

World Maritime University

The Maritime Commons: Digital Repository of the World Maritime University

World Maritime University Dissertations

Dissertations

7-18-2009

The study on strategy of enhancing the competitiveness of ports in Yantze Delta Area

Ying Han

Follow this and additional works at: https://commons.wmu.se/all_dissertations



Part of the [Business Analytics Commons](#), [Marketing Commons](#), [Strategic Management Policy Commons](#), and the [Transportation Commons](#)

Recommended Citation

Han, Ying, "The study on strategy of enhancing the competitiveness of ports in Yantze Delta Area" (2009). *World Maritime University Dissertations*. 1971.
https://commons.wmu.se/all_dissertations/1971

This Dissertation is brought to you courtesy of Maritime Commons. Open Access items may be downloaded for non-commercial, fair use academic purposes. No items may be hosted on another server or web site without express written permission from the World Maritime University. For more information, please contact library@wmu.se.



WORLD MARITIME UNIVERSITY

Shanghai, China

ITL – 2009

The Study on strategy of enhancing the competitiveness of ports in

Yangtze Delta Area

By

Han Ying

China

A research paper submitted to the World Maritime University in partial

Fulfillment of the requirements for the award of the degree of

MASTER OF SCIENCE

In

INTERNATIONAL TRANSPORT AND LOGISTICS

@Copyright Han Ying, 2009

DECLARATION

I certify that the below work is my own account and that all sources of material contained in this paper are true. No part of the work is a quotation from published or unpublished sources, except where this has been clearly acknowledged.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

(Signature): _____

(Date): _____

Supervised by

Professor Zong Peihua

Shanghai Maritime University

Assessor:

World Maritime University

Co-Assessor:

Shanghai Maritime University

ACKNOWLEDGEMENT

First, I'm very thankful to the World Maritime University and Shanghai Maritime University for the chance to study international transportation and logistics.

It's impossible for me to finish this work without support from many people and institutions. I feel deeply grateful to my supervisor-Professor Zong Peihua for her patient instruction and insightful comment on my work. Very special thanks go to port authorities and agencies of Shanghai Port, Ningbo Port, Zhoushan Port Zhenjiang Port and Suzhou Port for their data supply.

Third, I'm thankful to Mr. Liu Tongan, Ms. Zhou Yingchun, Ms. Hufangfang and all the others who working in the administration office. They give me so much help both in study and in daily life. I am also grateful to all the professors who gave us excellent class and share the profound knowledge. More over, I would like to thank all my classmates whoever give me so much care during the two years.

Finally, I would like to show my indebtedness to my beloved parents, who offered me full support and always encourage me during the whole studies in Shanghai.

Abstract:

The world economy changed a lot due to the international redistribution of labour and capital, and the process of integration and globalization of markets. The market developments in the world have great effect on the seaports while modern seaports- evolving from transport centers to complex logistic and industrial centers- play important role in the world trade. Ports are at the forefront of trade facilitators propelling one country's economic growth and linkage to the world. They play a strategic role that is crucial to the nation's economic well-being.

The port development cannot follow the development of the economy. But now too many ports cannot be fully used in the economy depressed period. However, we are facing the coming World Expo which is held in Shanghai in 2010. How to operate our ports under such changeable world is the problem we studied in this essay. It's therefore crucial that stakeholders involved in ports seriously focus their efforts to enhance the competitiveness of their ports.

Key words: port competitiveness, port development, cooperation, coordination strategy.

TABLE OF CONTENTS

DECLARATION	II
ACKNOWLEDGEMENTS	III
Abstract	IV
List of Tables	VIII
List of Charts	IX
Chapter 1 The Introduction of the Thesis	1
1.1 Research background	1
1.2 Literature review	2
1.2.1 Port competition pattern	2
1.2.2 Researches on port cooperation	5
1.2.3 Application of AHP and SWOT methodology	6
1.3 The framework and content of this dissertation	8
1.4 Research Methodology	9
Chapter 2 Analysis of the Status of the Port Industry in Yangtze Delta Area	10
2.1 The analysis of throughput of port operation in the Yangtze Delta Area	11
2.2 Analysis of main ports operation in YDA	15
2.3 Characteristics of the Port Development in the YDA	18
2.3.1 Characteristics of container port development in Yangtze Delta Area	18
2.3.2 Characteristics of bulk and crude oil port development in Yangtze Delta Area	19

2.4 Summary	21
Chapter 3 Application of AHP in port market competition in YDA ..	23
3.1 The analysis of factors affecting port market competition	23
3.1.1 External factors	23
3.1.2 Internal factors	24
3.1.3 Social factors	27
3.2 The analysis of the competitive power of the ports in YDA	28
3.2.1 Building of evaluation index system	28
3.2.2 Evaluation of 16 ports in YDA by AHP	31
3.3 Analysis of the evaluation results	32
3.4 The weaknesses of the ports in YDA	33
3.4.1 Redundant construction and disorderly competition	33
3.4.2 Ineffective implementation of new plan	33
3.4.3 Environmental pollution	34
3.4 Summary	34
Chapter 4 The strategy to enhance the ports competitive power in YDA	36
4.1 Application of SWOT method in analysis of the port competitiveness in YDA	36
4.2 The strategies to enhance the competitiveness in YDA	42
4.2.1 Optimize the competition market environment	42
4.2.2 Speeding up the informationization in YDA	43

4.2.3 Integration and cooperation among ports in YDA	43
4.3 The significance of strengthen ports competitive power in YDA	45
4.4 Summary	46
Chapter 5 Conclusion	47
References	48

List of tables

Table 2.1 Economic Operation of Ports in Yangtze Delta Area.....	11
Table 2.2 The throughput of 3 provinces in Yangtze River Delta.....	13
Table 2.3 Throughput of each ports in YDA(2007-2008).....	14
Table 2.4 Container throughput of each port in YDA(2006-2008).....	18
Table 2.5 Bulk and crude oil throughput of port in YDA (2006-2008).....	20
Table 3.1 The weight of all indexes in evaluating of port competitiveness.....	30
Table 3.2 The research result of port competitiveness.....	31
Table 4.1 SWOT matrix for Shanghai port.....	36
Table 4.2 SWOT matrix for Lianyungang port.....	36
Table 4.3 SWOT matrix for Ningbo port.....	37
Table 4.4 SWOT matrix for Zhoushan port.....	37
Table 4.5 SWOT matrix for Wenzhou port.....	37
Table 4.6 SWOT matrix for Nanjing port.....	38
Table 4.7 SWOT matrix for Zhenjiang port.....	38
Table 4.8 SWOT matrix for Nantong port.....	39
Table 4.9 SWOT matrix for Suzhou port.....	39
Table 4.10 SWOT matrix for Jiangyin port.....	40
Table 4.11 SWOT matrix for Yangzhou port.....	40
Table 4.12 SWOT matrix for Jiaxing port.....	40
Table 4.13 SWOT matrix for Taizhou port.....	41
Table 4.14 SWOT matrix for Xuzhou port.....	41

List of charts

Chart 2.1 Port distribution in Yangtze River Delta	10
Chart 2.2 Economic operation of ports in YDA	12
Chart 2.3 Throughput of each port in YDA in past 3 years	14
Chart 2.4 Container volumes in each port in YAD from the year 2006 to 2008	18
Chart 2.5 Throughput of Bulk and Crude oil of Shanghai port in 2007 and in 2008	20
Chart 2.6 Throughput of Bulk and Crude oil of ports in Zhejiang in 2007 and in 2008	20
Chart 2.7 Throughput of Bulk and Crude oil of ports in Jiangsu in 2007 and in 2008	20
Chart 3.1 AHP model applying in port competitiveness	29

Chapter 1 The Introduction of the Thesis

1.1 Research Background

Yangtze River Delta is one of the port intensive areas in China. Rapid development of Port cluster in Yangtze Delta Area is conducive to the promotion of speed economic growth along YDA. The throughput of ports in YDA took up 45% of the total national throughput. Among these ports Shanghai port is the third biggest integrated port in the world wide while its scale is the biggest.

The ports in Yangtze Delta Area (YDA) compete intensely for the resourced hinterland, repetitively constructing infrastructures and facilities, although the economic integration is put forward on YDA. The unhealthy competition has affected not only the individual port development but also the competitive power of the port cluster. It is the common sense of both government and corporations that the growth of ports in YDA should be harmony, healthy and in order.

The government tried to make clear of the port role respectively in YDA through the modernization of the Yangtze River Delta area of highway and waterway transport planning framework published by the ministry of transport in 2005. The distribution of functional ports in YDA is defined as follows: the ports in YDA should form transit transportation system of bulk cargo from sea to river and transshipment system relying on deepwater stretches of coast of Ningbo and Zhoushan as well as the coastal resources in south of the Nanjing port. In 2006, National Development and Reform Commission together with Ministry of Communications issued a national coastal port layout plan to do further planning of the port layout on the Yangtze River Delta.

However, these ports face the practical problem of how to cooperate with each other and establish scientific and reasonable port cluster. To solve this problem, government has published two plans, one is “Modernization of the Yangtze River Delta area of Highway and Waterway Transport Planning Framework” in 2005 and the other one is “Plan of National Coastal Port Layout” in 2006. Yet, the port plans lack binding force

and effective implementation. The problem of redundant construction and disorderly competition outstands. The coordination of port planning and development is still at lower level.

The ports in Yangtze River Delta are exploring a new way out in face of crisis. The chief officer of Planning Office of Shanghai Complement Port said that the port cluster in Yangtze River Delta should promote cooperation to be world-class functional ports. These ports should be clearly targeted to achieve harmonious development and to form a cooperative and win-win situation. At the same time, it's a priority to make ports cooperate in the aspects of port customs clearance, human resources and modern shipping service, etc.

1.2 Literature review

After reviewing all kinds of reports, statistics, official data etc., we could see that the port market is opaque and complicated.

1.2.1 Port competition patterns

In *Port Competitiveness*⁽¹⁾ written by M. Hnybrechts the analysis of the competitive position of seaports presented takes into account all the changes and developments in the global transport industry. More specifically, this book offers an economic and legal analysis of the factors determining the competitiveness of seaports. The general aim is to provide a framework for understanding the competitive position of Flanders' seaports within Europe, particularly the position of Antwerp in the Hamburg-La Havre range. It focuses on the phenomenon of port competition from the perspective of the strategic behavior of the relevant players in the port industry.

The Institutional Position of Seaports⁽²⁾ written by Henrik Stevens deals with the logic and functioning of international seaport administration. This volume not only contains interesting look throughs for public and private port administrators and managers but can offer by its international comparison relevant insights for the deregulation, privatization,

liberalization and deconcentration of former government duties. By means of the institutional model the division of responsibilities for nautic control, port planning and port services can be determined. The readers can also learn via this model about the specific conditions that are needed to activate the learning capabilities of the different port activities.

The planning and design of a port is quite important to the development of the port. In the book *Planning and Design of Ports and Marine Terminals*⁽³⁾, the author Hans Agerschou introduces facilities requirements, economic and financial feasibility, ships and their influence on port facilities, access channels and basins, breakwaters, berth and terminal structures design, environmental considerations, dredging and disposal of contaminated sediments and MARPOL.

Some other research focuses on the software competition of ports. According to *Port Competitiveness: SWOT Analysis of Malaysian Ports under Federal Port Authorities*⁽²⁰⁾ written by Nazery Khalid Ahmad Fakhruddin Muda & Armi Suzana Zamil, central to MIMA's assessment of port competitiveness is the drawing of the framework defining port competitiveness and the use of common indicators frequently used to measure port competitiveness. It is found that the scope of a port to increase its level of competitiveness is enhance when it can offer technical efficiency and lower costs, and capitalize on its strategic advantages and core competencies in delivering efficient, cost-competitive services to its users.

