

World Maritime University

# The Maritime Commons: Digital Repository of the World Maritime University

---

World Maritime University Dissertations

Dissertations

---

8-4-2007

## Research on competitiveness of Dalian Port

Zhaobo Xu

Follow this and additional works at: [https://commons.wmu.se/all\\_dissertations](https://commons.wmu.se/all_dissertations)



Part of the [Business Analytics Commons](#), [Development Studies Commons](#), and the [Statistical Models Commons](#)

---

### Recommended Citation

Xu, Zhaobo, "Research on competitiveness of Dalian Port" (2007). *World Maritime University Dissertations*. 1928.

[https://commons.wmu.se/all\\_dissertations/1928](https://commons.wmu.se/all_dissertations/1928)

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](mailto:library@wmu.se).



**WORLD MARITIME UNIVERSITY**

Shanghai, China

**Research on Competitiveness of Dalian Port**

By

**Xu Zhaobo**

**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**

**(INTERNATIONAL TRANSPORT AND LOGISTICS)**

2007

## DECLARATION

I certify that all the material in this research paper that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

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

.....  
(Xu Zhaobo)  
.....

### **Supervised by**

Professor Sha Mei  
Shanghai Maritime University

### **Assessor**

Professor Detlef Nielsen  
World Maritime University

### **Co-Assessor**

Professor Wang Xuefeng  
Shanghai Maritime University

## ACKNOWLEDGEMENT

First of all, I would like to owe my deepest appreciation to my supervisor, Professor Sha Mei. Her guidance, support and encouragement throughout my dissertation writing are inevitable and critical. Without her suggestions and assistance, this dissertation would not have been completed.

Also, I want give my thanks to World Maritime University and Shanghai Maritime University for they providing me such wonderful education during the last two years. That will be an unforgettable period in my life.

Thanks to the whole faculty, who had provided me so many wonderful lectures. Thanks to Ms. Zhou Yingchun, Mr. Zhu Minjian and Miss. Qu Shanshan for their great quality of services during the last two years.

Finally, I am thankful to my classmates and my friends. During the period that I was badly ill and lived in hospital, they provided me selfless help and support to guarantee this paper can be completed.

## Abstract

**Title of Dissertation:** Research on Competitiveness of Dalian Port

**Degree:** Master of Science in International Transport and Logistics

With the development of economy globalization, as a main port in North of China, Dalian port becomes to play a more and more important role in national economy and social development. But on the other hand, some other ports in northeast of Asia also announce the purpose in the same way. Actually, with the competition with these ports, the most important "hard ware" of the construction as the regional shipping center, development of Dalian port has slowed down in recent years.

On this occasion, through the study of port resource, we could draw a conclusion that many factors involved in the slow disposition, among which there are factors inside and factors outside. With the stability of the factors outside, it is a better way to deal with the factors inside and improve the advantage, so that Dalian port can find it' s way to become one of the top ports in the world.

This dissertation is based on the total and systematic ideas, considering the port's development would boost district economy; analyzing Dalian port's position, function, competitive condition and economy environments of district economy development; forecasting the transfer need of the port and suggesting the policy goal of Dalian port and also the steps & means to reach the goal in the future.

**Key Words:** port, competitiveness, index system,

# TABLE OF CONTENTS

DECLARATION .....	i
ACKNOWLEDGEMENT .....	ii
Abstract .....	iii
List of Tables .....	vi
List of Figures.....	vii
Chapter 1 Introduction .....	1
1.1 Background.....	1
1.2 Contents of Research .....	3
1.3 Overview of Literature in Relative Field.....	4
Chapter 2 Dimension of Competitiveness.....	7
2.1 Dimension of Enterprise Competitiveness .....	7
2.1.1 Competition and Competitiveness.....	7
2.1.2 Definition of Enterprise Competitiveness.....	7
2.2 Dimension of Port Competitiveness .....	11
2.3 Purport of the Port Competitiveness Research .....	13
Chapter 3 Analysis on Status of Dalian Port and Analysis of Competitions Faced by Dalian Port ....	15
3.1 Analysis on Status of Dalian Port.....	15
3.1.1 Status of Resources along Dalian Port Shoreline .....	15
3.1.2 Main Port Enterprises in Dalian and Status of Terminals.....	17
3.1.3 Forecast of Throughput in Dalian Port .....	22
3.1.4 Problem Analysis on Port Enterprises in Dalian.....	23
3.2 Analysis of Competitions Faced by Dalian Port.....	25
3.2.1 Comparison and Analysis of Current Dalian Port and Surrounding Ports.....	26
3.2.2 Survey of major competitors of port cities in the surrounding area at home.....	30
Chapter 4 Build a model for evaluating ports competitiveness .....	41
4.1 Build port competitiveness evaluation index system.....	42
4.1.1 Principles for building the evaluation index system .....	42
4.1.2 Composition of the evaluation index system.....	43
4.2 Build evaluation model and determine weighing .....	44
4.2.1 Build evaluation model.....	45
4.2.2 Determine weighing .....	48
4.2.3 Results of comparison of competitiveness.....	50
Chapter 5 Countermeasures for Improving the Competitiveness of Ports in Dalian.....	54
5.1 Main principles .....	54
5.1.1 Principle of adjusting measures to local conditions.....	54
5.1.2 Principle of market mechanism .....	54
5.1.3 Principle of diversity .....	55
5.1.4 Principle of advancement .....	55
5.1.5 Principle of the most excellence in whole .....	55
5.2 Countermeasures for improving the competitiveness of Dalian Port .....	56
5.2.1 Accelerate to make the high-quality development planning for ports in Dalian .....	56
5.2.2 To form the internal dynamic mechanism that the port enterprises will self-consciously follow the market requirements to integrate the resources .....	57

5.2.3 Perfect the distribution & transportation systems in ports in Dalian .....	58
5.2.4 Construct logistic centers for the ports in Dalian.....	59
5.2.5 Enhance the core function area in the port, and construct the affiliated medium-small port group .....	60
5.2.6 Construct a public information platform with Dalian Port as the center .....	62
5.2.7 Increase the financing capabilities in ports.....	63
Reference:.....	66

## List of Tables

Table 3-1 2010 Throughput Forecast of Main Port Areas in Dalian Port.....	22
Table 3-2 2020 Throughput Forecast of Main Port Areas in Dalian Port.....	23
Table 3-3 Throughput of Containers of Major Foreign Competing Ports in Recent Years.....	29
Table 3-4 Analysis of growth rate of throughput of containers at three ports.....	32
Table 3-5 Call-at terminals of regular ships of branch sea routes and Dalian ocean routes.....	34
Table 3-6 Main Ocean Routes of Tianjin Port.....	35
Table 4-1 Port Competitiveness Evaluation Index System .....	43
Table 4-2 Evaluation Results of Weighing of Port Competitiveness Evaluation Index.....	49
Table 4-3 Evaluation Results.....	50
Table 4-4 Internal Environment of Dalian Port .....	52

## **List of Figures**

Figure 2-1 Affecting Factors of Port Competitiveness.....12

Figure 4-1 Steps in Determining Port Competitiveness Evaluation Model.....41

# Chapter 1 Introduction

## 1.1 Background

As one of the major foreign trade ports, Dalian Port locates at the south end of Liaodong Peninsula. With northeast district and south Inner Mongolia to the back and Jiaodong Peninsula to the front, it looks at Japan and South Korea with the ocean in between. Dalian Port is the nearest port leading to foreign countries in Bohai district and Liaodong Peninsula, the most convenient port for the northeast Asian area to enter the Pacific Ocean, the center of the Northeast Asian economic circle and one of the most hopeful ports for circulating of goods to the Far East, South Asia, North America and Europe. Currently, Dalian Port has established economic, trade and shipping relationships with more than 160 countries and districts and more than 300 ports in the world. Now, Dalian Port has become the largest port to transfer food supplies, the largest transfer center of petroleum and liquid chemicals in northeast Asian area, and one of the largest ports for passengers in China.

In October 2003 when the State Council were making the strategy to develop the old industrial base in northeast area, they clearly brought forward “to make full use of the current port conditions and advantages of northeast area and construct Dalian into an important international shipping center in Northeast Asia”. Afterwards, Liaoning Province Government proposed the strategies to construct a regional international shipping center and develop port economy. As the major "hardware" of the regional international shipping center in northeast Asian area, Dalian port will take the lead and assume the burden.

In the background of economic globalization, ports are no longer only the transfer point of cargo between land and water, but also are strategic resources to take up the international market. No matter which port becomes an important international port, the

city where it locates will possibly become an international shipping center and a center of economy, trade, finance, information and logistics. However, in the northeast Asian area, Dalian will be faced with the intense competitions with other port cities in this area if it intends to develop into a regional shipping center herein. From the international perspective, due to different factors, Dalian port has developed at a slow speed in recent years. However, ports in Korea and Japan that have been developed in early stage are entitled to edges in terms of advanced dock equipment, dense shipping lanes, scientific management, loose environment and etc. Domestically; from the perspective of arrangement of competitive and regional international shipping center construction in China, there are Hong Kong and Shenzhen in the south, Shanghai in the center, Tianjin and Qingdao in the north. Compared with the above cities, Dalian has been left behind.

In order to be the regional international shipping center in northeast Asia, Dalian has to become the shipping center in North China. However, the competition for shipping center in North China has been started six years ago. In 2001, Dalian has included the construction of regional international shipping center into the “tenth five years’ plan” of Dalian. Almost at the same time, in May 2001, Qingdao Government announced to preliminarily build Qingdao into the shipping center in North China before 2005, construct it into a regional international logistics center, information center and processing center before 2010, and thus become one of the important shipping centers in northeast Asia. Tianjin, in turn, proposed to build the international shipping center in North China more specifically. However, the fact in recent years is that compared to Qingdao and Tianjin, Dalian has been left behind in terms of port development. As the “engine” of development for Dalian City, if not striving harder, Dalian Port, one of the three parts for the status of triangular balance will become weaker and weaker, finally back off from the competition, and become the feeding port or branch for other larger ones. If so, not to mention to become the regional international shipping center in northeast Asia, Dalian cannot even be the international shipping center in North China.

Objectively, the slow development of Dalian port is caused by multiple causes. Mainly: firstly, the hinterland of Dalian Port, i.e. the three provinces in the northeast, is developing at a slow speed. Secondly, Dalian port failed to give full play to its edges in terms of resources. The first one is external cause, and cannot be changed directly. Therefore, Dalian port has to find the cause in itself and promote its competitiveness by means of integrating its resources. In this way, it is necessary to study what are the competitive edges of Dalian port.

## **1.2 Contents of Research**

This dissertation is based on total and systematic ideas, conclude the dimension of port competitiveness, analyze the general situation of Dalian Port and the competition circumstance that Dalian Port faces to. According to the Affecting Factors of Port Competitiveness to establish building the evaluation index system and the weighting of index and conclude the evaluation results. Finally finds the lower competitiveness of Dalian Port, and gives the measures for improving the Competitiveness of Ports in Dalian

Chapter 1 is the introduction, which describes the background and contents of research of the thesis.

Chapter 2 introduces the meaning of competitiveness and the meaning of study, and also defines the factors in port's competitiveness.

Chapter 3 presents the status of Dalian port and the status of rivals of Dalian port during the construction of northeast Asian regional international shipping center

Chapter 4 introduces the evaluation model of port's competitiveness and interprets the index and weight of port's competitiveness, then comes to conclusion of the comparisons of the competitiveness of the three by means of the competitiveness model.

Chapter 5 proposes the countermeasures for Dalian port to get improved.

### 1.3 Overview of Literature in Relative Field

European Port committee (2002) defined port as “ the hub that goods to be transported are handled in”. Ministry of Communications of United States (1992) gave the definition of port as “ market of logistics activity; the engine of economy development.” Ministry of Communications of China (1997) clearly defined port as “distributing center of goods to be delivered”.

The *Presidential Commission Report on Industrial Competitiveness* of 1985 in USA contends that enterprise’s competitiveness refers to “the ability to provide good product and service in international market and to improve domestic people’s living standards in a free and favorable market”.<sup>1</sup>

*Report on Competitiveness* of World Economic Forum in 1985 indicates that enterprise’s competitiveness refers to “the ability and opportunity to design, produce and sell products and provide services on the basis of its environment with edges in terms of price and quality over its domestic and overseas rivals in the present and in the future”.<sup>2</sup>

Michael · E · Porter from Harvard University defines from the direct representation of competitiveness that advantage or disadvantage of an enterprise refers to the position of the enterprise in the industry.<sup>3</sup>

---

<sup>1</sup> Presidential Commission on Industrial Competitiveness (1985); *Presidential Commission Report on Industrial Competitiveness*.

<sup>2</sup> Yuan Jiabin and Cheng Longsheng (2003). Enterprise’s Competitiveness and Evaluation. *Statistics and Decision-Making*, May, 2003, pp38-39.

<sup>3</sup> Michael E Porter. (1980) *Competitive Strategy Techniques for Analyzing Industries and Competitors*. Huaxia Press,1997.15-25

Clarkson Research Studies(1992) pointed that the competition of ports means that the competition between ports operators for achieving profit. Liu Bin(1999) and Goss(2000) pointed that globalization will deep the complexity of competition among Chinese ports.

