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The influence of Shanghai free trade zone to Shanghai international shipping industry

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The Influence of Shanghai Free Trade Zone to Shanghai International Shipping Industry

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Abstract

By summarizing the results of researches on the development of free trade zones(FTZ) both at home and abroad and with reference to current situation of Shanghai international shipping industry as well as the implementation of policies concerning free trade in Shanghai, this paper aims to carry out a qualitative analysis on the policies in the Bonded Area of Shanghai and the development of Shanghai's shipping industry.

Given the complexity of the coverage of the shipping industry and its related industries and the multitude of the uncertain factors influencing the FTZ, the paper sets a system consisting of seven representative indicators and twenty secondary indicators. According to the relevant data collected through questionnaires, it is known that the establishment of Shanghai Free Trade Zone (Shanghai FTZ) is mainly dependent on the shipping trade, first on the shipping information, then on the indicators of shipping finance, shipping market, port infrastructures, human resources, environment and government supports.

In the discussion part, the fuzzy comprehensive evaluation method was adopted with a supportive index system to analyze the situation of the shipping industry in Shanghai, Hong Kong and Singapore.

In the conclusion part, solution and measurements to improve the shipping industry in Shanghai have been proposed from the perspective of both government and companies in line with the evaluation results.

Key Word: Shanghai Free Trade Zone, Shipping Industry, Analytic Hierarchy Process

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Chapter 1 Introduction

1.1Objectives and Significance

Throughout history, China has been experiencing a total of four waves of reform and opening up. The first wave lasted from 1978 to 1988, with the major results of establishing five special economic zones in 1979 and opening up 14 coastal cities in 1984; the second wave took place from the Pu-dong district of Shanghai with the decision on the concept of Pu-dong New Area on May 2, 1988 as the starting point; the third wave is China's entry into the World Trade Organization, starting from its resumption of membership in the General Agreement on Tariffs and Trade in July, 1986 and signified by its becoming a WTO member in December, 2001; the fourth wave is the establishment of the Shanghai Free Trade Zone(FTZ).

There’re over 1200 pilot free trade zones, free trade zones and foreign trade zones altogether around the world, more than 400 of which are located in developed countries, but not any one of them can offer the voice of experience for the Shanghai FTZ. On July 3, 2013, *Plans on China (Shanghai) Pilot Free Trade Zone* (No.38 [2013], State) was approved by the State Council, marking the Shanghai Pilot Free Trade Zone as the first special customs supervision area of international standard in China. On September 18, 2013, *On Implementing the Plans on China (Shanghai) Pilot Free Trade Zone and Promoting the Construction of Shanghai International Shipping Center* (No.584[2013], Water Transport)was issued jointly by Ministry of Transport of PRC and Shanghai Municipal People’s Government to accelerate the construction of an international shipping center, to explore shipping systems and models of international competitiveness by expanding the level of openness, innovating shipping policies, extending the functions of the center, improving the quality of service, and strengthening infrastructures.

Experience a development of 40 years, Free Trade Zones have established in more than 100 regions and countries. In developing nations, in fact, have giving more and more importance to the development of Free Trade Zones. The Shanghai Free Trade Zones has going to offer preferential policies and greater openness for the shipping industry, and also to simply the work procedures, reduce costs of transportation and to realize the territory of the commissioner of policies. Therefore, the advantages of the Shanghai Free Trade Zones are easy to be found in creating jobs, attracting foreign investment, increasing international trades and booming local economic development etc. With the success and experience of major shipping centers in other countries, this paper concludes that the establishment of the Shanghai Free Trade Zones is will bring tremendous acceleration of the development of the shipping industry in Shanghai. Especially, by comparing with the shipping industry in world-famous shipping centers of Hong Kong and Singapore, suggestions have been put forward for developing the shipping industry in Shanghai. It is suggested that Shanghai should seize the strategic opportunity and recourse to the enhancement of basic shipping, the up-gradation of shipping information, more invest at infrastructures, the development of shipping finance market, the improvement of shipping infrastructures, recruitment high-end shipping professionals and the improvement of shipping policies to speed up the development of shipping industry.

Compare to Hong Kong Singapore, Rotterdam and other world-class international shipping industry, one of the major differences of Shanghai is the lack of an efficient free port policy or free trade area. Opening a free trade zone in Shanghai will strengthen its international influences, trade, processing, financial services, and other functions. It can also increase the charm of Shanghai for international transit, expand the transit trade, and improve the international status of Shanghai. It plays an important role in the development of Shanghai shipping industry.