The World Bank has republished a book named *Port Reform Toolkit*⁽⁵⁾ concerning about the evolution of ports in a competitive world. It gives the introduction of competitive scan module, overviewing the competitive landscape. By analyzing the hinterland market, the ability to service transshipment trade, regional port capacity and demand, ability to create competition within the port, stakes at risk, ability to absorb losses, ability to control operations, limits on rival within ports, government willingness to subsidize operations, we can know the rivalry condition among existing competitors. However, these ports should provide a barrier to new competitors since changes in

distribution patterns can create new port competitors. The book also predicts the potential for global substitutes, such as other global sources for products moving through the port, substitute products for exports and imports. It studies on the bargaining power of port users in the aspects of concentration of port user power, impact of changing business relationships, presence of large value adding tenants, ability to replicate port services, facility investments by port users, etc. Bargaining power of service providers is also researched in this book. The emergence of global terminal operators and the development of these ports are described in detail here. Last but not least important is environmental and safety concerns. At the end of the book, some challenges and opportunities are mentioned.

The books above all research on single port competition. But what if it's a port cluster?

As for the strategy of seaport, Elvira Haezendonck writes the book *Essays on Strategy Analysis for Seaports*⁽¹⁵⁾. The unitization of cargo, the proliferation of alliances and the concentration in liner shipping, the growth of mergers and joint-ventures of port operators, the ongoing liberalization processes in the railways and inland navigation sectors, and at a more fundamental level, the increased demand for integrated global logistics and the increased society concerns about the environmental impact of transport, are the key features of the changing market environmental faced by ports today. The analysis provides tools to achieve a better understanding of the nature of the resources which could well make the difference between maintaining versus substantially improving a port cluster's competitive position, underlying the competitive position. The main research question to be answered is why particular businesses, located in a specific port cluster, based on specific clustering characteristics of their port.

The research of Pearl River Delta (PRD) has been made in *Developing a Competitive Pearl River Delta in South China under One Country-two systems*⁽¹⁴⁾. The authors have studied the development of PRD. On the basis of the research on its development of economy, society and environment, the authors point out how to optimize the infrastructure and transport, institution and legal in PRD to enhance its competitiveness.

Cross-boundary cooperation is broached in the last part of the book. But the whole book only concerns about PRD itself. There is no word on its competitors.

1.2.2 Researches on port cooperation

The books above all write about the competition a port and how to enhance the competitiveness of the port. In the book *From Competition to Cooperation*⁽⁸⁾, the question of the cooperation among the ports along Yangtze Delta Area (YDA) is proposed. The author compared the port cooperation and economic development between PRD and YDA. It starts from the period of reform and opening up to now when China has become the world factory. During this period, how the ports in YDA developed individually and how their relationship turned from competition to cooperation is described in detail. And the advantages and disadvantages of port cluster in YDA compared to that in PRD are mentioned too.

The book *Cepa Regional Economic Cooperation with the Pearl River Delta and Yangtze River Delta*⁽¹²⁾ is also about the regional economic cooperation. Besides the content in *From Competition to Cooperation*, the author predicts the future development of the ports in PRD and YDA by analyzing the geography, relative governmental policy, industry structure, etc.

As for the Yangtze Delta Area many problems exist. The book *Public Economics*⁽⁹⁾ explains the key of these problems which are related to the distribution and redistribution of the nature resources.

Structural changes in logistics and the increasing importance of containerization and intermodality continuously challenge port managers and policy makers. The book *Current Issues in Port Logistics and Intermodality*⁽¹⁶⁾ written by Theo Notteboom consists of a set of papers on the issues occurred in 2002 in port logistics and intermodality. The book not only intends to examine the role of port logistics and intermodal transport from a conceptual point of view. It also explores how market players, port managers and policy makers, particular in Belgium and Poland dealing

with the challenges in this field.

Being a modern metropolis, Shanghai shoulders the responsibility as a link in YDA. Both the book *Shanghai Overview*⁽¹⁰⁾ and *China Business*⁽¹¹⁾ introduce the importance of Shanghai port. Shanghai has been the centre of international economy, finance, trade and shipping in China for years.

Where an important seaport has managed to successfully transform itself, analytical attention is focused on activities other than that of the 'port'. Shanghai, for example, has emerged prominently as a financial centre, as a city of contemporary culture and as a mass tourist destination but not as a 'port' in the imagination of academic researchers, let alone of the lay population. Seaports-as economy and as culture-which were once the main locus of international trade, have been analytically eclipsed, displaced, if not entirely neglected. It's mentioned by Arndt Graf and Chua Beng Huat in *Port Cities in Asia and Europe*⁽¹⁷⁾.

In the book of *Host the Expo, Host the World*⁽⁷⁾, Shanghai is suggested to quicken the pace of integration with other ports in Yangtze Delta Area to increase export and import taken the opportunity of Shanghai Expo.

The literature above has written a lot about the port competitiveness and development. But we can hardly see the analysis of how to optimize the resources utilization in the ports in Yangtze Delta Area when the resources has wasted a lot due to the blandly development of each port without cooperation with each other.

1.2.3 Application of AHP and SWOT methodology

The Analytic Hierarchy Process (AHP) is a structured technique for dealing with complex decisions. Rather than prescribing a "correct" decision, the AHP helps the decision makers find the one that best suits their needs and their understanding of the problem.

Based on mathematics and psychology, it was developed by Thomas L. Saaty in the 1970s and has been extensively studied and refined since then. The AHP provides a comprehensive and rational framework for structuring a decision problem, for representing and quantifying its elements, for relating those elements to overall goals, and for evaluating alternative solutions. It is used around the world in a wide variety of decision situations, in fields such as government, business, industry, healthcare, and education.

The scope of the paper *Transport Science and Technology*⁽¹⁸⁾ was to offer an evaluation tool for the port manager adequate to support a decision on the dilemma, which of the three major groups of forecasting methodologies to select: time-series analysis, supply-side calculations based on the generalized cost or advanced simulation techniques. The trigger for such a tool stems out of the framework of Europe Commission funded research project, called TRAPIST that aims to provide ports with 'soft' tools to improve their operational capabilities. As the evaluation of alternatives (forecasting methodology) is a multi-criteria decision making problem, the well known and user-friendly Analytic Hierarchy Process (AHP) methodology has been selected and applied. The hierarchies of the problem used, i.e. the understanding of the insights, is a refined version of similar hierarchies used in other research and development projects. Nevertheless as there is no relevant work in the literature, the application of the hierarchy is considered as innovative.

M. Hnybrechts opts deliberately for a multiple perspective approach, consisting of a combination of a quantitative and a strategic economic analysis, complemented with a legal analysis of a number of relevant cases. The quantitative approach encompasses a detailed analysis of the goods flow to and from the principal ports in the Hamburg-Le Havre range, in terms of the goods type and the relative position of the port (i.e. market shares and growth rates) within the range.

The paper *A Port Competitiveness Indicator Through the Multicriteria Decision Method Promethee* focuses on designing a synthetic indicator which allows to

determine the relative development of the competitiveness of Spanish Port Authorities, considering the most relevant variables influencing on this competitiveness.

In this context, Port Authorities face a wide range of complexities in the decision making process, as they have to satisfy several objectives which can be in conflict among them. Hence, the concern to optimize their decisions on the basis of multiple criteria makes Port Authorities try to find a balanced solution. This paper examines these circumstances, using the methodology of the decision theory with multiple objectives, which, through the Promethee method, makes possible the design of a ranking of Port Authorities according to their behaviour before some specific ad hoc competitiveness indicators.

SWOT Analysis is a strategic planning method used to evaluate the Strengths, Weaknesses, Opportunities, and Threats involved in a project or in a business venture. It involves specifying the objective of the business venture or project and identifying the internal and external factors that are favorable and unfavorable to achieving that objective. The technique is credited to Albert Humphrey, who led a research project at Stanford University in the 1960s and 1970s using data from Fortune 500 companies.

As for the SWOT methodology, report in *Port Competitiveness: SWOT Analysis of Malaysian Ports under Federal Port Authorities*⁽²⁰⁾ analyzes the SWOT analysis of eight local ports under the management of federal port authorities. An examination of the SWOT reveals that Malaysian ports are characterized by the relatively satisfactory degree of vertical integration, but this varies between individual ports. They enjoy various degrees of competitiveness and demonstrate various levels of competencies and deficiencies.

1.3 The framework and content of this dissertation

The main goal of this dissertation is to analyze the port market competition inside the Yangtze River Delta and to make clear of the role of each port in YRD. In this dissertation I want find out the strategies to enhance the whole competitiveness of ports

in YRD. To achieve this purpose, the dissertation will first analyze the operation of the ports in YRD and their developing characteristics. Second, the factors affecting market competition will be analyzed. The factors can be divided into external factors, internal factors and social factors. By analyzing these factors and using AHP method we can evaluate port performances in YDA. We will find out the problems existing in port competition market. Third, I will use SWOT method to analyze the port competitiveness and suggest some strategies to enhance the ports competitive power in YDA.

1.4 Research Methodology

This dissertation will use AHP and SWOT methods. AHP method is used to analyze the port performances in Yangtze River Delta and SWOT method to make clear of the competitiveness of each port in YRD.

Chapter2 Analysis of the Status of the Port Industry in Yangtze Delta Area

The area of the Yangtze Delta incorporates twenty relatively developed municipalities in three provinces-Shanghai, Zhejiang and Jiangsu. The term can be generally used to refer to the entire region extending as far north as Lianyungang, Jiangsu and as far south as Taizhou, Zhejiang. The region includes some of the fastest-growing economies in China in recent years, The Yangtze River drains into the East China Sea. The area near the Southern Dynasties period, the Yangtze Delta has been a main cultural and economic center of China. Key cities of the region include Shanghai, Suzhou, Nanjing, Wuxi, Changzhou, Nantong, Yangzhou, Zhenjiang, Hangzhou, Ningbo, Shaoxing, Taizhou, Jiaxing, Huzhou and Zhoushan.

From Shanghai to Nanjing, there are more than 10 ports such as Nanjing port, Yangzhou port, Taizhou port, Zhenjiang port, Changzhou port, Jiangyin port, Nantong port, etc. within 392 kilometers, an average of 39 kilometers distance between two ports. Along the Yangtze River the ports are of great density. We can see it from the chart below.

