

物流學碩士 學位論文

**Dalian Port's Container Logistics System:  
Strategy Study**

大連港 컨테이너 物流시스템 發展戰略에 관한 研究

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2007 年 2 月

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東北亞物流시스템學科

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本 論文을 孫祥煜의 物流學 碩士 學位論文으로 認准함

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2006 年 12 月

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## **ABSTRACT**

# **Dalian Port's Container Logistics System: Strategy Study**

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The container transportation of China will have great development, due to the growth of the Chinese economy, globalization process, and joining the WTO. With the increase of handling capacity of container terminal, it puts forward some new demand for container delivery system. As a main port in North China, Dalian port becomes to play a great role in the national economy and social development.

This thesis analyses the hinterland range of Dalian port and its economic development. On the base of the hardware and software of container transport system of Dalian port, this thesis aims to forecast scientifically the container handling capacity of Dalian port up to 2010. It refers to the planning of container transportation of Dalian port at 2010. Moreover, it discusses both advantages and problems of Dalian port, assumes the future strategy and overall target, and puts forward some useful countermeasures and suggestions for logistics development of Dalian port.

## 국문초록

경제의 글로벌화에 따라 전세계 컨테이너 물동량은 지속적으로 증가하고 있다. 특히, 중국은 WTO에 가입하면서 컨테이너 물동량이 급증하였다. 이에 따라, 중국은 증가하는 수요를 충족시키기 위하여 컨테이너 터미널 개발에 박차를 가하고 있다. 이는 이미 항만이 지역사회에 미치는 경제적인 영향이 크다는 것을 내포하고 있다.

이 논문은 북중국의 대표적인 항만인 대련항의 배후지와 이와 관련된 경제적 발전을 다루고 있다. 먼저, 대련항의 현황을 살펴보고 비교분석을 통하여 장단점을 분석한다. 또한, 대련항의 컨테이너 복합운송시스템의 하드웨어 및 소프트웨어 측면을 바탕으로, 2010년까지 대련항의 컨테이너 물동량을 예측하였다. 이에측치를 기준으로, 2010년 대련항의 컨테이너 하역 능력을 검토하였다. 마지막으로 이러한 분석을 통해 대련항의 물류시스템 발전을 위한 목표 설정 및 미래 전략을 계획하고 대응책 및 시사점을 제시하였다.



# Chapter 1

## Introduction

### 1.1 Background and Objective

Port container transport is an integral part of the whole water carriage and its developmental level is affected by many factors, such as natural condition, regional economy, and global shipping industry. After the world war II, the revitalization of the world economy, not only has speed up the development of the international trade but also stimulated the growth of sea transportation demand.

For adapting the development of international economy and fierce competition of sea transportation, shipping companies in all countries reduce the transport cost with shipping large-scale and specialization. In the late 1950s, container appeared in sea transportation. Passing by a decade's development, dedicated container ships appeared, and what also appeared was very few container terminals and dockside gantry crane.

From 1970 to 1983, the container quantity of the whole world container ship increased to 2,080,000TEU. The shipping line of container ship reached all over the world. Every port began to construct the special-used container berth. Up to 1983, container berths around the world had already increased to 983. After 1984, port container transport came into a new high speed development stage. Up to 1990 the number of berth of the world container port had already been close to 2000. At the same time inland transport network got further improvement from port to inland, carrying out scientific-managed and information-based systems destination. The port position changed from parts of water carriage to the main hinge of the modern synthetical conveyance system.<sup>[7]</sup>

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<sup>[7]</sup> Haiping Wang, "Research of Port Development", Tianjin Science and Technology Press, 1998.

In last ten years, Chinese port container transport has been developed quickly. Container throughput has increased by 30% above continuously for more than ten years. This is rare in the development history of global port container conveyance. While the port container box grows, the port construction is lagging behind the rapid development of the national economy and the rapid growth of imports and exports. There is misplanning on the national level concerning the port container infrastructures in relation to the economic situation. If the antinomy can't be solved as soon as possible, there will be some new bottlenecks probably. It will affect port development and restrict the development of national economy.

Dalian is an important port city in northern China. The natural condition of the port is very superior. In the late 2003, it's proposed that "make a full use of the port condition and advantage of the northeast region; become the Northeast Asia important shipping center." Meanwhile, it is suggested that the bases of old industries in the northeast should be adjusted and reinforced quickly. However, it urgently needs a shipping center playing a role of center for logistics, fund and information for the adjustments, reformation and development of northeastern old industries. This will promote the opening-up and high-level market of the northeast. Dalian is the window and group leader in this region; it's the main passage and important hinge when northeast hinterland merchandise materials make for the southeast circumlittoral and international market; it is the important node connecting two markets and installing good resources. If Dalian becomes the important shipping center of the Northeast Asia, if the radiation and affection functions are strengthened, if more funds are raised and information are spread, goods are absorbed in Dalian. All of these can form the economy linkage of port and hinterland, and promote competition ability of the northeast region in the Northeast Asia economic cycle and even the world's economy.

This thesis aims to study a constructing of shipping center in Dalian. For this, it analyzes and predicts Dalian port container conveyance development trend in the future, and puts forward several proposals for Dalian port containerized conveyance development.

## **1.2 Method and Structure**

This thesis is a result of a literature research on how to promote the competition ability of Dalian port container transport systems. Apart from competitive factors, under the great environment of market economy, how to build up modern enterprise system for Dalian is also the important problem related to the future development of Dalian port.

This thesis, synthetically considers the development needed for Dalian port container transport systems and the decisions need to be made. It also provides the management needs for the development of Dalian port on the basis of full analysis of the external environment.

This thesis includes six chapters. Chapter 1 depicts the background and purpose of study and outline of the thesis. Chapter 2 reviews Dalian Port container inland transport system. The chapter divided into two parts and gives a brief introduction of the position of Dalian port container conveyance in Chinese port container conveyance and the current existing problem analysis of Dalian port container inland transport system development. Chapter 3 analyses Dalian port's container transport development competition. It also introduces foreign major ports and the main domestic ports. Chapter 4 forecasts Dalian port's container throughput by using the grey model. Chapter 5 focuses on the strategic plan of Dalian port. Chapter 6 is the conclusion of the study.

## **Chapter 2**

### **The Condition and Problem of Dalian Port's Container Inland Transport System**

#### **2.1 The Position of Dalian Port among Chinese Ports**

##### **2.1.1 The Position of Dalian Port**

Through the development for several years, the layout of China's coastal container hinge port has already seen clues. The south will become to take Hongkong as a center and take Shenzhen as a complementary South China hinge port. The center part will become to take Shanghai deep water port as center of east China hinge port. At present, Dalian, Tianjin and Qingdao are competing each other in the Northern gulf in wreath of Bohai Sea, but only one container hinge port will be left finally. Many facts explain that Dalian port doesn't gain advantages among three northern ports. In recent years, Dalian port's container conveyance gets rid of overcast appearance for several years gradually and get into the period of high-speed growth. It has a big breakthrough in trunk line inaugurate, transfer development, port service, internal trade development and industry adjustment, but is still enlarging with the coastal other major port absolute box quantity disparity by horizontally comparing, Dalian port faces a more furious competition and challenges. At the same time, after China has joined the WTO, the sturdy growth of Chinese economy in the future, can bring the vitality to the shipping industry. This is also a great chance that Chinese ports enlarge their development.