C K Prahalad and Gary Hamel put forward the definition of “ core competence” in *The Core Competence of the Corporation* in 1990. They pointed that the core competence is a kind of inherent capabilities of resources which is unique owned by an enterprise and which can brings consumers special effects so that the enterprise in a market with long-term competitive advantages.<sup>4</sup>

Chinese academician, Fan Xiaopin, defines competition from the result of competition and thinks that enterprise’s competitiveness is the state and ability embodied by the enterprise to struggle for resources for the sake of survival. The specific interpretation is "enterprise’s competitiveness refers to a certain state and ability embodied by the enterprise in terms of continuous and effective struggling for market share, challenging the rivals, searching for favorable positions, expanding operation fields, realizing the operation effect and etc. by means of its specific competition mode".<sup>5</sup>

Xu Qin put forward the port competitiveness definition as the most basic ability to make port enterprise keep long-term competitive advantage achieve more profit and sustainable development.<sup>6</sup>

---

<sup>4</sup> Zeng Qingxue, Gong Min,(2000)*On the Evolution and New Development of Strategic Theories of Enterprise* ,Commercial Research 2000,No.8

<sup>5</sup> Fan Xiaopin (1999). *Discussion on Meaning and Composition of Enterprise Competitiveness*. Journal of Zhejiang University, December, 1999

<sup>6</sup> Xu Qin(2006). *integrate port resource to upgrade the competitiveness of port*. Shipping management Vol.28 No.4

Hao Junli, Lei Mi gave their opinion on port competitiveness as the ability and opportunity for a certain port to provide more attractive price and service quality than other ports. It shows as the ability of a port to get survival and sustainable development in market competition.<sup>7</sup>

Wang Changda pointed that port competitiveness index reflect the scale and opportunity for sustainable development for a port's development, that is the integration of quality and quantity.<sup>8</sup>

Quoted from the overall planning of Dalian port, the thesis predicts that the throughputs of Dalian Port in 2010 and 2020 are respectively 250 million tons and 380 million tons and the container throughputs are 8 million TEU and 17 million TEU.<sup>9</sup>

In their article *Research on Diversified Fund Raising Modes for Construction of Port Facilities*, Huang Yong and Ma Ning proposed multiple modes for financing suitable for ports in China, including investment of shipping enterprises, stock funding, financial lease and etc.<sup>10</sup>

---

<sup>7</sup> Hao Junli, Lei Mi(2005) *Evaluate Port Competitiveness by AHP*. China Ports 2005 No.1

<sup>8</sup> Wang Changda(2006). *Factors analysis on competitiveness of harbors in China*. Quanguo Shangqing (Jingji Lilun Yanjiu).2006, No.6

<sup>9</sup> Dalian Municipal Port Administration Bureau (2005). *Overall Planning of Dalian Harbor*. Pp14-16

<sup>10</sup>Huang Yong, Ma Ning, (2006). *Research on Multi-financing Model of Port Construction*, Journal of Beijing Jiaotong University(Social Sciences Edition) Vol. 5 No13, Sep. 2006

## **Chapter 2 Dimension of Competitiveness**

### **2.1 Dimension of Enterprise Competitiveness**

The research on enterprise competitiveness is to evaluate and analyze the level of enterprise competitiveness by means of the data of factors reflecting the enterprise competitiveness. It is necessary to have a clear understanding of the meaning of enterprise competitiveness in order to study it. The precondition for existence of competitiveness and enterprise competitiveness is competition. Without competition in economic relationship, there is no reason for competitiveness to emerge. Therefore, the first thing is to study competition, competitiveness, enterprise competitiveness and the relationships thereof, and then the meaning of enterprise competitiveness can be defined scientifically.

#### **2.1.1 Competition and Competitiveness**

Competition is the measurement of power. The more powerful one survives, develops and expands while the weaker is eliminated. The fittest survives in natural selection; this is the essence and the common rule of competition. Though competitions are seen in every field of human society, economic competition is always the main line thereof. The ultimate cause of competition in any field can be concluded to economic ones or to be related to that. Competition in economic field refers to the mutual contending occurring between various independent economic entities in order to obtain favorable production and sales conditions for survival and development. Therefore, competition, in itself, represents the social economic relationship, i.e. economic benefit relationship between competitors.

#### **2.1.2 Definition of Enterprise Competitiveness**

Enterprise competitiveness is one of the existing states of competitiveness. It has plenty

of meanings from different perspectives including academic research, policy and etc. As follows are several representative opinions: A. *The Presidential Commission Report on Industrial Competitiveness in USA* contends that enterprise's competitiveness refers to "the ability to provide good product and service in international market and to improve domestic people's living standards in a free and favorable market".<sup>11</sup>The one is defined from both micro and macro perspectives and has the odor of welfare economics. B. *Report on Competitiveness* of World Economic Forum in 1985 indicates that enterprise's competitiveness refers to "the ability and opportunity to design, produce and sell products and provide services on the basis of its environment with edges in terms of price and quality over its domestic and overseas rivals in the present and in the future".<sup>12</sup>The one is defined from the perspectives of ultimate objective of the enterprise and the welfare of the country. C. Michael · E · Porter from Harvard University defines from the direct representation of competitiveness that advantage or disadvantage of an enterprise refers to the position of the enterprise in the industry<sup>13</sup>. D. Chinese academician, Fan Xiaopin, defines competition from the result of competition and thinks that enterprise's competitiveness is the state and ability embodied by the enterprise to struggle for resources for the sake of survival. The specific interpretation is "enterprise's competitiveness refers to a certain state and ability embodied by the enterprise in terms of continuous and effective struggling for market share, challenging the rivals, searching for favorable positions, expanding operation fields, realizing the operation effect and etc. by means of its specific competition mode"<sup>14</sup>. Obviously the definition is made from the perspective of results of competitiveness.

There are cognitions of enterprise competitiveness defined from overall perspective of

---

<sup>11</sup> President's Committee on Competitiveness (1985). *Report of President's Committee on Competitiveness*.

<sup>12</sup> Yuan Jiaxin and Cheng longsheng, *Enterprise Competitiveness and its Evaluation, Statistics and Decision*, 2003 No.5, pp38-39

<sup>13</sup> Michael · E · Porter, *Competitive Strategy Techniques for Analyzing Industries and Competitors*, 1980, published by Huaxia Press, 1997.15-25

<sup>14</sup> Fan Xiaoping, *The discussion about contents and constitution of enterprise competitiveness (1999)*, Journal of Zhejiang University, 1999 No.12

enterprises in a country, from the micro perspective of enterprise competition, from the results thereof or from the influencing factors thereof. With comprehensive survey of different opinions, we find that any concept serves the perspective and objective of the research. Different definitions of enterprise competitive result from different perspectives and objectives of the research. The research herein orients at the evaluation of individual competitiveness of micro enterprises. It starts from practices of micro enterprise competition and puts emphasis on the surviving and developing ability of the enterprise without consideration of the amounts of national welfare brought by the enterprise. Meanwhile, analysis of competitiveness does not only take into account the results thereof, but also the cause that backs up the results.

The thesis holds that enterprise competitiveness is a comprehensive domain with multiple meanings. It does not only relate to the ability of the enterprise to obtain the market and create values, but also involves the internal elements and operation management process of the company. It is not only the static competing ability, but also the dynamic developing capability. The key to enterprise competition analysis is to find out the most basic factors in competition and enterprise. In accordance with the orientation and the objective of the research herein, the thesis defines enterprise competitiveness as follows: it is the competing ability of the enterprise as independent economic entity against other enterprises in the same industry in the market competition environment in terms of market occupation, value creation, maintenance and development and etc. by means of configuring, creating resources and organically integrating its resources.

The definition includes four levels of meanings: a. Enterprise competitiveness is a competing ability or competing productivity. The precondition of competitiveness is the competition among enterprises. b. Enterprise competitiveness is formed during the production and operation. The enterprise gradually forms its competitiveness by means

of configuring different resources and during the process of strategic planning, product design, marketing, purchasing, sales and management. c. Enterprise competitiveness is mainly reflected by the enterprise's ability to occupy the market, create values and profits, and maintain and develop itself. Whether the enterprise is able to obtain the consumer's recognition of its products or not decides whether the capital recycling can be completed successfully and whether re-production can be proceeded or not. Profit is the foundation that decides the realization of enterprise mission and target. Therefore, the ability to create values and profits is the root of the enterprise competitiveness. Nowadays, the developing ability decides the sustainable development of the enterprise. d. The main reason that sustains the competitiveness or that forms the enterprise competitiveness is the elements and ability of competitive resources of the enterprise.

The influencing system in the external circumstance of the enterprise includes government policy, market circumstance, legal circumstance, financial circumstance, natural circumstance, educational circumstance, cultural circumstance and etc. This dissertation orients at the evaluation of micro enterprise competitiveness, that is to say, puts emphasis on the comparison and analysis of competitiveness in certain industry. For a certain enterprise, the external environment remains relatively stable. The enterprise has to adapt to the external environment. In addition, different enterprises in the same industry in one country are faced with similar external environment. Therefore, from the perspective and objective of the thesis, the external environment of enterprises is seen as a fixed constant and will not be taken into account during the analysis. However, it does not equal to eliminating the function of external environment.

Internal operation system of enterprise consists of two subsystems, i.e. operation and management. The operation activities are the main body for the enterprise to create values and also the substantial system to generate competitiveness while management activities are the supporting system to the enterprise during creation of values and the

spiritual system to culture enterprise competitiveness. Either operation activities or management activities, they are both the functioning process of key internal elements of the enterprise. This dissertation holds that the key elements that support the internal operation system of the enterprise include material resource, enterprise management, technical innovation, human resources and enterprise culture. The competitive edge of the enterprise is formed with the above key elements acting collectively on the reproduction system of the enterprise to optimize the value chain and concentrate into the core ability of the enterprise.

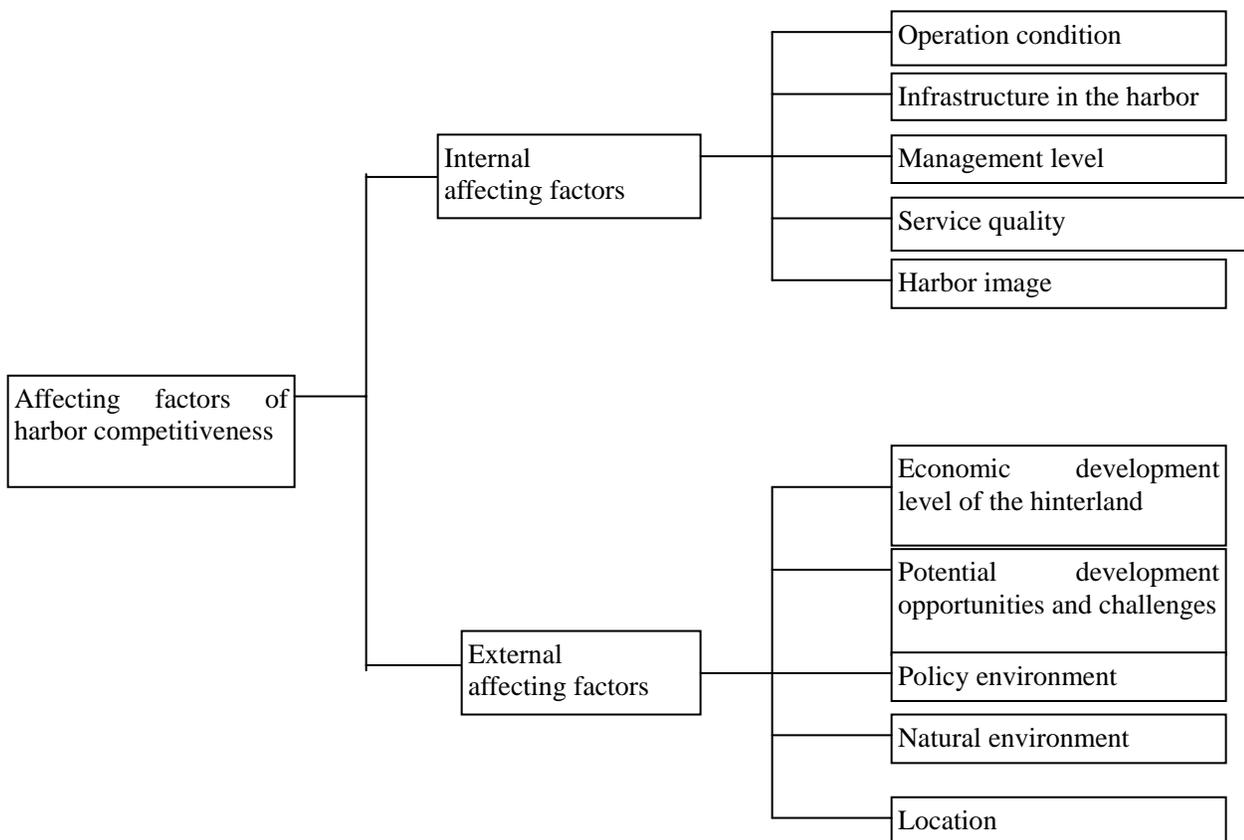
Based on the above analysis, the thesis defines the decisive factors of enterprise competitiveness are the five elements of material resource, enterprise management, technical innovation, human resources and enterprise culture. The definition is rooted on the internal activities for operation and management of the enterprise, and explains the deep cause to the difference of enterprise value chain as well as finds the real source that decides the enterprise competitiveness.