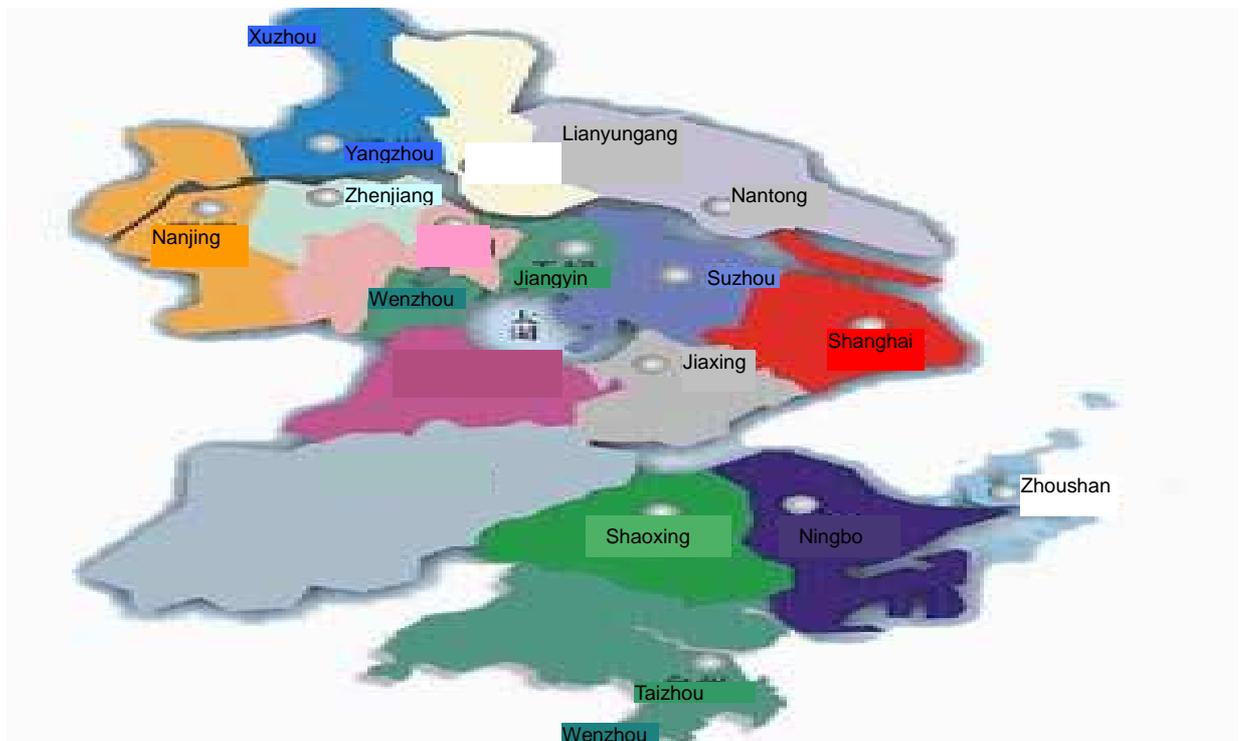


Chart 2.1 Port distributions in Yangtze River Delta

Resource from: www.baidu.com

2.1 The analysis of throughput of port in the Yangtze Delta Area

A review of the port economy of the Yangtze Delta in the first half of 2008 and an analysis of future trends⁽⁴⁾, offered by Shanghai Port Combination Management Office, declares that the increase rates of total throughput, container throughput and the amount of import and export cargo have gone down.

However in the same period of 2007 and 2006, the same analysis report *First half of 2007 analysis of situation and prospect of economic operation of ports in Yangtze River Delta*⁽⁶⁾ and *First half of 2006 analysis of of economic operation of ports in Yangtze River Delta*⁽¹³⁾ showed the fast-developing trend of the marine economy in YDA. The three indexes went from higher in 2006 to the highest in 2007.

Table 2.1 Economic Operation of Ports in Yangtze Delta Area

	(Million)		
	2006	2007	2008
Total Throughput(ton)	959.38	1093.69	1355.00
Throughput of container (TEU)	15.36	19.94	23.25
Throughput of import and export cargo(ton)	261.89	308.25	344.00

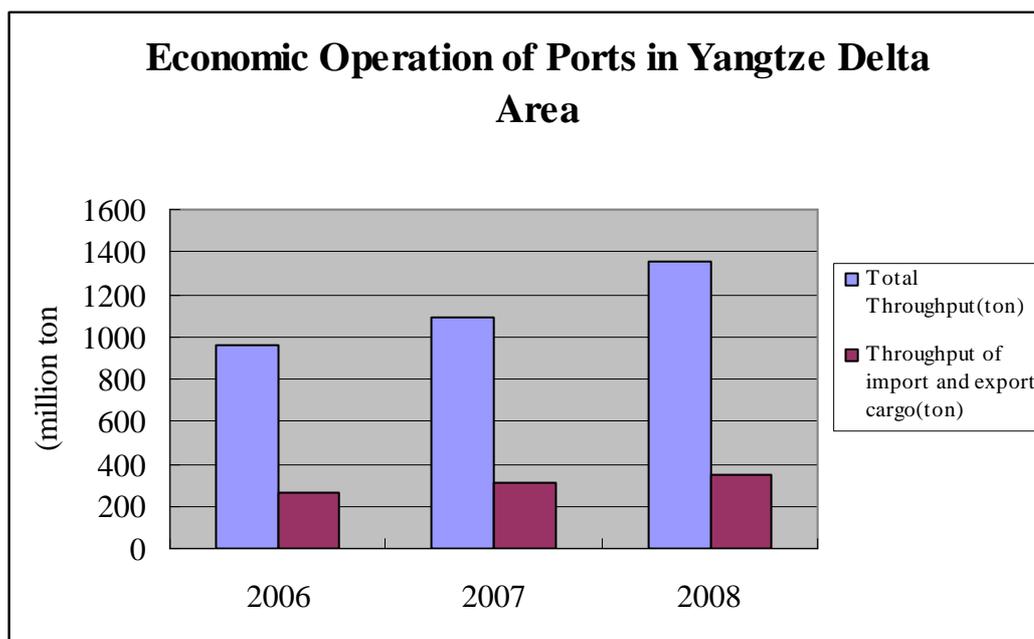


Chart 2.2 Economic operations of ports in YDA

Resource: *A review of the port economy of the Yangtze Delta in the first half of 2008 and an analysis of future trends⁽⁴⁾, First half of 2007 analysis of situation and prospect of economic operation of ports in Yangtze River Delta⁽⁶⁾ and First half of 2006 analysis of economic operation of ports in Yangtze River Delta⁽¹³⁾*

We can see from the graph that the increase rate of total throughput decreased from 14% in 2007 to 9.8% in 2008, that of container throughput decreased from 29.6% to 16.6% and that of throughput of import and export cargo decreased from 17.7% in 2007 to 11.7% in 2008.

Decrease of the three throughput index is caused not only by the external factor of shrinking of international trade but also the internal factor of limitation of the ports themselves.

Yangtze Delta Area is constituted by 16 ports: Shanghai Port, Lianyungang Port, Ningbo Port, Zhoushan Port, Wenzhou Port, Nanjing Port, Zhenjiang Port, Nantong Port, Suzhou Port, Jiangyin Port, Yangzhou Port, Jiaxing Port, Taizhou Port, Xuzhou Port, Jinhua Port and Jiangxi Port. Ningbo Port, Zhoushan Port, Wenzhou Port, Jiaxing

Port, Taizhou Port, Xuzhou Port and Jinhua Port belong to Zhejiang Province. Rest belongs to Jiangsu Province except Shanghai Port.

Among these ports, Shanghai Port, Lianyungang Port, Ningbo Port, Zhoushan Port, Wenzhou Port, Nanjing Port, Zhenjiang Port, Nantong Port, Suzhou Port are divided to main ports, while Jiangyin Port, Yangzhou Port, Jiaxing Port, Taizhou Port are defined as local important ports.

The throughput growth rate of Shanghai international shipping center has continued to fall since last year due to the impact of Shanghai's economic growth dropping and rapidly declining of foreign trade growth rate. However, port throughput of Zhejiang and Jiangsu Province maintain the same growth rate.

Table 2.2 The throughput of 3 provinces in Yangtze River Delta

	(million ton)		
	Shanghai	Zhejiang	Jiangsu
2007	561.78	887.85	1056.91
2008	582.00	950.00	1170.00

Resource from: www.ocn.com.cn & www.chinaports.com.cn

The total annual cargo throughput increases 3.6 percent in 2008, 1.1 percentage point slowdown compared with that of 2007. 511 million tons cargoes are transported by sea way, up 3.9 percent up; 72 million tons by river, 0.3 percent up. Shanghai's port cargo throughput continues to maintain top one in the world.

Cargo throughput of ports in Zhejiang Province on the south side of Shanghai International Shipping Center of the port increases 7 percent up, maintaining a steady growth. 640 million tons cargoes are transported by sea way, 11 percent up, 310 million tons by river, 0.4 percent down. Cargo throughput of Ningbo-Zhoushan port keeps top two in China and rank four in the world.

Cargo throughput of Jiangsu Province North Wing of Shanghai International Shipping

Center increases 10.7 percent, maintaining a good momentum of development. Of these, 790 million tons cargoes are transported by sea way, 12.5 percent up, 380 million tons by river, 7.3 percent up. Total cargo throughput of Jiangsu Province has been the largest since 2007.

Table 2.3 Throughput of each ports in YDA(2007-2008)

	(million ton)						
	Shanghai	Lianyungang	Ningbo	Zhoushan	Wenzhou	Nanjing	Zhenjiang
2006	537	72.32	309.4	114.18	32.75	100.9	64.13
2007	561.78	80.62	345	128.18	34.96	107	78.24
2008	582	100	361	158.62	42.63	112.43	100.5

	Nantong	Suzhou	Jiangyin	Yangzhou	Jiaxing	Taizhou	Xuzhou
2006	103.86	154	53	44.5	22.18	30.28	47.42
2007	121.1	183.51	72.18	55.47	24.17	35.07	51.5
2008	132	207	87.4	57.25	25	38.97	55.9

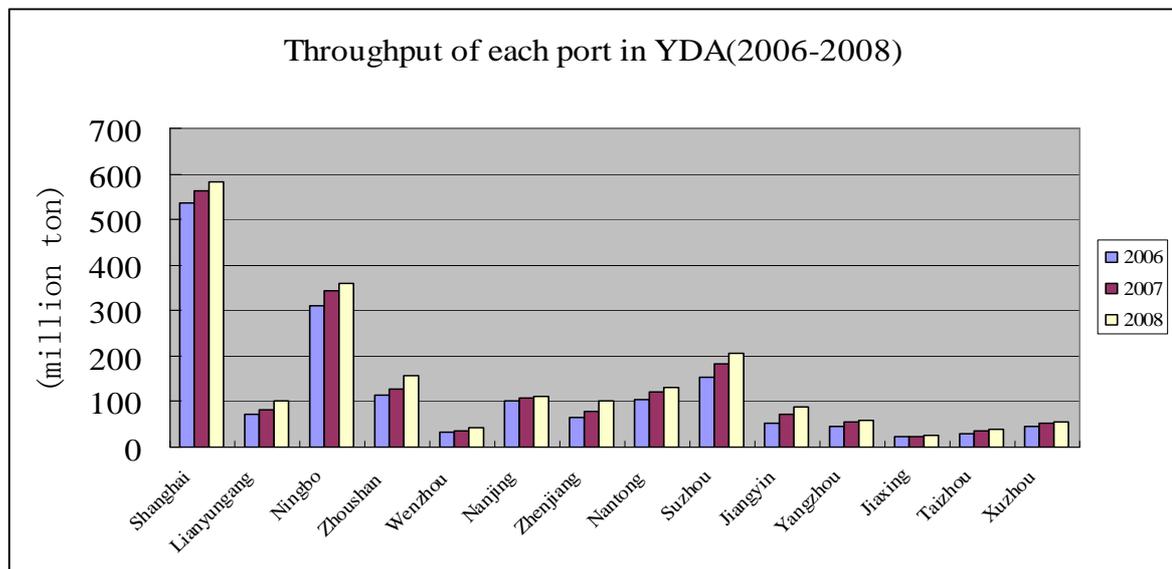


Chart 2.3 Throughput of each port in YDA in past 3 years

Resource from: Yearbook of Chinese ports⁽¹⁹⁾

In 2008, the growth rate of ports' cargo throughput in the Yangtze River Delta has declined obviously, except Zhoushan port, Wenzhou port, Zhenjiang port and Lianyungang port. The biggest decrease of the growth rate reaches to 67%. Among these ports, that of Zhenjiang Port rises by more than 28%: Zhenjiang port completes 100.5 million tons cargoes, 28.5 percent up, growing fastest in the Yangtze River Delta. Zhoushan port, Lianyungang port, Jiangyin port and Wenzhou port completes 158.7 million tons, 100 million tons, 87.4 million tons and 42.6 million tons; increasing 23.8%, 24%, 21.1% and 21.9% respectively. Suzhou port and Taizhou Port, completes 207 million tons and 39 million tons, increasing 12.8% and 11.1%. Shanghai port, Ningbo Port, Nantong Port, Yangzhou Port, Nanjing port, Jiaxing port and Xuzhou port completes respectively 582 million tons, 361.4 million tons, 132.1million tons, 51.3 million tons, 112.43 million tons, 25 million tons and 55.9 million tons, increasing 3.5%, 4.6%, 9%, 3.2%, 5.1%, 3.4% and 8.5% respectively. There are 16 ports with hundreds of million tons' throughout in China. The Yangtze River Delta accounts for six ports, namely, Shanghai, Ningbo-Zhoushan Port, Suzhou Port, Nantong Port, Nanjing Port and Lianyungang Port. It takes up three eighths. It's the first time for Lianyungang Port to complete more than a hundred million cargoes in 2008, which further enhancing the port group's overall competitiveness of the Yangtze River Delta.