Dalian port has strategic geographic position, located in the entrance of Bohai Sea Gulf. It is the economic center of wreath Bohai Sea and Yellow Sea and the transportation hinge where three province in northeast, region in Neimenggu and Shandong peninsula lead to world. In compare with Bohai Sea container port, Dalian has the advantages in niche condition, development potential and natural condition. Especially, it has a bigger

potentiality in the port supporting conditions and port construction. Dalian port, located in the entrance of Bohai Sea, is the nearest port to the international airline surrounding Bohai Gulf. Table 2-1 is the comparison of marine transportations from the surrounding of Bohai Gulf to the northern three ports.

<Table 2-1> The comparison of marine transportations from the surrounding of Bohai Gulf to the northern three ports

Unit: sea mile

Port	Dalian	Tianjin	Qingdao
Dalian	0	210	274
Tianjin	210	0	423
Qingdao	274	423	0
Yingkou	210	256	460
Yantai	89	200	238
Weihai	93	234	200
Qinhuangdao	168	177	216
Longkou	117	150	315
Dandong	159	344	350

Source: Dalian Statistic Bureau

Dalian port opened a branch line inside Bohai Gulf surrounded in August, 1998. It passes Jinzhou, Qinhuangdao, Longkou, Weihai, Yantai and Yingkou in the whole course. Meanwhile, it successfully opened the unfixed transfer shipping line from Dalian to Tianjin, Yantai and Dandong. Dalian port takes advantages in the route arrangement and becomes the transfer center of surrounding regions of Bohai Gulf. At present, it's obvious that relay box quantity of Dalian port gets a growing tendency. The economic development in region of Bohai Gulf necessarily will provide more sources for Dalian port.

<Figure 2-1> The location of the northern three ports in Bohai Gulf



Source: Map

### 2.1.2 Dalian Port Facilities

At present, DCT (Dalian Port Container Terminal) port has five container berths. Two container deep water berths are being set up with the 1500 meters wharf shore line and the 12.1-14 meters deep water. It can contain the fifth generation container ship, and its yearly designing throughput is 1,900,000TEU. Dalian has many routes closed to the ocean coast, more than 40 lines and 8 lines away from the ocean coast.<sup>[12]</sup>

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<sup>[12]</sup> Dalian Port Bureau

<Figure 2-2> Dalian container ports



Source: <http://lady.tom.com/1028/1192/200596-86954.html>

## **2.2 The Problem of Dalian Port Container Inland Transport System**

### **2.2.1 Economic Limitation**

Chinese foreign trade steadily grew in 2001. The imports and exports increased by 13.3%, but the foreign trade exports of three provinces in the northeast increased just 5.4%, lower in the average level of the whole country. Particularly its export increased only 1.4% and it has the serious shortage of export goods. From the viewpoint of GDP, three northeast provinces occupied 13.8% in the whole country in 1980's. It descended to 10.6% in 1999. From the perspective of the foreign trade, the foreign trade exports amount of the three provinces in the national proportion descended to 6.8% in 1997. It further declined to 5.6% in 1999. The traditional hinterland of Dalian stresses on the three provinces in the northeast. The recession of hinterland economy certainly will influence development of seaport container conveyance.

### **2.2.2 The Furious Competition of Peripheral Ports**

In China, in order to compete with northern container hinge port, Dalian, Qingdao and Tianjin ports strengthen the infrastructure construction continuously in recent years. At the same time, two ports continuously expanded the transfer of interior branch lines cycling Bohai Sea. According to the rough statistics, in 2001 deep-sea container quantities of the two ports respectively reached to 4000TEU and 2000TEU through branch lines directly distributing from Dalian seaport.

Pusan port in South Korea reduced miscellaneous fee and cooperate with shipping companies in recent years in order to construct the container hub of Northeast Asia. It vigorously contests for the international transfer container quantity of Northeast Asia. This makes a great impact on the development of deep-sea lines of Dalian port and other northern ports in China. According to DCT statistics, the Korean flight path exports box quantity was 80633TEU in 2001, among which there were 35478TEU from Pusan. The quantity of transfer distributed good occupies 44% of the exports. The lost of those goods supply limits the opening and development of Dalian port trunks. At the same time, the mutual transfer passages in the north China has to be transit in South Korea. Large volume of goods is lost in the offshore. It also brings huge pressure for exploration of the new line in Dalian and Tianjin. And for the steady work, the ports in north part of China have not yet formed the benefit community.

### **2.2.3 Under Development of the Modern Logistics**

The modern logistics is another revolution in transport area after transportation of container and multi-combined transport. It gets through the whole processes from the production of raw material to final consumption, crossing professions, section, regions and even borders. It integrates transportation, warehouse and information effectively. It is considered to be the most important



profit sources of the modern enterprises. To mention the environment of hinterland container transportation, multi-modal transport containers and modern logistics network have not yet been fully spread in the hinterland because of lack the knowledge of modern logistics system and the relation and unification of container transport are separated artificially in order to maintain the loco interest by all the transportation departments. This will inevitably affect the development of appropriate cargo sources and increase of crating rate in Northeast hinterland and thus impact the overall competitive ability of Dalian port.

#### **2.2.4 Limitations of Hinterland Distribution Systems**

The network has already formed, but the operation is not so easy. It has not played the role it should have. Since April, 1997, Dalian port has opened many container arrangements in inland areas such as Dalian to Harbin, Changchun, Yanji, Shenyang and Jilin in order to contain the influence of interior good source. It has taken Dalian as the central radiation pattern collection network. After the operation for nearly three years, the container arrangement transportation amount increases progressively year by year. However, to describe the present arrangement operation, it has not achieved the operation of “five to decide the arrangement”. At the same time, owing to public operators of arrangement has not been decided yet, the arrangement operation is greatly affected by the railroad. The malpractices have not been effectively restricted such as the chaos of management in the arrangement transportation and the service inferiority. The arrangement carrying quantity is available and hard to satisfy the developing requests of the port containerized traffic.

## **Chapter 3**

### **Analysis of Dalian Port's Competition**

In 2003, Chinese government to build Dalian to an important international navigation center in the Northeast Asia. But to compare with other competitors, as the most important hardware during the construction of Dalian port hasn't possess the corresponding big international port status. Moreover, there are many other ports put forward the same object to be the world's hinge port and gain more profit. According to Dalian port's current condition, it faces great challenge and steep competition.

#### **3.1 Current Condition of Foreign Major Ports**

In the Northeast Asia, there are several ports have ability or potential ability to compete with Dalian port, mainly Korean's Pusan and Kwangyang port and Japanese's Tokyo port, Yokohama and Kobe port, etc.