This article is will summarizing the research achievements of domestic and foreign on

Free Trade Zones and combining with the current situation of Shanghai shipping industry, as well as the doing of Shanghai free trade policy. We analyze the factors that the establishment of free trade zone will affect the development of shipping industry in Shanghai from basic. Given the definition of the shipping industry and related industries is very difficult, and the influence of the Free Trade Area has too many uncertain factors, this paper will set up complex index system with the selected seven representative indicators and twenty secondary indexes. Through questionnaires we collect the study data, we think the Shanghai Free Trade Zone is mostly affected by the shipping based trade, followed by shipping information environment, and then is the basic index shipping financial markets, the shipping market and port infrastructure, human resources, environment, government support. And then we use the index system into fuzzy comprehensive evaluation method, analyzed the development situation of Shanghai, Hong Kong, Singapore shipping industry. Finally, according to the evaluation results, we put forward the measures to improve Shanghai shipping industry.

1.2 Literature Review

By discussing the patterns, process, impacts, challenges and measures of Japan in signing free trade agreements, Shujiro Urate (2009) has studied the influence of Japan's Strategy of free trade agreements on its economy. He believed that to establish free trade zones was the most effective approach for Japan's economic development and its trade partners should be found with East Asia as the core. Lau, Evan, Lee and Po(2007) explored the degree of their interdependence of GDP revenue between China and five members of ASEAN from 1960 to 2000. It was found out that the revenues of China and the five ASEAN countries are clearly interdependent and the integration level of the sides has become higher than ever with the establishment of China-ASEAN Free Trade Zone, it was also concluded that this kind of interdependence between different economies would become a significant feature to realize the goal of regional common

currency.

A Research on Trade Facilitation and Liberalization in Shanghai Free Trade Zone, written by WANG Guanfeng and GUO Yu (2011), is about the trade and investment in the China (Shanghai) Free Trade Zone and covers the topic of trade facilitation. The facilitation of trade can reduce costs and create efficiency. They have become an increasingly urgent strategic task of practical significance - how to provide better conditions for free trade, how to overcome trade barriers and how to speak in "the voice of China" in the process of realizing trade liberalization. YANG Fan (2012) described the most basic experience of reform in China and concluded openness, development trend, norms and experiences as the driving forces in *What's the Point of Shanghai Free Trade Zone?* Since the Third Session of the Eleventh National People's Congress and by the end of 2013, the market-driven reform has created a context featuring a much higher level of openness. The establishment of the Shanghai FTZ is part of the reform to explore new frontiers. WANG Xiaosong and ZHANG Guowang (2011), in *The Management, Comparative Analysis and Development Prospects of Shanghai Free Trade Zone*, explained the major measures taken by the Chinese government in the new international economic landscape, that is, to integrate the Shanghai FTZ into a bigger picture of transforming government functions, improving financial system, strengthening service trade and increasing international investment, thus making it possible to implement a series of service models of supervision and innovation. Favorable operation in the Bonded Area of Shanghai, with its various distinctive advantages in different aspects, is good for the establishment of logistics and financial centers.

After nearly 40 years of development, the FTA has more than 100 countries and regions throughout the world. Especially in developing countries and the new nation, which is create a free trade area as the development of international trade, entrepot trade, the introduction of foreign capital, expanding employment, the implementation of the new

economic policy, promoting regional economic development, the revitalization of the national economy experimental base and demonstration zone. From the international perspective, Hong Kong, Singapore, Rotterdam and other world-class international shipping industry, one of the main differences compare to China's big port is having an efficient free port or free trade zone policy. Which practiced in Hong Kong's free port policy, with characteristics of tax concessions, simplify procedures, and exemption of a registered ship etc. it will enable the enterprises to reduce the cost of doing business, improve the efficiency of management, and therefore attract a large number of international shipping enterprises settled in, at the same time driven by the prosperity and development of the Hong Kong advanced shipping services industry.

Existing problems:

(1) Chinese shipping infrastructure level is relatively low, and the collection and distribution system is not perfect. In recent years, with the people being aware of the importance of shipping infrastructure, China's shipping infrastructure has been greatly improved, but it is still in a low level and far from developed countries. Low shipping infrastructure level is not conducive to the overall improvement of the efficiency of shipping, hindering the further rapid and healthy development of China's shipping industry.