## **2.2 Dimension of Port Competitiveness**

The above analysis shows that as a specific competitive entity, the port's competitiveness has a similar meaning to the enterprise competitiveness. Therefore, these defines the port competitiveness as the competing ability of one port enterprise against other ports in terms of market occupation, value creation, maintenance of sustainable development by means of integrating, optimizing of its elements and interactions with the external environment in the market competition. According to the internal and external circumstance characteristics of the port enterprises, the port competitiveness is subjective to factors such as the geological location, the comprehensive transportation development level in the hinterland, the economic power of the hinterland and the city, natural condition, policy circumstance, customs circumstance, infrastructure, development of collection, distribution and transportation,

potential development opportunities and challenges, charge, management level, service level of the port and etc. The dissertation makes research on the port competitiveness from the perspective of practices of port enterprise competitions, and puts emphasis on the surviving and developing ability of the port itself. Meanwhile, since the external circumstance remains relatively stable, the enterprise has to adapt to the external circumstance. Therefore, from the perspective and objective of the thesis, the external circumstance of port is seen as a fixed constant and will not be taken into account during the analysis. Factors affecting the port competitiveness are as shown in the following figure:

Figure2-1 Affecting Factors of Port Competitiveness



### **2.3 Purport of the Port Competitiveness Research**

In the day of economic globalization, especially with China's entrance into WTO and the transfer of global economic development center, many countries take Asia-Pacific region and China as the rising target market, and enlarge their investment in China. As a result, the import and export proliferate in China, which effectively enlarges the requirement on port transportation and brings forward the development opportunity for ports in China. In this condition, ports in China are faced with more intense competition with each other and with others in the region. Meanwhile, they are involved in international competitions in wider regions and will display the functions as the windows to China in a larger sense. Right now, domestic and overseas ports are all enlarging the investment and adjusting their development strategies in order to take up a favorable stand in the region or in global range and to obtain a larger market share. Therefore, the competitions of ports are very intense. In this case, it is significant to study the competitiveness of the port. Specifically:

a. Study of port competitiveness urges the port to pay more attention to appropriate configuration of its resources and to combine the internal resources, dispersive social resources and development environment for consideration, so as to make best use of the port resources and give full play to the effect thereof.

b. Study of port competitiveness promotes optimization of organization structure of the port and improvement of its decision-making methods so as to establish routine management of the port on a regular and orderly basis, and to promote the management efficiency and level by means of reinforcing the coordination, communication and control abilities of the port.

c. Study of port competitiveness enables the port enterprises to understand their distance

to other competing ports by getting an insight into their deficiencies and to promote the expansion of the overall scale of the port and the improvement of its benefits by means of adjusting their development strategies on the basis of the market situation and the clients' demand.

d. Study of port competitiveness urges the port enterprises to reinforce their management, intensify innovation, and improve the smoothness of the port, especially the expedite level of the container transportation, so as to improve the attractiveness of the port and the city to foreign investment, and promote the integral competitiveness of the port and the city by means of interaction between the port and the city.

## **Chapter 3 Analysis on Status of Dalian Port and Analysis of Competitions Faced by Dalian Port**

### **3.1 Analysis on Status of Dalian Port**

#### **3.1.1 Status of Resources along Dalian Port Shoreline**

The shoreline along Dalian is long, covering Ertuozi in Dashao, Nanerjian Village, Zhuanghe City along the Yellow Sea in the east, and the estuary of Fudu River in Ligan Village, Wafangdian City along the Bohai Sea in the west along with the shoreline of islands and islets such as Changshan Archipelago, etc. With a span of 1906 km, it occupies 73% of the total shoreline length in Liaoning Province, among which the shoreline of continent is 1288 km and island 618 km. The major characteristics of Dalian shoreline are:

##### **(1) Abundant resources along shoreline feasible for building port**

There are abundant resources for building port, breeding, and tourism along the shoreline of Dalian, and what's worth mentioning is that, the natural conditions of building port there are distinctly advantageous than other coastal cities in China. Most of the shoreline, beginning from the estuary of Dengsha River in Jinzhou, Dayaowan Bay, Dalian Bay, Laotieshan Mountain in Lvshun, Shuangdaowan Bay, Yangtouwa, until the shoreline of Changxing Island in Wafangdian City, including the Changshan Archipelago are bedrock coasts consist of cragged hills. These coasts boast various bays and ports. Daduwan Bay, wide with deep water, short and straight sea route, wide range of anchorage ground, fine sheltering condition without freezing or silting, open rear continent, and convenient for goods distribution, is suitable for construction of deep-water terminals of different scale and function. The bedrock shoreline along the

land of Dalian is about 950 km, with over 20 locations ideal for building commercial ports and fishing ports, which boast a length of 80 km. Among them, 14 scatter along the seacoast of the Yellow Sea in the south with a total length of about 52 km, and 6 along the seacoast of the Bohai Sea in the north with a length of about 28 km. The ones most suitable for building deep-water ports are Dalian Bay, Dayaowan Bay, Yangtouwa, Shuangdaowan Bay, Changxing Island, etc, among which the water depth of Dalian Bay near the main city zone and new downtown area reaches 47m. With superior natural conditions, it is unparalleled among all coastlines in China.

## (2) Key Shoreline Segments have reached a Mature Stage of Development

The port shoreline is a non-reproducible precious resource. Dalian City has reinforced and quickened the steps of development in port shoreline, and the measures taken prove to be reasonable as a whole. Presently, the resources in major deep-water shoreline, especially the ones in Dalian Bay and Dagushan Peninsula have reached a mature stage of development. A length of 37km port shoreline has been exploited in the city, accounting for 46.3% of shorelines suitable for building ports; there are 11 terminals built and 199 production berths, among which there are 56 deep-water berths above 10,000 tons, 16 enterprise docks, and the shoreline length of production berths is 24334.7m and non-production berths 6745m. The annual transiting capability of the berths is 110 million tons. Basically all the port resources along the Dalian Bay are exploited, including public terminals such as Dagang Stevedoring Area of the Dalian Port Group, Xianglujiao port area, Ganjinzi port area, Dalian Bay (Heshangdao Island) port area, etc, as well as professional and consignor terminals such as terminals of Beiliang Company, Liaoning Province Dalian Ocean Fishery Group of Corporations, Dalian Petrochemical Company, Dalian Posts and Telecommunications, Dahua Group, etc. Currently, the planning and construction of Dayaowan Bay and east coast of Dagushan Peninsula is also mature, and the second and third phases of Dayaowan Bay project, Nianyuwan port area and the newly-built 250,000-ton ore and 300,000-ton crude

oil terminals are distributed along the shoreline segments suitable for building ports.

### (3) Potential of Resources along the Port Shoreline is Huge

The potential of port-building shoreline in Dalian is still huge. According to preliminary estimates, there are altogether 9 segments suitable for building ports yet not developed, with a total length of about 43km, accounting for 53.7% of the shoreline suitable for building ports. Among it, locations suitable for building deep-water ports include some segments along the north bank of Dalian Bay, Shuangdao Bay in Lvshun, and Changxing Island in Wafangdian, etc; there are many undeveloped shoreline suitable for building medium and small-size terminals along the coasts of each coastal borough and city including Changdao coast; in addition, the ports built or under construction, such as Xin Port in Lvshun, Zhuanghe Port, Pikou Port, etc, are of huge development potential.

### **3.1.2 Main Port Enterprises in Dalian and Status of Terminals**

The total length of shoreline in Dalian is 1906km, with a length of 31km for terminals. There are 40 port enterprises in the city and 184 berths, among which 56 are deep-water berths above 10,000-ton; the shoreline of production berths is 24334.7m and non-production berths 6745.4m; the port throughput of the city in 2005 is 111.88 million tons and 2.65 million containers are completed with an annual increasing rate of 22%. In 2005, the percentage of throughput of 6 kinds of cargos including petroleum, rolling cargo, grain, metal and ore, container and steel in total volume reached 88.5%.

As a whole, Dalian has superior resources suitable for building ports and complete infrastructure. The accurate function positioning, complete cargo types, fine operation in production and good overall benefits for enterprises have promoted the rapid development of economy in Dalian. And the information about main ports is as follows:

#### (1) The Original Dalian Port

The original Dalian Port embodies 78 berths, among which 5 are deep-water container berths, 2 are deep-water container berths under construction, and the planned throughput is 1.9 million containers. The port mainly manages 4 kinds of freights including container, rolling cargo, oil products and grain. Right now it has opened 8 ocean main lines, over 40 near ocean routes, and branch line around the Bohai Sea for external trade, as well as train lines for containers opened to major cities in Northeast China for internal trade. The key projects such as the second phase of Dayaowan Bay, 250,000-ton ore terminal, 300,000-ton crude oil terminal and International Logistics Park are already under construction. Moreover, The EDI construction of ports has quickened its pace, and the projects such as reconstruction of old ports are currently under tight schedule.

## (2)Beiliang Port

Beiliang Port is a major integrant of Dalian Beiliang Company, Ltd., and the world's largest grain storage port with most advanced functions. Currently, it has established 5 berths with a total berth length of 1376.6m. The deepest front water of the berth is -15.8m, and the designed water depth of channel is -13.8m. It can host 100,000-ton large bulk grain ship, and the berth capacity of terminals built and under construction is 30 million tons. Moreover, it features the world's largest grain storage capacity--2 million tons, the largest national port storage in China--600,000 tons, the unparalleled 1800 L18 bulk railway wagons in China, large-scale railway depot with 29 paths. It also has advanced grain laboratory in the world able to conduct trans-gene inspection, which is named as Beiliang workstation, National Grain Quality Monitoring and Test Center by the state. In 2001, it began its trial operation. As the fast growing of its throughput, the port completed a throughput of 2.73 million tons, which increased to 5.43 million tons in 2002 with an increase of 98.9%. In the first quarter of 2003, it achieved a throughput of 2.172 million tons. The percentage of the foreign trade grain export in cargo throughput in Beiliang Port has been held at above 80%, and the total grain volume exported through Beiliang Port accounts for over 40% of the total grain export volume of all ports

in the Northeast. Therefore, the port has become the main port of grain export in the Northeast, and the hinge port for sending grains from the North to the South. Moreover, the 300,000-ton terminal in Beiliang Port is completed, and large deep-water container terminal, together with others, is planned according to the 30m water depth condition of the area. The overall development prospect is to develop the Beiliang park area and give priority to the logistics of grain, oil products and containers, etc, exploit the processing industry of the port and build the port into an international logistics trade base. The construction of “Beiliang Park Area” was begun in June 2002. Occupying a land area of 13.5 sq. km., with a planned investment of 12 billion Yuan, the industrial zone mainly focuses on the projects such as modern comprehensive port, logistics, grain and oil product processing. Currently the intent investment from domestic and overseas enterprises has exceeded 10 billion Yuan, with 6 projects under construction and a total investment of 2.275 billion Yuan.

### (3) Local Ports

Right now there are multiple local ports in Dalian, including Yangtouwua Port in Lvshun, Pikou Port in Pulandian City, Zhuanghe Port, Changhai Archipelago, etc, among which the Zhuanghe Port is under construction.

Meanwhile, there are 16 enterprise terminals in Dalian. In 2002, the terminals fulfilled a throughput of 33.56 million tons, accounting for about 30% of the total port throughput of the city. They have become an indispensable part of Dalian Port. The basic information about the three enterprise terminals is as follow:

(a) Liaoning Province Dalian Ocean Fishery Group’s new port in Dalian Bay Town. Located in Dalian Bay Town, Ganjinzi District, Dalian, it mainly engages in the businesses of passenger ro-ro ships, break-bulk cargo and oil products with a 3000-ton oil terminal and nearly 10,000stere bonded oil storage. It has a goods yard of 80,000 square meters, and an annual throughput of 10 million tons. Moreover, it has the largest refrigerator group in China with a capacity of 100,000 tons. In 1994, it cooperated with

Bohai Ferry Company Ltd. in Shandong engaging in the business of passenger ro-ro ship transportation. It now has 7 berths, including 3 passenger ro-ro ship berths, 4 break-bulk cargo berths (also can be used as passenger ro-ro ship berths). The depth of berth front water is -7m, water depth of waterway is -8.4m, with a max berth capacity of 20,000 tons. The 7 berths are all used for passenger ro-ro ships, and over 20 times can be arranged in daily shipping schedule. Currently, there are 4 passenger ro-ro ships under operation, mainly managing the routes from Dalian to Yantai. There are 8 runs in and out every day, with 650 times of conveying vehicles, and 3500 times of passengers, and every year there are 170,000 times of conveying vehicles, and 600,000 times of passengers, which have accounted for 26.2% and 12.8% of provincial route vehicle and passenger throughput respectively. There is a whole set of service facilities for passenger transport in Dalian Bay, including ticket service, waiting room, catering service, accommodation and entertainment auxiliaries. According to the requirements of developing passenger transport, the Liaoning Province Dalian Ocean Fishery Group plans to build 2 large passenger ro-ro ship berths, which is 450m in length and -11m in water depth, with the capacity of hosting 50,000-ton ships, as to build the center of passenger ro-ro transportation in Dalian. They have the faith that they are qualified in both conditions and ability to build the new port into the center of passenger ro-ro transportation in Dalian, and hope that the municipal government will have the similar plan and give their support.

(b) The port of Dalian Petrochemical Company. Right now, Dalian Petrochemical Company owns 3 ports for oil transportation, altogether 11 berths with a scale of 5000-ton to 50,000-ton. Its original planned throughput was 12.8 million tons per year. It mainly undertakes the tasks of loading of most of the oil products and unloading of a small part of imported crude oil for PetroChina Dalian Petrochemical Company. In 2000, its throughput was 5.67 million tons, accounting for around 6% of total throughput in Dalian Port area, which made it one of the most important terminals in Dalian Port.