##### **3.1.1 Pusan Port**

Since 2000, Pusan port become the third container port in the world instead of Kaohsiung port. In 2002, its throughput increases steady and has reached to 9.44 million TEU. Pusan port lies at crossroad of the three navigation lines--from northeast to Northern America, Europe to Russia and Huanghai Sea to East Sea, which has the important advantage of Pusan port. If Pusan becomes the beginning port of Pacific of Asia—Europe lines, it will be the transit center of Northeast Asia, so there's large potential in this port. From 1970, with opportunities of Kobe earthquake and the rapid development of Chinese international trade, Pusan port proposed the strategic target to construct the center port across the Pacific in 21 century. Now it has planned to use 6 billion dollars to expand a new huge port area in Gaduk Island near the southwest of Pusan before 2011, which includes several container docks with 16 meters deep water. It is estimated

that from 2001 to 2011 there will be 10.2% increase annual in Pusan port's container transit ability. On June 15, 2000, in the North-South Korea summit an appointment was passed to re-connect the railway between Seoul and Shinuiju, which means that if the railway passes, Pusan port will connect TSR (Trans-Siberian Railway), so it will become main port of Northeast Asian transit node combined the sea and the land.

In addition, Pusan port is constructing a logistics center, the authority hoped that the international enterprises could be attracted to build the third Party Logistics, so the port can provide the value-added service. Therefore, South Korea is expanding the free trade function of the port to construct Pusan port as Northeast Asia's shipping center, business center, financial center and the information center.

### **3.1.2 Kwangyang Port**

Kwangyang port is a good natural port, which is 150km far away from the west of Pusan port. The port has sufficient development land to set up the large-scale container spot; it does not need to scour the route for large ships and does not have to guard against the slope. According to the layout, there will be 29 container berths built by 2010, by then it has ability to compete with other big international ports. Kwangyang port is very near to the mainland of China, so there's more attractiveness to Chinese cargo to transit by Korea, which is the main reason why Kwangyang port developed so rapidly.

### **3.1.3 Tokyo Port**

Tokyo port is the largest container port in Japan, lying on the northwest shore of Tokyo Bay in the south of Japanese Honshu Island. With 30 million people in Tokyo and large Guandong area around, Tokyo port is the transport node between metropolitan area and other domestic and foreign areas. There are more than

110 thousand people working directly in related port industry and the construction industry and financial insurance. From 1998, Tokyo port's throughput is always the first in Japan and its foreign trade container throughput is 2637971TEU in 2000, 10% more than 1395972 in 1999 which had made a record. It has kept increasing in continuous 7 years. In 2000, its throughput is 2.9 million TEU, 17th in the world.

### **3.1.4 Yokohama Port**

Yokohama port is one of three largest ports in Japan, southwest of Tokyo, 30kms. There are 21 container berths and the front water is between 11 to 14 meters with 5.3kms sea shore. In the passed several years, Japanese economy was not very well, the container throughput rose slowly in recent years, even has the sliding momentum. But its throughput still maintained above 2 million TEU and reached to 2.4 million TEU in 2002, 24th in the world. At the same time, Yokohama port has the highest density navigation networks in the world, there are altogether 162 scheduled ship route and the ordinary routes leading to more than 150 countries. We should not look underestimate its competition ability.

### **3.1.5 Kobe Port**

Kobe port lies on the southwest of Japan Island, getting closed to Osaka Bay, whose throughput is 2 million TEU in 2002, 27th of the world. There are 38 container berths equipped. In 1997, after the end of earthquake repair, Kobe port ambitiously announced the 《renew declaration》 to construct the Asian mother port in 21th century. Put its sight on the whole Northeast Asia, even Chinese Changjiang River is considered to its lateral range by building ships of sea-river use. There are 8 container berths in the next plan, 4 of there have 15 to 16 meter deep. In this region, traditional international ship companies usually stopped at Kobe port, so it owns perfect cargo concentrating and distributing

system. Therefore, there is large developing space. Moreover, the Osaka port has a good development momentum these years. Its throughput is up to 1.673 million TEU in 2002 and there is large possibility that it will overtake the Kobe in recent years and become the potential competitor of Dalian port.

According to the above described, in the way of Dalian port's construction of regional international navigation center, there are two main foreign competitors: one is Pusan in Korea, which has great effect on Dalian port and the other Chinese north ports to create and develop ocean lines by means of lowering the port miscellaneous fee and cooperating with ship company which effectively rob the transit throughput in Northeast Asia. According to DCT's statistics, in 1999 there are altogether 85724TEU throughput passing Korea and 36677TEU is done by Pusan port, about 43%; in 2001 it was up to 60-65%, that is to say in the whole of 233 thousand TEU there are 140 thousand TEU transferred by Pusan port.

The other competitor is the ports of Japan. In 2001, there are altogether 358 thousand TEU from Dalian to Japan lines, about 35.8% of the whole foreign trade. Besides local trade, there are 240 thousand TEU every year transferred through Japan, 67% in the total ocean transportation. In 2001, there are 400 thousand TEU from Dalian port to transit by Japanese and Korean ports, which seriously limited the creation and development of Dalian port's main ocean lines.

<Table 3-1> Container throughput of the main foreign competition ports in recent years

Unit: ten thousand

	1986	1996	1999	2000	2001	2002
Pusan	144.8	472.5	644.0	754.0	790.7	944.0
Kwangyang		35.0	41.8	64.2	89.9	100
Kokyo	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

Data source: 《Ocean Shipping Information》 2003

## 3.2 Survey of the Main Domestic Competitors

### 3.2.1 Tianjin Port

By the end of the first and second projects of 100 thousand tons channel, the water in Tianjin port has reached to 15 meters which makes the sixth generation container ships possible to pass. Up to the end of 2002, there are very intensive container scheduled shifts and lines (68 container scheduled shifts), including 45 sea lines, 3 internal lines, 10 internal trade lines and 10 ocean lines. Moreover, Tianjin port's hinterland inland transport network system is also very developed, currently including Jingshan, Jinghu, Jjingjiu and Jingbao railway lines and Jingjintang, Jingbin, Jintang highway lines, which provide enough guarantee for the hinterland. With several 62.5 meters container suspension bridges, Tianjin port can adopt double-box work, and its yearly container throughput is designed to over 2 million TEU.

### 3.2.2 Qingdao Port

The port also has the hardware of deep water route and deep water dock. The water of Qingdao port's main route is 14.6 meters deep (the deepest is 21 meters). There are 8 deep water container berths and in front of the port there is specific dock for the fifth

generation containerships with 14.5 meters deep water.

The building of the third container dock includes 7 deep water (16 meters) big container berths which can berth the sixth generation container ships and more big ships.

This year, Qingdao port opens the first container lines to Africa which means the port has global lines. And ships from Dalian port and Tianjin port almost all have a stop in Qingdao port.

### **3.2.3 Analysis of Dalian, Qingdao and Tianjin port**

On the strategy, the three ports have already confirmed their aims, which are to construct the hub container port of the Northeast Asia. On the strategy competition, they are all creating ocean lines and building deep water container berths used to competitor base's core. Now we make a comparative analysis of the three ports' geographical position, economic hinterland, ports ability and main strategic factors.