(2) Shipping finance system is undeveloped. Shipping financial institutions are little, and the degree of internationalization is not high. With the increase of the risk of international shipping, China’s shipping industry on the demand for shipping insurance is increasingly strong. However, China's shipping insurance institutions are still in the initial stage, there are a number of small scale, low international awareness, backward management level, lack of risk pricing and other defects.

(3) The lack of shipping professionals, especially shipping high-end talent. Due to the domestic people do not understand the ocean culture and ocean consciousness and

professional shipping talent training time is too long, convergence is slow, it needs long-term investment and accumulation, which resulting in the overall number of China's maritime industry practitioners being low, the number of professionals directly affects the future prospects for the development of the shipping industry in our country.

(4) The shipping information technology level is low. The information system and the public information service platform construction are relatively backward, and the information system cannot be effectively shared.

(5) Shipping laws, regulations and policy are lagging. The healthy and rapid development of the shipping industry need to improve the level of laws, regulations and policies. At present, China's shipping industry legislation is still relatively backward, the legislation is far from enough to adjust the amount of large, cumbersome shipping act.

On the international perspective, comparing with those world-class international shipping center, Shanghai lacks of an efficient free port or free trade zone policy for develop shipping industry, such as Hong Kong, Singapore, Rotterdam. Fortunately, China (Shanghai) Pilot Free Trade Zone was officially announced on Sep.29, 2013. This Free Trade Zone is expected to strengthen Shanghai’s international trade, logistics processing and financial services, improve the Shanghai’s attraction to international cargo transit and enhance the international status of Shanghai port. It plays a major role in promoting the development of shipping industry in Shanghai.

Experience the development for 40 years, the free trade area has founded in more than 100 countries and regions all over the world. Especially in the developing countries, the construction of the free trade zone is on the top of all business. Shanghai free trade zone will provide greater openness and preferential policies for the development of the shipping industry, it will simplify procedures, reduce the cost of shipping and implementing the policy from outside and domestic. It will thus attract more foreign investment, expand employment, promote the development of local economic as well as

increase the international trade benefits.

1.3 Organization

This paper is divided into six parts. The first part is the introduction, consisting of the objectives and significance, literature review, organization. The second part is methodology of the study, which will tell you why use Analytic Hierarchy Process and Fuzzy Comprehensive Evaluation method. The third part is a qualitative analysis on the influence of the Shanghai FTZ on the shipping industry in Shanghai, mainly focused on the policies concerning China (Shanghai) Pilot Free Trade Zone, the development of Shanghai's shipping industry and the relations between them. The fourth part is about the standards for evaluating the influence of the Shanghai FTZ on the shipping industry, which was presented as the principles for designing evaluation system, the analysis of factors and the index system. The fifth part is the evaluation of the influence of the Shanghai FTZ on Shanghai's shipping industry with Analytic Hierarchy Process and Fuzzy Comprehensive Evaluation method. The sixth part is built on the basis of the above parts and mainly focuses on conclusion and suggestions which is about promoting Shanghai's shipping industry from the perspectives of government and shipping companies.

Chapter 2Methodology

2.1 Methods' select

There are many methods for study the influence of Shanghai Free Trade Zone to its shipping industry, such as:

(1) Extension Evaluation Method

Extension Evaluation Method is a kind of extension theory to solve the problem of quantitative analysis and dealing with incompatibility. Firstly, according to the index system, establish the classical field element matrix, and then establish the whole element matrix, and finally the evaluation level is determined according to the maximum value of the correlation function. The key of this method is to evaluate the content of comprehensive index system and reasonable weight value.

(2) BP Neural Network

BP (Back Propagation) Neural Network is a multi-layer feed-forward network algorithm base on error inverse propagation. By the input layer, which is responsible for receiving the external information, the middle layer, which is responsible for processing information, and the output layer which is responsible for the output information, constitute its topological form. But the method has a slow convergence speed and a large redundancy.

(3) Evidential Reasoning Approach

Evidential Reasoning Approach is a kind of uncertainty evaluation method based on evaluation analysis model and evidential reasoning theory. First, the fuzzy rules are used

to evaluate all the basic indicators directly, then the upper level indicators are processed and transformed, and finally the evaluation results are obtained.

