Analysis on the Level and Strategy of Port-City Interation Development in Xiamen

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ABSTRACT: The relationship between port and city economy becomes more closely under the trend of world economic integration, Ports play a significant role in promoting the urban economic development. At the same time, the development of urban economy also brings strong support for the development of ports. Correlation analysis and regression analysis were used to analyze Xiamen harbor city interaction development level, then put forward some development strategies for the existing problems. It may have some reference significance to achieve "Beautiful Xiamen" strategic planning.

KEYWORD: Correlation analysis; Regression analysis; Economic contribution; Interactive development

1 GENERAL INSTRUCTION

The relationship between harbor and city much affects the development of port city and it runs through out the process of the development. To a certain extent, the level of interactive develop represents the development of port city (Ma 2014). With the pace of the construction of the southeast international shipping center continues to accelerate, and the strategic planning of "Beautiful Xiamen" which was put forward by Xiamen government, brings lots of favorable opportunities. Analysis on the level of interactive development and research on the development strategies of port city of Xiamen is conducive to promoting the formation of good interactive effect between port and city, then realize the sustainable development of port city.

2 GENERAL SITUATION OF DEVELOPMENT

2.1 *Development of port*

Xiamen port is one of the major coastal ports in china, and a container hub port. It also plays an important role in transportation to Taiwan. At present, there are 143 productive berths in Xiamen port, and 63 berths have the capacity of over 10 thousand tons. Container, oil, coal and other special terminals are all included. There are 183 containers shipping lines in Xiamen port and monthly flights are up to 944. In 2013, the cargo throughput of Xiamen port achieves 1.91tons, with an increase of 10.8%, the container throughput runs up to 8007900 TEUs, with a growth of 11.2%.
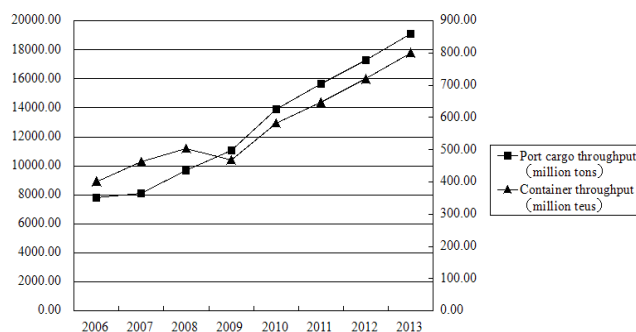

Figure 1. 2006-2013 the change of port cargo throughput and container throughput.

2.2 *Development of city*

Since the reform and opening up, Xiamen, which is the only special economic Zone on the Western Coast of the Taiwan Strait and has some policy advantages, has become the frontier on Taiwan cooperation, the southeast coastal regional shipping center, logistics center, trade center and financial center.

In 2013, the regional GDP of Xiamen reaches 3018.16 billion yuan, according to comparable prices, increases 9.4% than last year. The added value of primary industry, secondary industry and tertiary industry was respectively 2.599 billion, 143.479 billion and 155.738 billion yuan. In addition, the comprehensive competitiveness of Xiamen ranks fifth in the top 100 global trade city

list. In 2013, total value of foreign trade import and export in Xiamen port up to 840.94 billion dollars, with a growth of 12.9% over the last year. Xiamen city exports 523.54 billion and imports 317.40 billion dollars.
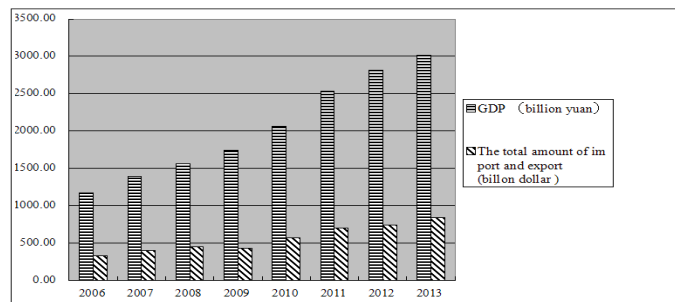

Figure 2. 2006-2013 the change of the xiamen GDP and import and export volume.

