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Analysis on development of empty container distribution center in Shanghai Port

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Analysis on Development of Empty Container Distribution Center in Shanghai Port

By

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China

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DECLARATION

I certify that all the material in this dissertation 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 dissertation reflect my own personal views, and are not necessarily endorsed by the University.

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ABSTRACT

Title of Dissertation: **Analysis on Development of Empty Container Distribution Center in Shanghai Port**

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

Container transport features for its convenience and cost-efficiency. Therefore, many companies choose it as the main means of transport. With the increasing number of containers, the problem of empty container reusing and positioning is on the rise, concerned by more and more experts.

Entering the year of 2009, the global economic recession prevailed over the world. With the fall of commodity trade, the container market enters into a depressive period. Shanghai Port, the world leading harbor, cannot escape from the crisis, for the sake of slide of its main routes to Europe and U.S.A.

But the management cost for empty containers is still the second biggest one, next to the port operation expense. It occupies one fifth of the total cost. Meanwhile, the expense for empty positioning is one fourth of management cost for empty containers. So, the cost for empty positioning affects the net profit of shipping companies considerably.

At the meantime, the volume of empty containers increases with the decrease of

export and import. How to deal with the piles of these empty containers is the first issue of SIPG, Shanghai Port Authority. Now Shanghai Port are carrying out the policy ECBP, Empty Container Business Projection, and its new target now is to build a ECDC, Empty Container Distribution Center.

In this dissertation, the author would make analysis on the economic recession impacts on the container market. Also, the author gives reason that the empty container distribution center should be settled in Shanghai Port. AHP modal would be used in compare the 3 ports' capacity of dealing with empty containers. SWOT and recession analysis would be used to forecast the future volume of empty containers and Shanghai port's characteristics. Finally, the author would give advices to Shanghai Port's Empty Container Distribution Center.

Key words: economic recession, ECDC in Shanghai Port, SWOT analysis, AHP analysis

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LIST OF ABBREVIATION

ECBP	Empty Containers Business Project by SIPG
ECDC	Empty Container Distribution Center in Shanghai
SIPG	Shanghai International Port Group (Port Authority of Shanghai)
CY	Container Yard
RTG	Rubber Tyred Gantry
TEU	Twenty Foot Equivalent Unit
RMB	Ren Min Bi
USD	United States Dollar
ICD	Inland Container Depot

CHAPTER 1 INTRODUCTION

1.1 Background

In the year of 2009, the global economic recession prevailed over the world. With the fall of commodity trade, the container market enters into a depressive period. Shanghai Port, the world leading harbor, cannot escape from the crisis, for the sake of slide of its main routes to Europe and U.S.A.

Meanwhile, the volume of empty containers increases with the decrease of export and import. How to deal with the piles of these empty containers is the first issue of SIPG, Shanghai Port Authority. Now Shanghai Port are carrying out the policy ECBP, Empty Container Business Projection, and its new target now is to build a ECDC, Empty Container Distribution Center.

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1.2 Literature review

1.2.1 Recent research of resource allocation on empty positioning:

First, traditional causes of the increasing number of empty containers are summarized.

In Liu Heng Jiang (2001)'s article, the subjective reasons are listed: (1) many empty containers are overstocked, due to insufficient facilities, especially happen to most ports in China; (2) level of management decides turnover ratio and height of containers; (3) the requirement of the off-lease condition in the contract, such as the place limitation; (4) the difference of cost of container production and repair. Similar causes are also mentioned by NIE Jun and GAO Xiao Jian (2004).

Second, to solve the problems above, some frameworks of the methodology of dealing with the issue of traditional empty positioning are given.

Liu Heng Jiang (2001) pointed out three core problems in this area: (1) Flow route, from the place where the empty containers pile to where the sources are needed; (2) When to transport the empty containers is realize minimization of cost. (3) How

many containers are needed, namely the logistic flow.

Third, many models are used to evaluate the process of building a port competitiveness, which a fair criterion of empty container distribution..

Lei Mi, Hao Junli (2005) build the methodology of the port competitiveness by the SWOT analysis. Zhao Gang, Zhu Chao(2005), studied the Rizhao Port Development by using the model SWOT. The same modal are used by DING Min, SUN Wenyi, Gu Weihong (2007), Li Bingbo (2003).

Fourth, APH model are widely used in the research of this field.

On the paper BCG matrix analysis on port logistics on the base of AHP, ZHAO Xishao, Gu Yazhu(2005) made a change of traditional BCG combined with APH into analysis on the whole system of the seaborne transportation, focusing on the research of single-route system model under 8 hypotheses. It was also used to simulate the demand and supply of containers, the flow chart and the schedule of the dispatch. Xue Peihua, Tang Xiaoya (2008), Application of AHP on Development Conditions of Ports forecasting the throughput of empty containers at Hong Kong Port，which was compared with parametric regression.

Fifth, the empty container cost-benefit analyses are concerned.

BU Xiangzhi, ZHAO Wuquan, HUANG Qing, WU Zhenye (2005) compared the difference between container ocean shipping revenue management problem and airline revenue management problem. ZHAO Dao Zhi and HUANG Jian (2008) built a model of empty container distribution, based on the integral cost of ocean shipping and land—carriage, according to the distribution process for the empty container analysis. CHENG Ci Shen，CHEN Bao Xin，LI Ming Shun (2004) established a mix—integer planning model of the location problem of Inland Container Depot. LI Jianzhong, DENG Dingbing (2004) discussed cooperation between container

companies which enhance the utility ration of the containers and raise the economic profit of each company. ZHONG Min, LE Meilong (2005) discussed the relationship between the level of cost and customer service.

Finally, from the perspective of ports, how to attract empty containers is important indicator of port performance.

Yang Jinglei, Liu Jun, Zhao Binlian (2006) set a relative modal in *Study on Evaluation of Port Logistics International Competitiveness*. In Daniel Coronado, et al.'s article (2007), Kevin Cullinane et al.'s article (2007), and Tengfei Wang, et al.'s article (2005), port planning are related closely with empty container logistics system.

1.2.2 Existing problems

Generally speaking, the research on empty container distribution has already covered all aspect in this field. But, in current environment, there is not adequate cargo supply, namely more empty containers which would lead to high cost. It is more important for ports to deal with increasing number of empty containers in the depressing market, and seek opportunities in near future. Thus, this paper would discuss the issue of setting a empty container distribution center, based on the following points:

- The shipping market is not the same as it was for the sake of worldwide economic recession. So, the market forecast is necessary.
- Most models are established for minimizing the container operation cost. But to build an empty container distribution center is really a good opportunity in current environment. So, the economies of scale and marginal benefit model are

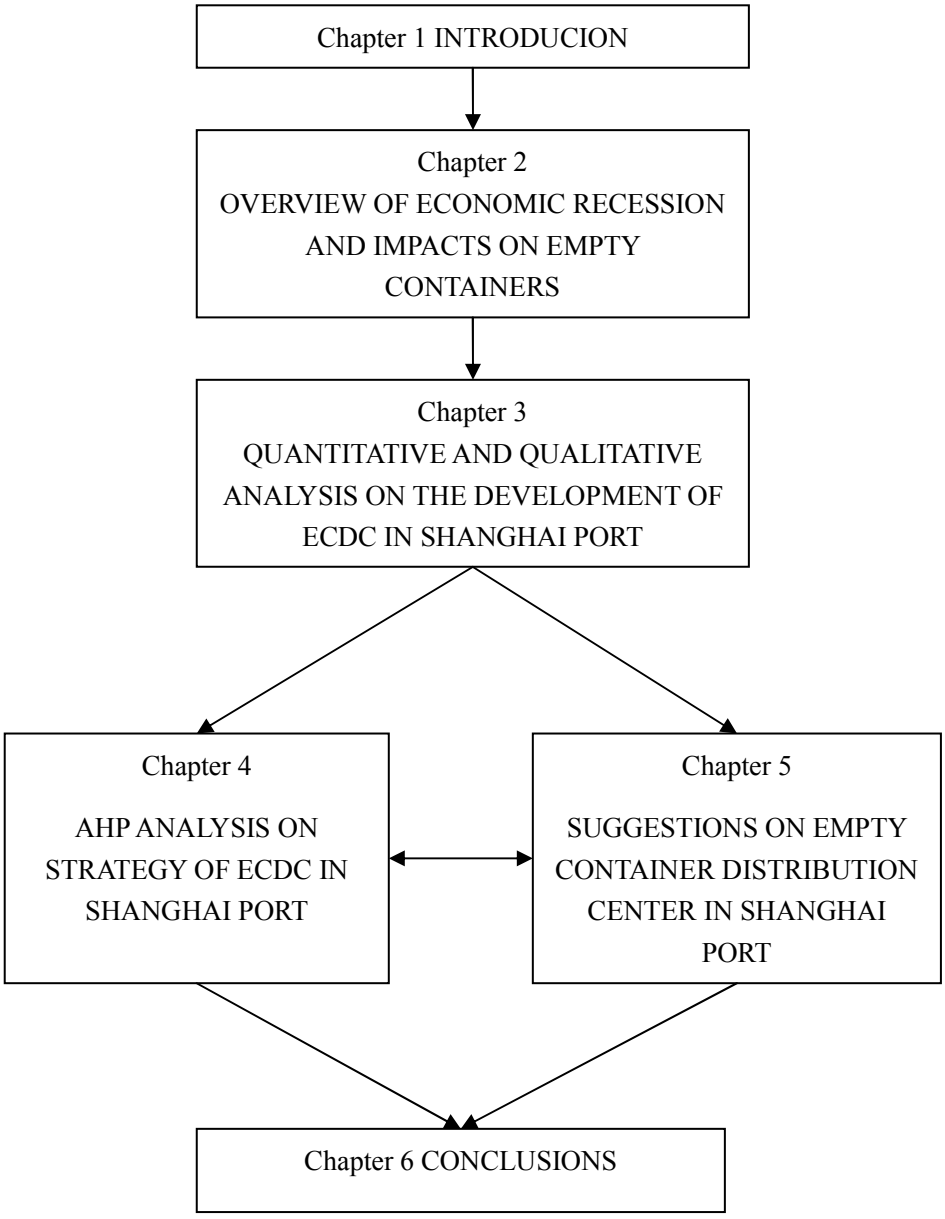
indispensable.