(4) Evaluation Gray

Grey relational grade analysis is mainly used to deal with the complex and fuzzy problems in the evaluation index by using the qualitative factors in the system, which can be used as the information of the data. It is a combination of qualitative analysis and quantitative calculation, comprehensive consider human factors and the underlying factors, and make full use of the evaluation method of system information. However, there are some disadvantages such as large amount of calculation, cumbersome task, and over reliance on the function of whitening.

(5) Principal Component Analysis

Principal Component Analysis method is a mathematical transformation method, is mainly transform the original index to a few independent comprehensive index. After simplified the index system, get more information with fewer variables and improve the operability. But the results of the analysis can only reflect the relationship between the strong and the weak, and cannot reflect the nonlinear relationship of the original variable and the weight of the index.

(6) Data Envelopment Analysis

Data Envelopment Analysis based on the "relative efficiency" as the basis for the evaluation of non-parametric method. The method has the advantages of simple structure, convenient using and so on.

Summary, we can draw the conclusion that there are two kinds of methods, the subjective weight and the objective weight, for study the influence of Shanghai Free Trade Zone to its shipping industry. Combined with the actual situation of this paper, we

will use the Analytic Hierarchy Process method for finding the weight of index system and use fuzzy comprehensive evaluation method for evaluate the result.

2.2 Analytic Hierarchy Process

The Analytic Hierarchy Process is proposed by the famous American scientist T.L.Satty in the early 1970s. AHP algorithm is a combination of qualitative and quantitative methods of decision analysis. It is a process of modeling and quantitative for complex systems. The application of this method, the decision maker will decomposing complex problems into a number of standard layer and a number of factors layer (as shown in Figure 2-1), do a simple comparison and calculation between the various factors, you can then weight the different schemes, and to provide the basis for the selection of the best solution.

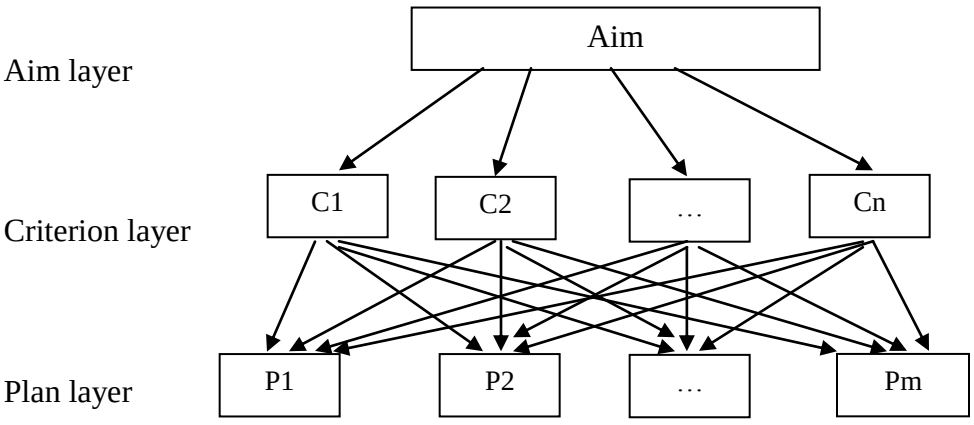

Figure 2-1Structure of Analytic Hierarchy Process

The basic principle of AHP is with hierarchical structure of goals, sub goals (criteria), constraint condition, on the basis to evaluate the program uses the paired comparison method to determine the judgment matrix, and the judgment matrix of the largest

eigenvalue corresponds to the eigenvector component for corresponding coefficients, finally gives the scheme of weight (priority).

Table 2-1The Scaling of Importance

Importance	Meanings
1	Two elements are equally important
3	The upper element is slightly more important than the lower one.
5	The upper element is obviously more important than the lower one.
7	The upper element is intensely more important than the lower one.
9	The upper element is extremely more important than the lower one.
2,4,6,8	The intermediate value of the result above.
Reciprocal	The degree of importance of comparing the lower element to the upper.

After creating a systematic hierarchical structure, AHP should be adopted to determine the weights of each evaluation indicator in an order as follows: to take an element of an upper level which is dominantly related to the elements of a lower level, to determine the relative importance of the elements in the lower level with pairwise comparisons, to scale the importance generally from 1 to 9, and then to get a pairwise comparison matrix based on the relative importance of each indicator. The AHP scale is shown in Table 2-1.