#### **(1) Geography position and economic interior region of three ports**

They all have their own positions and cargo resource advantages of themselves. They all lie in north China, near to each other, relatively have the shipping position and the interior region advantages. From the viewpoint of shipping location, Dalian port is located in the Bohai Sea, while Qingdao port lies in the east of the Jiaodong peninsula, compared with Tianjin, they have the advantage of short distance to the main lines of the world.

From the hinterland's cargo source, Dalian port's current weakness is that there are little container throughput in northeast area, especially the foreign trade container throughput, so there's large space in Dalian port's ocean trade development. Comparatively, Tianjin port is nearest from the hinterland, so it is

easy to concentrate export goods on the land; but with Shandong province's developing foreign trade, Qingdao port's cargo source is about equal to the whole amount of the three northeast provinces.

Seen from the relative independence of the hinterland, Dalian port depends back on three northeast provinces and the Inner Mongolian. Therefore, it's easy to occupy certain source advantages; although there are many cross areas between Tianjin and Qingdao, as far as cargo's rational flowing trend is concerned, Tianjin port has certain advantage in Tianjin, Beijing, Hebei, Shanxi and Shanxi while Qingdao port can reach to Shandong, Henan and their neighbor areas. Next table shows the container throughput condition of Dalian, Qingdao and Tianjin ports (table 3-2):

<Table 3-2> Growth rate analysis of three port's container throughput

	Dalian port (ten thousand TEU)	Tainjin 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 (%)	23.10	27.50	36.30

Source: China Statistic Bureau

(2) The advantages and disadvantages of the three ports

From the table 3-3, we can see that both Qingdao and Tianjin are superior to Dalian in foreign trade proportion, container numbers, heavy container proportion class and berth number, line density. In the whole competition, Dalian is at the end.



<Table 3-3> The advantages and disadvantages of Dalian, Tianjin and Qingdao port

	Advantages	Disadvantages
Tianjin	-Large hinterland -Sufficient cargo source -9 main lines	-Port is far away from the main lines and limited lines passing in port area
Qingdao	-Near to the north and south main lines -Extroversive hinterland economy -Good circumstance of the shore -Owning the most throughput basement, 16 main lines and 10% transferring boxes	-The negative effect by the adjustment of the new and old port layout -Seriously hold down by Shanghai port
Dalian	-Apparent advantage of regional network lines across Bohai Sea -Good natural conditions and facilities -Good management and service	-Lagging economy of hinterland -Shore tache must be promoted -8 main lines -Parts of good flows to Yingkou port, especially domestic trade

### 3.4 Competitors' Comparison Result

If we consider 10 as satisfactory, we have expert result of the main competitors in the Northeast Asia in table 3-4:

<Table 3-4> Evaluated results

Index 2	Pusan	Kobe	Qingdao	Tianjin	Dalian
Container ship density	8.21	7.52	7.90	7.34	6.95
Fare	8.12	7.45	7.65	7.35	6.96
Inland transport developing system	8.45	7.26	7.24	7.01	6.99
Working efficiency	7.62	7.42	7.34	7.33	7.34
Fluency of ship's entering	8.43	7.23	7.42	7.28	7.30
Efficiency of going through customs	8.31	7.21	7.12	7.11	7.31
Extent of service message	8.42	7.21	7.21	7.23	7.22
Upload and download	8.01	6.38	7.11	7.13	7.10
Warehousing	8.23	7.12	7.65	7.63	7.21
Mechanic equipment	7.91	6.23	7.26	7.24	7.12
Berth ability	8.56	6.89	7.45	7.32	7.26
Management efficiency	8.55	7.25	7.24	7.25	7.01
Workers ability	8.35	7.56	7.65	7.57	7.11
Flawless degree of management information system	8.45	7.11	7.45	7.57	6.89
Company culture	8.46	7.01	7.98	7.87	7.12
Content degree of clients	8.56	7.46	7.35	7.32	6.89
Synthesized score	8.23	7.14	7.44	7.34	7.11

From the above the table we can see that competitiveness among competitors, Dalian port is in the end of the competition. Beside Pusan port, there seems great difference from its domestic competitors Qingdao and Tianjin port in the north China.

Those are the results of outside and inside factors interactive ends. There are many reasons for Dalian port's slow development, internal and external factors (Table 3-5). Dalian port cannot do anything with external factors. If Dalian port wants to change its inferior position and make progress, all it can do is to find the shortcomings of itself, which requests the whole northeast area to treat Dalian port with far sight.

From the beginning of Dalian port's resource, we should highly cooperate and deploy rationally source of Dalian port. Make right plans to build and develop Dalian port, increasing its competition rapidly.

〈Table 3-5〉 Internal environment of Dalian port

Internal advantages	Internal disadvantages
1. Long history	1. Confusing management
2. Fine international and domestic trade transportation network	2. system and blur property right
3. Superior positions and regional advantages	2. Conservative mentality and short of farseeing
4. Perfect natural condition	3. Need to reinforce the port's environment and service quality
5. Well equipped port facilities and function	4. Short of construction money, think more but do less
6. Widen hinterland and abundance resource	5. Irrational port ability structure
7. Certain experience of port strategic management	6. Short of competition and adaptation
	7. Slow development of container transportation.

## **Chapter 4**

### **The Forecast of Dalian Port's Container Throughput**

#### **4.1 Qualitative Analysis of Dalian Port's Container Cargo Volume**

This section qualitatively analyses the quantity of Dalian port's container cargo, mainly from two aspects: domestic trade and international trade.

##### **4.1.1 Dalian Port's Foreign Trade Container Volume**

The high-speed development of hinterland trade will drive the rapid development of the containers' amount of foreign trade. Chinese government have made the policy to develop the old industry basement in northeast of China to push Chinese economy step by step from south to north. The economy of the northeast region and around the Bohai Sea are increasing its developing steps, and there is a good chance that this area becomes an important area for the development China after the success of Changjiang River delta and Zhujiang River delta economic zone.

As far as the international economic trend is concerned, the economy among China, Korea, Russia and Japan has strong complementarity, so that there's broad cooperation prospect. Now the whole global economy is going to uniform and under this background, the Northeast Asia economic circle's shape is coming into being.

Dalian is the leader and the window of the northeast area and it's also the main pass and important gate of the large amount of cargo from the northeast to southeast sea area and international market. It's the node to connect the two markets and connect the two resources. We can believe that Dalian port's container throughput will have a new level along with the industry frame's adjustment of the northeast area.

<Table 4-1> Foreign trade import and export volume and foreign trade container quantity of Dalian

Year	Import and export volume (100million U.S. dollars)	Foreign trade container amount(10 thousand TEU)
1993	170.68	24.2
1994	182.36	29.1
1995	206.16	36.31
1996	203.77	41.38
1997	216.41	44.05
1998	191.60	49.3
1999	202.12	64.50
2000	270.45	83.67
2001	286.22	100.11
2002	321.88	114.93
2003	380.62	143.79
2004	440.56	225.33
2005	525.14	270.26

Source: Dalian Statistic Bureau

#### 4.1.2 Dalian Port's Domestic Trade Container Volume

Dalian port's internal trade has been intensified and the volume of domestic trade containers will be increased dramatically. Among China's coastal ports, Dalian has formed the perfect branch network firstly and becomes base of foreign container in Bohai Sea area. In addition, Dalian has roads directly to Shanghai and Qingdao as transfer branches which opened the channel transferring among big domestic ports, now it has made positive effect on the domestic port's cooperation.