- An international port could be optimal site for container storage. Further research in this field could be carried out. So, the cost-benefit analysis is essential.

1.3 The framework and content of this dissertation

It consists 6 chapters. Chapter one introduces the object and background of this paper, also it review related research results. Chapter two introduces economic recession and its impacts on container market. It also explain the reasons why Shanghai Port want to establish a empty container distribution center. Chapter three forecasts problems that Shanghai Port would have to face, continuously increasing number of empty containers. Also, in the same chapter, SWOT analysis would be made for evaluate the situation of Shanghai Port as a empty container distribution center. In chapter four the author used the APH modal to compare Shanghai, Ningbo, and Qingdao, which are racing for establish a empty container center. In chapter five, the author tries to give some suggestions to improve the comprehensive capacity of Shanghai Port in order to build the ECDC. Chapter six reaches the conclusion of the full context.

The Structure of research paper is as following:



1.4 Forecast methods

Qualitative and quantitative analysis is have been used on both the supply and demand sides of the market in order to make a study on the opportunities and risks in the market of empty containers. The paper will use some economic principles and several mathematical forecasting methods.

(1) Recession Analysis (by aid of software EXCEL)

(a) Set independent variables x_{1i}, x_{2i} …, and induced variables y_i (i =1, 2, 3…, n)

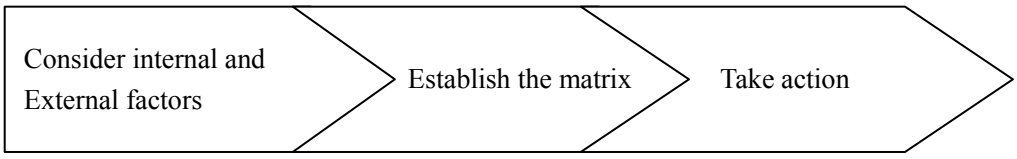
(b)Establish the equation of regression

(c) Statistic test to estimated value

(d) Economic implications of the equation

(e) X estimation by regression equation

(2) SWOT Analysis



Step 1: Take any measures to gain the information of internal and external factors.

Step 2: Arrange these factors and make matrix according to the criteria of *harmful or helpful*

Step 3: Take action on the conclusions

(3) AHP Analysis

(1) Establish the hierarchy modal

(2) Setting a judgment matrix

(3) Calculation on weights of each level

(4) Check the consistency of the judgments.

(5) Come to a final decision based on the results of this process

CHAPTER 2 OVERVIEW OF ECONOMIC RECESSION AND IMPACTS ON EMPTY CONTAINERS IN SHANGHAI

2.1 Estimated economic growth rate demonstrates the finance crisis

The economic recession in 2008 was the most severe finance crisis since the year of 1929, the Great Depression. Since then, the global economy came into recession phase. In November 2008, International Monetary Fund (IMF), made downward adjustments of estimate of economic growth target, namely, 3.7% in 2008 and down to 2.2% in 2009. Meanwhile, IMF reported, the risk of economic backdrop would intensify, with the finance deleveraging and slide of consumer confidence.

As IMF report estimates, the GDP's drop of developed economy would reach 0.3%, the lowest record registered since the World War II. Geographically, in the 4th quarter of 2008, USA's GDP decreased to 1.1%. The GDP in Euro zone decreased by 0.6% at the end of 2008, which was the biggest two-consecutive-quarter decrease since 1999. Ireland, German, and Italy headed for a recession.

In Asia, the economic growth rate slumped for 1% in the 4th quarter of 2008. IMF believed that emerging markets and develop economies are inevitable to slow down the rate of accelerating, estimated at 5.1% in 2009. Among them, China and India are estimated at the growth rate of 8.5% and 6.3%, respectively.

IMF forecasted that the growth rate of global trade of commodities and services would be 4.6% and 2.1%, far below the level of 7.2% and 5.3% y-o-y growth.

Other economic research organization seemed to be more pessimistic. According to Morgan Stanley report in 15 March, the global output growth in 2009 would stand at

-0.6%, lower than the estimate by IMF. Japan, the world's second biggest economy and the world's third biggest container market, is estimated to suffer a negative growth rate of -6% in 2009. Also, the fastest developing nation, China would decelerate its growth rate from 9% to 5.5%. The situation in USA and Europe, the major economies of world, are not optimistic, either, down to -3.3 and -1.5, respectively. (Table 2.1)

Table 2.1-1 Estimated GDP growths in major economies by Morgan Stanley

	2006	2007	2008	2009（e）	2010（e）
Global Economy	5.1	5.1	3.3	-0.6	3.0
Industrial World	2.8	2.4	0.8	-2.8	1.3
Developing world	7.6	8.0	5.9	1.5	4.6
USA	2.8	2.0	1.1	-3.3	1.8
Europe	3.0	2.7	0.8	-1.5	1.2
France	2.4	2.1	0.7	-1.7	0.9
Germany	3.0	2.5	1.3	-2.3	1.3
UK	2.8	3.0	0.7	-1.3	2.0
Japan	2.9	2.4	-0.6	-6.0	-0.1
Asia ex Japan	9.4	10.1	7.0	3.0	6.4
China	11.6	13.0	9.0	5.5	8.0
India	9.9	9.2	7.4	4.3	6.1
S Korea	5.1	5.0	2.5	-2.8	3.8
Latin America	5.4	5.8	4.3	-0.4	2.4

Note:(e) estimated

Source: Morgan Stanley

Table 2.1-2 Real GDP growths in major economies by IMF

IMF 2008 GDP Forecast					
Date of Forecast	**Apr '08**	**Jul '08**	**Oct '08**	**Nov '08**	**Jan '09**
Global Output	3.70%	4.10%	3.90%	3.70%	3.40%
US	0.50%	1.30%	1.60%	1.40%	1.10%
Euro Zone	1.40%	1.70%	1.30%	1.20%	1.00%
Japan	1.40%	1.50%	0.70%	0.50%	-0.30%
China	9.30%	9.70%	9.70%	9.70%	9.00%
India	7.90%	8.00%	8.00%	7.90%	7.30%
Russia	6.80%	7.70%	7.70%	7.00%	6.20%
Brazil	4.80%	4.90%	5.20%	5.20%	5.80%
IMF 2008 GDP Forecast					
Date of Forecast	**Apr '08**	**Jul '08**	**Oct '08**	**Nov '08**	**Jan '09**
Global Output	3.80%	3.90%	3.00%	2.20%	0.50%
US	0.60%	0.80%	0.10%	-0.70%	-1.60%
Euro Zone	1.20%	1.20%	0.20%	-0.50%	-2.00%
Japan	1.50%	1.50%	0.50%	-0.20%	-2.60%
China	9.50%	9.80%	9.30%	8.50%	6.70%
India	8.00%	8.00%	6.90%	6.30%	5.10%
Russia	6.30%	7.30%	5.50%	3.50%	-0.70%
Brazil	3.70%	4.00%	3.50%	3.00%	1.80%

Source: Drewry

2.2 Main elements of Chinese container market slow down

As estimated by IMF, the 2009 GDP U.S.A and Europe Union would experience zero growth, which would give considerable negative impacts to China market, namely the growth rate could slow down to about 5%. From the long-term perspective, the

economic transformation in China would be the key driver of decrease of export volume.