3 ANALYSIS OF PORT-CITY INTERGRATION DEVELOPMENT

3.1 *The selection of methods and indexes*

The input-output analysis method is applied to analysis the quantity relationship between input and output in specific economic system. When the input-output table is difficult to obtain, it's more suitable to use correlation analysis and regression analysis to study the mathematical relationship between two complex system. Due to above characteristics of the system between port and city, this article will use the methods of correlation analysis and regression analysis (Zhang 2003).

The area which this paper studied refers to the whole city range of Xiamen. Based on the principle of representative, comprehensive, and the availability of correlation, finally selected 17 city economic indicators as follows (Chen 2011): the regional GDP U1, the first, second, third industrial GDP U2, U3, U4, and industry, agriculture, construction industry, transportation and telecommunication, wholesale food and beverage industry's GDP U5,U6,U7,U8, U9, U10 and reflects the overall situation of freight transportation indexes, such an freight turnover U11, waterway freight volume of U12, reflects the retail industry overall situation index: the total retail sales of consumer goods U13, the total import and export U14, imports U15, exports U16, the total investment in fixed assets U17. There are 15 port indicators,

cargo throughput P1, container throughput P2, foreign trade cargo throughput P3, domestic trade cargo throughput P4, coal and its products P5, petroleum and natural gas P6, metal ore P7, iron and steel P8, mineral building materials P9, chemical raw materials and products P10, wood P11, nonmetal ore P12, light industry, pharmaceutical products P13, mechanical equipment, appliances P14 and foods P15.

3.2 *Quantitative analysis of port-city interactive development*

3.2.1 *Correlation analysis*

Correlation analysis was done between 17 city economic indicators selected and 15 port economic indicators, the correlation matrix can be obtained of each index. The coefficient of correlation, Pearson's

$$r = \frac{1}{n-1} \sum_{i=1}^{n} \left(\frac{Xi - \bar{X}}{S_X} \right) \left(\frac{Yi - \bar{Y}}{S_Y} \right)$$

The greater r is, the stronger relationship becomes. After correlation analysis on the indexes of 2006-2013, according to the experience explore whether there is a causal relationship between the indexes which have great correlations. Then combined with the characteristics of Xiamen and select the indexes of port and city, which have high degree of correlation and causality, shown in the following table.

Table 1. Correlation matrix

	P1	P2	P3
U1	0.993	0.975	0.992
U14	0.99	0.998	0.996

3.2.2 *Regression analysis*

In order to know the mathematical relations of the economic influences which port affects on the city, firstly we need to analysis the contribution that port made to general urban economy (Wan 2014). Based on this idea, data of the general urban economic output GDP (U1) and cargo throughput P1, container throughput P2 were analyzed by using multiple stepwise regressions.

Table 2. Regression coefficient of P1-U1

Model	Nonstandardized coefficient		Standardized coefficient	t	Sig.
	B	Standard error			
Constant	2428676.504	473401.114		5.130	0.000
Port cargo throughput	1414.751	50.339	0.993	28.104	0.000
a. The dependent variable: GDP					

Then regression equation was obtained:

Table 3. Regression model (1)

Regression model (1)	The parameter value
U1 = 2428676.504 + 1414.751P1	R = 0.993, R^2 = 0.985 P < 0.0001

Correlation analysis on Xiamen foreign trade import and export value and Xiamen port cargo

Table 4. Regression coefficient of P3-U14

Model	Nonstandardized coefficient		Standardize coefficient	t	Sig.
	B	standard error			
Constant			0.996		
	-80574.107	120556.858		-0.668	.518
Foreign trade throughput	855.179	24.384		35.072	.000

The regression equation can be obtained.

Table 5. Regression model (2)

Regression model (2)	The parameter value
U14= -80574.107 + 855.179P3	R= 0.996, R^2= 0.991 P < 0.0001

In addition, the demand for transportation is a derived demand, which is closely related to the general economic conditions (Lin 2012). Especially the development of foreign trade has a vital influence on international container transportation. Xiamen port container throughput P2 and Xiamen foreign trade import and export U14 also showed a high correlation and the correlation coefficient is 0.988. Through curve and linear regression analysis we can see the chart as follow:

Figure 3. Curvilinear regression of P2-U14

Obviously, the effect of the quadratic regression is better than that of linear regression. We can got the quadratic regression equation (3).

throughput, container throughput, the total amount of foreign trade cargo throughput shows that Xiamen foreign trade import and export value and Xiamen port cargo throughput as well as the total amount of foreign trade cargo throughput manifested a high degree of correlation, correlation coefficient up to 0.990 and 0.996. A further step-wise regression analysis on the two related indicators, we can get the regression equation.