Judgment matrix A: $A=\begin{pmatrix} \frac{w_1}{w_1} & \mathrm{K} & \frac{w_1}{w_n} \\ \mathrm{M} & \mathrm{O} & \mathrm{M} \\ \frac{w_n}{w_1} & \mathrm{L} & \frac{w_n}{w_n} \end{pmatrix}$

With the table of scaling of importance, we can establish the judgment matrix which indicates the relative importance of each element in the hierarchy for a certain element in the upper level. Its significance is: 1 is means an equal importance; 3 is means a little important point; 5 is means more important; 7 is means very important; 9 is means extremely important. And 2, 4, 6, 8 of the median value of the adjacent judgments, when the five level is not enough, you can use these values.

Obviously, any judgment matrix is satisfied:

$$a_{ij} = \begin{cases} 1 & i = j \\ \dfrac{1}{a_{ij}} & i \neq j \end{cases} \left(i, j = 1, 2, \mathrm{L}\ , n\right)$$

Therefore, when constructing the judgment matrix, you can only write the upper triangular (or lower triangular) part.

The determination of the relative weights of indicator subsystems of each level or the indicating items is actually a matter of calculating the largest eigenvalue of the judgment matrix and its corresponding eigenvector. For instance, in the case of the judgment matrix H,

$$HW = \lambda * W$$

In the equation, H stands for the judgment matrix, λ stands for the eigenvalue, and W

stands for the eigenvector. By work out max λ and the corresponding W and converting the maximum eigenvector of max λ into "1" (100%), the proportion of the relative importance of elements of the lower level to elements of the upper level.

Since the judgment matrix is manually established, relative tests should be conducted to ensure its consistency and reliability. The test should be done in the steps followed:

The calculation of consistency:

$$\mathrm{CI}=\frac{\lambda_{\max}-n}{n-1}$$

The smaller the value of CI in the judgment matrix is, the higher the consistency will be. When CI = 0, the judgment matrix is fully consistent; on the contrary, when CI = 1, the judgment matrix is completely inconsistent. According to Equation (4.3), in the process of quantifying a series of qualitative problems, the cognitive understanding of the degree of inconsistency can be described in a quantitative way.

In building a judgment matrix, there're two factors affecting its consistency. One is the inconsistency of personal thinking and judgment, and of the pairwise comparison by scaling 1-9 scale; the other is that the consistency is hard to maintain with the increase of the rows and columns in the matrix, therefore, it's not reasonable to set a standard to based only on the value of CI for judgment matrixes with different rows and columns. In order to get a critical value for testing the consistency of all the judgment matrixes with rows and columns, the influence of different rows and columns should be eliminated. Therefore, Thomas L. Saaty, a professor at the University of Pittsburgh, on the basis of further researches, has proposed to adopt the mean random consistency index RI, which is no affected by the rows and columns, to compensate for the shortcomings of CI, to replace CI, the indicator of the extent of the deviation from consistency, with the consistency ratio CR = CI / RI , and to take it as the standard for testing the consistency of the judgment matrixes.

RI is used to eliminate the factors in causing the inconsistency of the judgment matrixes with different numbers of rows and columns, whose value is shown in Table 2-2.

Table 2-2 10 Scales of RI for Judgment Matrix

Rows and Columns	1	2	3	4	5	6	7	8	9	10
The Value of RI	0.00	0.00	0.58	0.90	1.21	1.24	1.32	1.41	1.45	1.49

Generally, for judgment matrixes with more than 3 rows and 3 columns, when CR <0.10, the judgment matrix is consistent, or corrections should be made on the matrix. In the process of AHP, the consistency ratio should be tested for each judgment matrix, this is to ensure the final correct evaluation.

2.3 Fuzzy Comprehensive Evaluation

Since the indicator system in this paper is with multiple levels, the multilevel fuzzy comprehensive evaluation will be introduced. It is mainly adopted in the following steps:

(1) To classify the primary indicator set X={xl，x2，x3，...，xn} into p subsets according to certain attributes as xi={xil, xi2, xi3,...,xiq} where i=l, 2, 3,…,p and nx=Uxi.

(2) To introduce single-stage fuzzy comprehensive evaluation to the secondary indicator xi, and to define the evaluation set as yj={yjl，yj2，yj3，.. .，yjs} with the fuzzy weight vector of the elements in xi being Wi={wil， wi2， wi3，...，wiq} and Σwij = 1, Wij>0,i=l, 2, 3..., q. If the single-element judgment matrix of xi is Ri, then the single-stage fuzzy evaluation is Bi=Wi*Ri=(bil, bi2, bi3,...,bim).