According to the recent report of IMF, Chinese main export partner, U.S, Europe and Japan all suffer from the huge slides. What's more, U.S and Europe Union are the biggest export destination of China, whose volume occupies more than 40% of total volume of exports in China. Thus, mixed with the previous conclusion, the zero economic growth rates would deeply affect Chinese container market.

2.2.1 The weak demand of transpacific trade

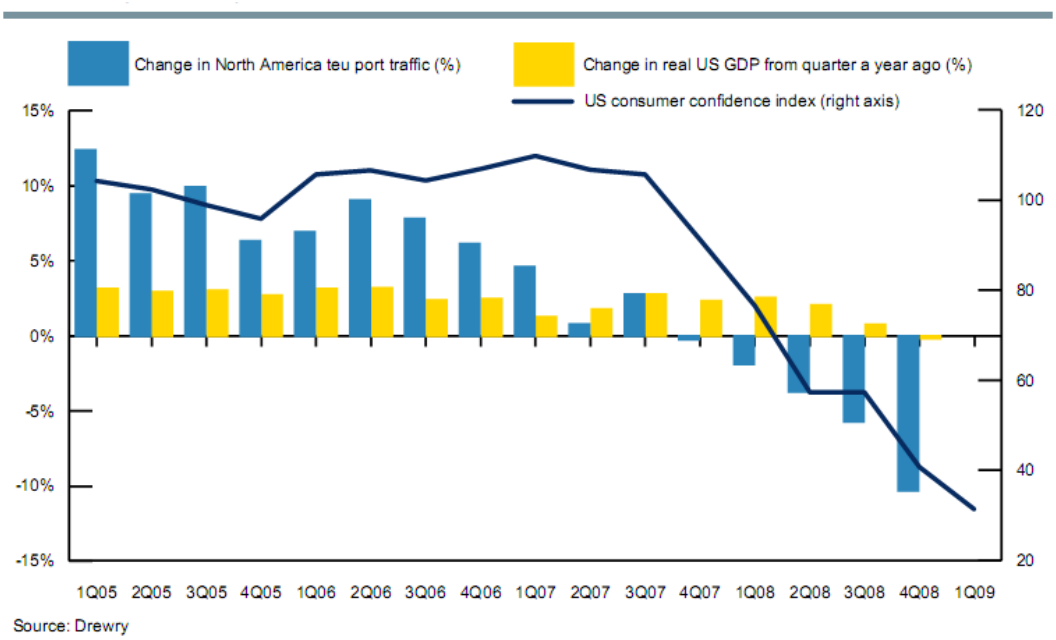
According to Drewy's Container forecast 09.1Q, in the past year, there was a correlation between consumer confidence and container traffic in the given country.

From the Figure 2.2.1, over the last few quarters the US confidence index (dark blue line) has been much more closely positively related with box traffic development. A fall in the US consumer confidence index below 70 points has coincided with negative developments in North American container traffic. (see Figure 2.2.1)

It is easy to associate that consumer demand on Barbie' dolls made in Zhejiang or T-shirts made in Guangdong and other containerized cargo is driven by their buying confidence. In this economic background, GDP, personal disposable income and personal expenditures will not have the last word on container market. People keep their wallet in the pocket from the import good, including Chinese ones.

Statistically, the coefficient of correlation between the US confidence index and box traffic development in the region for the period 1st Quarter of 2005 to 4th Quarter of 2008 was as high as 0.85.

Figure 2.2.1 Relationship between GDP, consumer confidence and port container traffic in the U.S (2005-2008)



Source: Drewry

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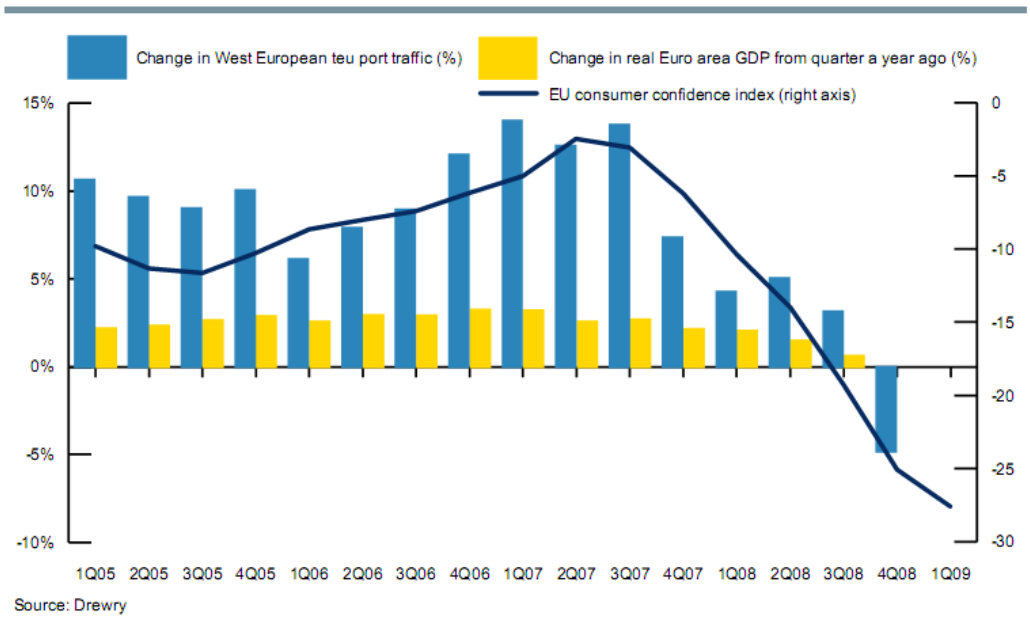
2.2.2 The weak demand of Asian-Europe trade

Figure 2.2.2 Relationship between GDP, consumer confidence and port container traffic in the West Europe (2005-2008)



Source: Drewry

In Figure 2.2.2, there is a strong correlation between the EU consumer confidence index and container traffic development in recent years. Container traffic did not decline in Europe until 4th quarter of 2008. But the rates of growth of European container traffic fall rapidly since 4th quarter of 2007, when European consumer confidence collapsed.

According to Drewry's Statistics, the coefficient of correlation between the European confidence index and container traffic development in the region in the 1st quarter of 2005 to 4th quarter of 2008 was also high, at 0.89. The confidence index in January

and February of 2009 levels keep a year-on-year fall in West European container traffic of 6% in 1st quarter of 2009 – though in practice the volume reduction seems certain to be more pronounced than that.

2.3 Reasons of set a Empty Container Distribution Center (ECDC) in Shanghai

By the end of 2008, Chinese export annualized growth in December is only 0.4%. The throughputs of Shenzhen and Guangzhou contract by 27% and 19% respectively on the y-o-y base. For Shenzhen, it was the four-consecutive-month decrease of throughput. In the North parts, Shanghai experienced a fall of 4.6%

The speed of volume decline continued in the first quarter of 2009. The average decline rate in China in the first quarter was close to 13%. Especially, the decline rate at Shenzhen was 17.5% and 30% at Guangzhou. A drop of 23.2% happened in neighboring Hong Kong. The north port faced the same situation, such as Shanghai (-17%), Ningbo (-8.7%), Xiamen (-10.6%) and Tianjin (-4.1%). Qingdao and Dalian keep the weak rising trend 2% and 6% respectively. (see Table 2.3)

Obviously, there are no safe ports in the global economic recession. Every ports of authority are facing a practical question: More and more empty containers are piling up in the yard. Meanwhile, the cargo supplies are so weak to fill up these containers. The rate of turnover come downs by 4 or 5 times. Nowadays, how to turn these empty boxes into priceless treasure become the first issue first to both ports and shipping companies.

In such a critical point, the author believes that Shanghai should take the opportunity to build a empty container distribution center in Asia-pacific, even in the scope of global. The reasons are following:

1. As mentioned before, each shipping companies are worrying about their high cost of empty containers. If port authority in Shanghai could take the responsibility to finish this urgent issue, this would help the strategic partner relationship after the economic recession.

2. Empty containers confuse not only the ship owners, but also other small-size ports. In China, 85% ports are confronted with the block of containers. Shanghai could be a leader to deal with such issues together. It would also a great action of brand-rebuilding.

3. Container transport mainly relates the trade of commodity. After the previous insight, benefits of port authority would be affected by the financial crisis. Collecting empty containers would keep continuous cash flow for Shanghai port to get through the crisis.

4. The transport of empty containers contributes the total throughput. Informally, via the collecting empty containers, Shanghai Port could keep its level of throughput in order to maintain the international rank of container terminals, which are also very important intangible assets.