Although the economic environment is quite bad, the throughput of each port in YDA still goes up. Every port has taken different measures to ensure their business. Especially those relatively small ports like Wenzhou port and Taizhou port. They do great effort to extend their business.

2.2 Analysis of constitution of main ports operation on Yangtze Delta Area

Different port has different structure of cargo constitution. In the port like Suzhou, Taizhou, Wenzhou and Jiaxing the amount of export cargo takes up large proportion which is export oriental. Thus these ports are affected by international financial crisis to a large extend. However, the throughput of Nantong port increased 100% due to the completion of its third phase construction.

Shanghai is located in the front edge of Yangtze River Delta. It's the main hub of the coastal areas. Shanghai port participate in international economic business of

and is important for China's opening to the outside world. 99 percent of Shanghai's foreign trade is transported by Shanghai port. It completes about 20% the total throughput of foreign trade major ports along the coast. Because of the affect by the world wide financial crisis, the amount of import and export is plummeting.

Ningbo Port mainly engaged in imports of iron ore, domestic and foreign trade containers, crude oil products, liquid chemical products, coal and other bulk handling, storage, transit operations.

Zhoushan port deals with iron ore and crude oil mainly. After more than three years the construction of coal power projects-coal transshipment terminal (one 150,000 tonnage, one 50,000 tonnage, one 35,000 tonnage and one 20,000 tonnage) of Liuheng Zhoushan has been completed. Coal storage and transportation volume this year is expected to increase 7 million ~ 10 million tons. Zhoushan Port has introduced of Zhoushan suitable domain characteristics of storage and transportation of bulk material and energy transit projects, from oil to ore to grain and oil to coal, which are suited to Zhoushan port. Zhoushan port begins to build the country's major transit base for storage and transportation of energy supplies.

Zhenjiang port mainly deals with chemical bulk cargo. The price of these chemical cargoes is seriously affected by financial crisis. So the volume of these cargo increases. Many other reasons such as business growing of shipping shipyard repair make the volume of Zhenjiang Port outer berthing increase rather than reduce.

As Zhu Xiang the Manager of the Shipping Ministry of Far East International Ship agent Zhenjiang Ltd. Introduces, their recent business increases of which import is the heavily weighted. It is because of the low international prices of raw materials such as iron ore, sulfur, paper pulp and other raw materials in particular. So some industrial enterprises purchase and store these raw materials to save the cost of production. Imports amount increases significantly after the Chinese New Year. Zhu Xiang said that

some domestic enterprises resuming production is the also an important reason of ocean shipping increasing.

Lianyungang Port is known as the starting point of the New Eurasian Continental Qiaodong bridgehead and the new Silk Road, located in the south-west of Haizhou Bay in Chinese central coast, in the northeast side of Jiangsu Province. It's the main artery of Trans-Chinese Railway - eastern final port of Longhai, Lan-Xin Railway, as well as the most convenient and most economical access to the sea in the central and western regions of China.

Lianyungang port now has 35 berths of various types, including containers, bulk grain, coke, coal, iron ore, alumina, liquid chemicals, ro-ro and pieces of groceries. 30 out of the 35 are over ten thousand tonnage berths. Lianyungang port has set up shipping relationship with more than 160 countries and regions, opened over 40 container and freight liner routes to Europe, America, Middle East, Northeast Asia, and Southeast Asia. Two large off box liner routes to South Korean Inchon and Pyeongtaek are newly opened.

Many shipping routes have been combined to reduce route flights due to the shipping market is oversupplied. The freight rates declines sharply, that of route to Europe and the United States even falls 80 percent. Since the fourth quarter of last year, foreign trade of Jiangsu Province has fallen so substantially that the throughput of ports fell 18.7 percent, 13.3 percent down in January of last year because of the recession. The province's ports mainly handle ore, coal, petroleum, and natural gas, whose throughput showed a downward trend.

Thus, a new round of port competition has been brought by shrinking market. Container ports in provinces next to Jiangsu adjust their strategies, shifting weight towards the national routes and home container trade. This pressurizes the container ports in Jiangsu and makes competition on important supply source fiercer between the ports in the Yangtze River Delta.

2.3 Characteristics of container port development in Yangtze Delta Area

2.3.1 Characteristics of container port development in Yangtze Delta Area

Table 2.4 Container throughput of each port in YDA(2006-2008)

	Shanghai	Lianyungang	Ningbo	Zhoushan	Wenzhou	Nanjing	Zhenjiang
2006	20	1.3	7.06	6.75	0.28	0.8	0.1
2007	26.15	2	9.34	8.06	0.35	1.06	0.28
2008	80.55	3	10.85	8.74	0.43	1	0.29

	Nantong	Suzhou	Jiangyin	Yangzhou	Jiaxing	Taizhou	Xuzhou
2006	0.3	1.25	0.13	0.23	0.05	0.05	0.03
2007	0.4	1.9	0.3	0.26	0.04	0.05	0.04
2008	0.44	2.57	0.5	0.28	0.1	0.06	0.04

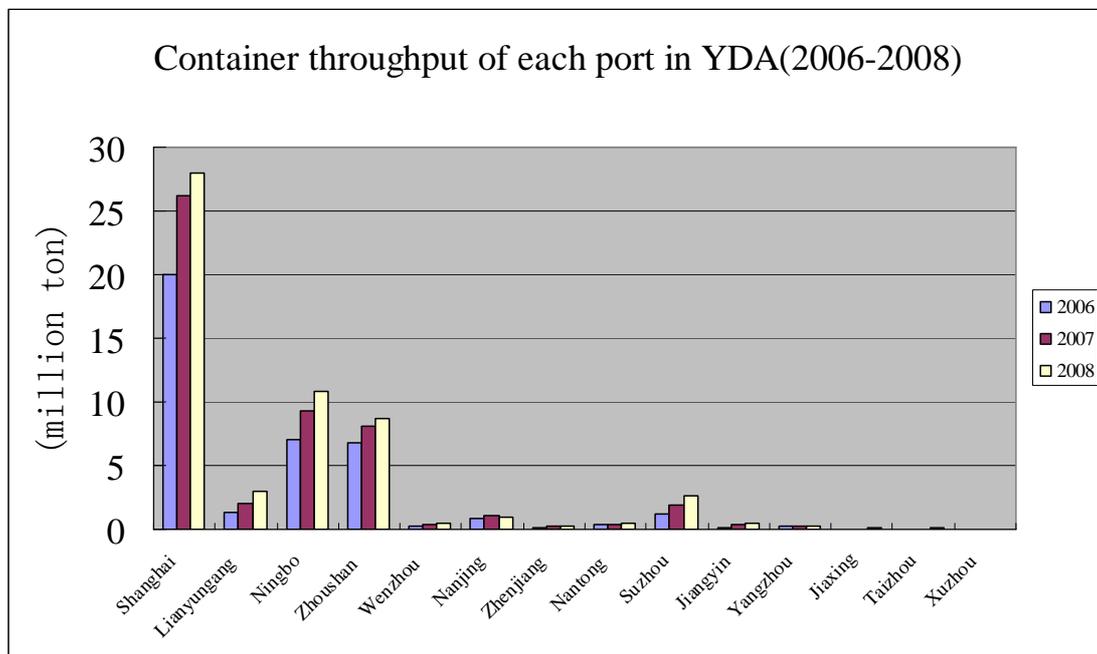


Chart 2.4 Container volumes in each port in YAD from the year 2006 to 2008

Resource from: *Yearbook of Chinese ports*⁽¹⁹⁾ & *China Port Industry Report*⁽²⁵⁾

As the chart shows, the scale of big port becomes larger. The trend is clearly drawn from the year 2006 to 2008. The ports whose container throughput is over a hundred million TEU are still Shanghai port, Lianyungang port, Ningbo port, Zhoushan port, Suzhou port and Jiangyin port. As the container throughput grows, these ports put more investment to container port equipment and management so that they can attract more containers. Rest of ports in YDA has weaker competitive power in container business against these ports.

In 2008, development of container shipping ports in the Yangtze River Delta has main characteristics as follows: the growth rate of container transportation in majority ports declines sharply, from high speed development to a slow growth. Throughput of those ports in YRD decreased in varying degrees. The number of export full containers, container transport flights declines, so does the containers exporting to Europe and America. But the box volume of emerging market maintains a good momentum. Many liner companies remove, combine or even stop some routes. Thus, freight rate and container handling rates drop substantially, which affects the benefit of ports to a large extend. Thus, the competition among ports in Yangtze River Delta becomes fiercer, particular in container market competition.

Zhejiang Province, Jiangsu Province and Shanghai pay great attention to the port development, container transport in particular. Ports in YDA face a new more competitive environment. Each port tries to enhance its advantages by further specifying traffics, reselecting routs, increasing port hierarchy and other measures to strengthen the container business. Hangzhou Bay Bridge and Suzhou Bridge opening to traffic makes the container transport in YDA system optimal and container transport market structure more reasonable. Specific changes in the trend needs further study.

The quality of service of each port is forced to improve. At the macroeconomic background, the price is still the primary means of competition among ports because the growth rate of the volume decreases. The aspirations of regional co-operation at the port are increased by further elimination of administrative barriers.