During the “Tenth Five-year Plan” period, under the overall deployment of China National Petroleum Company, the PetroChina Dalian Petrochemical Company was to undertake the task of processing crude oil from Russia, the total processing volume for which was increased to 20 million tons per year from the 5 million tons per year during the “Ninth Five-year Plan” period. Except for the crude oil entering into the factory mainly through pipeline (crude oil from Daqing and Russia), there would be over 17 million tons of oil products shipping out per year, which is nearly threefold in the throughput compared with the “Ninth Five-year Plan” period. As a terminal mainly providing services for the Dalian Petrochemical Company, it was no longer capable in meeting the needs, whether from the aspects of throughput capacity, technical level of facilities or management. From then on, it will target the PetroChina Dalian Petrochemical Company as its major market, base on the modern logistics standard and strive to build the terminal into an important base for ocean shipping of petrochemical products in the Northeast region with complete functions, modern facilities, advanced management and top service, through discovering its potential, expanding and innovation. In 2005, the throughput of the terminal was improved to 17 million tons per year and two 10,000-ton oil product berths were innovated, with the berths increasing to 13. It further optimized the functions and work division of each operating section in the terminal, updated the techniques and equipments in the terminal and greatly improved the level of information-based loading and unloading automation.

(c) Special terminal of Dahua Group. Located in the factory of Dahua Group, it boasts a shoreline of 4 km. The designed throughput of the bulk cargo terminal is 2 million tons. The 5 berths can host two 10,000-ton cargo ships and one 3000-ton cargo ship at the same time. The designed throughput capacity for the first year of the liquid chemical terminal is 450,000 tons, and one 3000-ton and one 2000-ton berth are in place. There are 5 special railways for the terminal, which can host 34 train wagons at the same time. Products from Dahua can be directly loaded and shipped overseas. Right now, the

terminal mainly serves the Group itself with half of it left unused. It is planned to cooperate with the Dalian Land-port Logistics Park in Ganjinzi District and to be used as the special port of departure of the Park.

### 3.1.3 Forecast of Throughput in Dalian Port

In 2005, the cargo throughput in Dalian Port was 170 million tons, including containers 2.65 million TEU, oil and oil products 42.6 million tons (imported crude oil 15.6 million tons), metal ores 23 million tons (imported iron ore 8.3 million tons) and grain 16.6 million tons.

According to analysis on the development trend of throughput and various factors, by using multiple means of forecast, the throughput level of Dalian Port in 2010 and 2020 shall be 250 million tons and 380 million tons respectively, among which the throughput of containers will be 8 million TEU and 17 million TEU.

See Table 3-1 and Table 3-2 for throughput forecast of each port by cargo category for the same year.

**Table3-1 2010 Throughput Forecast of Main Port Areas in Dalian Port**

Unit: Ten thousand tons

	Whole Port	Dayaowan Port Area	Nianyuwan Port Area	Bulk Ore Working Area	Beiliang Port	Heshangdao Island Port Area	Others
Total	25000	7800	4300	1700	1300	4200	5700
Coal	600					600	0
Oil	5900		4300				1700
Including: Crude oil	3100		2900				200
Metal ore	1700			1700			0

Steel	1200	200				1000	0
Grain	1800	300			1300	200	0
Other break-bulk cargos	1200	100				700	400
Rolling goods	5100	100				1700	3300
Container weight	7500	7100					300
Number of containers	800	770					30

**Table 3-2 2020 Throughput Forecast of Main Port Areas in Dalian Port**

Unit: Ten thousand tons

	Whole Port	Dayaowan Port Area	Nianyuwan Port Area	Bulk Ore Working Area	Beiliang Port	Heshangdao Island Port Area	Others
Total	38000	15400	6100	2700	1400	5300	7100
Coal	800					800	0
Oil	7400		6100				1800
Including: Crude oil	4400		4200				200
Metal ore	2700			2700			0
Steel	1500	200				1300	0
Grain	2000	400			1400	200	0
Other break-bulk cargos	1500	100				700	700
Rolling goods	6600	200				2300	4100
Container weight	15500	14500					500
Number of containers	1700	1660					40

### 3.1.4 Problem Analysis on Port Enterprises in Dalian

We can see from the status of Dalian Port that the Port is of certain scale, however, the following problems still exist:

Firstly, resource development and layout of the port is illogical. That images as: first the structure is not reasonable, and the terminals are not large and specialized enough. There

are excessive medium and small bulk terminal and capacity overplus, and lacks of large specialized deep-water ore, oil, container terminals and terminals for chemical and dangerous goods, and there is potential surplus of large deep-water specialized terminals under construction or planning. Second is the illogical layout. The orderly local development and blind overall development have formed the chaotic port pattern in the city, and have led to the result of lack of core competitiveness. The third one is the problem of stressing development while ignoring protection of resources along the shoreline. Some enterprises want to build large comprehensive ports, irrespective of their existing terminals, financial power and the economic status of the hinterland. Moreover, some important deep-water resources are occupied by the aquaculture industry, which has led to waste of precious resources ideal for building ports.

Secondly, the management functions are dispersed, and the poor grand regulation has led to non-standard management of port enterprises and multiple conflicts between the shipping industry with the aquaculture and tourism industry. First, unjust competition still exists. Since the Dalian Port has been executing some of the governmental functions for a long time, as well as the right to conduct independent port business, therefore certain monopolization exists and some enterprise terminals and local ports complain the unfair competition. Moreover, there are some port enterprises, especially enterprise terminals who conduct businesses exceeding the business scope of terminals, and at the same time drive down their operational costs through evasion of construction fees. The second point is that vicious competition exists in some fields. The competition in fields such as bulk goods, passenger ro-ro transportation and grain transportation is overly ferocious, and the non-standard means of competition and severe inner consumption have weakened their resultant force of competition, thus affecting the market growth and port image. Third point is the unordered management system. There are large varieties and quantities of ports in Dalian, including comprehensive ports, local ports and enterprise terminals. But the dispersed management functions and lack of unified and

authoritative management organ have caused the incompetent coordination, direction and management towards the operation and construction of the port enterprises. Although the problems are solved to some extent after the establishment of Port Administration Bureau, problems still exist due to multiple factors. And a fine coordination system is yet to be built between the shipping industry with the aquaculture and tourism industry. The fourth point is a lack of industrial cooperation system and standard of self-discipline, which has led to discordant practices of the enterprises. The function of trade association is not fully exerted and a platform for communication between the port enterprises is needed.

Thirdly, some enterprises are uncompetitive and lack of dynamics. First, there is big shortage in enterprise system reform and incompleteness in corporate governance structure. Most of the terminals, whether major port terminals in Dalian or local terminals of consignees, are lack of complete and standard modern enterprise system. The unitary property right, straggling system, inflexible mechanism have restricted the development of the enterprises. Second, the market positioning of some port enterprises are inaccurate without distinct management characteristics, and there is certain blindness in their development. Last but not least, some enterprises have difficulties in management, such as Lvshun New Port, Pikou Port, Dahua Terminal, etc. They are promising on one hand, but on the other, it makes the enterprises hard to position themselves because of short of capital or indefinite macro planning of the government. The Dalian Port, with heavy load, huge gap in construction fund and limitation in hinterland economy, has evidently declined in its competitiveness.

### **3.2 Analysis of Competitions Faced by Dalian Port**

In 2003, China Government worked out the strategy of rejuvenating traditional industrial

bases in Northeast China, and explicitly put forward the requirement “to make full use of existing port conditions and advantages of the northeastern region, to develop Dalian into an important international shipping center in Northeast Asia.” However, compared with other major port rivals, Dalian Port, the most important “hardware” for building Dalian into an international shipping center in Northeast Asia, has not yet to acquire the corresponding status as a major international port. In addition, various other port cities both in and out of China in Northeast Asia have also put forward similar objectives, so as to acquire the status as an international hub port and achieve more benefits. Considering the current development of Dalian Port and the development of main rival ports both at home and abroad, if Dalian Port intends to become a major international port, it has to face highly intense competitions and challenges.

### **3. 2. 1 Comparison and Analysis of Current Dalian Port and Surrounding Ports**

(1) Intense competitions from foreign major port cities in the surrounding area

In Northeast Asia, port cities that constitute practical or potential competitors against Dalian in building a regional international shipping center mainly include Busan of Korea, Tokyo, Yokohama and Kobe of Japan etc. (see Table 3-3). The analysis is as follows:

#### **a. Busan Port**

Ever since 2000, Busan Port has exceeded Kaohsiung Port to become the world’s third largest container port. In 2002, its throughput of containers achieved a steady growth, reaching 9.44 million TEU. The important geographical advantage of Busan Port lies in that the port is located at the converging point of such three sea routes as Northeast Asia—North America, Russia—Europe and the Yellow Sea—the East Sea. If Busan Port can become the starting port of the Pan-Pacific sea route or the Euro-Asian sea route, the port will become the transfer center of the Northeast Asian region, hence

enjoying great potential for development. Ever since the mid-1970s, Busan Port has been taking advantage of the opportunity after Hanshin Earthquake of Japan and of rapid foreign trade development in the mainland of China. It puts forward the strategic objective of building “itself into a central port around the Pacific in the 21<sup>st</sup> Century”. With an investment of USD 6 billion, the port plans to build a huge new port area on Kadok close to the southwestern part of Busan before 2011 and complete a number of container terminals with water depth as much as 18m. From 2005, it plans to complete 3 to 5 container berths every year. It is estimated that between 2001 and 2011, the volume of transfer containers handled at Busan Port will increase by 10.2% annually. In 2005, the throughput of containers at Busan Port reaches 11.02 million TEU. On 15 June 2000, at the summit between South Korea and North Korea, an agreement on reconnection of the railway between the two countries was reached. If this railway could be open to traffic, Busan Port would be linked with TSR, hence becoming a major port at the sea-land through traffic node in Northeast Asia. In addition, Busan Port is dedicated to building a logistic center. The port administration expects to attract transnational enterprises for 3PL and provision of value-added services. For this end, Korea is enhancing the free trade capability of the port and strives to build Busan Port into a shipping, commercial, financial and information center in Northeast Asia.

#### b. Tokyo Port

Tokyo Port lies on the northwestern shore of Tokyo Bay to the south of Honshu Island of Japan and is the largest container port in Japan. Tokyo Port is the transportation node between the capital area and various other places both at home and overseas. In the hinterland, it boasts a Tokyo Circle with a population of 30 million as well as the surrounding northern part of Kantou etc. In the port, building, financial and insurance industries closely interlinked, there are over 110,000 employees. Ever since 1998, the throughput of containers at Tokyo Port has been taking the first place in Japan. In 2000, the throughput of foreign trade containers was 2.64million TEU, which was 10% more

than even the record high in 1999, i.e., 2.4million TEU. The throughput had also achieved a growth for seven consecutive years ever since 1994. In 2002, the throughput of containers handled at the port reached 2.9 million TEU, ranking at the 17<sup>th</sup> place among world container ports.

#### c. Yokohama Port

Yokohama Port lies 30km away from the southwestern part of Tokyo, and is one of the three major container ports in Japan. The port boasts a total of 21 container berths, some 11 to 14m-deep water in the front of the terminal, a shoreline as long as 5.3km and 41 container handling bridges. Affected by sluggish economy in Japan, in recent years, the throughput of containers handled at Yokohama Port has been increasingly slowly, and even decreasing. Nonetheless, the container throughput has kept above 2 million TEU, and reached 2.4 million TEU in 2002, ranking at the 24<sup>th</sup> place in the world. Meanwhile, Yokohama has the most advanced sea rout network in the world, with 162 sea routes of various kinds, including regular ships and common ones, leading to over 150 countries worldwide. Thus its competitiveness and potential can never be belittled.

#### d. Kobe Port

Kobe Port lies in the southwestern part of Honshu Island of Japan and borders on Osaka Bay. In 2004, the throughput of containers was 2 million TEU, ranking at the 27<sup>th</sup> place worldwide. It is a major container port in Japan. The port operates 38 container berths and is equipped with over 20 container handling equipments. In 1997, after the rehabilitation project in the aftermath of the earthquake was basically completed, Kobe Port published the ambitious *Declaration of Rejuvenation*, proclaiming that it would take “the development of a head port in Asia in the 21<sup>st</sup> Century” as its own task and turns its eyes to the entire Northeast Asian region for competition. It even attempted to build dual-purpose ships for both river and sea, so as to include the Yangtze River of China into its extension area. For the next step, the port plans to build 8 new container

berths, of which 4 boast water depth as much as 15m to 16m. In this area, traditional major international regular ships basically call at Kobe Port, which also has a complete collection, distribution and allocation system of cargoes. Therefore, though the throughput of containers handled at Kobe Port has become stagnant, and even decreased in recent years, its future development potential cannot be ignored, either.

In addition, Osaka Port has achieved favorable development in recent years. In 2004, the throughput reached 1.673 million TEU, thus quite possibly, it is to take the place of Kobe Port and also one of the potential rivals of Dalian Port.

Table 3-3 Throughput of containers of major foreign competing ports in recent years

Unit: ten thousand TEU

Year Port	1986	1996	1999	2000	2001	2002
Busan	144.8	427.5	644.0	754.0	790.7	944.0
Tokyo	108.2	231.1	269.6	288.9	277.0	240.0
Yokohama	131.0	234.8	217.3	231.7	240.0	234.0
Kobe	188.2	222.9	217.6	226.2	210.0	200.0
Osaka	46.8	111.8	125.0	147.4	150.2	167.3

Resource: *Maritime Information*, 2003

### Summary

All in all, the foreign major port city that constitutes a threat to Dalian in building a regional international shipping center is Busan of Korea. In order to develop itself into an international container hub port in Northeast Asia, the city has in recent years reduced incident expenses at the port and carried out cooperation in port and shipping with shipping companies etc. to actively win over more international transfer containers market in Northeast Asia. This has had a major impact on Dalian and other ports in

North China in the opening and development of trunk ocean lines. According to DCT statistics, in 1999, the volume of export-oriented DCT heavy containers through the Korean sea routes reached 85,724 TEU, of which 36,677 TEU were transferred by way of Busan, and the volume of transfer containers accounted for 43% of the total export; in 2001, QCT exported 233,000 TEU by way of Korean sea routes, of which about 60% to 65% ocean cargoes were transferred via Busan, reaching as many as 140,000 TEU; Secondly, there are Japanese ports. In 2001, from Dalian Port, a total of 358,000 TEU were shipped via Japanese sea routes, accounting for 35.8% of the total volume of foreign trade containers in the entire port, or one million TEU. Apart from local cargoes of Japan, ocean cargoes transferred via Japanese ports accounted for about 67%, reaching as many as 240,000 TEU. In 2001 alone, the volume of ocean cargoes shipped from Dalian Port and transferred via above-mentioned Japanese and Korean ports approached 400,000 TEU. The loss of this part of cargoes has greatly limited the opening and development of trunk ocean sea routes of Dalian Port.