5. Last but not least, Shanghai port itself is facing the strains, such as low turnover rate of containers and inadequate CY for piling empty containers. So, building an empty container distribution center would help Shanghai port itself first. This issue would be discussed in Chapter 3.

From the previous point, the definition of ECDC, empty container distribution center, is an ideal location for piling empty containers, which also provide the whole set of professional service. What is more, ECDC also provide favorite rate of charges and convenient shortcut to other links in the world main routes.

For the reasons above, Port of Authority in Shanghai comes up with Empty

Container Business Projection. But as to now, it is no more than a This project mainly aims at becoming Empty Container Distribution Center, not only this special period, but also for a long term in the future. The details in the project will be released gradually, companied with relative analysis.

Table 2.3 Monthly growths in container throughout at Chinese Ports

Port	Aug '08	Sep '08	Oct '08	Nov '08	Dec '08
	Port Handling ('000 TEU)				
Dalian	411	403	377	402	394
Guangzhou	800	781	856	846	659
Lianyungang	277	280	250	220	371
Qingdao	1000	962	997	1005	1060
Ningbo	838	539	839	838	1124
Shanghai	2550	2350	2400	2300	2192
Shenzhen	1941	2005	1820	1686	1668
Tianjin	687	732	771	768	739
Xiamen	472	418	430	413	392
Yingkou	165	165	175	180	147
Total	9141	8635	8915	8658	8746
Year-on-Year Change					
Dalian	20.9%	18.2%	10.6%	1.3%	14.7%
Guangzhou	1.6%	-4.4%	7.1%	7.8%	-18.8%
Lianyungang	84.7%	55.6%	11.1%	-4.3%	61.5%
Qingdao	16.8%	12.2%	20.9%	26.9%	38.6%
Ningbo	5.8%	3.4%	1.1%	3.9%	37.6%
Shanghai	10.9%	4.4%	6.7%	2.2%	-4.6%
Shenzhen	2.4%	-1.8%	-4.0%	-11.3%	-27.3%
Tianjin	9.4%	16.4%	24.2%	20.4%	19.6%
Xiamen	20.9%	1.4%	13.3%	0.8%	-8.6%
Yingkou	46.0%	39.9%	37.5%	100.0%	36.7%
Total	10.7%	5.6%	7.5%	4.3%	0.4%
Source: Drewry					

CHAPTER 3 QUANTITATIVE AND QUALITATIVE ANALYSIS ON THE DEVELOPMENT OF ECDC IN SHANGHAI PORT

The core operation of ECBP is empty container collecting. SIPG make room of yard, lower the rate of retention, and provide a whole set of services in order to attract the ship owners to put empty containers in Shanghai container terminals.

But the fact is the cost of handling empty containers is very high. As reported, SIPG are negotiating about business of 300,000 TEU with a German Company. The gross cost has reached ￥200,000,000, including retention and towing fee, except from handling cost.

So, the first issue of Shanghai EBCP is the calculation of the cost, compared with its profit. But the category of empty container cost is so sophisticated that it is difficult to give an accurate outcome. What's more, the potential revenues of these empty containers in the future rising market are uncertain. Therefore, the author chose another modal in the place of cost-profit estimation, namely the relationship of supply and demand of container market, especially the empty container market.

Supply and demand is always the critical factor to decide the price, which would effects the cost-profit estimation. The container market rate is also following this rule.

3.1 Quantitative analysis: Regression Analysis

3.1.1 Introduction of Regression Analysis

Regression analysis is a statistical tool for the investigation of relationships between variables. Usually, the investigator seeks to ascertain the causal effect of one variable upon another—the effect of a price increase upon demand, for example, or the effect of changes in the money supply upon the inflation rate. To explore such issues, the investigator assembles data on the underlying variables of interest and employs regression to estimate the quantitative effect of the causal variables upon the variable that they influence. The investigator also typically assesses the "statistical significance" of the estimated relationships, that is, the degree of confidence that the true relationship is close to the estimated relationship.

3.1.2 Steps of Regression Analysis

(1) Set independent variables x_{1i}, x_{2i}… (i=1, 2, 3…, n), and induced variables y_i (i =1, 2, 3…, n)

(2)Establish the equation of regression

(3) Statistic test to estimated value

(4) Economic implications of the equation

(5) X estimation by regression equation

3.1.3 Regression Analysis on Future trend of Empty containers by aid of software EXCEL

(1) Establish x_{1i} = Export Volume

x_{2i} = Import Volume

y_i = Volume of empty containers

(2) Establish the equation of regression

$$y_i = a_0 + a_1 \cdot x_{1i} + a_2 \cdot x_{2i}$$

(3) Original Data input

Table 3.1.3-3 Recent relative statistics in Shanghai Port (`000 TEU)

Time	Export Volume	Import Volume	Empty containers	Time	Export Volume	Import Volume	Empty containers
Jun 08	1687.97	976.58	9.862	Nov 08	1123.87	932.39	27.499
Jul 08	1430.14	936.89	9.651	Dec 08	1079.89	921.36	27.956
Aug 08	1758.68	945.69	9.876	Jan 09	1057.98	945.67	29.823
Sep 08	1454.79	936.98	10.879	Feb 09	1098.67	947.56	45.123
Oct 08	1365.19	925.63	10.560	Mar 09	1136.56	986.29	54.987

These data are available from author's friends in SIPG Zhendong Container Terminal Branch.

(4) Establish the equation of regression

On the base of data, via Excel, the author gets the outcome as listed:

$a_0 = 2.59451$, $a_1 = 0.14119$, $a_2 = 0.17353$

So, Equation of recession is:

$$y = 0.14119x_{1i} + 0.17353x_{2i} + 2.59451$$

$T(4.303768)(4.912415)$

$R_2 = 0.976351$

$DW = 0.79723$

$P(0.0001)(0.0002)$

$AdjustedR_2 = 0.955415$

$\Pr ob(F - statistic) = 0.000000$

The outcome is clear that F-statistic and value of R_2 are "statistical significance", but the value of DW is too far from the average level, less "statistical significance". After this analysis, the interrelationship of the independent valuables and induced variables does exist.

Via the Q-test, the author found first order autocorrelation in the modal. Then rectify the equation via modified covariance differencing technique and adjust the equation as following:

$$y = 0.13015x_{1i} + 0.18256x_{2i} + 0.65764$$

$T(2.97664)(3.04896)$

$R_2 = 0.96941$

$DW = 2.27119$

$P(0.0014)(0.0112)$

$AdjustedR_2 = 0.994301$

$\Pr ob(F - statistic) = 0.000000$

(5) Implication of analysis

The volume of export and import has effect on the volume of empty containers. The export has much more effect on the volume of empty containers than import does. From the perspective of quantitative analysis, the volume of export increase by 1000TEU, the volume of empty containers increase by 183 TEU, while the volume of import increase of 1000 TEU, the volume of empty containers increase by 51 TEU.

From this perspective, the Empty Container Business Project is quite risky. The reason is simple. The shrinking demand of trade would lead the less volume of Shanghai export to western market, which would lead to accumulation of empty containers, which would induce high cost in the short term. But on the other hand, building an empty container distribution center would help. The results of forecast are following:

Table 3.1.3-4 Forecast of empty containers volume in Shanghai Port (`000 TEU)

Time	**Export Volume**	**Import Volume**	**Volume of empty containers**
Apr 09	1137,31	994,88	54,987
May 09	1255,78	1109,88	41,579
June 09	1388,04	1098,09	45,687

Based on the forecast above, in the next coming months, the volume of export and import began to recover. The empty containers would keep the volume at about 45,687, much higher than it used to be. How long this situation would keep is very hard to say. ECBP only could be a temporary methodology. More measures should be taken to enhance the competency of port.

3.2 Qualitative Analysis: SWOT analysis

3.2.1 Introduction of SWOT analysis

SWOT analysis is a useful and extensive-used analysis tools dealing with the decisions of enterprises. In this analysis, it connects a certain business target with internal and external factors, which is positive and negative to achieve the target.

Figure 3.2.1 the modal of SWOT analysis

	HELPFUL	HARMFUL
INTERNAL ORIGIN	STRENGTHS (S)	WEAKNESSES (W)
EXTERNAL ORIGIN	OPPORTUNITIES (O)	THREATS (T)

- Strengths: qualities of the organization, which are helpful to achieving the objective.
- Weaknesses: qualities of the organization, which are harmful to achieving the objective.
- Opportunities: external elements, which are helpful to achieving the objective.
- Threats: external elements, which could do damage to the business's performance.