At the same time, it grasped the chance that North Korea opened its economy to the international market, opening transit center for Dalian port operations for which made a useful attempt for the future's international transit of business.

### **4.1.3 The Prospect of Dalian Container Volume**

For a long time, northeast area has its own heavy industry structure which makes the resource of container increase slowly, so relatively there is little supply suitable to Dalian port. But in the next few years, with the guide of the policy to revitalize the northeast's old industry, its structure will change greatly and the box good's proportion in the cargo of the hinterland will increase, and we can imagine that in the next 5 to 10 years there will be great progress of the northeast economy, and this progress including the adjustment of the industry structure will bring more trade, which will have great effect on the container transportation of Dalian port.

## **4.2 The Forecast of Dalian Port's Container Throughput**

As the container throughput is an important index to weigh the port's container development condition, there is great guiding meaning for the progress of Dalian port's container transportation to make a forecast of Dalian port's future container throughput. From above, we can see that there is a relationship between Dalian port's container throughput and hinterland's economy (GDP), so we can use MGM (1, n) model (more variables grey model) to predict the throughput and then make the future container development objective of Dalian port.

### **4.2.1 MGM (1, n) Model**

GM (1, n) model is the most used grey model, which is a single-band differential equation model. The model can be used to single time series modeling and forecasting. However, there are usually more than one variable in the actual social and economic systems, interrelated with each other. It is the advantage which GM(1,1) model does not have.

In the former discussion we can see there are relationships

between Dalian port's container throughput and hinterland economy, so we bring forward number of variables grey models-MGM (1, n) model. Its characteristic is that it can describe every variable uniformly from the system. Its form is n single differential coefficient equation groups, and we can see it's the nature expand of the GM (1, 1) model under n variable. It's not the simple combination of GM (1, 1) model and there is difference between them MGM (1, n) model has ability to predict n interrelated variables.<sup>[8]</sup>

Name  $x_i^{(0)}(k)_i$  ( $i=1,2,\dots,n$ ) as n grey time series,  $x_i^{(1)}(k)_i$  ( $i=1,2,\dots,n$ ) as corresponding accumulation production sequence,

$$x_i^{(1)}(k) = \sum_{j=1}^k x_i^{(0)}(j) \quad (4.1)$$

Here  $k=1, 2, \dots, m$ .

MGM(1,n) model is a differential coefficient equation group:

$$\begin{aligned} \frac{dx_1^{(1)}}{dt} &= a_{11}x_1^{(1)} + a_{12}x_2^{(1)} + \dots + a_{1n}x_n^{(1)} + b_1 \\ \frac{dx_2^{(1)}}{dt} &= a_{21}x_1^{(1)} + a_{22}x_2^{(1)} + \dots + a_{2n}x_n^{(1)} + b_2 \\ &\quad \bullet \\ &\quad \bullet \\ \frac{dx_n^{(1)}}{dt} &= a_{n1}x_1^{(1)} + a_{n2}x_2^{(1)} + \dots + a_{nn}x_n^{(1)} + b_n \end{aligned} \quad (4.2)$$

Sign  $x^{(0)}(k) = (x_1^{(0)}(k), x_2^{(0)}(k), \dots, x_n^{(0)}(k))^r$ ,

$x^{(1)}(k) = (x_1^{(1)}(k), x_2^{(1)}(k), \dots, x_n^{(1)}(k))^r$

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<sup>[8]</sup> Jun Qu, Jianming Sheng, "MGM (1, n) Grey Model and Application", Systems Engineering Theory and Practice Press, No.5, 1997.

$$A = \begin{pmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{22} & a_{21} & \cdots & a_{2n} \\ a_{n1} & a_{n2} & \cdots & a_{nm} \end{pmatrix}$$

$$B = (b_1, b_2, \dots, b_n)^T$$

Then (4.3) can be looked as:

$$\frac{dX^{(1)}}{dt} = AX^{(1)} + B \quad (4.3)$$

The run-on time response is

$$X^{(1)}(t) = e^{At} X^{(1)}(0) + A^{-1}(e^{At} - I) * B \quad (4.4)$$

Here

$$\begin{aligned} e^{At} &= I + At + \frac{A^2}{2!}t^2 + \cdots \\ &= I + \sum_{k=1}^{\infty} \frac{A^k}{k!}t^k \end{aligned}$$

In order to identify the parameter A and B, we can disperse (4.3):

$$\begin{aligned} x_i^{(0)}(k) &= \sum_{j=1}^n \frac{a_{ij}}{2} (x_j^{(1)}(k) + x_j^{(1)}(k-1)) + b_i \\ i &= 1, 2, \dots, n; k = 2, 3, \dots, m \end{aligned} \quad (4.5)$$

$$\text{Sign } a_i = (a_{i1}, a_{i2}, \dots, a_{in}, b)^T, \quad i = 1, 2, \dots, n$$

Through mathematic way, we can get the indentified value



$$\hat{a}_i = \begin{Bmatrix} \hat{a}_i \\ \hat{a}_{i2} \\ \vdots \\ \hat{a}_m \\ \hat{b}_i \end{Bmatrix} = (L^T L)^{-1} L Y_i \quad i = 1, 2, \dots, n \quad (4.6)$$

Here

$$L = \begin{Bmatrix} \frac{1}{2}(x_1^{(1)}(2) + x_1^{(1)}(1)), \frac{1}{2}(x_2^{(1)}(2) + x_2^{(1)}(1)), \dots, \frac{1}{2}(x_n^{(1)}(2) + x_n^{(1)}(1)), 1 \\ \frac{1}{2}(x_1^{(1)}(3) + x_1^{(1)}(2)), \frac{1}{2}(x_2^{(1)}(3) + x_2^{(1)}(2)), \dots, \frac{1}{2}(x_n^{(1)}(3) + x_n^{(1)}(2)), 1 \\ \frac{1}{2}(x_1^{(1)}(2) + x_1^{(1)}(1)), \frac{1}{2}(x_2^{(1)}(2) + x_2^{(1)}(1)), \dots, \frac{1}{2}(x_n^{(1)}(2) + x_n^{(1)}(1)), 1 \end{Bmatrix}$$

$$Y_i = (x_i^{(0)}(2), x_i^{(0)}(3), \dots, x_i^{(0)}(m))^T$$

Calculate the identified value of A and B

$$\hat{A} = \begin{pmatrix} \hat{a}_{11} & \hat{a}_{12} \cdots & \hat{a}_{1n} \\ \hat{a}_{21} & \hat{a}_{22} \cdots & \hat{a}_{2n} \\ \vdots & \vdots & \vdots \\ \hat{a}_{n1} & \hat{a}_{n2} \cdots & \hat{a}_{nm} \end{pmatrix} \quad \hat{B} = \begin{Bmatrix} \hat{b} \\ \hat{b} \\ \vdots \\ \hat{b}_n \end{Bmatrix} \quad (4.7)$$