### **3.2.2 Survey of major competitors of port cities in the surrounding area at home**

#### **1. Analysis of Dalian, Tianjin and Qingdao ports**

Strategically, all three ports have explicitly put forward the strategy of development into regional container hub ports in Northeast Asia. In tactical competition, all are sparing no efforts to accelerate the construction of deepwater container berths and development of trunk oceangoing lines, which lie at the core of the foundation for competition. Next, comparisons and analysis will be made as to their development potentials on the basis of such strategic factors as the geographical locations, port capacity and other aspects of the three ports.

(1) Geographical locations of Dalian, Qingdao and Tianjin ports as well as analysis of their economic hinterland

All the three cities enjoy geographical advantages and advantages in cargo resources. Dalian, Tianjin and Qingdao are all port cities in North China and are close to each other, nevertheless, they vary in their shipping locations and relative independence of the hinterland. In shipping locations, Dalian Port lies at the mouth of the Bohai Bay and Qingdao Port at the eastern end of Jiaodong Peninsula, hence enjoying shorter sailing distance to world trunk sea routes. In terms of cargo resources in the hinterland, the weakest point of Dalian at present lies in that the volume of containers in Northeast Region, esp. foreign trade containers, is too small, thus its geographical advantage for oceangoing has not been duly brought into play. Comparatively speaking, Tianjin Port is the closest to the hinterland, making it easier to gather exports from the hinterland; Qingdao Port obtains its main resources of goods from the entire Shandong Province, which has witnessed advanced foreign trade and economic development. Its total import and export volume in foreign trade in recent years is basically the same as the total of the three provinces in Northeast China in the same years. Next, in terms of the relatively independence of the hinterland, Dalian Port leans back upon the three northeastern provinces and the eastern part of Inner Mongolia, hence the overlapping hinterland area with Tianjin Port and Qingdao Port is small. Thus it is easy to gain some advantages in this area in terms of resources of goods. On the other hand, in spite of more overlapping hinterland area for Tianjin Port and Qingdao Port, on the basis of the reasonable flow of goods, Tianjin Port enjoys advantages in the area around Tianjin, Beijing, Hebei, Shanxi, Shaanxi etc. While Shandong, Henan and the surrounding area are places where Qingdao Port can effectively radiate towards. The following table shows the throughput of containers at Dalian, Tianjin and Qingdao ports in recent years (Table 3-4):

Table 3-4 Analysis of growth rate of throughput of containers at three ports

	Dalian Port (ten thousand TEU)	Tianjin Port (ten thousand TEU)	Qingdao Port (ten thousand TEU)
1998	62.60	101.80	121.30
1999	73.60	130.20	154.30
2000	100.84	170.84	211.63
2001	120.89	201.10	263.85
2002	135.10	240.80	341.00
Average growth rate in the past five years (%)	23.1	27.5	36.3

(2) Analysis of port facilities, equipment capacity, and current arrangement of sea routes  
 At present, in Dalian, the terminal boasts 5 container berths and 2 deepwater container berths under construction. The terminal shoreline is as long as 1,500m and the water depth is -12.1 to -14m, where the fifth generation of container ships can call at. The designed annual throughput is 1.9 million TEU. Dalian Port opens more offshore sea routes, over 40. In addition to the three ocean routes newly opened this year, the total number of ocean routes reaches eight (see Table 3-5).

With the completion of the first and second phases of a 100,000-ton sea-route, Tianjin Port will boast a container terminal with water depth as much as -15m, where the sixth generation of container ships can successfully sail forwards. By the end of 2002, Tianjin Port had enjoyed relatively dense container ships and sea routes. At present, there are 68 regular container sea routes, including 45 offshore sea routes, 3 internal extensions, 10

sea routes for domestic trade and 10 ocean routes (see Table3-6).

In addition, Tianjin Port also has a relatively developed collection, distribution and transportation network and system at the backside. At present, there are such four railway trunk lines as Beijing-Shanhaiguan, Beijing-Shanghai, Beijing-Kowloon and Beijing-Jixian, as well as such three trunk expressways Beijing-Tianjin-Tangshan Expressway, Beijing-Binzhou Expressway and Tianjin-Tangshan Expressway. They provide important guarantee for the collection, distribution and transportation at the rear. The port is also equipped with several containers handling equipments, which can extend as much as 62.5m outwards. Dual container operations can be carried out. The planned annual throughput of containers at the port exceeded 2 million TEU.

Qingdao Port is also well equipped with hardware conditions for deepwater sea routes and deepwater terminals etc. The main sea route leading to the port has an average water depth of -14.6m, and -21m at the deepest. It has 8 special berths for deepwater containers, of which the berth in the Qianwan Port area enjoys a water depth as much as -14.5m, where the fifth generation of container ships can call at. The Qianwan third-phase container terminal under construction boasts one berth special for large containers, with a water depth of 16m, where the sixth generation or even larger container ships can call at. It is also equipped with two world's largest container hanging bridges with an outward extension distance of 165m and lifting capacity of 650,000 tons. Moreover, in2003, with the formal opening of the first direct container sea route to Africa, Qingdao Port has actually realized global access via ocean sea routes. And almost all shipping companies opening trunk lines at Dalian and Tianjin ports would be dependent on Qingdao Port.

Table 3-5: Call-at terminals of regular ships of branch sea routes and Dalian ocean routes

Sea Route	Dalian Shipping Time	Shipping Company	Call-at terminal and shipping time	Container spaces	Starting time
European and the Mediterranean lines	Monday	CIMC	Shanghai 6-Dalian1-Qingdao2-Yantian5-Hong Kong6-Singapore2-Suez5-Felixstowe-Rotterdam6-Hamburger7-Antwerp2-Suez3-Singapore7-Hongkong3	5466	2002.3
	Monday	CMA-CGM	Busan4-Gwangyang5-Tianjin7-Dalian1-Qingdao3-Xiamen4-Singapore2-Kelang3-Jedda5-Malta2-Southampton7-Hamburger1-Rotterdam4-Antwerp5-Le Havre6-Damietta6-Suez7-Jedda3-Kelang5	4000	1998.12
	Thursday	Maersk	Dalian-Xingang-Qingdao-Gwangyang-Busan-Hong Kong-Tanjung Pelepas-Salaam-Jedda-Suez-Damietta-Gioia-Tauro-Genoa-Fos-Valencia-Algeciras-Damietta-Suez-Jedda-Salaam-Tanjung Pelepas-Hong Kong-Gwangyang-Dalian	4200	2003.7
	Saturday	GA	Southampton2-Rotterdam4-Hamburger5-Jedda5-Kelang1-Singapore6-Hong Kong3-Dalian6-Tianjin7-Busan2-Ningbo4-Ishigaki5-Kaohsiung6-Yantian1-Suez1	5500	2003.7

	Thursday	China Shipping	Dalian4-Tianjin6-Qingdao1-Shanghai4-Ningbo4-Xiamen6-Hong Kong7-Chiwan1-Kelang5-Salaam5-Peirai6-Naples2-Genoa3-Barcelona4-Valencia6	2800	1999.8
West of America lines	Saturday	CIMC	Dalian6-Tianjin7-Qingdao2-Yokohama5-Long Beach1-Auckland4	2915	1997.8
	Sunday	China Shipping/ CMA-CGM	Tianjin6-Dalian7-Qingdao2-Busan4-Kobe6-Los Angeles4-Auckland6	2500	2003.6
Middle East lines	Wednesday	Wan Hai Lines/ OOCL	Shanghai2-Dalian3-Tianjin4-Qingdao6-Ningbo1-Hong Kong4-Shekou4-Singapore1-Karachi6-Nhava Sheva2-Kelang7-Singapore 2-Hong Kong5-Shanghai1	2500	1999.7

Table3-6: Main Ocean Routes of Tianjin Port

Sea Route	Quantity	Operator	Foreign ports to call at
European lines	3	China Shipping	Hong Kong, Jakarta, Felixstowe, Rotterdam, Hamburger, Antwerp
		Hanjin	Felixstowe, Rotterdam, Hamburger

		MSC	Hong Kong, Felixstowe, Antwerp, Busan, Singapore
The Mediterranean lines	2	China Shipping	Hong Kong, Jakarta, Peiraievs, Naples, Geona, Barcelona
		ZIM	Hong Kong, Jakarta, Peiraievs, Busan, Haifa
The Persian Gulf lines	2	Wan Hai/Oriental	Hong Kong, Singapore, Kelang, Jebel Al, Damman, Nhava Sheva
		CIMC	Hong Kong, Singapore, Dubai, Colombo
West of America lines	2	Hanjin/Sinotrans	Long Beach, Auckland
		CIMC	Long Beach, Kobe, Vancouver
Australia	1		Sydney, Melbourne, Brisbane

Note: information of Tianjin Port at the end of 2002

### (3) Analysis of development potentials of the three ports

In 2003, the State Council published the strategy of “rejuvenating old industrial base in Northeast China”, aiming at changing the backwardness of industries in Northeast China and accelerating their economic development. With the adoption of favorable national policies, more investments would necessarily be made and efforts increased to reform the Northeast, and restructure the northeastern industry. To achieve economic prosperity in the three northeastern provinces is only a matter of time. With such development opportunities, Dalian Port, undertaking over 70% shipping tasks of the northeastern region and around 80% of container transportation tasks have been enlivened again and planned to build ten major projects with an investment of 27 billion Yuan before 2010. It is striving to equip itself with infrastructure conditions as an international major port and channels for the collection, distribution and transportation network, in order not to lag

behind the other two ports in competitions any more. In terms of competition strategies, Dalian Port follows closely Tianjin Port and Qingdao Port, so as to achieve a throughput of containers of more than 7.5 million TEU by 2010, or preferably 10 million TEU. From the long-term perspective, such development potentials of Dalian Port cannot be belittled.

While trying to catch up with Qingdao, in order not to be surpassed by Dalian, in the coming years, Tianjin Port will make further efforts in the infrastructure construction. With an investment of 7 billion Yuan, it is to build 10 specialized large container terminals and with an investment of 1.1 billion Yuan, it is to complete a container logistic center covering an area of 5.4km<sup>2</sup>. At the same time, Tianjin will make an investment of 11.9 billion Yuan to build 20 auxiliary works outside the port before 2010, so as to establish a complete distribution and transportation system catering to the status of Tianjin Port as a modern international major port. In terms of the development opportunity, the holding of Beijing 2008 Olympics will undoubtedly drive the rapid development of the around-Bohai economic circle, the main hinterland of Tianjin Port. Meanwhile, Tianjin, as a municipality directly under the Central Government, will also gradually display its economic advantages in recent years.

At such a crucial moment when Dalian, Tianjin and Qingdao are contending for the status of the international shipping center of North China, Qingdao Port signed a joint venture agreement worth USD 887 million with Denmark Maersk Group, a world shipping giant and Cosco Terminal (Qianwan) Co., Ltd., for joint investment in the construction of Qingdao Port Qianwan Terminal. They plan to develop the terminal into China's largest container terminal with an annual throughput of more than 6.5 million TEU. From this joint venture, what Qingdao Port gains most is not tens of millions of US dollars, but an opportunity of attracting ships of large shipping groups to call at Qingdao Port and of building an important platform within a short time for Qingdao Port

to become a major international port in Northeast Asia. At the same time, Qingdao also sets down the long-term plan of building itself into a regional major international transfer port in Northeast Asian region before 2010, with an investment as much as 30 billion Yuan.

#### (4) Summary

Based on the above analysis, Qingdao and Tianjin ports outdo Dalian in terms of the foreign trade proportion, volume of containers, proportion and class of heavy containers, the number of berths and density of sea routes etc. They have directed and won over quite a many containers from Dalian Port. Currently, in the competition of building a regional international shipping center among the three northern cities, Dalian is at a disadvantageous position for the moment.

## 2. Yingkou Port

Yingkou lies in the Qiandong Bay in the eastern part of Bohai Bay. It lies in the northwestern part of Liaodong Peninsula, leans against the three northeastern provinces and eastern part of Inner Mongolia. It is an important foreign trade port and the second largest port opening to the outside in the northeastern region. Yingkou Port governs Yingkou and Bayuquan port areas, and is linked with Shenyang-Dalian Expressway, Harbin-Dalian Highway and Changchun-Dalian Railway, hence enjoying convenient traffic conditions and strong capability of distribution and transportation of cargoes.