3.2.2 SWOT analysis on Shanghai port in dealing with empty containers

3.2.2.1 STRENGTH: Powerful Hardware

SIPG, Shanghai International Port Group, is the authority of Shanghai Port. Container liner services from the Port of Shanghai cover all major ports around the world. More than 2,106 container ships depart from the Port every month. Among them, the number of ocean routes is 498，near-sea lines is 535，feeder service is 794,

and internal trade lines is 279. This structure of routines is well-developed and complicated, which enable the stable volume of container transfer. The 12 routes (in Figure 3.2.1) are the critical lines, maintaining the stable relationship with big companies.

Container terminal operation is a core business of SIPG. There are three major container port areas. In the past 7 years, the container throughput of the Port of Shanghai increased from the 6.43 million TEU recorded in 2001 to 28 million TEU, 580 tons in 2008.

1. Shanghai Container Terminals Co., Ltd in Wusong Area

- Berths: 10
- Quay length: 2,281m
- Quay cranes: 20
- Container yard: 550, 000m^2.

2. Shanghai Pudong International Container Terminals Limited in Waigaoqiao Area

- Berths: 3, accommodating the 5^{th} and 6^{th} generation container ships
- Quay length: 900m
- Quay cranes: 10, RTGs: 36, container trucks: 73 and Forklifts: 11
- Container yard: 500,000m^2 with a of 8,200 flat container slots capable to stack 30,000 TEU at the same time.

3. SIPG Zhendong Container Terminal Branch in Waigaoqiao Area

- Berths: 5
- Quay length: 1,566m

- Quay cranes: 13.
- Container yard: 1,659,000m^2.

4. Shanghai East Container Terminal Co., Ltd in Waigaoqiao Area

- Berths: 4
- Quay length: 1,250m
- Container yard: 1,550,000m^2
- Quay cranes: 13 and RTGs: 48.

Shanghai Shengdong International Container Terminal Co., Ltd in Yangshan Deepwater Port (Phase- 1 and Phase-2 terminals).

Quay length: 3,000m, deepwater,

Quay cranes: 34, world most up-to-date container, RTGs: 120

3.2.2.2 WEAKNESS: Unexpectedly huge volume of empty containers

According to the statistics by Shanghai Custom Export and Import Bureau, Shanghai port registered the biggest decline at the y-o-y rate of 9.7%.Total value only reached 45.4 billion dollar, among which export volume contributed 31.42 billion, a considerable glide from +20.8% in 2007 to -2.4% in 2008. As to the perspective of import volume, the decline was much bigger from +7% in 2007 to the -22.8% in 2008, down to 13.88 billion dollars.

Table 3.2.2.2 Volume of empty containers in recent months

Name of companies	Num. of empty containers
Shanghai Zhendong in Waigaoqiao Area	78,000 TEU
Shanghai Shendong in Yanshan	73,459.5 TEU
Shanghai East in Waigaoqiao Area	52,000 TEU

Source SIPG.com

According the Statistics in the Table 3.2, dated in Dec. 25th, 2008, SIPG Zhendong Container Terminal Branch registered 78.000 TEU, the highest historical record since its establishment. As to Shanghai Shengdong International Container Terminal Co., Ltd in Yangshan Deepwater Port, the number of empty has reached 73,459.5 TEU. Shanghai East Container Terminal holds the reservation of about 70,000 TEU, and 52,000 of which are empty containers. Usually, the limitation of empty containers is 10,000 TEU. The actual empty container number in Shanghai East is 5 times higher than average level.

The inadequate cargo supply leads to the shrinking demand of seaborne transport. The fatigue caused by excess capacity of transport spread from western routines to others. On the other hand, the following high ratio of empty containers becomes the biggest trouble of shipping companies. In Drewy's forecast report, the volume of containers has reached 41 million TEU in the global volume of 201 million TEU. Based on the ratio of empty container cost to total transport cost at about 1/5, the global ship owners need to spend more than 20% of total capacity to carry these empty containers. Based on 300 dollars per box, the total expenditure would reach 11 billion dollars, let alone the cost of railways and highways transport.

3.2.2.3 OPPORTUNITIES

Though the global economic environment is not so good, some good news still comes.

The first one is that the increasing numbers of empty containers itself. This means Shanghai Port is still in operation, still keep quite good relationship with big companies and position of second biggest container terminal. Entering the year of 2009, the number of ocean route has stayed on the same level as usual. After the most difficult period, January and February in 2009, the container market begins to recover. SIPG succeeded in maintaining the nice relationship with ship owners.

On the base of the first news, shipping lines are inclined to stack their empty containers in the Chinese port, while Shanghai is the most important port in China.

The reasons that the lines choose China as their main yards are simple. Furthermore, the causes that Shanghai would be an optimal place are easy to list:

- The lowest cost of labor and land are only available in China;
- Shanghai Port is the biggest container port in the world, which ensure it would provide a whole set of service, by using its experienced staff
- Inevitably, the market in China is most potential in the world; empty containers could be valuable resources in the shortest period when economic recovery comes.
- Shanghai port has the biggest hinterland in the region of Asia-Pacific. The liner has confidence that their containers could enjoy a relatively high rate of turnover. On the other hands, these empty boxes could be rented for Chinese internal trade.

3.2.2.4 THREATS

The biggest threat comes from Shanghai Port's neighbor, such as Ningbo and Qingdao, which are also planning of building ECDC

Qingdao is important sea-railway transport link in the northern China, which enjoy the advantage of geographic position. To some extent, its railway system reinforces its capacity of turnover rate of empty containers, accelerating the rates. In the year of 2008, the volume via railway has reached 38 thousand, increased by 57.5%. In the March of 2009, total volume in Qingdao standed at 2.5 million, increased at the 2.3% y-o-y, the top rate in China.

Ningbo, the second biggest port in Yangtze River Delta, is the biggest competitor of Shanghai in the race of collecting the cargo supply. Especially, the development of shipping building technology, Ningbo begins to enjoy its advantage of natural resources, namely Beilun Harbor Deep water port. Though this, more super big size of ships would choose Ningbo as a good choice. On the other hand, Port Ningbo has very good facility and experience on transshipment. It is an important link of internal and external trade.

Both Qingdao and Ningbo are rapid-developing harbor, competing with Shanghai Port. In most occasions, this kind of competition is disordered. Cost of land in Ningbo and Qingdao is 3/5 of that in Shanghai, while labor cost is only half of that in Shanghai. Nonetheless, these ports are still use extreme low fee to attract and maintain the clients and collect empty containers. The only target of them is to gain and slight benefits, without considering the long term enterprise images.

CHAPTER 4 AHP ANALYSIS ON STRATEGY OF ECDC IN SHANGHAI PORT

4.1 Introduction AHP analysis

Analytic Hierarchy Process, AHP, was established by Professor T.L. Satty in 1970, who is authoritative specialist in the field of the science of operational research. The basic idea of AHP is to decompose the complicated problem into several complex components in the first stage. The analyst should clarify dominance relationship of all the components and set the hierarchical structure accordingly. Then the analyst should set the relative importance of every lay in the hierarchical system. Comprehensive evaluation is reached after the arrangement of every hierarchy in the system.

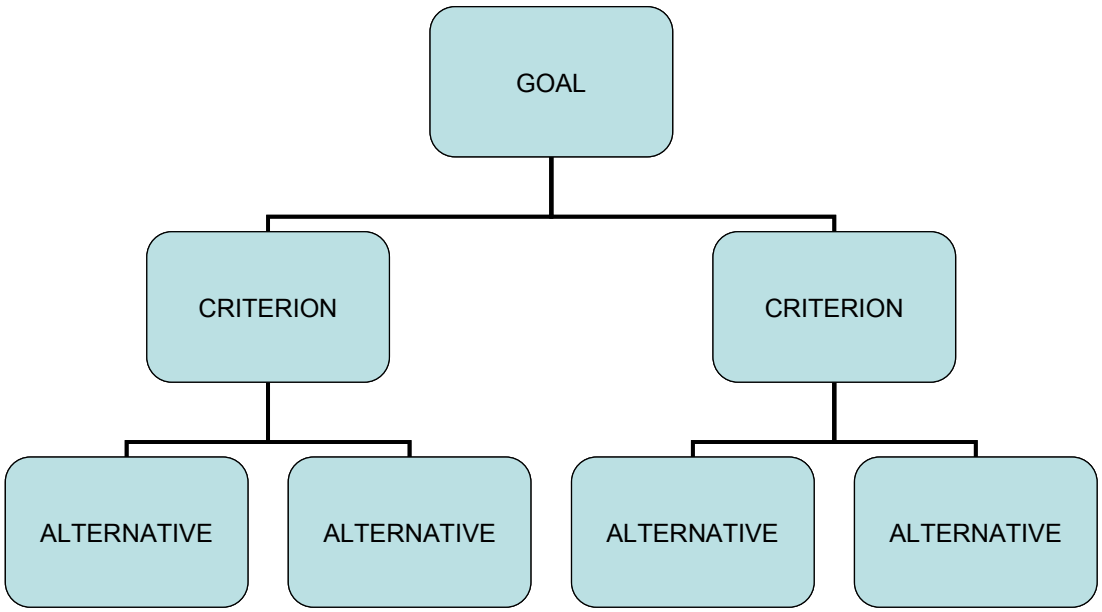
AHP is an advanced methodology of decision-making technology. This handy and flexible multi-standard methodology integrates the quantitative and qualitative analysis methodology. Particularly, this methodology is specialized in dealing with the information, which has a complicated structure but is difficult to define the value and the weight of indexes. These methodologies make the way of thinking into clear layer structure and quantification for forecast modal, decision-making, analysis or provide evidences for further quantitative analysis. The whole analysis is based on mathematics derivation.