The calculation of MGM (1, n) model is:

$$\hat{X}^{(1)}(k) = e^{\lambda(k-1)} X^{(1)}(1) + \hat{A}^{-1}(e^{\lambda(k-1)} - 1) * \hat{B} \quad k = 1, 2, \dots, n \quad (4.8)$$

$$\hat{X}^{(0)}(1) = X^{(0)}(1)$$

$$\hat{X}^{(1)}(k) = \hat{X}^{(1)}(k) - \hat{X}^{(1)}(k-1) \quad k = 2, 3, \dots, n \dots \quad (4.9)$$

So, we can see that when n=1, MGM(1,n) model degenerates to GM(1,1) model; when B=0, MGM(1,n) model is the

compounding of n GM(1,n) models.<sup>[6]</sup>

(1) Choose model's variables

Hinterland economy is an important factor to container volume, so when economy develops, the volume of the container will increase too. However, the increase of throughput also drive the increase of hinterland's GDP. In this model, we can predict Dalian port's throughput under the premise that there are mutual relations between the throughput and hinterland GDP. We can think the increasing of Dalian port's container throughput is due to the development of hinterland economy and thus the increase of the cargo transport. So, in the following steps, we use MGM (1, 2) model to predict the increase of Dalian port's container throughput.

(2) Original data handling

According to the mathematic describe MGM(1,n) model, using MGM(1,2) to predict need a differential equation group, with original data (Dalian port's container throughput and every year's GDP of northeast), we can calculate matrix L (use EXCELL to make matrix transfer), at last through formula (4.6) we can get a matrix with differential equation coefficient.

$$\hat{a}_1 = (0.237043028, -0.000278502, 20.63145604)^T$$

$$\hat{a}_2 = (2.771346616, 0.072394962, 4948.901387)^T$$

Thus, the differential equation group is:

$$\frac{dx_1}{dt} = 0.237043028x_1^{(1)} - 0.000278502x_2^{(1)} + 20.63145604$$

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<sup>[6]</sup> Desheng Yi, Ping Qi, Grey Theory and Method, Beijing Petrolevm Industry Press, 1992.

$$\frac{dx_2}{dt} = 2.771346616x_1^{(1)} - 0.072394962x_2^{(1)} + 4948.90.1387$$

<Table 4-2> Dalian port container throughput and interior region yearly GDP

year	Container throughput of Dalian port (ten thousand TEU) $x_1^{(0)}(k)$	GDP of three northern provinces(a hundred million yuan) $x_2^{(0)}(k)$
1993	25.7	4456.7
1994	30.5	5176.1
1995	37.4	5936.1
1996	42.1	6897.4
1997	45.2	7737.8
1998	25.6	8238.4
1999	73.6	8730.0
2000	101.0	9734.3
2001	122.0	10626.6
2002	135.0	11586.5
2003	167.0	12957.3
2004	221.0	15133.9

Source: Dalian Statistic Bureau

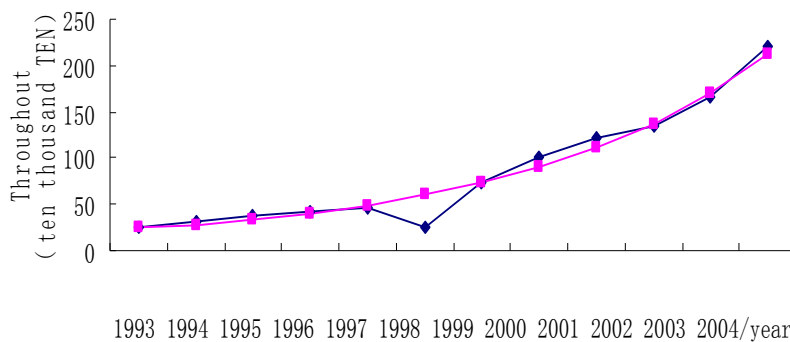
Function to get the accumulative date, then revert to get the predictive data of Dalian port's throughput and hinterland GDP:

<Table 4-3> Yearly Dalian port's throughput and hinterland GDP

year	Container throughput of Dalian port (ten thousand TEU) $\hat{x}_1^{(0)}(k)$	GDP of three northern provinces (a hundred million yuan) $\hat{x}_2^{(0)}(k)$
1993	25.7	4456
1994	27.9	5579
1995	33.6	6.86
1996	40.6	6650
1997	49.2	7276
1998	59.9	7980
1999	73.4	8769
2000	90.2	9662
2001	111.1	10674
2002	137.3	11831
2003	170.1	13159
2004	211.2	14687

Source: Dalian Statistic Bureau

<Figure 4-1> Compare of Dalian port's yearly throughput and prediction



Compare of Dalian port's yearly throughput and prediction

From the figure, we can see that the predicted points are very close to the real lines perfectly.

Now, let's test the model's precision with the remaining, here's method:

Design remaining as  $e(k) = x^{(0)}(k) - \hat{x}^{(0)}(k)$ , its series is  $\{e\} = \{e(1), e(2), \dots, e(n)\}$ .

Difference of original series  $x^{(0)}$  and the series "e" is:

$$s_1^2 = \frac{1}{n} \sum_{k=1}^n (x^{(0)}(k) - \bar{x}^{(0)})^2$$

$$s_2^2 = \frac{1}{n} \sum_{k=1}^n (e(k) - \bar{e})^2$$

Here,  $\bar{x}^{(0)}$  and  $\bar{e}$  is the average value of  $x^{(0)}$  and remaining series "e". Now calculate probability p, which prefers to the case's proportion of the whole matters and the condition must be satisfied:  $|e(k) - \bar{e}| < 0.6745s_1$

That is  $c = s_{(2)} - s_{(1)}$   $p = P\{|e(k) - \bar{e}| < 0.6745s_{(1)}\}$

Model precision classes is generally divided into four classes, such as table 4-4<sup>[5]</sup>:

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<sup>[5]</sup> Xia Zhong, The application of gray theory and its combination model in the transportation volume, Communication Standardization Press, No.12, 2004.

<Table 4-4> Precision of grey model

Model precision classes	P	C
First grade (good)	$0.95 \leq P$	$C \leq 0.35$
Second (check-out)	$0.80 \leq P \leq 0.95$	$0.35 < C \leq 0.50$
Third (just so-so)	$0.70 \leq P \leq 0.80$	$0.50 < C \leq 0.65$
Forth (bad)	$P < 0.70$	$0.65 < C$

Calculate the precision value C based on the data above

The predicted precision value of Dalian port container throughput  
 $C_1 = 0.0997$

The predicted precision value of GDP in three northeast provinces  
 $C_2 = 0.0862$

Both of them are far little than the first grade standard value 0.35, so the precision of the model is also in the first grade, which means it can be used to predict the total container throughput of Dalian port.