2.3.2 Characteristics of bulk and crude oil port development in Yangtze Delta Area

Table 2.5 Bulk and crude oil throughput of port in YDA (2006-2008)

	Shanghai	Zhejiang Province	Jiangsu Province
2007	150.27	350.28	361.25
2008	146.15	395	419

(million ton)

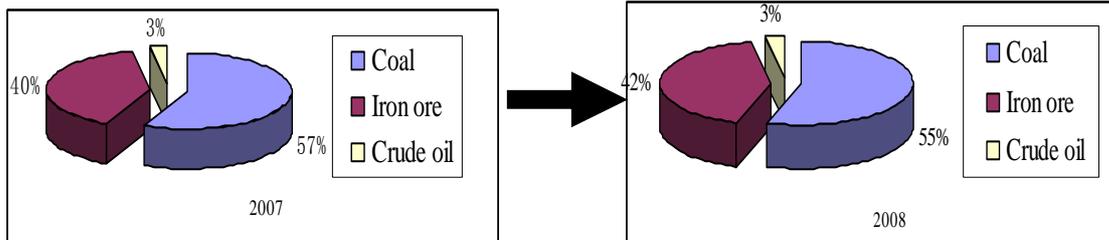


Chart 2.5 Throughput of Bulk and Crude oil of Shanghai port in 2007 and in 2008

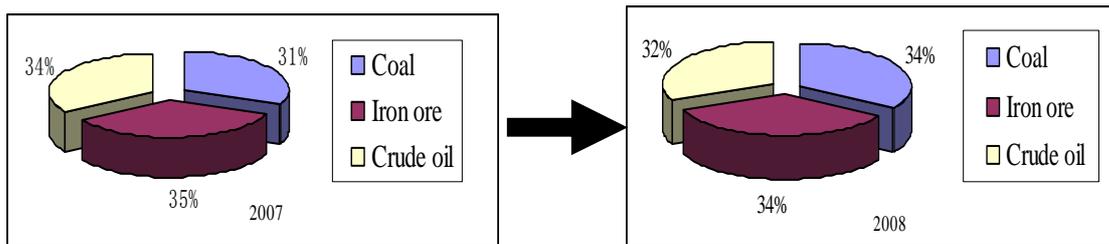


Chart 2.6 Throughput of Bulk and Crude oil of ports in Zhejiang in 2007 and in 2008

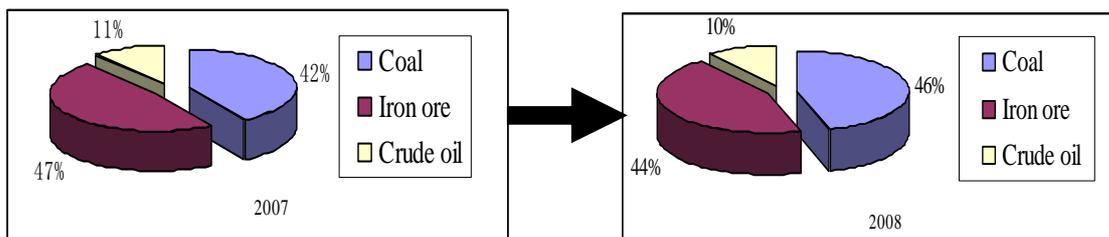


Chart 2.7 Throughput of Bulk and Crude oil of ports in Jiangsu in 2007 and in 2008

Resource from: *Yearbook of Chinese ports*⁽¹⁹⁾ & *China Port Industry Report*⁽²⁵⁾

The first half of 2008, ports in the Yangtze River Delta and related units worked together to fight against snow disaster and protected the transportation of coal, metallic ores, crude oil and other key materials, which are the basis of the national economy. In

second half of the year influenced by the international financial crisis, China limited production capacity of iron and steel, electric power, manufacturing enterprises due to the plummeting demand for transportation of coal, ores, crude oil and other key species of goods. The coal shipments have fallen sharply since August, appearing negative growth in October. Shanghai port completed 80.55 million tons, 5.9 percent declining. The ports in Zhejiang Province completed 135 million tons, 22.5 percent up while the growth rate dropping 7.5 percentage points. The ports in Jiangsu Province completed 190 million tons, 26.7 percent up.

Iron ore throughput of ports in Yangtze River Delta was 382 million tons, 9 percent up but the growth rate declining 4 percentage points. Shanghai port completed 61.35 million tons, 1.1 percent up but the growth rate 5.4 percentage points down. The ports in Zhejiang Province completed 135 million tons, 12.5 percent up and the growth rate 9.5 percent up as well. The ports in Jiangsu Province completed 186 million tons, 9.5 percent up but growth rate 15.5 percent down.

Crude oil throughput of ports in Yangtze River Delta region to completed 172 million tons, 4% up. Shanghai Port completed 4.25 million tons, 6.5% increase. The ports in Zhejiang Province completed 125 million tons, 4.1 percent up. The ports in Jiangsu Province completed 43 million tons, 3.8% up.

In conclusion, throughput of coal of Shanghai ports takes up more than 50% of the total volume of bulk and crude oil. The volume of coal, iron ore and crude oil which is handled by ports of Zhejiang Province is quite even. Jiangsu Province deals with more volume of both coal and iron ore than Shanghai and Zhejiang Province. The volume of bulk and crude oil of Shanghai port can neither compete with that of ports of Zhejiang Province nor of Jiangsu Province.

2.4 Summary

In 2008, ports and shipping industries of the Yangtze River Delta- highly dependent on foreign trade- were dragged down by the financial tsunami significantly. The growth rate of total cargo throughput in Yangtze Delta Area fell largely. Throughput of foreign trade goods and container declined rapidly. We can clearly see from the figures above that the demand for the raw material like coal, ores and crude oil slows down and

shipping and port industry is suffering an unprecedented winter. The construction of Shanghai International Shipping Center is facing severe challenges from both international and domestic. We should pay more attention to the new problems and challenges faced by ports in Yangtze River Delta now.

Ports market competition in the Yangtze River Delta will be even more intense. Unhealthy competition has been appearing. Each port pays more attention to market development, especially cargo attraction and business expansion. Irrational pricing strategy is still the principal means of market competition. Inter-regional ports rob routes and goods by decreasing the handling rates. Cut-throat competition is inevitable if a good collaboration of the market mechanism is not established.

Chapter 3 Application of AHP Method in Port Market Competition in YDA

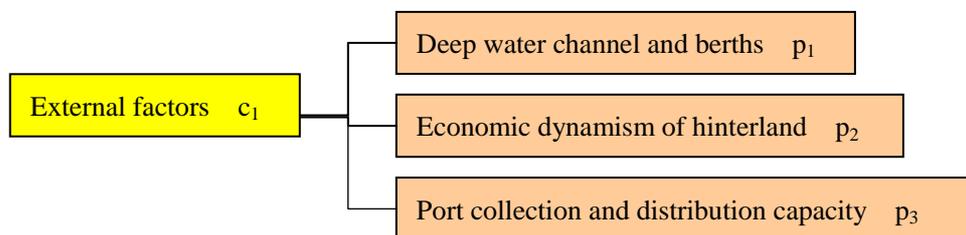
3.1 The analysis of factors affecting market competition

There are 14 important ports along Yangtze River, so the competition among them comes from sharp to sharper. The port can amplify its supply source by strengthening its competitive power. By doing so, the port will promote the trade development and increase its profit.

How to enhance the competitive power of these ports is the objective I am to discuss by using the method of AHP. First of all, we should analyze the main factors that affect the port market competition.

There are many factors that can affect the port transport, including the port operation conditions, service level, integrated environment, infrastructure, modern management and the goodwill of the port. All these can be divided into external factor, internal factor and social factor.

3.1.1 External Factor



External factors refer to the factor that port operators can hardly change by their subjective effort. It's an indivisible part.

As for the port, it's hard to change the natural factors, like channel, depth, tides, weather and shoreline length, belonging to external factors. These factors have a direct

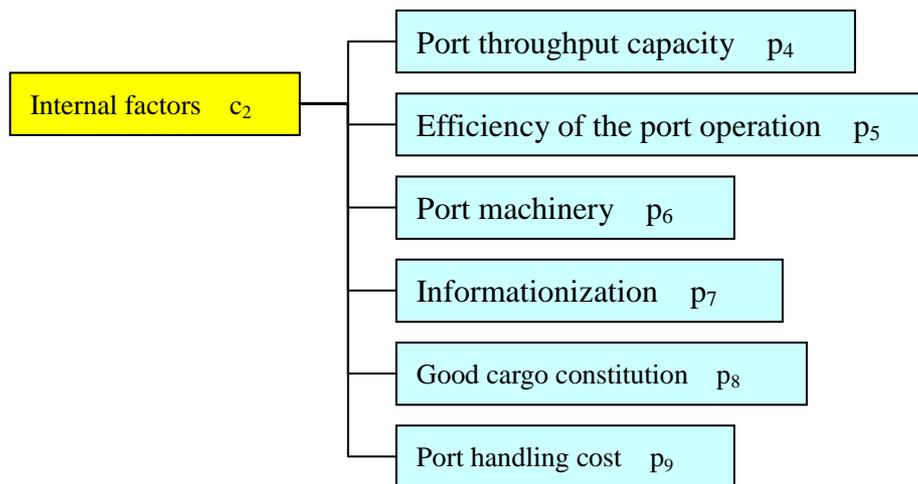
impact on the port operation and the port's competitiveness. Most of the hub port in the world has good natural conditions. With deep-water channel and deep-water berths the port will be possible take a place in the increasingly competitive international shipping market,

The economic power of the port hinterland is also the external factor that affects the port competitiveness. Each port has its own hinterland which can support the port with fundamental cargos. If the port has the hinterland with strong economic strength, it will attract more transit of goods, to further improve the competitiveness of the port.

Those world-renowned ports all have higher proportion of transit goods in the total throughput and earn a lot from the transit of goods. This operation will enhance the competitiveness of the port. Therefore, the economic strength of the hinterland and the volume of transit cargo port operators are important indicators of port competitiveness.

Port capacity of collection and scattering is another important external factor that has the impact of port development. It directly affects the size of the port. The choosing of dock scale (dock number and berth tonnage) is the main task of port planning, the scale of the other establishments (such as field warehouse anchorage ground load and unload machines transport machines collect and scatter tools) should assort with the dock scale. Therefore, port authority should set up collection and distribution channels in the rear, speed up the establishment of a modern loading-unloading-hauling system, and construct a container transport system with advanced freight-handling technologies and featuring a combination of trunk lines with branch lines while strengthening the technical transformation of old harbors to improve their handling capacity and efficiency, if it wants to develop the ports.

3.1.2 Internal Factor



Besides the external factors can not or hardly be changed, there are internal factors that enterprises can improve the port business competitiveness by their own efforts.

The internal factors, having impact on the competitiveness of enterprises, refers to the factors that are decided by their own different characteristics and qualities, resulting in the competitiveness of enterprises in different. It can be improved through their own efforts (like the reform) and enhance business competitiveness. It's easier for port enterprises to better the internal factors rather than changing the external factors if they want to improve the operation performance.

The port throughput capacity is one important factor among the many internal factors. Port throughput capacity is depend on its cargo types and the flow of goods, the volume and the performance of port facilities, the overall layout of ports and terminals specialization, the quality and the number of port workers, the production management level of enterprises and so on. The indicators reflecting the throughput capacity are: terminal capacity, the container yard capacity, the collection and distribution capacity of railways and highways, the loading and unloading ability of workers and machines. The port throughput capacity can be enlarged by the cooperation among different department to achieve the professionalism of berths, promote equipment and technological innovations and raise the level of management.

The service level of the port is also important to the port competitiveness. Customers, especially the shipping companies, concern more about the efficiency of port operations,

port congestion level, ship delay time, which will directly affect the efficiency and profit of shipping companies. Customs clearance efficiency and information services in particular will have a greater impact on the owner.

The efficiency of the port operation is the main index, reflecting of the competitiveness of the port and the port management level. The efficiency is the chief signs of port service level and important indicator reflecting the competitiveness of the port. It's main component of the port integrated ability. Efficiency improvement is the basis of port development.

Modernization of the port is an industry heavily dependent on machinery. Port handling capacity and the ability to attract sources of goods will be reduced, if there is no advanced port machinery. The working conditions of port machinery and equipment affect the competitiveness of the port. Therefore, it's necessary to set up an index system of mechanical application in the port.