The container transportation in Yingkou Port started in 1990. In October 1996, Yingkou Cosco International Container Terminal Co., Ltd. was jointly established by Yingkou Port and Cosco, hence the port became the second one with special container berths in the northeastern region. Currently, Yingkou has two special container berths, as long as 424m, where two container ships around 170m long and weighing 15,000 tons can call at simultaneously. The container ground covers an area of 150,000m<sup>2</sup>, including 20,000-m<sup>2</sup> ground for frozen containers. It is also equipped with two CFS warehouses

and auxiliary equipment covering a total area of 10,000m<sup>2</sup>. The annual throughput is 250,000 TEU. At the terminal, there are two special railway lines for containers, and the handling efficiency is 25TEU/h. Ever since 1996, Yingkou Port has maintained a rapid growth and development in containers. The throughput at the port increased from 14,000 TEU in 1995 to 600,000 TEU in 2005, with an annual average growth rate of around 90%. However, of the containers handled at Yingkou Port, containers of goods for foreign trade only take up a small proportion while those for domestic trade take up a larger part. Recently, direct offshore sea routes have been opened from Yingkou Port to Japan and Korea as well as internal foreign trade extensions to various basic ports worldwide like in Australia, the Mediterranean, the Persian Gulf, Europe, East of America, West of America and South Africa etc. There are about 40 scheduled ships per month. Yingkou Port positions itself as a container hub port for domestic trade and an international lateral port of containers. At present, in addition to Cosco, China Shipping, Haiqing, Haifeng of Shandong and other shipping companies have all set up offices in Bayuquan.

With the rapid development of the port, Yingkou Port has become an important distributing center of goods for both inside and outside communication in the northeastern region. The largest market of steels, iron ores, chemical fertilizers, sugar, ceramics and building materials in the northeastern region has been formed. The green passageway of vegetable and fruits built through cooperation with farm produce bases in the hinterland and the south has also played its role, and is developing on the basis of the logistic industry at the terminal. At present, at the Yingkou terminal, a logistic area covering an area of 1 million m<sup>2</sup> has been completed and put into use, while specialized warehouses, railways, stacking grounds and other auxiliary facilities are being improved. These have effectively promoted the formation and development of the logistic industry in Yingkou area. Especially the establishment of a steel plant by Yingkou Port together with Anshan Steel Group in Bayuquan in 2006 has greatly promoted the economic

development of Yingkou Port.

Thus it can be seen that, with a good momentum of development, Yingkou Port will pose a potential threat to Dalian Port. If Dalian is to become a regional international shipping center, it shall fully consider a coordinated and developing interactive relationship with Yingkou Port.

## Chapter 4 Build a model for evaluating ports competitiveness

As the ultimate goal of port resource integration is to enhance its competitiveness, this thesis conducts quantitative analysis from the perspective of competitiveness and aims to find the inner causes of Dalian port's competitiveness by combining the current situation of building Dalian into a regional international shipping center and comparing the competitiveness of Dalian with that of other major competing ports. The study of port's competitiveness is carried out by selecting a certain evaluation index system. In designing the comprehensive evaluation index system, the fundamental principle is to reflect a port's competitiveness objectively and accurately and utilize the current statistical data as much as possible. The scale of the index system should be appropriate and completeness is not the only target in determining the system. It will add workload. What's more, complementation between different indexes might submerge the difference of the evaluation objects; neither should be the system too small, then it will be unable to reflect the features of the objects comprehensively.

The calculation of port competitiveness evaluation includes the below steps: determine the evaluation index system, the weighing of indexes at various levels, evaluation points of various indexes and then conduct comprehensive evaluation. Figure 4-1 shows the program supporting this process:

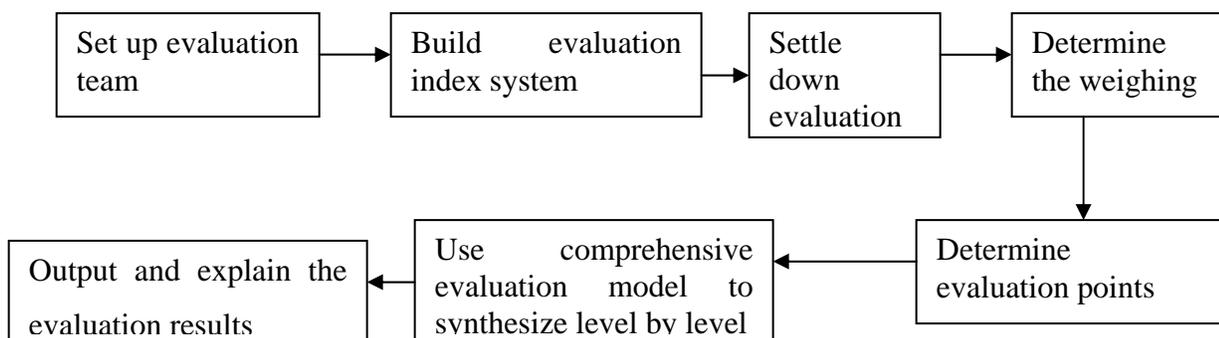


Figure 4-1 steps in determining port competitiveness evaluation model

## **4.1 Build port competitiveness evaluation index system**

### **4.1.1 Principles for building the evaluation index system**

In order to select a complete, precise and scientific evaluation index system of port's competitiveness, the establishment of the indexes should follow the below principles:

1. The indexes should be highly pertinent. The study of port's competitiveness is different from that of countries and companies. The port industry is quite special in that the study of its competitors is not limited to its own country of itself. Neither is it enough to study related industries at abroad solely. The selected index system should be able to display the current status and the differences of the port's competitiveness scientifically and objectively. That is why the evaluation index system of this subject should be of high pertinence.

2. The established indexes should be both with stress and preciseness. There are many indexes to choose from. If too many are selected, though to some extent it increases the accuracy of evaluation, it may affect the exposition of key effects. Therefore, The selection and establishment of port competitiveness evaluation indexes should lay importance on the main aspects and fundamental features, give prominence to major indexes that can exhibit the port competitiveness and use as accurate indexes for evaluation as possible.

3. The indexes should be scientific and applicable. Applicability means the data necessary to the index system should be able to be collected and scientificity means to

guarantee accuracy and reasonableness of the evaluation results. On the basis of applicability, the indexes should be certain to reflect the features of port competitiveness and possible to be measured quantitatively and analyzed.

4. The indexes should pay equal attention to process index and status index. Process index is one that shows competitiveness is raised, reflects the long-term and stable competitiveness trend of a port and is of great importance. Status index shows port's competitiveness and competition results, such as income and cost of the port, business operation condition of the port enterprise. The design of the evaluation index system must integrate both process index and status index.

#### 4.1.2 Composition of the evaluation index system

The index system is norm of comments. Only with unified standards and methods can we correctly evaluate the competitiveness of fellow port enterprises. Only comparable calculation results can be of valid support to wise policy-making. Usually, the index system can be built according to the "From rough to fine, from general to detail, step by step and level by level" methods followed by man in learning and solving complicated problems. Based on the above principles, an evaluation index system as shown in the below table is built:

Table4-1 Port competitiveness evaluation index system

I-tier index	II-tier index
Operation conditions	Density of container liner ship and coverage of sailing course
	Charge rate

	Container feeder system
Service quality	Port work efficiency
	Smooth pulling-in of the ships
	Customs clearance efficiency
	Convenience of information service
Infrastructure conditions	Capability of loading and unloading equipments
	Capability of storage equipments
	Capability of mechanic equipments
	Perth capability
Management level	Management efficiency
	Competence of business staff
	Completeness of management information system
Port image	Corporate culture
	Customer's degree of satisfaction

#### 4.2 Build evaluation model and determine weighing

Establish comprehensive evaluation methods according to the characteristics of the objects. In light of multi-hierarchy of the port evaluation index system and obscurity in the evaluation subject's knowledge of the object, here a comprehensive port competitiveness evaluation model is established based on the principle of multi-layer fuzzy integrated evaluation.

Fuzzy integrated evaluation method was founded by L A Eden, an US expert in control theory, in 1965. The theoretical basis for fuzzy integrated evaluation of corporate competitiveness is: the evaluation of corporate competitiveness is obscure. Usually we

divide competitiveness strength into four levels, very strong, fairly strong, ordinary and bad. It is hard to define the standards of each level. This kind of hierarchical classification results from people's subjective sense and is "fuzzy" in nature. In corporate competitiveness evaluation, some factors are obscure and cannot be graded. For these factors, we employ fuzzy integrated evaluation method of fuzzy math to do quantitative evaluation about corporate competitiveness. Fuzzy integrated evaluation can solve the problem of obscurity in comprehensive evaluation (such as mistiness between event categories, obscurity of evaluation experts' knowledge, etc.), and is, as a result, more suitable for object system with many evaluation factors and structural layers.<sup>15</sup>

#### 4.2.1 Build evaluation model

According to multi-layered fuzzy integrated evaluation principle, build comprehensive evaluation model of port competitiveness in the below steps:

##### 1. Set evaluation index set

Evaluation index set, multi-layered, is a group of evaluation indexes of corporate competitiveness, i.e.:

$$U = \{U_1, U_2, \dots, U_i, \dots, U_m\}$$

$$U_i = \{U_{i1}, U_{i2}, \dots, U_{ij}, \dots, U_{im}\}$$

$$U_y = \{U_{y1}, U_{y2}, \dots, U_{yk}, \dots, U_{yp}\}$$

##### 2. Build weighing set

Weighing is used to describe the degree of importance of the indexes towards the evaluation target. Weighing set is a multi-layered set matching the factor set, i.e.:

$$A = \{a_1, a_2, \dots, a_i, \dots, a_m\}$$

$$A_i = \{a_{i1}, a_{i2}, \dots, a_{ij}, \dots, a_{in}\}$$

$$A_y = \{a_{ij1}, a_{ij2}, \dots, a_{ijk}, \dots, a_{ijp}\}$$

---

<sup>15</sup> Hu Dali (2000), Corporate Competitiveness Theory, Economic Management Press, 2001, Page 100-101, 102-105, 81, 80-97.

### 3. Build comment set

Comment is the description about the degree of good of the evaluation object. It converts abstract data into comments that are familiar to people. Comment set is the same for indexes of different layers.

$P = \{\text{very good, good, ordinary, bad, very bad}\}$

### 4. Build evaluation matrix

Evaluation matrix  $R$  is an obscure matrix formed by  $U \rightarrow P$  obscure mapping. It illustrates the result of comprehensive review, by experts, of the layers to which various indexes of corporate (industry or country) competitiveness (mainly estimated according to the evaluation points) belong. If there are  $M$  indexes,  $N$  layers, then  $R$  is a matrix with  $M$  rows and  $N$  columns,  $R = \{r_{ij}\}$

To set evaluation matrix, firstly, it is required to calculate the evaluation points of the indexes. Please refer to the below text for detailed calculation methods of quantitative indexes. The actual values of qualitative indexes are given by experts. Then, set up the evaluation matrix  $R$ . Quantitative indexes at bottom layer can be made out by matching the calculation results of evaluation points with comment set. Qualitative indexes at bottom layer are given by experts.

$$R = \begin{bmatrix} R_1 \\ R_2 \\ \dots \\ R_m \end{bmatrix} = \begin{bmatrix} r_{11}, r_{12}, \dots, r_{1n} \\ r_{21}, r_{22}, \dots, r_{2n} \\ \dots \\ r_{m1}, r_{m2}, \dots, r_{mn} \end{bmatrix}$$

In the formula,  $r_{ij} = k_{ij}/n$ . It means, for the  $i$  index, experts idea of the possibility of it belonging to the  $j$  level:  $k$  is the number of experts taking part in the evaluation;  $k_{ij}$  means  $k$  experts think a certain enterprise's  $i$  bottom layer index belongs to the  $j$  level.

## 5. Multi-layered obscure and comprehensive judgment

Corporate competitiveness evaluation index system has multiple layers of indexes (target layer, principle layer, index layer), therefore, the final result comes from multi-layered obscure and comprehensive judgment. It starts from the bottom layer and moves upward gradually to get the final result. Weighing and average operator calculation is employed, i.e.:

$$B = A \bullet R = (b_1, b_2, \dots, b_i, \dots, b_n)$$

$$\text{In the formula, } b_i = \min \left( 1, \sum_{j=1}^m a_j \cdot b_{ji} \right)$$

It is completed by the below two steps:

Firstly, calculate the comprehensive judgment set  $B_i$  of the  $i$  index of the principle layer

$$B_i = A_i \bullet R_i = (b_{i1}, b_{i2}, \dots, b_{ip})$$

in the formula,  $i=1, 2, \dots, m$ ;

$A_i$  is the weighing set of evaluation factor set  $U_i$

$$A_i = \{a_{i1}, a_{i2}, \dots, a_{ij}, \dots, a_{in}\}$$

$R_i$  is evaluation matrix of evaluation factor set  $U_i$

$$R_i = \begin{bmatrix} r_{i11} & r_{i12} & \dots & r_{i1p} \\ r_{i21} & r_{i22} & \dots & r_{i2p} \\ \dots & \dots & \dots & \dots \\ r_{in1} & r_{in2} & \dots & r_{inp} \end{bmatrix}$$

$n$  is the number of evaluation factors under the  $i$  index;

$m$  is the number of indexes at principle layer;

$p$  is the number of elements in comment set.

Then, calculate comprehensive judgment  $B$  of target layer

$$B = A = R = (b_1, b_2, \dots, b_i, \dots, b_m)$$

In the formula, R is the evaluation matrix of evaluation factor set

$$R = \begin{bmatrix} B_1 \\ B_2 \\ \dots \\ B_n \end{bmatrix} = \begin{bmatrix} b_{11} b_{12} \dots b_{1p} \\ b_{21} b_{22} \dots b_{2p} \\ \dots \\ b_{m1} b_{m2} \dots b_{mp} \end{bmatrix}$$

A is the weighing set of evaluation factor set

$$A = \{a_1, a_2, \dots, a_i, \dots, a_m\}$$

m is the number of indexes of the principle layer;

p is the number of element in the comment set.