Table 6. Regression model (3)

Regression model (3)	The parameter value
P_2= (-6.684E-12) U^2_{14} - 25.452	R=0.998, R^2=0.995 P < 0.0001

3.3 *The analysis of calculation results*

From the correlation analysis and regression analysis above we can see the port development not only brings out direct economic benefits, but also is the pulling effect of industry before and after contacting on the city economic growth. Regression model one shows that the variable P2 is removed in the process of step-wise regression analysis. It means that port cargo throughput has greater stimulating effect to city total economy than container throughput, and the increase of port cargo throughput has a better reflection on the city economic growth. The coefficient of determination shows that variation of Xiamen port cargo throughput can explain 98.5% of variation of GDP. In addition, every ton increase in the total cargo throughput, city GDP will increase 1414.751 yuan.

In regression model (2), the variable P1 is removed. It means that import and export volume are closely related to foreign trade cargo throughput. We can know that one ton growth of foreign trade throughput will bring 855.179 dollars increase in import and export volume. Therefore, Xiamen should develop international container transport actively, and promote the development of foreign trade.

It can be seen in regression equation(3) that there is a two function relationship between Xiamen foreign trade development and the container throughput. The slope of the curve decreasing means the promoting effect which economic development brings to container throughput growth has a trend of decline. This also suggests that economic benefits of
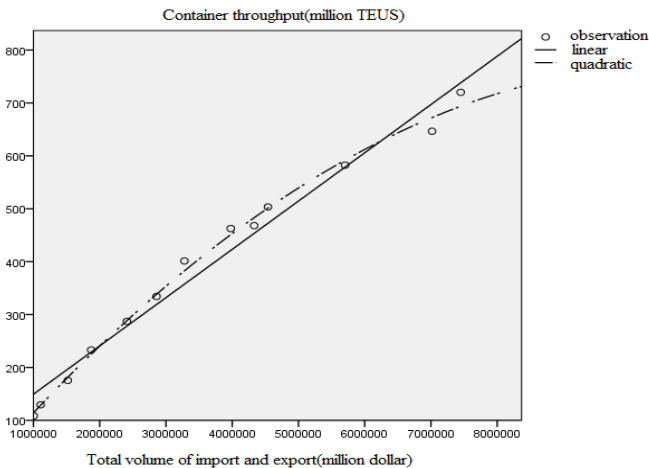
each container throughput in Xiamen presents ascendant trend.

4 PROBLEMS AND DEVELOPMENT STRATEGIES

4.1 *The existing problems*

Deducted from the analysis above, there still exist some shortcomings in Xiamen port, and in interactive development among cities.

First of all, the port pulling function on the urban economy is not obvious, and lack of interaction between port and city (Wang 2014). With every ton increase in the total cargo throughput of Xiamen port, the urban GDP only increases 1414.751RMB. Compared to Shanghai's 4020RMB growth per unit, there still remains a certain gap between them.

Secondly, the driving roll of foreign trade to the development of container transport shows a downward trend (Li 2006). On one hand, it is due to Xiamen port economic hinterland limits, on the other hand, it is also affected by the trade from low value-added to high value-added transformation.

Finally, the scope of port and city interaction still needs further expansion. Currently, the interaction between city and port of Xiamen mainly limited itself. Interactive forms are mainly confined to port and industry, port and city, etc. Interactive way is not enough diversity.

4.2 *Recommended development strategies*

Firstly, develop high-end shipping industry, and enhance the added value of the shipping economy. Xiamen should focus on the development of finance, trading, shipping insurance, ship maritime arbitration and other high-end shipping service with high-added value (Li 2014). Actively cultivate and perfect shipping service system and improve the port's contribution to the city.

Secondly, strengthen the interaction between the port and the surrounding city and expand the scope of interaction. Xiamen should give full play to its advantages, actively strengthen the cooperation with Sanming, Longyan and other inland dry ports, and build one-stop international logistics public service platform for the enterprise, then strengthen Xiamen's economic hinterland.

Thirdly, develop cruise economy (Bei 2010). Xiamen has lots of tourism resources and advantages of develop cruise economic, and it's an environmental protection and sustainable way for urban development.

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