#### 4.2.2 Prediction of Dalian Port's Container Throughput

Solve the differential coefficient equation with Matlab

Run and gain the predicted accumulative values from 2006-2010, and revert to the predicted values in table 4-5:

<Table 4-5> The predicted values of GDP and yearly throughput from 2006-2010

year	Dalian ports throughput (ten thousand TEU)	Three northeast provinces GDP(a hundred million yuan)
2006	327.7	17550
2007	409.1	19012
2008	511.6	20934
2009	640.4	22800
2010	802.6	24950

We can see that, up to 2010, Dalian port's throughput will reach to 8,026,000TEU and the GDP of the northeast three provinces will be 2495 billion yuan.

#### **4.2.3 Analysis of the Forecasting Data**

MGM(1,2) model indicates that in 2010 Dalian port's container throughput will be 8,026,000TEU and the GDP of the northeast three provinces will be 2495 billion yuan which is a little more than the government's plan of 2400 billion yuan. Meanwhile, according to Dalian port's building plan, when Dayao Bay project comes to the end, container handling volume will reach to 8 million TEU, and the data from the model also is a little bigger than Dalian port's plan, but here we do not consider two factors: "construct the northeast navigation center" and "boom old northeast industry basement". So if we consider the effect that the two new policy bring to Dalian port's container throughput and the northeast three province's GDP, we can suppose the throughput is 10% more than the model, that is 8.8 million TEU of Dalian port's container throughput up to 2010, we can see in the future years Dalian port's throughput will increase rapidly.

## **Chapter 5**

### **The Strategic Plan of Dalian Port**

#### **5.1 The Determination of Strategic Target**

The strategic development target of Dalian port is determined under the great structure of global transport network, based on fully understanding and concluding of the main achievement and existing problem of harbor development in the past, the future development condition, the restriction factor and the development trend. And it is determined also according to base on the service, subjected to the national economic policy and the need of developing northeast area economy. It's determined to fulfill the need of developing export-oriented economy and the participation in world market competition. It's based on the present situation of the port and fully estimates the port's future developing tendency, fully displays synthesis transportation overall benefit, and sharpens the harbor competitive ability. It's determined on the principle of gradually consummating the market economy movement system.

The general strategic targets of Dalian port is that Dalian port will be built into a multi-functional, omnidirectional and modern international big port by 2010.

“Multifunctional” refers to that continuing to develop the traditional functions of realizing cargo and passenger displacement as the main port, at the same time, relying on the port advantage to expand industries including trade, processing, ship security services, maritime industries, the entire transport services, tourism, entertainment, information, finance, insurance, real estate and other traditional functions associated closely with the port industry, to achieve port functional diversification, port production specialization, asset management regulation, to make the port become an integrated transport center and a base which has the features of the third generation port.



“Omnidirectional” refers to that setting the concept of large region, large circulation and major service, overcoming the traditional interior region consciousness and client limitations, standing on the height of the regional economy, facing to the domestic and international markets. It also refers to expanding outreach services through international transit, and other forms of transport making the interior region of port extend toward each direction, realizing the internationalization of port management, forming a multi-level and broad radiating open pattern.

“Modernization” on one hand refers to modernization of the management, namely according to the system idea and the entire optimization, to establish a market economy system, a port with modern enterprise system, using advanced and scientific management concepts and methods to maintain the high efficiency of port management and realize the methods of modern management. On the other hand it refers to that using the advanced technology and equipment to equip the harbor unceasingly, to make sure that the efficiency of port work is placed in advanced level and the technical equipments reach the modernized level which required by the world advanced port. Meanwhile, in the concept of renewal and the development of a culture of enterprise, we should have service awareness, brand awareness and higher professional and ethical standards to meet the requirements of modern port development.

Nowadays, the trend of world port development is developing towards the large-scale, the structural specialization, the functional diversification, the craft automation, the management intellectualization and the liberalization pattern.

## **5.2 Strategic Points**

To carry out port development strategy, we need to focus on five strategic points.

### **5.2.1 Strongly Develop Container Handling Capability**

Container handling ability seems to be the main mark of testing the grade and the modernization level of the port. So far, Dalian port has 8 deep-sea trunk lines, 32 near ocean lines, 2 inside branch lines and 7 internal lines. The flight density is 240 classes/month, container yearly handling ability is more than 1,500,000TEU, but compared with several other local big harbors, the difference is still very big. If Dalian port wants to establish the position of a big port, it must have a great development in container conveyance. First, it must accelerate the building of software and hardware facilities and set terminal advance development; second, it must enlarge the development of sea branch network and make sure the competition position of trunk line port; third, it must strengthen the development of inland transport network and establish the whole transport services system; fourth, it must improve the port environment and enhance the port comprehensive competitiveness; fifth, it must take logistics development as a breakthrough, promote related industrial structure and speed up the commercial network of the port community to turn construction; sixth, it must speed up the step of enterprise reform and build up a scientific and valid work system.

### **5.2.2 Speed up the Deep-water Port Berth Construction**

One of the biggest competitive advantages of Dalian port is that it owns the shore line which can set up a deep water port. Dalian port must take advantage of it if it wants to develop unceasingly in the keen competition, adapt to the international shipping ships large scale trend of development and realize international shipping center goal. At present, we need to focus on promoting construction step of large-scale, professional port, Dayaowan Project Two, including five container berths, which can increase the legislation capacity by 1.5 million TEU every year. Another project is 300,000 tons import crude oil port construction, which

can increase crude oil capacity by 5,000,000 every year. We also need to focus on the 200,000 tons mineral stone port constructing project, which can increase the ore handling capacity by 10,000,000 tons every year. After the completion of the three major projects, it will form the fully functional deep water berth group, which will lay the foundation for construction of an international deep water enter port from Dalian port.

### **5.2.3 Speed up the Harbor Layout Adjustment and Functional Transformation**

In recent 10 years, the position in Dalian port of China has changed, its handling capacity dropped quickly in the coastal major ports. Especially, the port international trade descended greatly, resulted in the slippery of profit. Port owner and place port construction lacks the macroeconomic regulation and control, which caused the harbor building redundant project and non-standardized competition; and the problems which were brought by the change of conveyance ways and the tendency of large-scale shipping, such as the use of intermediate port, have already affected the construction and development of the ports. Therefore, we must adjust as soon as possible the current unwell development of layout which is not fit for using good land-and-water area condition and region advantage and utilizing it scientifically and rationally. At the same time, we need to further speed up the old port area functional transformation, take advantage of its characteristics of locating in the urban center and owning a larger space of land developing and using, and speed up the adjustments of production and functional distributions.

### **5.2.4 Enlarge the Intensity of Management Innovation**

In order to carry out the strategic target of the port development, the talented human factor is the basic assurance. At present, looking from current situation of Dalian port talented human, the problem of unreasonable structure of the talented human troop is

particularly prominent, as well as the problems such as brain drain and backlog seriously appeared day by day. Looking from the future development, the talented human have become the key point of port development and market competition. Therefore, if we want to develop the ports greatly, we must set up a mechanism which can form an open talent management model of talent allocation.

### **5.2.5 Push System Reform Actively**

With the economic development and China's joining WTO, the port faces market competition more vigorously. Therefore if the port wants to exist and develop in the competition, it should be in line with the international level and push forward a system reform actively. At present, we should speed up the change of enterprise managing system, to make it become Dalian port at a main economical point of growth. Actively coordination with competent departments, local governments at all levels of functional departments, can solve the disadvantageous influence caused by the overlap of management organization and management power to the port development.