#### 6. Calculate final evaluation value

Based on the comment weighing coefficient matrix got from comprehensive division of comment level, educe G, the final evaluation result of corporate competitiveness. Attain the sequence of corporate competitiveness by comparing absolute value of G;

$$G = B \bullet F^T$$

In the formula, B is the comprehensive judgment set of the target layer;

F is the weighing coefficient of comment set

$$F = (f_1, f_2, \dots, f_p)^T$$

p is the number of comments in the comment set.

#### 4.2.2 Determine weighing

Determine the coefficient of relative degree of importance of the indexes to the evaluation targets. Currently, the widely used methods include direct grading method, functional grading method, binomical coefficient method and hierarchical analysis method. This thesis employs direct grading method to determine weighing. That is to say, by using pre-designed index system, in the form of tables, industry experts render weighing to indexes of various levels in the bipolar index system, and then average

calculation is done.

Table 4-2: Evaluation results of weighing of port competitiveness evaluation index

I-tier index	Weighing	II-tier index	Relative weighing	Absolute weighing
Operation conditions	0.21	Density of container liner ship and coverage of sailing course	0.34	0.0717
		Charge rate	0.33	0.0693
		Container feeder system	0.33	0.0693
Service quality	0.24	Port work efficiency	0.27	0.0648
		Smooth pulling-in of the ships	0.25	0.0600
		Customs clearance efficiency	0.26	0.0624
		Convenience of information service	0.22	0.0528
Infrastructure conditions	0.25	Capability of loading and unloading equipments	0.26	0.0650
		Capability of storage equipments	0.24	0.0600
		Capability of mechanic equipments	0.23	0.0575
		Perth capability	0.27	0.0675

Management level	0.17	Management efficiency	0.34	0.0528
		Competence of business staff	0.33	0.0528
		Completeness of management information system	0.33	0.0544
Port image	0.13	Corporate culture	0.47	0.0611
		Customer's degree of satisfaction	0.53	0.0689

#### 4.2.3 Results of comparison of competitiveness

The full mark for each evaluation indicator is 10. Compare Dalian with its major competitors in the development of a regional international shipping center in Northeast Asia. According to the grading by experts as to their satisfaction with various indicators of the ports, the evaluation statistics and results are shown in Table 4-3:

Table 4-3: evaluation results

Class II Indicator	Busan Port	Kobe Port	Qingdao Port	Tianjin Port	Dalian Port
Density of regular container ships and coverage of sea routes	8.21	7.52	7.90	7.34	6.95
Expenses	8.12	7.45	7.65	7.35	6.96

Advanced collection, distribution and transportation system	8.45	7.26	7.24	7.01	6.99
Operating efficiency at the port	7.62	7.42	7.34	7.33	7.34
Smoothness of ships putting in	8.43	7.23	7.42	7.28	7.30
Customs declaration efficiency	8.31	7.21	7.12	7.11	7.31
Convenience of information service	8.42	7.21	7.21	7.23	7.22
Capacity of handling equipment	8.01	6.38	7.11	7.13	7.10
Capacity of storing equipment	8.23	7.12	7.65	7.63	7.21
Capacity of machinery	7.91	6.23	7.26	7.24	7.12
Capacity of berths	8.56	6.89	7.45	7.32	7.26
Management efficiency	8.55	7.25	7.24	7.25	7.01
Capability of personnel	8.35	7.56	7.65	7.54	7.11
Perfection of management information system	8.45	7.11	7.45	7.57	6.89
Corporate culture	8.46	7.01	7.98	7.87	7.12

Customers' satisfaction	8.56	7.46	7.35	7.32	6.89
General scores	8.23	7.14	7.44	7.34	7.11

According to the above evaluation and analysis of comparative competitiveness of Dalian Port and its major port competitors, Dalian Port ranks at the last place in the evaluation of competitiveness. It is not only far inferior to Busan Port, but also lags far behind Qingdao and Tianjin ports etc., its major competitors in contending for the status of the international shipping center in North China.

These are the results of mutual interaction between internal and external environment of Dalian Port. Dalian Port has developed slowly for various reasons, including external and internal ones (see Table 4-4). Dalian Port is incapable of changing external conditions, thus to change its disadvantageous position and seek development, Dalian Port has to find out the causes and deficiencies internally. This requires that we should base ourselves upon Dalian, the northeastern region and even the entire Northeast Asian region at large, start from the port resources of Dalian and look upon the development of Dalian Port from a long-term perspective, execute effective integration and reasonable allocation of resources at Dalian Port by taking a farsighted view and a bold vision as well as correct planning, construction and development of Dalian Port, so as to elevate the competitiveness of Dalian Port.

Table 4-4: Internal environment of Dalian Port

Internal environment	Internal advantages	Internal disadvantages
	<ol style="list-style-type: none"> <li>1. long development history of port</li> <li>2. good transportation network for domestic and international trade</li> <li>3. advantageous geographical location of port and advantages</li> <li>4. advantageous natural conditions of port</li> <li>5. complete functions and facilities of port</li> <li>6. vast expanse of the hinterland and abundant resources</li> <li>7. experience in strategic management of port</li> </ol>	<ol style="list-style-type: none"> <li>1. disorderly management system of port and unclear property right</li> <li>2. conservative and lacking long-term vision of development</li> <li>3. port environment and service quality to be improved</li> <li>4. inadequate funds for port construction, attaching importance to plan rather than implementation</li> <li>5. unreasonable structure of port capacity</li> <li>6. inadequate competitiveness on the port market and insufficient adaptability</li> <li>7. slow development of transportation of containers</li> </ol>

## **Chapter 5 Countermeasures for Improving the Competitiveness of Ports in Dalian**

Dalian Municipal Government emphasizes it should stick to prospering the city with ports, and achieve the common prosperity of ports and the city, and based on serving the economy in Dalian and its hinterland, accelerate the port construction, further integrate the port resources, uniformly plan the coastlines, and carry out multi-lateral cooperation and diverse investment, to accelerate the construction of deep-water docks and duty-free logistic ports, exert the advantages of the regional location and the deep-water coastlines in Dalian, to deeply develop and integrate the port resources, to form the strong competitiveness in the port groups, and enable Dalian to grasp the important and great opportunities in prospering the old industrial base in Northeast China.

### **5.1 Main principles**

#### **5.1.1 Principle of adjusting measures to local conditions**

Development of port resources should fulfill to deeply develop the deep water, shallowly develop the shallow water, develop the port into a cargo port if it is appropriate for cargo, develop it into a fishing port if it is appropriate for fishing, and develop it into a tourism port if it is appropriate for tourism, and well plan each segment of coastline resources and well excavate its potentials.

#### **5.1.2 Principle of market mechanism**

Under the prerequisite of meeting the layout planning for ports in the whole country and the overall planning for the ports in the whole city, we should fully exert the basic functions of the market mechanism for resource allocation, and the planning, construction, size and the specialty setup of ports should be established totally according

to the market demands, and the port enterprises are encouraged to enhance the collaboration and cooperation with their assets.

### **5.1.3 Principle of diversity**

To break through the situation of simplex investment channel at present, attract the governments and enterprises in the hinterland, foreign companies, especially the international multi-national companies to invest in port constructions in Dalian, to form a port construction pattern with diverse investment, multi-lateral construction and cooperation among many countries.

### **5.1.4 Principle of advancement**

According to the development situations of international and domestic economies and ports, the planning and the construction of port should keep the appropriate advancement, and it especially should be based on the development within next ten to twenty years to establish the grand strategic considerations.

### **5.1.5 Principle of the most excellence in whole**

Ports in Dalian must be clear that the competition between ports has had the market transformation, and it has no longer been the “Individual combat” for any one port, but to participate in the competition in the port market with the whole Dalian Port. Therefore, the scale benefits and the overall competitiveness of Dalian Port must be taken into account. Firstly, the internal structure in Dalian Port should have the clear levels, the alternative competitiveness and the strengths that supplement with each other, and secondly, we should fulfill to carry forward our strengths and avoid our weakness, and whoever has the dominant strengths and capabilities, whoever will lead the integration, and the resource allocation should incline to the enterprise with the good returns and capabilities.

## **5.2 Countermeasures for improving the competitiveness of Dalian Port**

### **5.2.1 Accelerate to make the high-quality development planning for ports in Dalian**

The planning for ports in Dalian concerns the overall development situation in Dalian and even in the Northeast China area, to affect our offspring, and we should try to follow the regulations in the “Port law” in the country, and the characteristics of the port resources and the requirements in the planning for Dalian, to prepare the high-quality development planning for ports in Dalian as soon as possible. This is an emergency for integrating the port resources, and is also the major responsibility recently for Port Administration Committee and the port administration authorities. We should enhance the planning force, and led by Dalian Municipal Port Administration Committee, Municipal Planning Bureau, Port Bureau and related districts should join hands to organize the related departments and first-class experts in the country to participate in establishing the planning, and invite the authoritative experts in the international community to assist for planning argumentation. We should well fulfill the works in two aspects in focus: On the one hand, based on the ocean function area classification in Dalian, we should establish the overall planning for ports in Dalian, to relatively systematically and comprehensively plan the function orientations, development conditions for coastlines in ports in Dalian, as well as the development procedures for various coastline segments, and on the other hand, we should combine the port layout planning the country, to establish the overall planning for ports, to make the clear regulations for the classification of the scopes, port areas in the water areas and land areas, the throughputs and the arriving ship models, nature and functions, facility construction and coastline use, etc in various ports.

Dalian Municipal Port & Dock Bureau has organized Planning Research Institute in Ministry of Transportation and Building & Construction Design & Research Institute in Dalian University of Technology carrying out huge amount of works for related surveys and researches, and in Dec 1995, after the review jointly by Ministry of Transportation and Liaoning Provincial People's Government, according to the review opinions, the "Overall planning for ports in Dalian" was revised and formed. This reference is the important reference for establishing the medium-long-term development planning and construction plans and port development for the ports in Dalian within a long period of time in the future, is the guideline document for development and construction of ports in Dalian, and is also the important reference to implement the macro adjustment & control for port development and the management of coastline resources. Meanwhile, it should be promptly adjusted according to the current situations, to enable it to really show the direction for development of ports in Dalian in the future.

### **5.2.2 To form the internal dynamic mechanism that the port enterprises will self-consciously follow the market requirements to integrate the resources**

Firstly, accelerate the pace of the system reform for the port enterprises in Dalian, to direct the port enterprises including Dalian Base Port and Beiliang Port, etc to be adapted with the needs in the modern market competition, and by means of joint venture, cooperation, transfer and lease, etc, accelerate the reform for diverse proprietary and the separation between the proprietary and the operating right, establish the modern enterprise system, to really become a principle part in the market competition.

Secondly, promote and fulfill the combination and reconstruction of port enterprises with the market as orientation and the assets as the connection. Port enterprises are encouraged to break through the affiliation boundaries, to follow the principles of

supplementing strengths with each other and achieving the multi-win results, transform the individual combat and relying on the low-price competition to the cooperative combat and relying on the overall functions to achieve the competitiveness. Large port enterprises (Groups) not only are encouraged to develop and construct the ports together through the association between the strong enterprises, but also are encouraged to utilize their capital and technology strengths to cooperate with the medium-small port enterprises, while assisting the medium-small enterprises improving their development capabilities and the enterprise management & technology levels, using the medium-small enterprises to expand the commodity resources and exploit the market.

Thirdly, develop and complete the port industrial association, and follow the international traditions, to coordinate the relationships between enterprises in the industry, maintain the legal rights and interests of port enterprise and the operating owners, and enhance its functions in the industry. Finally, form the Dalian port structure with Dalian Base Port and Beiliang Port as the core ports, medium-small ports and the shipper docks including Lvshun Port, Zhuanghe Port and Pikou Port, etc as the supplementary ports, with the alternative levels inside, supplementary competitions with each other, and the clear work divisions.

### **5.2.3 Perfect the distribution & transportation systems in ports in Dalian**

In the modern logistics system, port has become the connection part and the hinge on the logistic supply chain, and become the connection point between various kinds of transportation means, and bears the heavy tasks for distribution, transfer or reloading. Its internal transportation and the external transportation are an integer, and the concentration, distribution and transportation in port are its important components. At present, the commodity flow has no longer totally selected the port, but selects the logistic chain, and port is just one point on the logistic chain. Therefore, only the efficiency, low price and promptness of the operating status of the concentration,

distribution & transportation system comprised of port and other transportation means in the inland are the important conditions for attracting the commodity flow to pass the port. Therefore, Dalian Port must make great efforts to enhance and improve the capabilities for distribution and transportation, to increase the connection and coordination between the port and various kinds of transportation means, attach importance to the through transportation and operation, and carry out the business convenient for the commodity owners and merchants including the transfer, reload and through transportation. For the increase of the throughput capacity and operating benefits in ports in Dalian, the key is to form the networks of the nonstop lines between trunk and lateral, and between the river and the sea as well as the through transportation on the water course, to make various kinds of transportation means be organized into a uniform integer. With various kinds of shipping routes, especially the trunk ocean lines, form the relatively complete network-shape concentration, distribution & transportation system, reduce the transfer points and many unnecessary & complicated procedures caused by isolation, shorten the transportation period, and greatly reduce the goods waste and expenses for loading, unloading and transportation, thus to increase the competitiveness of the ports in Dalian.

