the critical value of 0.05, and it does not enter the model. In addition, the VIF values were all less than 2, which is much smaller than the critical value of 10, indicating that there is no multicollinearity. Therefore, the final regression model is: $Y=0.402X_1+0.129X_2+0.559X_3$, where Y denotes the GDP, X_1 denotes the cargo throughput, X_2 denotes the added value of logistics industry, and X_3 denotes the total volume of import and export trade.

Table 2 Linear regression analysis of variance of the port logistics and regional economic development

| Mode | Sum of squares | df | Mean Square | F | sig |
|------------|----------------|------|-------------|--------|-------|
| Regression | 0.848 | 3 | 0.283 | 55.328 | 0.000 |
| Residual | 0.031 | 6 | 0.005 | | |
| Total | 0.879 | 9 | | | |

a new urban belt. Besides, it is recommended to seize the opportunity to make rational planning based on regional economic development, expand on the urban framework, and accelerate the construction of international port cities with modern characteristics. In addition, in the overall development of Ningbo, it is recommended to learn from Shanghai's development mode, integrate resources in the surrounding areas, and rationally optimize the overall structure of the city. These measures can play a certain role in the regional economy and promote the regional economic development.

3.1.2 Strengthening the support of industrial policies for coastal cities. According to the above analysis, a very important part of the development of the port economy is the support for the regional economy. Besides, the support of related industrial policies and strategies is a very important driving force. With the acceleration of the coastal economic development, relevant departments of Zhejiang Province should attach important to the development of Ningbo Port to Zhoushan Port and strengthen support for related industries. For example, it is recommended to establish an industrial park to support the healthy development of the project. In addition, it is also recommended to reduce the taxation of related industries from the perspective of taxation, formulate corresponding favorable policies, and provide the space for emerging industries and enterprises.

3.1.3 Adjusting scientific and technologies policies. From the above analysis, it can be known that the port development is closely related to the support of regional emerging technologies. As it is said that science and technology are the primary productivity, un-

der the tide of economic globalization, the level of science and technology has become the core competitiveness of a company or even a country. The development of a modern port is also inseparable from the support of science and technology. For example, both communication technology and navigation technology play an important role in the port development. The regional economy should learn from this idea, focus on promoting the research and development of various high-tech and advanced technologies, and keep moving forward to solve the three major problems encountered in port development: port facility modernization, port industry integration and port management modernization. Furthermore, it is recommended to strengthen the talent strategy, cultivate high quality professional personnel, and attract them to join the development and construction of the port.

3.2 Measures for Ningbo Port development based on interactive development

3.2.1 Accurately positioning the functions. It can be seen from the above analysis that the port line along the port from Ningbo Port to Zhoushan Port has a great impact on the development of the regional economy, especially, the export volume of containers has a significant driving effect on GDP. In addition, the export of this area along the line has also developed rapidly, bringing considerable returns to the development of the regional economy, and realizing the development of emerging enterprises. Moreover, the development of this area also exerts a significant impact on the industrial structure of the regional economy, and promotes the development of emerging industries of surrounding areas to a great extent. All the above demonstrate that only the port and regional economy develop in a coordinated manner, may both realize better development. Thus, it is recommended to make accurate positioning for the port development on the basis of the overall economic situation of Zhejiang Province, so as to promote various functions of containers by every means.

Ningbo Port is rich in natural resources and has unique advantages. However, it is worth noting that after years of use and development, the natural resources along the coast have been consumed too much, and there are few good ports that can continue to be developed. What's more, the natural resources of the coastline that have not yet been developed are subject to various constraints, such as the limitation of water conditions and the limitation of marine functions, leading to a series of unavoidable problems such as increasing difficulty in development and rising costs. For these problems, it is recommended to make every effort to promote the alliance and cooperation of different ports, to make up for the defects of limited development space, so as to realize healthy and sustainable development of port clusters.

3.2.2 Accelerating the establishment of a cross-border supply chain service center. As time goes by, we have already entered the 21st century, and technology is highly developed. The 21st century is an era of rapid development of the Internet. With the globalization of the Internet, e-commerce has also emerged and it is accelerating the process of global integration. At present, the development of port logistics also needs to cater to the trend of the times, join the pace of Internetization, and seek new directions for the development of the industry. For example, it is recommended to es-

tablish the data exchange center to share the logistics of supply chain of all parties. Besides, it is recommended to establish a cross-border network service center to realize a comprehensive business communication platform. Under the support of this new platform, port logistics can realize a brand new online Silk Road and achieve a completely new development. This not only effectively guarantees the comprehensive service, but also is helpful for establishment of a cross-border bonded warehouse.

4 Conclusions

The development of the port is crucial to the economic development of a region. Since the proposal of the Belt and Road Initiative by President Xi Jinping, people have started to focus on the port development. In the 21st century of economic globalization and Internet globalization, the strategic construction of maritime trade is very important to a country or even the international situation, and is also an inevitable and important step. The development of a port will drive the development of the surrounding areas and even drive the national economic development. As the mainland port with the largest cargo throughput in China, Ningbo Port takes a very important position in China, and it has great promoted economic development of the surrounding areas. Taking Ningbo Port as the research object, using relevant quantitative analysis methods, we made an in-depth study of the relationship between the development of Ningbo Port and the surrounding regional economy. Finally, we came up with some recommendations, in the hope of providing certain references for the development of Ningbo Port and regional economy.

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