4.2 The procedures of AHP analysis

(1) Establish the hierarchy modal

To further insight of the issue, all the components could divide into three levels as following:

Table 4.2.1 Basic modal of AHP



The top level is the Goal level, namely, the final target to achieve

The secondary level is the Criterion level. To achieve the final goal, some standard ought to be kept.

The bottom level, the Alternative level, derived from the criterions from upper layer of the structure, respectively.

(2) Setting a judgment matrix

Every element in the judgment matrix reflects the relative importance against elements recognized by people's preference. The relative importance indicator are judged by strengths/weakness, and importance or minor importance, etc.

Generally, the number 1 to 9 and their reciprocals are used to show the relative importance in the matrix. When the importance of these elements could be expressed by the ratio with actual meaning, the corresponding elements could use these values.

(3) Calculation on weights of each level

(4) Check the consistency of the judgments.

(5) Come to a final decision based on the results of this process

4.3 AHP analysis on the ECDC strategy in Shanghai

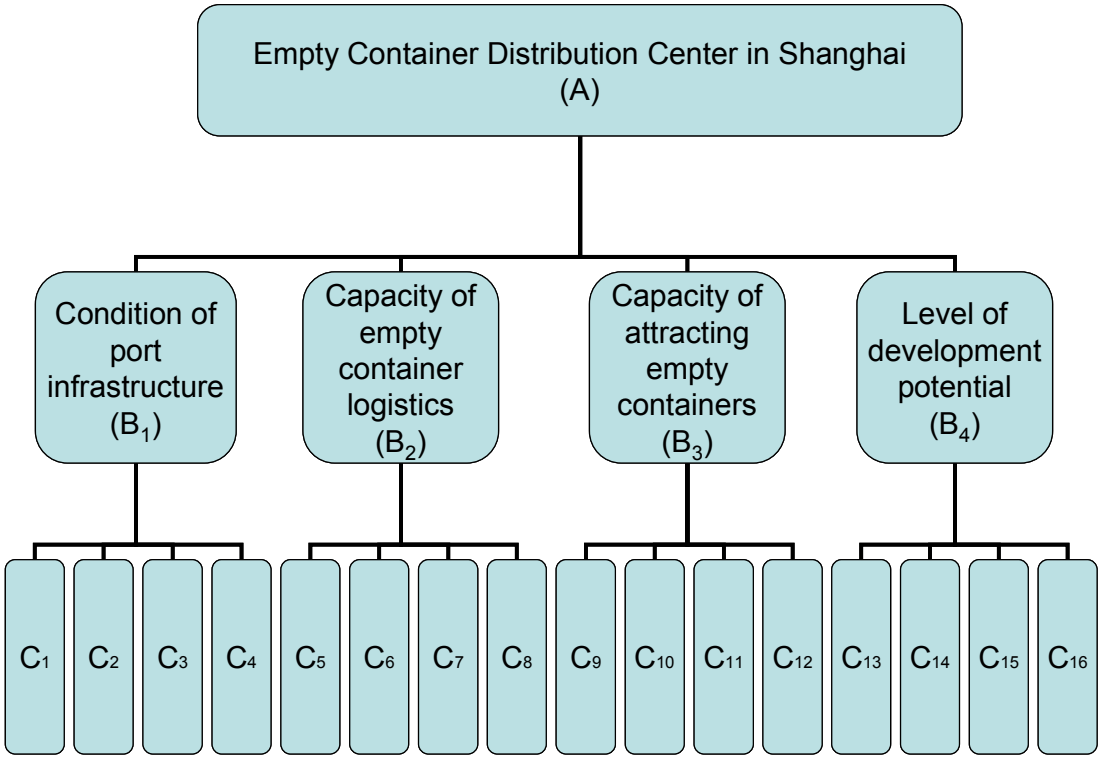
4.3.1 Establish the hierarchy modal

The top level is the Goal level, namely, to empty container distribution center in Shanghai.

The secondary level, the Criterion level, consists of four elements: the condition of port infrastructure, the capacity of port logistics, position in the container market, and the level of development potential.

The bottom level, the Alternative level, consists of 16 indicators, derived from the 4 element from upper layer of the structure, respectively.

Figure 4.3.1 AHP modal of Empty Container Distribution Center in Shanghai



The 16 indicators are as listed:

1. Condition of port infrastructure

   (1) Equipments and facilities

   (2) Geographic position

   (3) Resources of hinterland

   (4) Natural resources

2. Capacity of empty container logistics

   (5) Handling capacity

(6) Containerization

(7) Capacity of container logistic system

(8) Level of IT application

3. Capacity of attracting empty containers

(9) Domestic shipping companies

(10) Oversea shipping companies

(11) Goodwill

(12) Resources of route layout

4. The level of development potential

(13) Level of management

(14) Human resource

(15) Quality of service

(16) Risk management

4.3.2. Setting judgment matrixes

To decide the values of each criterions and alternatives, the author use Delphi Method and consulted experts and reviewed relative materials. The values in the matrix are the comprehensive outcome summary, arranged cautiously by author.

Matrix for Criterion Level:

$$S_{A-B} = \begin{matrix} 1 & 3 & 6 & 9 \\ 1/3 & 1 & 3 & 6 \\ 1/6 & 1/3 & 1 & 3 \\ 1/9 & 1/6 & 1/3 & 1 \end{matrix}$$

Four matrixes for Alternative Level:

$$S_{B_1\text{-}C} = \begin{matrix} 1 & 1/2 & 1/3 & 1/4 \\ 2 & 1 & 2/5 & 3/4 \\ 3 & 5/2 & 1 & 2 \\ 4 & 4/3 & 1/2 & 1 \end{matrix}$$

$$S_{B_2\text{-}C} = \begin{matrix} 1 & 3 & 1/4 & 1/2 \\ 1/3 & 1 & 4 & 6 \\ 4 & 1/4 & 1 & 2/3 \\ 2 & 2/3 & 1/6 & 1 \end{matrix}$$

$$S_{B_3\text{-}C} = \begin{matrix} 1 & 3/4 & 5 & 1/6 \\ 4/3 & 1 & 1/2 & 3 \\ 1/5 & 1/2 & 1 & 6/5 \\ 6 & 1/3 & 5/6 & 1 \end{matrix}$$

$$S_{B_4\text{-}C} = \begin{matrix} 1 & 1/2 & 3/4 & 7 \\ 2 & 1 & 1/5 & 5/2 \\ 4/3 & 5 & 1 & 4/5 \\ 1/7 & 2/5 & 5/4 & 1 \end{matrix}$$

4.3.3 Calculation on weights of each level

(1) Normalization: normalize every column vectors in the matrix: $A = (a_{ij})_{n\times n}$

$$\mathrm{B} = (\mathrm{b}_{ij})_{n\times n}\text{, namely, } b_{ij} = a_{ij} / \sum_{k=1}^{n} a_{ij}\ , i, j = 1,2\ldots\ldots\mathrm{n}$$

(2) Calculating the weight vector of every index to upper layer:

$$\omega_i = \frac{1}{n}\sum_{j=1}^{b} a_{ij}\ , i, j = 1,2\ldots\ldots\mathrm{n}$$

$$\omega_i = (\omega_1, \omega_2, \omega_3 \ldots\ldots \omega_n)$$

After calculation, the weight of criterions to goal is:

$$\omega = (0.5667,0.3667,0.2333,0.0333)^{\mathrm{T}}$$

In the same way, the weights of alternatives to criterions are as following:

$$\omega_1 = (0.5200,0.1305,0.1448,0.2047)^{\mathrm{T}}$$

$$\omega_2 = (0.4333,0.2667,0.1333,0.1667)^{\mathrm{T}}$$

$$\omega_3 = (0.4667,0.1667,0.1333,0.2333)^{\mathrm{T}}$$

$$\omega_4 = (0.2567,0.3433,0.1667,0.3333)^{\mathrm{T}}$$

(3)Calculation on weight combination for Alternatives to Goal

As the results of calculation above

$$\omega = (0.5667,0.3667,0.2333,0.0333)^{\mathrm{T}}$$

And $\mathrm{u}_j = (u_{1j}, u_{2j}, \ldots\ldots u_{16j})^T$

$\therefore$ Matrix 16×4 $\mathrm{U}=\begin{matrix} \mathrm{u}_{11} & \mathrm{u}_{12} & \cdots & \mathrm{u}_{14} \\ \mathrm{u}_{12} & \mathrm{u}_{22} & \cdots & \mathrm{u}_{22} \\ \vdots & \vdots & \ddots & \vdots \\ \mathrm{u}_{16,1} & \mathrm{u}_{16,2} & \cdots & \mathrm{u}_{16,4} \end{matrix}$