#### **5.2.4 Construct logistic centers for the ports in Dalian**

Under the situation of the economic globalization, modern logistics has become the most economical and reasonable comprehensive service means in the international transportation. Due to the transportation organization means in the international logistics-type ports, the point-to-point network-shape logistics transportation has been formed based on the multi-form through transportation of container and the door-to-door transportation. Therefore, whether the ports in Dalian can become a point in the international network-type logistics transportation depends on whether the ports have the complete and perfect logistics service functions or not in a great sense. At present, the competitiveness of ports in Dalian in the regional and international markets is still relatively weak, and whether we can grasp the great opportunities formed in the

international logistics networks to promote the ports in Dalian to become an important point in the international logistics network is the key factor to determine whether its international competitiveness can be improved. In addition, for the container port to construct the international logistic center, it not only can make use the current strengths of the container throughput and the scheduled shipping lines and routes, but also can attract more container sources and scheduled shipping lines and routes. Meanwhile, the increased container resources and scheduled shipping lines and routes can attract logistics enterprises, ship owners and cargo owners to invest in the port in reverse, to further expand the size of the logistics center, and promote the economic development of ports and the port city. Thus, by constructing logistics center, and providing the series of logistics services including the reload, allocation, distribution, processing and through transportation, etc, ports in Dalian can deliver the goods by the most economical, express, accurate and secured means to the distribution center in the next level or directly into the hands of the customer, to ensure to exert the functions as a point for the logistics transportation, and receive the continuously increasing freight volume and profit returns, and at the same time, making use of the concentration effects and diffuse effects of logistics center, to drive the development of logistics and its related industries in Dalian, enhance the opening degree of the economy and improve the international competitiveness of the ports.

#### **5.2.5 Enhance the core function area in the port, and construct the affiliated medium-small port group**

The focus here is to build two core function areas: Firstly, to accelerate the pace of planning and construction of the coastlines in Dayaowan Bay, to construct into the large-size specialized container working area, the large-size specialized dock areas and duty-free port areas for steel, wood and chemical fertilizer. Secondly to grasp the planning and construction of the Nianyuwan port area, to form the large-size specialized liquid bulk port area with the transportation of crude oil, finished oil product and various

types of liquid chemical products as priority. Thirdly, to develop the deep-water coastline in the area of the southwest coast of Dagushan Peninsula in focus, and the construction focus is to fulfill the function area classification on Dagushan Peninsula, and increase the size of Beiliang Port, to construct it into the international duty-free logistics port area with the biggest size and the strongest functions in North China.

Reconstruct the old port area in Dalian Base Port: The port areas including Dagang, Heizuizi, Ganjingzi, and Daliang Bay (Heshangdao Island), etc in the old port area. They should have the function adjustment according to the needs in the development of the city and the ports, to gradually transfer the big-size liquid and dry & bulk goods with the relatively serious pollution and hazard to the specialized deep-water port area newly developed (Dagushan Peninsula), and the original port areas should develop the trade, tourism and logistics service functions in focus.

Plan and construct Dalian Bay based on the long term: As the rapid development of the economy in Dalian and the prosperity of the old industrial base in Northeast China, the focus of the port development in Dalian Area will definitely be transferred to Dalian Bay, the port resource with the unique advantages and the most potential in Dalian. This needs to adjust some dispersed and small docks and transfer those port-adjacent industrial enterprises with the low economic benefits and serious pollution in Dalian Bay, to develop the new-type port-adjacent industries.

To reasonably develop the local port and the enterprise dock: Orient Pikou Port (With the land & island transportation services as priority), Zhuanghe Port (Local transportation) and Lvshun New Port as the medium-small docks serving the local characteristic resources and industries, the coastlines on Changxing Island Port can be constructed into the comprehensive docks serving the ship-repair and shipbuilding industries and the vehicle logistics and construct Changhai Ocean Island, etc into the specialized goods owner docks serving the enterprises.

Thus to form the port structure with Dalian Base Port and Beiliang Port as core ports,

medium-small ports of Lvshun Port, Zhuanghe Port and Pikou Port, etc and the goods owner docks as the supplement, with the alternatives, the supplementary competitions and clear working division in the port, to build a Dalian Port with the prominent core competitiveness.

#### **5. 2. 6 Construct a public information platform with Dalian Port as the center**

The progress of the economic globalization has pushed forward the rapid development of the extra-large container ship transportation and the internationalization and coalition of the scheduled ship companies in the shipping industry. In such the market environment, the ports in various places in the world are in the strict and orderly internationalized economic network, and while pursuing the high benefits, to continuously pursue the competitive environment and status good for themselves. Today, as the diversified competition factors in modern ports, the internationalized port operation, the economic trade transformation in the port hinterland and the information development in the ports, information construction undoubtedly provides an important means for port to improve the service quality and level, thus to enhance and improve the port competitiveness. In addition, the perfection of the concentration, distribution and transportation system in Dalian ports also needs various ports to establish the complete and perfect port information management system, and also requires to construct the concentration, distribution and transportation information network in ports in Dalian, to construct the database for the ocean shipping market in the Dalian area, to share the resources at the ports in Dalian, and coordinate the normal operation between various port enterprises, and promote the perfection and development of the concentration, distribution and transportation system in the whole ports in Dalian. Meanwhile, planning and construction of the connective, real-time and efficient port information network platform is also the important technology support for achieving the integrated port resources, especially the integrated port information resources.

As we all know, in any port cities, the port is the important point with the biggest size of the concentration of different transportation means, and also has the most possibility to be developed into a big platform integrated with various types of production elements and functions. Studying the business model of the modern logistics, its various types of industrial chains are gradually expanding towards the outside with the port as the center. Therefore, for construction of the public information platform in Dalian, it should be based on the development of the ports in the future, to prepare and plan a comprehensive port logistics information system with the highly integrated information, intelligence and network. Meanwhile, the public information platform should also be used as a core point in the supply chain management system in the whole city, to be connected with the city logistics, enterprise logistics and the other inland logistics system, thus to fulfill the strategic scheme for becoming the logistics center for the surrounding economic areas, i.e. It should include the contents in the following two levels:

One is with the ports in Dalian as center, use the information network to connect the goods owners, ship owners, agencies, goods wholesalers and retailers, packing companies, route transportation companies, customs and quarantines, etc together, to provide comprehensive services including information, transfer and release, etc for various parties. Two is in the frame of the modern logistics, expand the network connections, to collect, transfer, exchange and share the information for logistics, goods flow and the capital flow, etc through the port information center, to further improve the comprehensive service level of the port information platform in Dalian, and with the advanced information network platform to support the rapid development of the modern logistics in ports, and complete the port information network service functions in Dalian.

### **5.2.7 Increase the financing capabilities in ports**

Construction and development of port need the huge amount of capital investment, so it is very necessary to increase the financing capabilities in ports and achieve the diversity

of the port investment. The main methods are:

1. Broadly attract the diverse principal parts for investment including domestic and foreign big ship companies, big goods owners and big groups, etc to participate in the port construction, and at the same time, offer the special policies for the use of coastline and taxation, to form the win-win situation.

At present, due to the limited transportation force in the shipping enterprises, they only can select to affiliate the current hinge port. This kind of the “Affiliation” is mainly represented as the cooperation between the port and the enterprise for the construction of the berths on the port. To solve this problem well, the capital should be raised for the port facilities (Mainly the berth) based on the appropriate classification for the shipping enterprises.

Some berths can be developed, constructed and operated with the sole investment by large shipping enterprise. The port should organize the public bid invitation, and the large shipping enterprises with the strong strength bid to invest, and the bid winner should develop, construct and operate some berths in the port with the sole investment. By this means, the port can select one or two strategic operating partners dedicated in the long-term cooperation with it, thus being good for the long-term development of the port.

Set up the joint venture with ordinary shipping enterprise to develop and operate some berths. The port invests and takes the share with the materials like the land, coastline, berth and related facilities, etc currently available, and the ordinary shipping enterprise takes the share with the investment, and both parties develop and operate some berths together, and by this means, it can raise the sufficient construction fund for the port construction.

2. Fund raising with the stock

As the continuous development of the port industry in our country, the continuously increased port enterprises listed in stock market and the continuous perfection of the financial market, the stock fund raising will be increasingly becoming a major port fund raising means. At present, the width and the depth of the bond circulation market in our country both are very limited, and lack the related systems, therefore the bond market has the much smaller size of fund raising than the stock market, and moreover, the enterprise bond has the relatively big risks, and its interest rate is higher than that of the government bond, therefore, the enterprise bond is difficult to be released in big scale. Compared with that, the stock fund raising can solve this problem relatively well, and adopting the method of stock fund raising is a prior good solution for the port facilities in our country to raise the fund within a period of time in the future indeed.

### 3. Financing lease

In the medium-long fund activities for the investment in fixed assets, grasping the business opportunity and reducing the cost for fund raising are the two most important factors for enterprise to take into account. The financing lease transaction is the financing means with the material as the carrier. Under the circumstance that the enterprise has the good operating achievements and credit records, the enterprise intends to obtain a sum of the fund adapted with its own ability for bearing the debt, if procuring the advanced equipment after raising the sufficient fund, it is very possible it has lost the best competition opportunity, but adopting the financing lease can solve these problems very well. Due to it has many facilities, the big investment in the fixed assets, with the long returning period, the port enterprise is appropriate for adopting the financing means of the financing lease.

## Reference:

Caitao, Jinxu, Ma Yaohui(2004.1). *Cooperate to Create a Hub-Port in Northeast Asia*. China Water Transport

Chen Jiayuan.(1999). *Port Enterprises Management*. Dalian Maritime University Press, No9

Chu Liangyong, Fan Houming(2001.5). *Competition and Development Trend of Container Ports in Bohai Sea Region* . Ports in China, pp26-27

Dalian Maritime University, Yingkou Port Bureau(2002.3). *Strategic Plan on Yingkou Port's Development*.

Dalian Municipal Port Administration Bureau (2005). *Overall Planning on Dalian Port*

Fan Xiaoping(1999). *Discussion on Connotation and Composing of Enterprise Competitiveness*. Journal of Zhejiang University

Gu Yazhu(2006). *On Competitiveness Promotion of Container Ports in China* China Economist, No.4

Guo li, Wang Haixia(2005). *On Competitive Power Evaluation of Port Enterprises*. Port

& Waterway Engineering, No.10

Hao Junli, Lei Mi(2005) *Evaluate Port Competitiveness by AHP*. China Ports 2005 No.1

Hu Dali(2001). *On Enterprise Competitiveness*. Economic Management Press, pp100-101, 102-105, 81, 80-97

Huang Yong, Ma Ning(2006, Sep). *Research on Multi-financing Model of Port Construction*. Journal of Beijing Jiaotong University (Social Sciences Edition), Vol.5 No.13

Li Weitao(2004). *An evaluation controls system on business-running competition for port industries*. Technology & Economy in Areas of Communications, No.1

Liu Dongchuan(2001.3). *Major Problems Confronted by Ports in Liaoning*. Ports in China, pp30-31

Liu Yinfen (2006). *The world famous port layout plan characteristic and inspires*. China Water Transport, Vol.4 No.7 pp34-35

Mao Boke, (2002). *Expansion of Port Logistics*(4<sup>th</sup> Edition). Ports in China

Planning and Research Institute of Ministry of Communications&Tianjin Port Bureau(2002). *Overall Planning on Tianjin Port*

Planning and Research Institute of Ministry of Communications, Yingkou Port Bureau,(2004). *Planning on Yingkou Port*

Porter. Michael E(1997). *Competitive Strategy Techniques for Analyzing Industries and Competitors*. Huaxia Press, pp15-25

Presidential Commission on Industrial Competitiveness of the United States(1985). *Report from the Presidential Commission on Industrial Competitiveness*

Qiu Wen, Zhang Xiuyun(2005). *Cultivation and Promotion of Core Competitive Power of Port Enterprises*. Shipping Management, No.1

Ren Xingyuan(2000). *Strategic Thinking on the Development of Ports in China in the 21st Century*. Ports in China, No.1

Shen Na, Zhao Yichuan(2003). *Research on the distribution of container terminals round the Bohai sea region*. Journal of Dalian Maritime University, Vol.29 No.3 pp72-76

Shi Xin(2000). *Modern Administration Theory and Application for Water Shipping Enterprises*. The People's Communication Press

Sun Guangqi, Sunhong(2005,3). *Overall Development Strategy on Construction of Northeast Asia Shipping Center in Dalian*. Dalian Maritime University

Wang Chengyi(2000). *On Development Direction of Ports in Liaoning*. Ports in China, No.6

Xiao Qing,(2002). *The Analysis on Competitive Strategies for Port Enterprise*. World Shipping, No.10

Xu Jianhua(2001.7). *Competition Pattern of Ports in Northeast Asia*. Ports in China, pp 47-48

Xu Jianhua, Liuli(2006). *Competition over the Position of Shipping Center in North China*. China Shipping Gazette

Xu Qin(2006). *integrate port resource to upgrade the competitiveness of port*. Shipping management Vol.28 No.4

Yanglin, Suhui(2006). *Strategic Thinking on Constructing Qingdao Port into International Shipping Center in North China*. Shandong Social Science, pp106-109

Yuan Jiaxin & Cheng Longsheng(2003). *Enterprise Competitiveness and its Evaluation*. Statistics and Decision, pp38-39

Zhang Lianjun, Zong Peihua (2003). *A Study of Evaluation on Competition Power for Ports*. Journal of Nantong vocational & Technical Shipping College, Vol.2 No.2 pp51-52

Websites:

<http://www.portdalian.com/> (Dalian Port)

<http://www.ptacn.com/index.asp> (Tianjin Port)

<http://www.qdport.com/> (Qingdao Port)

<http://www.ykport.com.cn/> (Yingkou Port)