We must attach importance to the role of port machinery and do a good job of management, maintenance and replacement work, and maintain the port a good condition to operate to improve the port's competitiveness. This requires port enterprises to establish a complete set of machinery management, maintenance and replacement system as well as improving the quality of workers in the operation of machinery, so that machinery is in good condition at any time to ensure the completion of the Port of the heavy workload.

Informationization is becoming more and more important to modern ports as an information distribution center. Now, China's ports have DEI center to adapt the e-commerce and digitalization of information transmission, ensuring that businesses keep pace with the development of technology and management.

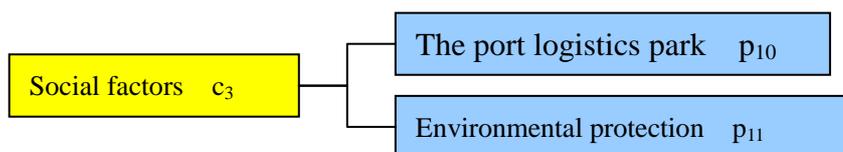
The proportion of cargo species port handling is also an important aspect. A reasonable proportion can help the port enterprises improve its ability to resist risks and losses due to a certain supply shortage. Container is the species of high handling cost but a higher

profit for the port. In other words, the bigger proportion of container goods, the more profit port earns. Port authority should optimize proportion of species considering the specific circumstances of the enterprise itself and the business strategy.

Another important factor is port handling costs. Low handling costs will ensure the profits of the ports, increase the port's competition ability in bargaining and directly raise the competitiveness of the port. So this is a very important indicator. To reduce the handling costs port enterprises must take measures to practice thrift economy, to apply advanced mechanical and reasonable ways to handling, to improve the quality of workers, to achieve mechanization and automation of cargo handling, to streamline the administrative structure and to separation government functions from enterprise management.

Of course, there are many other internal factors to impact port competitiveness, such as corporate strategies, collection of cargo. Port enterprises should be well aware of all aspects of their own strengths and weaknesses: concentrate on improving their weaknesses logging back the competitiveness of the enterprise and enhance their strengths.

3.1.3 Social Factors



The port is closely related with the community and survives in the society. It needs to communicate and collaboration with the outside community. So many social factors have impact of port enterprises.

The port logistics park built surrounding the ports combines port and community. Integrated warehousing and logistics business are carried out there, according to the characteristics of the port development. Building port logistics park can not only

improve the competitiveness of the port but also increase the source of profit for the port.

Environmental protection is also a social factor port that should pay attention to. Environmental protection is of important measures to achieve sustainable development. It can improve the port's social responsibility, increase the port reputation in the invisible way and increase the intangible value of the port. Therefore, port authorities should increase investment in environmental protection at the time they operate and develop their ports. This is a long-term investment.

It's the target of every port enterprise to coordinate with the development of the society. The port should intensify the sense of responsibility to enhance the social position. It's a win-win strategy for port enterprises and society.

3.2 The analysis of the competitiveness of the ports in YDA

Factors influencing in the port competitiveness can be divided into 3 broad categories of indicators, and indicators for each category can be divided into several more specific kinds. According to the impact of these indicators and relations among these indicators, we can establish multi-layer comprehensive evaluation index system of the market competitiveness of the port. This method provides an ordering of a finite set of alternatives, subject to a set of criteria in conflict.

3.2.1 Building of AHP model

Having described the indicator system above, next we should draw AHP model and indicator system of the AHP model as follows:

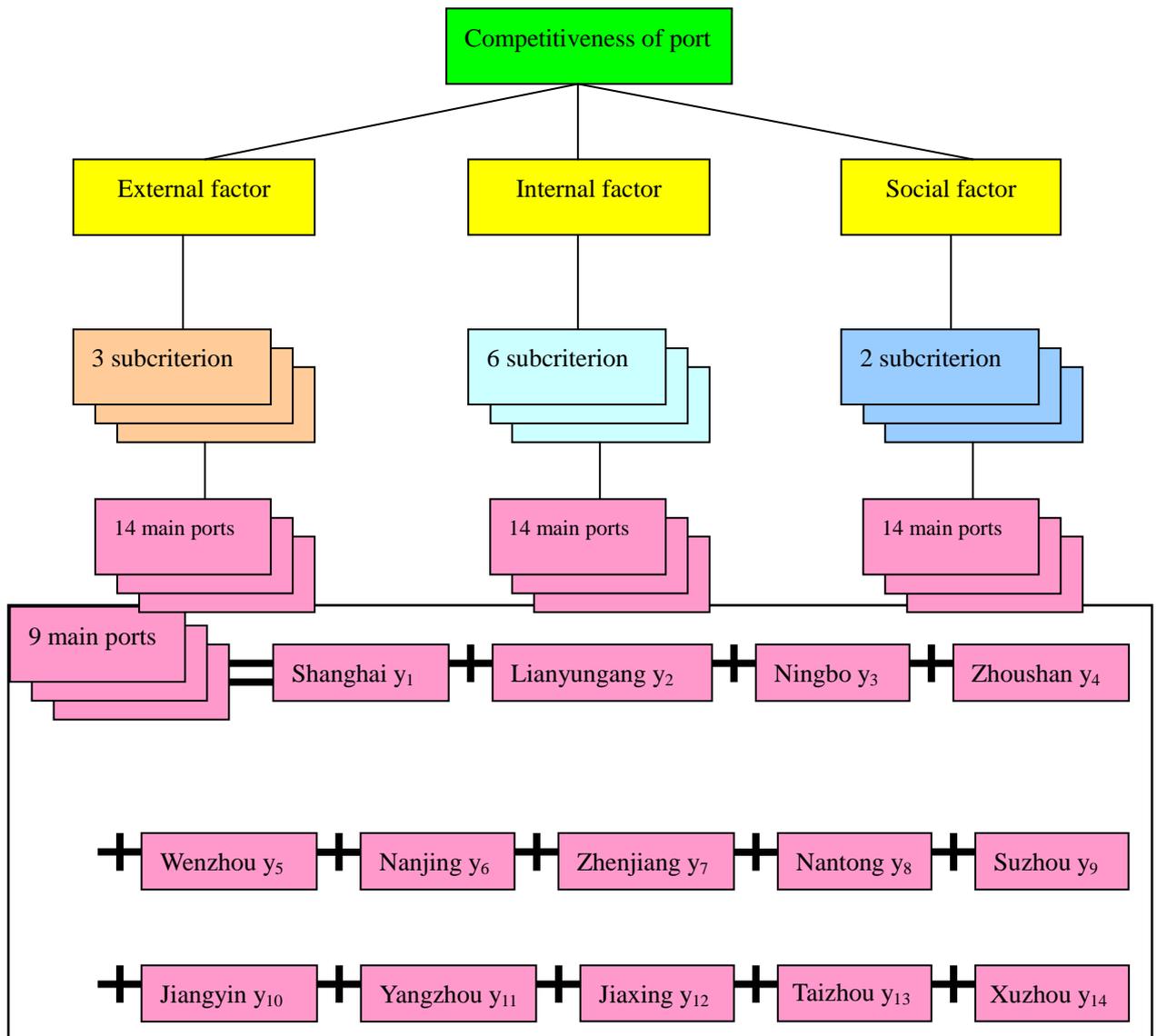


Chart 3.1 AHP model applying in port competitiveness

The objective is to select the most competitive port in YDA. There are three main criteria and eleven subcriteria. Fourteen main ports in YDA are to be selected to study.

It is necessary to establish the transcendence of each criterion, by linking them to some weights or adjustments. When it comes to assign weights, it was essential that they were not influenced by the perspective the analysts had about port sector. Hence, in order to be objective we have consulted a group of experts on port issues, coming from

two different spheres: Port Authorities and port agencies.

Briefly, the AHP method is defined as:

Let w_1 be associated weight to criterion 1 ($1=1,2,\dots,k$). For reasons of mathematic convenience, weight are usually normalized to 1, so that:

$$0 < w_1 < 1 \text{ and } \sum_{i=1}^n w_i = 1$$

The expression $w_1 > w_h$ shows criterion 1 is more important than criterion h, whereas $w_1 = w_h$ indicates that both has the same importance.

Weights are obtained from the initial ordering as follows:

$$w_{1j}^* = w_{1j} / \sum_{i=1}^n w_{ij} \text{ and } w_1 = \sum_{j=1}^n w_{1j} / (\sum_{j=1}^n \sum_{i=1}^m w_{ij})$$

Where:

w_{ij} = weight for subcriterion 1 by expert j

w_1 = aggregated weight of subcriterion 1 by all experts

The survey to port authorities and managers of the port agencies has been completely successful, as all port authorities of 9 main ports in YDA have answered the survey. Besides, managers of port agencies have also answered the survey. By consolidating the results of evaluation, we obtain the weight of all indexes showed in Table 2

Table 3.1 The weight of all indexes in evaluating of port competitiveness

Criterion	Weight	Subcroterion	Relative weight	Absolute weight
External factor	0.40	Channel and berth	0.36	0.1440
		Hinterland economy	0.32	0.1280
		C&D capacity	0.32	0.1280
Internal	0.48	Throughput capacity	0.20	0.0960

factor		Operation efficiency	0.25	0.1200
		Machinery	0.17	0.0816
		Informationaization	0.19	0.0912
		Cargo constitution	0.07	0.0336
		Handling cost	0.12	0.0576
Social factor	0.12	Logistic park	0.55	0.0660
		Environmental protection	0.45	0.0540

3.2.2 Evaluation of main ports in YDA by AHP

According to the index weight in Table 2, we can calculate the integrated competitive power of these nine ports.

Table 3.2 The research result of port competitiveness

	P ₁	P ₂	P ₃	P ₄	P ₅	P ₆	P ₇	P ₈	P ₉	P ₁₀	P ₁₁	E
	0.1440	0.1280	0.1280	0.0960	0.1200	0.0816	0.0912	0.0336	0.0576	0.0660	0.0540	
Y ₁	7.4	9.2	8.25	9.2	8.8	8.8	8.67	7.75	-7.2	8.6	7.88	7.59 ①
Y ₂	5.67	7	5.71	6.25	7.67	7.75	7.88	6.67	-6.92	6	7.89	5.96 ③
Y ₃	6.8	7.8	5.7	8	7.8	7.5	8	7.2	-5.7	8	7	6.57 ②
Y ₄	5.38	5.33	5	5.8	5.76	5.6	6.6	4.75	-7.88	4.29	6	4.72 ④
Y ₅	2.67	5.76	5.12	3	4.5	3.5	6.6	3.33	-8	3.28	5.13	3.64 ⑦
Y ₆	3.33	3.67	4.5	5.25	4.3	3.36	6.5	3	-8.6	3.43	3.99	3.46 ⑧
Y ₇	2.67	4.9	3.38	3.13	4	3.32	5.97	2.76	-9.2	2.67	4	3.00 ⑨
Y ₈	5.2	5.2	5	3.33	4.35	4.1	7	4.67	-7.89	4	5.33	4.12 ⑥
Y ₉	4.5	5.9	4.17	5.3	4.62	3.7	7	4.5	-7.88	5.5	4.98	4.27 ⑤
Y ₁₀	2.67	3.33	3.3	4	2.63	3.4	5.8	5	-9.23	3.12	5	2.85 ⑩
Y ₁₁	2.67	4.5	3.67	3.42	2.89	2.3	5.45	2.98	-9.3	2.87	4.99	2.81 ⑭
Y ₁₂	3	4.75	4.15	2.2	3.01	2.7	5	3.23	-9.5	3	4.79	2.84 ⑫
Y ₁₃	2.67	4.2	4	2.72	2.9	2.9	5.4	3	-9.2	3	5.12	2.82 ⑬

Y ₁₄	3.13	3.67	4.2	3.3	3	3	5.45	3.7	-9.37	2.89	5.2	2.93 ⑩
-----------------	------	------	-----	-----	---	---	------	-----	-------	------	-----	--------

Where: P₁= Deep water channel and berths, P₂= Economic power of hinterland, P₃= Port collection and distribution capacity, P₄= Port throughput capacity, P₅= Efficiency of the port operation, P₆= Port machinery, P₇= Informationization, P₈= Good cargo constitution, P₉= Port handling cost, P₁₀= The port logistics park, P₁₁= Environmental protection

Y₁=Shanghai port, Y₂=Lianyungang port, Y₃=Ningbo port, Y₄=Zhoushan port, Y₅=Wenzhou port, Y₆=Nanjing port, Y₇=Zhenjiang port, Y₈=Nantong port, Y₉=Jiangsu port, Y₁₀=Jiangyin port, Y₁₁=Yangzhou port, Y₁₂=Jiaxing port, Y₁₃=Taizhou port, Y₁₄=Xuzhou port

3.3 Analysis of the evaluation results

From the results we can see that Shanghai port has the highest score on each index except the index of environmental protection. It ranks No.1 in YDA. Shanghai port as we know is an integrative big port. Ningbo port needs to strengthen its port collection and distribution capacity, ranking in Number Two. And Lianyungang port has limitation in throughput capacity, ranking Number Three. The port like Suzhou port, Taizhou port specializes in bulk cargo handling such as coal, iron ore and steel. The bulk cargo takes great amount of the total throughout. Zhoushan port, Nanjing port mainly deal with crude oil with annual container throughput of more than one hundred million TEU.