Thus,

$\mathrm{U}_\omega = (0.016\,0, 0.066\,7, 0.266\,7, 0.200\,0, 0.016, 0.0\,204, 0.171\,6, 0.030\,5, 0.032\,0, 0.0320, 0.021\,3, 0.032\,0, 0.0215, 0.230, 0.011\,9, 0.102)^{\mathrm{T}}$

4.3.4. Check the consistency of the judgments.

Consistency check is a solution to check whether the weights of alternatives to goal are reasonable. The method is as following:

(1) Calculation of Eigenvalue of maximum $\lambda_{\max}$

$$\lambda_{\max} = \frac{1}{n}\sum_{j=1}^{n}\frac{(S\omega)_j}{\omega_j}$$

(2) Calculation of Consistency indicator:

$$C.I. = \frac{\lambda_{\max} - n}{n-1}$$

(3) Table search for mean random consistency index $R.I.$

(4) Calculation of Consistency index:

$$C.R. = \frac{C.I.}{R.I}$$

(5) Consistency check:

When $C.R. \le 0.1$, the result is consistency satisfactory

When $C.R. \ge 0.1$, the modal needs modification.

After calculation, the result of consistency check is as following:

Table 4.3.4 The result of consistency check

Judgment matrix	Eigenvalue of maximum	Results of Check
S_{A-B}	$\lambda_{\max} = 2.0097$	$C.R. = 0.0034 \le 0.1$
S_{B_1-C}	$\lambda_{\max} = 2.0010$	$C.R. = 0.0005 \le 0.1$
S_{B_2-C}	$\lambda_{\max} = 4.0076$	$C.R. = 0.0010 \le 0.1$
S_{B_3-C}	$\lambda_{\max} = 2.0000$	$C.R. = 0.0047 \le 0.1$
S_{B_4-C}	$\lambda_{\max} = 1.0059$	$C.R. = 0.0000 \le 0.1$

The result of consistency check shows that the judgment matrixes of Criterions and Alternatives are reasonable and acceptable. Thereout, the judgment matrixes of Alternatives to Goal, the outcome of the former two indexes, are also reasonable and acceptable.

4.3.5 Come to a final decision based on the results of this process

Using the AHP methodology, the author analyze the alternatives in Shanghai, Ningbo, Qingdao, which are all planning for building a empty container distribution center in Asia-pacific. The result is as following.

Table 4.3.5 ECDC capacity Indexes of three ports

Pt/Alt	C1	C2	C3	C4	C5	C6
Shanghai	8.625	8.101	7.890	8.850	7.660	8.551
Ningbo	7.758	8.802	8.384	7.056	7.963	7.407
Qingdao	8.491	8.084	7.881	7.305	8.745	7.756

Pt: Port, Alt: Alternative

Pt/Alt	C7	C8	C9	C10	C11	C12
Shanghai	8.641	8.343	8.804	7.222	8.647	7.403
Ningbo	7.607	7.176	7.571	7.342	7.416	7.301
Qingdao	7.514	7.951	8.918	8.810	7.784	7.141

Pt/Alt	C13	C14	C15	C16
Shanghai	7.805	7.496	8.805	7.414
Ningbo	8.032	8.895	7.867	7.249
Qingdao	8.389	7.328	8.794	7.561

Using the following formula to calculate the Composite Index for the target:

$$A = \sum_{i=1}^{16} P_i Q_i$$

A indicates the composite index for the goal, empty container distribution center

P_i indicates the weights of each indictors in the Alternative Level

Q_i indicates the value in the Table, namely, the value of alternatives in the three ports, Shanghai, Ningbo, Qingdao.

The final outcome is as listed:

Port	Shanghai	Ningbo	Qingdao
A	8.341	7.739	8.028

From the result, the author found Shanghai has the highest score of the three ports, 8.341. But the fact is the score of other two container terminals also are quite close. This means the competition would be quite severe. Shanghai still has slight advantages for some reasons. In the next chapter, Chapter 5, the author would give suggestions to stretch advantages.

CHAPTER 5 SUGGESTIONS ON EMPTY CONTAINER DISTRIBUTION CENTER IN SHANGHAI PORT

According to the previous analysis, it is clear that it is the very time for Shanghai to promote into an international port. Now, collecting the containers is very wise strategy in this special era.

According to the author, the micro planning for Shanghai aims at solving the internal problems. This planning's target is to reinforce the strength and make complete to the weakness, which mentioned in the SWOT modal. In detail, the micro planning includes the low-price strategy, strengthen the capacity of yard, and reorganize the empty container logistics system and so on. The author's advice is following.

5.1 Low-price strategy

Table 5.1 Retention Charges in Shanghai port (Aug. 2008)

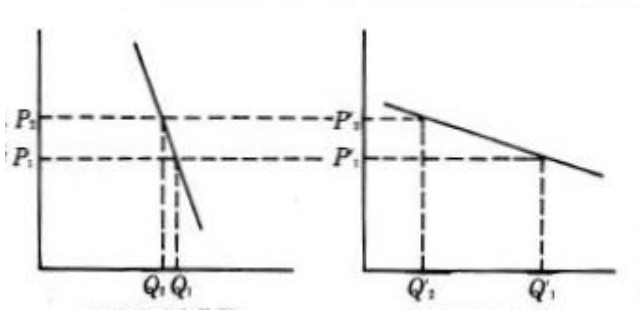
Type of box		Loaded (Yuan/day)	Empty (Yuan/day)
`20-foot	General:	3.00	3.00
	Dangerous:	3.60	
	Reefer:	3.60	
`40-foot	General:	6.00	6.00
	Dangerous:	7.20	
	Reefer:	7.20	

Table 4.1.1 showed the retention discharge in Shanghai at August in 2008, when the market operates well. Now the retention discharge all become 0 Yuan per day, regardless of 20-foot or 40-foot, Dangerous or Reefer.

What is more, Shanghai Port Authority released the policy to provide special offer in 9 respects including loading & discharging fee, loading and discharging fee in multimodal transport, transshipment fee, barge fee, pilotage fee, tally fee, loading and discharging fee in internal trade and proxy en-route fee.

Low-price strategy is a widely-used methodology to attract the new clients and maintain the relationships with old ones which is easy to be copied.

Figure 5.1.1-1 The Basic modal of low-price strategy



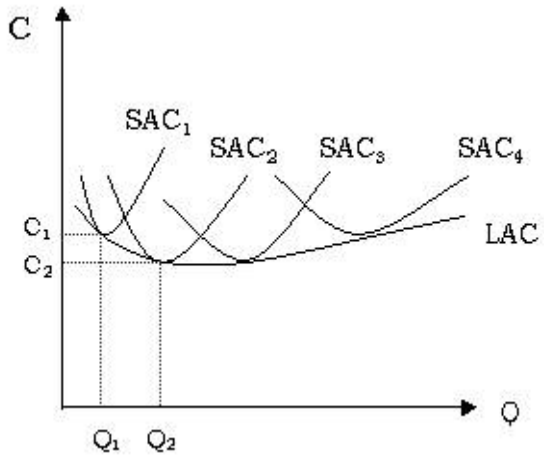
It is noteworthy that the price elasticity always obeys the formulation:

$$\mathrm{E_p} = \frac{\partial Q}{\partial P}\frac{P}{Q}$$

Combined the formulation and figure 4.1.1, the author believed that low price strategy only has limited power in a low-demand environment. The left figure could illustrate the situation in the front of most port authorities: though the price is considerably competitive, the effect is not so significant. The reason is quite simple: the demand drives the market. As analyzed in Chapter 1, main destination of Shanghai Port, Europe and US, are both in depress conditions. Any skills in pricing only could show the intention to cooperation with liners, let alone most services of different ports are homogeneous.

In the Figure 4.1.1-2, the question is much clearer. Quantities always decide the cost, no matter in short term or long term. The volume in Shanghai Port is much lower than the average level in the short period. In the curve SAV2 and LAC, when the actual quantities are less than Q2, the cost would be higher than C1. The gap bigger, the difference of cost more big. This means Shanghai port carries much higher cost in certain short period than the level of long average cost. It's obvious that the low-price could be applied in a relatively short period. It cannot stand for long time for the burden of cost.