### **5.3 Strategic Development Stage**

Currently, Dalian port is carrying out a strategic target so that the coming five years are stage of laying foundations and speeding developments. At this stage, according to the request of constructing international big port, the port adjusts management structure, utilizes production layout and substantial port functions, extends the management area and rationalizes port internal and external relationships. Looking from the present, Dalian port has basically achieved the goal of this phrase, which has laid a foundation for comprehensively promoting and realizing port development strategic objectives. By 2010, the development target of Dalian port is to set up a big international port. This will result having the third generation port function basically, forming

the port economic zone and having the container handling capacity reaching above 8,000,000TEU.

## **Chapter 6**

### **Conclusion**

The next 5-10 years is an important period for Dalian port's development, in which Dalian will seize the opportunity to speed up its development and the regional economic development and building an international shipping center.

#### **6.1 The Key Problem Encountered in Dalian Port's Development.**

##### (1) The unsuitable port system

Dalian port carries out a dual lead system, that is, Ministry of Transportation and local dual leadership, and have been practiced mainly by local and multi-institutional governance. This system cannot be able to meet the requirement of port development in the market economy. Besides, "raise the port by port" financial management system can not meet the financial needs. Therefore, in 1986 Dalian port decided to be decentralized, with the existing Dalian dual leadership. Financial policy has been based on the "raise funds by port and pay expenses from revenues" financial management system. In the implementation of such system, it is still directed by the central leader, and the significant items of basic construction still needs the central examination and approval; profits into the financial application with the central.

The imports and exports trade's decline caused by the industrial adjustment in the old industrial bases in northeast China has already exerted great influence on Dalian foreign trade of goods. It has dropped from 80% to 35% compared with that in 2000. The existing management and financial system has restricted the development of Dalian port construction.

(2) The imbalance between port development and synthesizing capacity

At present Dalian port has already undergone an overloading operation. The actual throughput (1 million tons) has significantly exceeded the design capacity (67.63 million tons). To solve this problem, we must accelerate the pace of expansion to meet the growing needs of transit goods and especially construct the large-scale specialized deepwater berth, to adapt the ships large scale trend of development.

(3) The key stage in port reform

Dalian port as an extra large type state-owned enterprise encounters a lot of problems, for example, the aging of the port facilities and the undertaking of the social responsibilities. All these factors have exerted great influence on the harbor management system and weakened the competitiveness of the port and market adaptability.

## **6.2 The Measures for Dalian Port Future Development**

(1) Strengthen the function and production layout

Existing port area (the Siengou port, Heizuizi port, Xianglujiao port, Ganjingzi port, Dalianwan port, New port and Dayaowan port) can't meet the development in function and distribution. It has to be developed and adjusted as soon as possible. In functional development of the port, it should construct large-scale, professional terminals and change the operating structure. It is also urgent to promote the development expansion and optimization of the eastern port as well as promote the port community service in order to make the port area have modern city function, finance, trade, information, tourism, and the gold district of integral transport center. Dalian port will lead towards a third generation port by the exploration of its function and the

adjustment.

- (2) Take the source of goods as the center, take the market as the guidance, seek the new point of growth diligently

Dalian port must take the market as the guidance in the source of cargo development mechanism establishment. It also needs to pay attention to the effectiveness and the flexibility by understanding the cargo owner demand, the source of goods development, the rich marketing method, and organize to struggle diligently to expand the market share. Depending on the stable existing source it should further enlarge sea and land bidirectional shift and strengthen the tie with the famous shipping companies at home and abroad to broaden the management realm. It should also cooperate with railroad, customs and extend its business to northeast, northwest and region and strengthen the construction of the inland interior region.

- (3) Further broaden port construction investment channels speed up the pace of port development

The realization of the long-term of strategic target must be on the basis of strong funds as a guarantee. Dalian port wants to seek larger development. It has to open widely investment outlet. At present, Dalian port is the same as the domestic coastal major port in terminal investment. The “raise the port by the port”, self-development system, has been unable to solve a series of problem, such as the funds, the expansion of the new harbor and the transformation of the old port area. Therefore, in port construction financing, we should not only strive for state and local financial input and policy support, but also should encourage domestic enterprises to participate in port construction. At the same time, the port technological transformations and construction should be sped up by introducing the foreign capital reasonably in the request of the port development. Moreover, it should be instilled with such a sense of rare opportunity and



urgency and improve the investment environment

- (4) Establish famous brand port by promoting its information in management and its stuffs' management level
- (5) Coordinated port and city relations, lead the region economy development vigorously
- (6) Insist on "improve port by technology", strengthen a port modernization construction

### **6.3 Some Policies for Dalian Port**

To reach the target, Dalian port demands the policy support from nation, province and other cities. Port as a nation's infrastructure, a remarkable public welfare, contributes a lot to nation's economic development. But its ability of economic efficiency and repayment is low, therefore, it needs the support from all industry fields. The fund support, the fiscal subsidy on the construction projects of Dalian port might be a key issue. Beside this Dalian port should take the following measures to strengthen its competition:

- (1) Extend its management to lead the port business toward comprehensive logistics direction and hand over the power of comprehensive development and the foreign trade rights such as bonded, clearing, brokering, trade processing to the harbor according to the international convention.
- (2) Provide preferential policy and establish the free port or the free port zone making use of Dalian port's position as the economic zone in the northeast to attract more imported goods, foreign capital, ships and so on.
- (3) Increase the input of the port construction funds. Eventually under the permission of financial conditions, the country or

the local authority should put more money into the basic facilities of the port.

- (4) The local government and department concerned should adopt effective measures to improve the seaport environment, service and attract more investments.

Prospective future development trends put forward a new request for the Chinese port industry, also a challenge to its logistics development. Only by the means of adjusting the internal resources to the trends can the competition ability be strengthened.

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## 感謝의글

韓國 留學 生活을 하는 동안 여러 분들의 도움과 가르침이 있었기에 이러한 結實을 맺게 되었습니다.

먼저 不足하고 미흡한 저를 이끌어주신 指導教授 南奇燦 教授님께 感謝드립니다. 바쁘신 중에도 불구하고 論文의 審査委員長을 맡아주신 辛容尊 教授님, 細心하게 指導해 주신 郭圭錫 教授님께 感謝드립니다. 그리고 그동안 자상한 가르침으로 學問의 길을 引導 해주신 朴眞希 教授님께도 眞心으로 感謝드립니다.

論文이 完成되기까지 많은 支援과 助言을 해주신 김태원 先輩님, 유주영 先輩님, Abdallah 先輩님, 성수님, 면수님, 달원이님, 우준이님, 찬용이님, 미선이, 그리고 친구들의 聲援과 激勵에도 고마움을 전합니다.

또한 매형 馮黎明과 누나 謝麗麗에게 眞心으로 고마운 마음을 전합니다. 그리고 아버지님 孫天凱, 어머니님 趙維娟 眞心으로 感謝하고 사랑합니다.