The relative small ports such as Jiangyin port, Yangzhou port, Jiaxing port, Taizhou port and Xuzhou port have little competition power with big ports. It's hardly for these ports to improve their geographic condition. Neither can they change the economic strengths of their hinterland. So these

The result provided the appropriate information for each port to understand and objectively evaluate their strengths and competitiveness. Ports can also find out their weaknesses and improve them in a targeted manner.

Meanwhile it reflects how far away we are now from the best level. Since the evaluation indexes are based on the ideal value, the result we got can be treated not only as a relatively information, but also embodies the true level compared with ideals.

3.4 The weaknesses of the ports in YDA

3.4.1 Redundant construction and disorderly competition

The problem of redundant construction and disorderly competition outstands. Local governments are in pursuit of economic growth and tax revenue simply. Port authorities usually construct ports by calculating the supply of goods within their ideal setting to hinterland according to their optimistic expectations, which causes seriously duplicated construction and contradictory structural. A number of ports are trying to amplify their supply source the by continuously reducing the ports charges, handling rates and so on which makes the more serious disorderly competition.

3.4.2 Ineffective implementation of new plan

To solve this problem, government has published two plans, one is “Modernization of the Yangtze River Delta area of Highway and Waterway Transport Planning Framework” in 2005 and the other one is “Plan of National Coastal Port Layout” in 2006. Yet, the port plans lack binding force and effective implementation. It’s hard to implement the plans because there are different administrations, superadding the shortcomings of the plans themselves, which further affect the interoperability of the plans. It’s difficult to implement the plan of ports layout and divide labor and responsibilities since part of the plan are self-contradictory, In addition, the plans lack innovation in many aspects.

The coordination of port planning and development is still at lower level. By far the government focuses attention on make ports cooperation by the hardware construction of terminals (i.e. berths) rather than by software construction (i.e. inland transportation system, logistic standards, shipping service level, etc.). More strategic alliances are

needed rather than only equity participation. Intermediate association like the Yangtze River Delta port operators association and port logistics association should be formed meanwhile regional laws and regulations or policy support should be broken through.

3.4.3 Environmental pollution

The ports in YDA are major hubs of economic activity and major sources of pollution. Enormous ships with engines running on the dirtiest fuel available, thousands of diesel truck visits per day, mile-long diesel locomotives hauling cargo and other polluting equipment, and activities at marine ports cause an array of environmental impacts that can seriously affect local communities and the environment. These impacts range from increased risk of illness, such as respiratory disease or cancer, to increases in regional smog, degradation of water quality, and the blight of local communities and public lands.

Most major ports are undergoing expansions to accommodate even greater cargo volumes. The growth of international trade has resulted in corresponding rapid growth in the amount of goods being shipped by sea. Despite the enormous growth within the marine shipping sector, most pollution prevention efforts at the local, state, and federal level have focused on other pollution sources, while the environmental impacts of ports have grown.

Marine ports are now among the most poorly regulated sources of pollution in the China. The result is that most marine ports are heavy polluters, releasing largely unchecked quantities of health-endangering air and water pollution, causing noise and light pollution that disrupts nearby communities, and harming marine habitats.

3.4 Summary

The main conclusion of our analysis is Shanghai port is the most competitive port in the YDA. Further integration of port resources is needed to accelerate the construction of port infrastructure and collection and distribution system, speed up the development of

modern shipping service system and improve the management level and integrative service capabilities so that we can build Shanghai International Shipping Center with the center of Shanghai and two wings of Jiangsu Province and Zhejiang Province as soon as possible.

Chapter 4 The strategy to enhance the ports competitive power in YDA

4.1 Application of SWOT method in analysis of the port competitiveness in YDA

With the result of the Table 8, we can see that the indicators have been evaluated so we can use SWOT method to analyze the advantages and disadvantages of individual ports of Yangtze River Delta

Table 4.1 SWOT matrix for Shanghai port

STRENGTHS	WEAKNESSES
<p>Will be freest port in China</p> <p>International transshipment hub</p> <p>Multi-modal transportation</p> <p>Government support</p>	<p>Typhoons limit use of port to 270 days/year</p> <p>High operation cost</p> <p>Official policies for operating in Lingang have not been implemented yet</p>
OPPORTUNITIES	THREATS
<p>The completion of 2nd phase of Yangshan Port reinforce Shanghai's long-standing role as an international hub</p>	<p>Facing the competition from neighboring ports in YDA and other international ports in Asia</p>

Table 4.2 SWOT matrix for Lianyungang port

STRENGTHS	WEAKNESSES
<p>Having dry port to lower operation cost</p> <p>Plenty of goods</p>	<p>Weak hinterland power</p> <p>Lack of highly developed industries</p>
OPPORTUNITIES	THREATS
<p>Adjustment of national and local industrial structure makes Lianyungang port might be the steel base and</p>	<p>Having homogeneous goods with Rizhao Port and Qingdao port, the streaming potential can not be neglected.</p>

petrochemical base of Jiangsu Province.	China's current trade policies limit the contamination of goods re-exports
---	--

Table 4.3 SWOT matrix for Ningbo port

STRENGTHS	WEAKNESSES
Deep water Low operation cost	Weak cargo distribution and collection capacity Limited hinterland
OPPORTUNITIES	THREATS
Integration projects with Zhoushan port	Competition from Shanghai port

Table 4.4 SWOT matrix for Zhoushan port

STRENGTHS	WEAKNESSES
Strategic location Strong economic power of hinterland	Low service level Not enough berths for large container vessels Supporting logistics industry and infrastructure fragmented
OPPORTUNITIES	THREATS
Opening of the bridge Connected with the mainland will help the development of multimodal transport	Not enough containers Competition from other ports at home and abroad

Table 4.5 SWOT matrix for Wenzhou port

STRENGTHS	WEAKNESSES
------------------	-------------------

Strategic location Mainly dealing with domestic trade	Weak collection and distribution infrastructure Poor linkage with multimodal transportation
OPPORTUNITIES	THREATS
Development of Zhuangyuanao deep water port	The lower level of service causes the a large number outflow of goods of the economic hinterland

Table 4.6 SWOT matrix for Nanjing port

STRENGTHS	WEAKNESSES
Complete collection and distribution system Longtan Free Trade Zone supplies ample containers Having the most container routes among ports in YDA	Bearing heavy burden of construction investment Transport enterprises are small Geographic location limits usefulness
OPPORTUNITIES	THREATS
The implementation of strategy of seizing the international shipping and logistics center of Yangtze River Adjustment of shipping routes of Shanghai Yanshan port	Disordered development of ports in Jiangsu Province causes blind competition Government support to Taicang port

Table 4.7 SWOT matrix for Zhenjiang port

STRENGTHS	WEAKNESSES
------------------	-------------------

<p>The important transit port of iron ore between Yangtze River and the sea</p> <p>Having long term relationship with many enterprises</p>	<p>Container ports are small</p> <p>Not enough containers from hinterland</p>
OPPORTUNITIES	THREATS
<p>The completion of third phase of Zhenjiang port construction</p>	<p>Competition from port at home and abroad</p>

Table 4.8 SWOT matrix for Nantong port

STRENGTHS	WEAKNESSES
<p>Government policies support</p> <p>Strategic location</p> <p>Good cargo collection and distribution condition</p>	<p>Land limitation for long term expansion</p> <p>Developing without plan</p>
OPPORTUNITIES	THREATS
<p>Completion of third phase of Langshan port</p>	<p>Competition from ports in Shandong Province in North and Ningbo port in South</p>

Table 4.9 SWOT matrix for Suzhou port

STRENGTHS	WEAKNESSES
<p>Government policies support</p> <p>Strategic location as transit port of bulk cargo</p> <p>Strong economic power of hinterland</p>	<p>Lack of professional management of port</p> <p>Ageing equipment and poor infrastructure</p>
OPPORTUNITIES	THREATS

Cooperating with Shanghai international shipping center	competition from other ports in Jiangsu Province and ports in Zhejiang Province
---	---

Table 4.10 SWOT matrix for Jiangyin port

STRENGTHS	WEAKNESSES
Relative low cost base(land rental and wages)	Insufficient volume of cargo Poor infrastructure and small
OPPORTUNITIES	THREATS
Opening direct air routes to Taiwan and Hong Kong	Competition from other ports in YDA

Table 4.11 SWOT matrix for Yangzhou port

STRENGTHS	WEAKNESSES
The vast hinterland market prospects Relatively perfect hardware and software facilities	Not enough cargo Low efficiency of port operation
OPPORTUNITIES	THREATS
Being supply port of Shanghai Yangshan port	Fierce competition on shared hinterland

Table 4.12 SWOT matrix for Jiaying port

STRENGTHS	WEAKNESSES
Strong economic power of hinterland	No real container business Infrastructure fragmented
OPPORTUNITIES	THREATS
Have cooperated with Ningbo port	Competition from Shanghai and Zhoushan port

Opening Hangzhou Bay Bridge	
-----------------------------	--

Table 4.13 SWOT matrix for Taizhou port

STRENGTHS	WEAKNESSES
Long offshore	Narrow landside
Ready cargo from natural resources	Incomplete equipment
	No logistic park
OPPORTUNITIES	THREATS
Cooperate with neighboring port	Higher logistics cost makes port lose more cargo

Table 4.14 SWOT matrix for Xuzhou port

STRENGTHS	WEAKNESSES
Strategic location as transit port of coal transportation from North China to South China	Poor port management
Main energy supply base	Scattered layout of port
OPPORTUNITIES	THREATS
Business expansion in subsidiary company	Increased competition from other ports in YDA

By analyze these ports we can find that the comparative advantages of each ports of YDA. The port competition in Yangtze Delta Area is increasingly fierce, not to mention the competition from other part of China. The market share of container port throughput of the East China and South East China expanded to 58.3% from 12.9%, that of Hong Kong reduced from 50.0% to 26.6%, that of Taiwan from 33.0% reduced to 15.1%. But during the same period, the container transit market share of Hong Kong port increased

from 54.0% to 61.7%, that of Taiwan went down from 46.0% to 35.0%. Other big ports like Shanghai, Ningbo, Shenzhen and Guangzhou accounted for merely 3.3% of this market. If the ports in YDA cannot enhance their competitive power, they will hardly increase economic benefits of port operations and improve the ability of anti-market risk.