Figure 4.1.1-2 Relationship of Short Average Cost and Long average Cost



5.2 Strengthen the capacity of yard

Land strain is another urgent issue to solve.

To deal with such issue, the efficient way is to expand the capacity of yard in order to gain more room for piling containers:

- Increasing the height of piling:

Raising the piling height is most simple but effective in limited area. According to

the International Container Multimodal Transport Regulation (1997), the piling height could reach 7 units, while now the average height is 4 units. Based on the same square area, the capacity increased by 25%-75%

- Functional transfer

In Shanghai Port, the imbalance between export and import is intensifying. The number of loaded containers for export is getting less, while that for import is quite stable. This would lead the imbalance of land for different usages. The ideal way is to make functional transfer of the land. Areas used for export loaded containers could turn into the one used to carry imported empty containers, which not only save the space, but also increase the ratio of export business.

- Rent new area of empty containers:

Waigaoqiao tariff-free zone used to be a hot spot of trading. Now, it also affected by the financial crisis. Still, land there is a valuable resource. For the favor of policy, the land rent is very competitive. Shanghai Port should consider rent land in Waigaoqiao tariff-free zone as a temporary point for piling empty containers. The cost would be relatively low than that in Wusongkou, company with the advantage of less transport cost.

- Take the use of non-primary routes and some minor ways

As a temporary measure, some non-primary and minor routes could be in use of piling area. On the other hand, some 6-lane ways are idle for quite a long time. Transfer them into 4-lane ways for more piling yards.

- Scrap some outdated machines to make room for boxes

It is a high time to renew the equipment and scrap old ones. The outdated machines could be sold for cash flow, which would lead the cut of labor cost. The redundant

area could be used in piling the containers. This action gains two advantages by a single move.

- Take usage of maintenance field and spare lift area.

As estimated, SIPG could expand its piling capacity to the volume of 40,000 TEU.

5.3 Improve the capacity of container collection

Empty container logistic system is very integrated part in setting an empty container distribution center. A complete system of collection would be a very good advertisement for attracting the supply of containers.

- Increasing number of empty containers comes from the shrinking export and import trade. The terminal of the logistic chain could be transferred from abroad trade to internal trade. According to the statistics of Chinese economy, in recent 6 month, the growth rate of sale volume of internal trade stands at 5.43%. This means the empty containers produced by external trade could find their way to balance from the internal trade.

  To transfer for internal trade, the first thing is enhance the capacity of railway-ocean combined transport or highway-ocean combined transport. In this aspect, Shanghai enjoys its advantages. Near the national railway lines, Shanghai has convenient access to the land traffic network. But the cooperation between authorities of port and railway needs more communication to reach the agreement on being unity to overcome the economic crisis together.

- Because of the special era, empty container has become valuable resource for its strategic importance and temporary economic effects. So, to exploit the market for container collection is a special measure in the logistics system. The branches

of SIPG all have a industrial chain related with port, including terminal, container yard and forwarder. Forward would be powerful weapon in searching the supply of empty containers.

Most empty containers belong to big ship owners. But forwarders have their own way to survival. Some companies have own containers with special objectives, such as flat rack Container, open top container and reefer containers, which are difficult to store, washing, preservation and amendment. Forwarder always could find these companies. Shanghai port may deal with special empty container in a special care way: provide special location equipped with professional staff and set flexible schedule of transfer.

Many a little make a mickle. A professional empty container distribution center should be able to deal with empty container in any status. Searching for special purposed containers would another way on building the brand of empty container center.

5.4 Improve the quality of empty container service

The quality of service is the best commercial brand in a competitive market. Customization is inexorable trend of development of service quality and necessary software in building a ECDC.

- When the shipping market was prosperous, the level of service quality was getting lower. It is the common fault shared by most Chinese port. Partially, this also presents the relationship of supply and demand. Now, the customization plan for empty containers should be established.

  More detailed information should be recorded. A category of empty containers

would be set, including condition of service, time of service, repair and maintenance report. This information would guarantee the clients to know the empty containers are well-preserved. Also, the category of clients ought to set. That would help port authority to acknowledge the preferences of clients, including the inquiry frequency and quantities needed per time. Such simple jobs are easy to accomplished in the relatively free time and extremely useful when the market recovers. These methods would not only help to clients' loyalty but also brand buildings.

- Furthermore, the authority of port ought to make more market survey on which kind of trade produce most empty containers. For example, non-woven fabrics export trade was little affected by financial crisis. The reason is that most non-woven fabrics are used in the hospital as the uniform of surgeon doctors. Its consumption is quite stable and invulnerable. After having these information, the company could send its salesman and forwarder to search relative industry in Shanghai hinterland, which is well-known for its plentiful resources.

5.5 Enhance the capacity of empty container logistic system

Port logistics has the last word on the running a empty container system. It decides the working efficiency of a distribution center.

- The scope of the logistic network would indicate the difference of a terminal. Shanghai Port has its own weakness, such as lacking of deep water harbor (Yangshan has been proved to be not good enough), the increasing cost of labour and area of container yard. What is more, in the Yangtze Delta, the internal competition against Shanghai are undertaking. So Shanghai should have some allies. Especially, the functional complementation is utmost necessary, such as

Ningbo, which has plentiful deep water resources and reasonable cost of labour and land.

- Logistic system is an integration. The core of the system is the level of management. The first thing first is the relationship management of the VIP clients, big shipping companies. The exchange of low rate of empty containers and long term relationship is very interesting. The logistic system of empty container distribution center even could change the layout of routes.

CHAPTER 6 CONCLUSIONS

In the year of 2009, the financial crisis spread over the world. The economic recession leads to the shrinking of commodity trade. Its domino effect is the fall of container transportation market. Cargo was so little to meet the capacity of container market. Thus, more and more empty containers are idle in the area of container yard. This problem is much severe in China, the export-oriented market. Shanghai was a typical example.

The author believe to build an empty container distribution center is not only an effective solution for increasing number, but also a strategic opportunity for Shanghai becoming an international empty container distribution center, and then become an international transshipment center.

Firstly, the author gave a background of the current situation of the economic depression. Then the author points out its impacts on container market. Low customer confidence leads to the low demand of commodity, which also affect the volume of trade and container market. After that the author listed the reasons why it is an opportunity for Shanghai to build an empty container distribution center.

To prove whether the reasons are acceptable, the author use the recession analysis modal. From the recession analysis, the issue of piling empty containers could not be solved in short period. Namely, the ECBP could not heal the root causes. The only way is to enhance the capacity of the port. This point was supported by SWOT analysis.

In the next stage, AHP was used for comparing the 3 port competency of building a empty container distribution center. The Quantitative analysis proves that Shanghai

could be a empty container distribution center. But its advantage is very slight.

So, in the Chapter 5, the author gave some suggestions including low price policy and capacity of CY, which could hardly to attract more clients. In this urgent situation, Port authority should consider problems in the stand of ship owner. Maybe some competitive proposals of empty container logistics would help not only in the field of cost, but also change the layout of routes for the shipping company.

Conclusively, the author recommends spreading the policy Empty Container Business Projection over the dual-core pattern of Shanghai-Ningbo/Zhoushan co-competition system, in order to build Empty Container Distribution Center in the Yangtze Delta.

Some suggestions are given for the details in the development of Empty Container Distribution Center in Shanghai Port:

1. Take advantage of the natural and industrial resources in Yangtze Delta, especially natural allocation of deep water and container yard area.
2. Balance the internal conflict between Shanghai and Ningbo. Extreme internal conflict would lead to snatch the resource of empty containers, which would high cost and unsteadiness of system.
3. Keep carrying out the micro strategies, such as low price strategy and strengthen the yard capacity, etc, in order to improve the intrinsic competency.
4. Provide several sets of empty container logistics proposal, which attract shipping owners to reconsideration of their layout of routes.
5. Set flexible regulation for the whole system, not to limit the right of development, but to cultivate the potential power of the ports in the 3rd tier, such as Taicang and

Nantong, in order to search the resource including the empty container and other internal trade resources.

6. Strengthen the way of effective communication, enable to dynamic running of the system.

7. Quality standard for ship management, operation process, safety and environment-protection.

8. Accurate measure against the proper market share, in order to strengthen the professional functional division on dealing with empty containers.

The author believed that Shanghai would establish the empty container distribution center before the market recovers via its internal and external factors, especially, the resource of the relationship with domestic and abroad shipping companies. But the biggest obstacle is the disordered competition from its neighboring ports. Theoretically, the ideal empty container distribution pattern would be the co-competition pattern among the ports in Yangtze Delta.

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