4.2 The strategies to enhance the competitiveness in YDA

To strengthen the coordination of the Yangtze River Delta ports, promotion of inter-port healthy and orderly development has become the consensus of the government and enterprises.

In my opinion the port authorities can take measures as follows.

4.2.1 Optimize the competition market environment

Government should strengthen the port co-ordination in Yangtze River Delta. Without government overall planning, local port could develop blindly which cause resources waste due to the repeatable construction. So we must treat these ports as a whole. The guidance planning related to the development of Yangtze River Delta port needs to have requests on port system construction of YDA, its functional layout, terminals scale and structure, logistics and collection and distribution systems. I think the government should focus on the resolution of ports coordination and revise the existing plan-affirming the overall size, structural layout and collection and distribution system of the Yangtze River Delta ports, training shipping service staff, as well as shipping services sector, foster, making other supporting policies-to improve the scientificity, binding and maneuverability of the plan.

To integrate the resources, Integration of the regional logistics system is the key resolution. It can optimize the port logistics and transportation system in Yangtze River Delta. As it prescribed, the construction of port cluster transportation needs to coordinate with development of Shanghai International Shipping Center system as well as the social economic development of Yangtze Delta Area. A reasonable, optimal and convenient network should be built to support the progress of hinterlands and cities.

Port authorities are encouraged to create a new organizational model of logistics and form a logistics alliance to realize of logistics resources sharing and reduction of logistics costs. We need to diversify vertically the port industrial chain and extend the service functions of the port to provide customers with full logistics services.

Based on the regulatory plan, government should make the plan to develop the port in details: defining the terminal region and building collection and distribution system, EDI systems; dividing port industry zone and affirming industries of priority, development timing and distribution of eco-friendly network; clearing the spatial layout and linkage among port, industrial zone and cities and strengthen the interactive coordination among different functional domains.

4.2.2 Speeding up the informationization in YDA

The regional development of modern shipping service needs to be strengthened. It's the great importance to develop shipping services, which is not only the main distribution to economic growth of Yangtze River port, but also the strategic measures to improve the function of port services and promote the restructuring development of port. To intensify the port informationization, we should focus on the qualified cities such as Shanghai and Ningbo, and actively with the plan and construct international shipping service whose roles are Governmental management servicers, operators combining port and related enterprises together and the information highway for information collection and distribution. We need to speed up the development of the information system of shipping finance and insurance, maritime engineering and technology consulting, maritime accounting and management consulting, ship brokers, etc. so that we can enhance the service functions of the port group.

4.2.3 Integration and cooperation among ports in YDA

To develop healthy Port Union is another way out. Ports conform to the needs of development trend. Port alliance is the port operators' response to cope with the alliance of international fleet so that they can enhance their negotiating capacity. At the same

time, the implementation of integration and cooperation of the ports will help port to become professional, intensive and large-scale. Thus, business can be distributed and adjusted dynamically among the ports in YDA according to the regional economic development, market demand for shipping transport, as well as the comparative advantage of different port. However, as the requirement of the construction of Shanghai International Shipping Center, each port needs to choose different types of Port Union to form a reasonable system of the Yangtze River Delta ports, which will be the trend of port development.

Main port like Shanghai port, Ningbo - Zhoushan port, Nanjing port, Suzhou port can cooperate with each other through strategic investment, asset reorganization, stock control and other forms. Those powerful of Shipping Group can extend their operation by merger and reorganization the shipping company lack of competitiveness. Port authorities should make a reasonable position of itself according to the role it plays in the port cluster. In the course of Port Union, the phenomenon of Port marginalized is the problem that needs great attention.

Government should create the port coordination system. The Yangtze River Delta had better to actively promote the incoming inter-firm cooperation and alliance between shipping industries and port enterprises, based on the capital, project and market. Port enterprises are encouraged to integrate and reorganize their capital by joint venture or the formation of an industrial investment fund so that the development of ports will be more vital and more competitive. We must reform the fiscal, taxation, investment and financing system to support for domestic and foreign enterprises and consortia, especially domestic companies, taking part port construction and operation through strategic investment and other forms. Besides coordination, ports can try extend preferential policies to other ports. Take Yangshan Bonded Port as an example, co-constructed by Zhejiang Province and Shanghai, it is necessary for it to actively seek some of its well-established preferential policies and extend to other ports such as Meishan Bonded Port. And then its preferential policies, as well as the successful

experiences are transferred to next neighboring like Liuheng and so on. It can create a more competitive environment for the development of port group in the Yangtze River Delta.

4.3 The significance of strengthen ports competitive power in YDA

Cities in Yangtze River Delta are of the highest degree of regional integration with consensus on the regional transfer of industries, allocation of resources and co-construction of transportation system. The ports integration goes into a new period as a clear positioning of YDA. Yangtze Delta Area is defined as the national economic hub, the international gateway, the world-class city group and the international advanced manufacturing base. The development of port coordination in YDA is expected to be a new breakthrough of the further integration of the ports in Yangtze River Delta. At present, regional development platform- Yangtze River Delta Co-operation Joint Conference-has been formed.

To enhance the port competitiveness in YDA is to satisfy the needs of construction of Shanghai International Shipping Center, which is the national strategic decision-making. Shanghai cannot be the International Shipping Center without cooperation with neighboring ports and coordination with neighboring. The development is on the national strategic level. Started from the coordination between Shanghai and Ningbo - Zhoushan port, co-specialization system is to be built, which is according with the development status and trend of Yangtze River Delta port. By enhancing the whole market competitiveness of YDA, we can improve the shipping service to an international level and help to built up Shanghai International Shipping Center as quickly as possible.

In fact, many new ports alliances have emerged. Shanghai International Port Group has equity participation in port berths of Chongqing, Changsha, Anqing, Nantong, Wuhan, Nanjing, Ningbo Daxie, Wenzhou Qili, etc. through strategic investments to promote strategic alliances. Ningbo - Zhoushan port promote strategic cooperation between two

ports by building multi-purpose terminals in Wenzhou Lingkun, Aojiang container terminals, Taizhou outside sand container operation area, Taicang military port, Nanjing Longtan Container Terminal and so on. Yangshan Port and Beilun Port have become sister harbors through border inspection and shipping route unified.

4.4 Summary

We should plan a reasonable layout of port cluster of Yangtze River Delta and clear the function of each port. Each port should cooperate with others closely on the business of customer clearance, courses charting, agent and forwarder choice, multimodal transport and so on. By doing so, we can progress the formation of scientific and reasonable system of the Yangtze River Delta ports and promote the development of Shanghai International Shipping Center as it's required by the government.

Chapter 5 Conclusion

Yangtze River Delta is one of the port intensive areas in China. Rapid development of Port cluster in Yangtze Delta Area is conducive to the promotion of speed economic growth along YDA. The throughput of ports in YDA took up 45% of the total national throughput. Among these ports Shanghai port is the third biggest integrated port in the world wide while its scale is the biggest. However, these ports face the practical problem of how to cooperate with each other and establish scientific and reasonable port system.

The ports in Yangtze Delta Area (YDA) compete intensely for the resourced hinterland, repetitively constructing infrastructures and facilities, although the economic integration is put forward on YDA. The unhealthy competition has affected not only the individual port development but also the competitive power of the port cluster. It is the common sense of both government and corporations that the growth of ports in YDA should be harmony, healthy and in order.

Whether the construction of the ports in Yangtze River Delta is excess or not has to be the problem to be in-depth studied, but competition situation caused by the local interests is difficult to recover in the short term under such economic situation. The supply capacity and transport demand of regional ports needs for dynamic balance and the functional layout is to be further optimized.

References:

- 1.M. Huybrechts, Eddy Van de Voorde, Eric Van Hooydonk, Alain Verbeke, Willy Winkelmanns, *Port Competitiveness: An economic and legal analysis of the factors determining the competitiveness of seaports*, Uitgeverij De Boeck, 2002.
- 2.Henrik Stevens, *The Institutional Position of Seaports: An International Comparison*, Springer, 1999.
- 3.Hans Agerschou, *Planning and Design of Ports and Marine Terminals*, Thomas Telford, 2004.
- 4.Wang Mingzhi, Zhang Mingxiang, *A review of the port economy of the Yangtze Delta in the first half of 2008 and an analysis of future trends*, China Maritime, 2008(9).
- 5.World Bank, *Port Reform Toolkit: Effective Decision Support for Policymakers*, World Bank Publications, 2003.
- 6.Wang Mingzhi, Zhang Mingxiang, Li Weichao, *First half of 2007 analysis of situation and prospect of economic operation of ports in Yangtze River Delta*, World Maritime, 2007(5), ISSN: 1006-7728(2007)05-0006-03.
- 7.Fangrong Liu, *Host the Expo, Host the World*, Linking Publishing, 2005, pp.107-110.
- 8.Wenhui Zhu, *From Competition to Cooperation*, Tsinghua University Press, 2003, pp.197-200.
- 9.Zhiyong Yang, Xin Zhang, *Public Economics*, Tsinghua University Press, 2005, pp.359-361
- 10.Yang jiao, *Shanghai Overview*, China Intercontinental Press, 2004.
- 11.Ke Ma, Jun Li, *China Business*, China Intercontinental Press, 2003.
- 12.Meijiao Rao, Siming Li, Yuequn Shi, *Cepa Regional Economic Co-operation with the Pearl River Delta and Yangtze River Delta*, Commercial Press, 2006. pp. 289-350.
- 13.Wang Mingzhi, *First half of 2006 analysis of of economic operation of ports in Yangtze River Delta*, Shipping Management, 2007(3).
- 14.Anthony G. O. Yeh, *Developing a Competitive Pearl River Delta in South China Under One Country-two Systems*, Hong Kong University Press, 2006.
- 15.Elvira Haezendonck, *Essays on Strategy Analysis for Seaports*, Garant, 2001.
- 16.Theo Notteboom, *Current Issues in Port Logistics and Intermodality*, Garant, 2002.
- 17.Arndt Graf, Chua Beng Huat, *Port Cities in Asia and Europe*, Taylor & Francis, 2008.
18. Konstadinos G. Goulias, *Transport Science and Technology*, Emerald Group Publishing, 2006, pp.450-452.
19. *Yearbook of Chinese ports*, Yearbook of Chinese ports Editorial, 2008.
- 20.Nazery Khalid Ahmad Fakhruddin Muda &Armi Suzana Zamil, *Port Competitiveness: SWOT Analysis of Malaysian Ports Under Federal Port Authorities*, 2004, pp.3-23
- 21.Kevin Cullinane, *Port Competition in China*, 2007
http://www.abdn.ac.uk/irr/documents/071023_ProfCullinaneseminarslides.ppt
22. Spanish Ministry of Public Works, *A Port Competitiveness Indicator Through the Multicriteria Decision Method Promethee*, 2005
- 23.Peter W. De Langen & Athanasios A. Pallis , *Analysis of the Benefits of Intra-port Competition*, 2004, pp.2-12

24. Slack, B., 'Containerization, inter-port competition and port selection' *Maritime Policy and Management*, 1985, 12(4), pp. 293-303.
25. *China Port Industry Report, 2008*(2008) <http://www.askci.com>