(3) To take every xi as an indicator and Bi as the result of its single-stage fuzzy evaluation, then we can get the affiliation matrix R as follows:

$$R=\begin{bmatrix} B1 \\ B2 \\ B3 \\ \cdots \\ Bp \end{bmatrix}=\begin{bmatrix} b11 & b12 & b13 & \cdots & b1m \\ b21 & b22 & b23 & \cdots & b2m \\ b31 & b32 & b33 & \cdots & b3m \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ bp1 & bp2 & bp3 & \cdots & bpm \end{bmatrix}$$

If the fuzzy weight of the element xi(i=l, 2, 3,..., p) is w(wl, w2, w3, ...,wn)， then the secondary vectors for fuzzy comprehensive evaluation can be worked out in the equation followed:

$$B = W*R =（bl, b2, b3, ... ,bm）$$

If there’re too many xi in the first step, further classifications can be conducted to get models with three or more levels. After designing the evaluation model for the influence of Shanghai FTZ on the Shanghai's shipping industry, the AHP theory will first be adopted to establish a hierarchy structure, to building judgment matrixes through pairwise comparison between the primary indicators and the secondary indicators below them, to work out the eigenvector, to convert proportion and check consistency, and to calculate the weight of each indicator. After that, the evaluation sets should be designed and be taken to fuzzy operations according to the scoring of experts, and finally to evaluate the scales based on the principle of maximum membership degree.

Chapter 3Qualitative Analysis of Shanghai Shipping Industry

3.1 Policy of Shanghai FTZ

China (Shanghai) Pilot Free Trade Zone, the first free trade zone in China's mainland, covers 1/226 of Shanghai with an area of 28,78 square kilometers, and consists of four customs special supervision areas of Waigaoqiao Free Trade Zone, Waigaoqiao Free Trade Logistics Park, Yangshan Free Trade Port Area and Pudong Airport Free Trade Zone. Unlike traditional free trade zones, the Shanghai FTZ is a special regional economic zone set in accordance with the law. As a kind of trading practices in a customs territory, it comprises as many as ten functions in promoting international trade settlement centers, in financial leasing, in futures bonded delivery, in expanding bonded ship registration and pilot scale, and in studying and establishing international accounts with offshore features.

3.1.1 Financial Policy

The Shanghai FTZ is important in promoting financial reforms because the establishment of a free trade zone not only offers flexible environment for the financial sector but also contributes to financial innovation and reform and opening up, in addition, better financial environment is also conducive to the development of the Shanghai international shipping industry and high-end shipping service industries. Currently, there're three major financial policies:

Firstly, it is to relax the regulation on lending rates of financial institutions and to promote the marketization of interest rate. It is advised to test the marketization of interest rate in a certain areas, which can avoid dramatic market fluctuations and bring stable reforms on the marketization of interest rate on one hand and can give banks and

other financial institutions some room to innovate and upgrade financial products on the other, this can enhance the international status of the Shanghai FTZ.

Secondly, it is to design and improve a system for managing the foreign currency exchange. Taking the characteristics and requirements of foreign trade zone into consideration, a system for managing foreign currency exchanges can ensure a higher flexibility of capital, an extension of the cross-border financial business and the growth of investment and trade, therefore developing the Shanghai FTZ much further.

Thirdly, it is to implement the "Pre-establishment National Treatment" and to transfer the "negative list management mode" into the "positive list management mode". Pre-establishment National Treatment means that the capital importing country should provide foreign capital treatment that is no less than domestic capital in the pre-establishment stage, by doing this, the scope of "national treatment of foreign investment" is expanded, the equal competition for foreign investment is ensured, and the attractiveness for foreign investment can be enhanced. Like the idea of "absence of legal prohibition means freedom", "Negative List Management" means a company lists about the forms of foreign investments that a country bans or allows, and then gets to do business in the free trade zone in all the industries and areas as long as it's not on the negative list, this broadens the scope of investment and business of the company. The policies above further improve the level of openness and the flexibility of investment, and promote the development of ship financing and shipping service.

3.1.2 Shipping Policies

Innovative shipping policies of the free trade zone will facilitate the development of the shipping industry in Shanghai. For instance, it is proposed to relax the previous restriction that "the shares in international shipping of foreign investment should be no more than 49%", it is allowed to establish joint ventures or cooperative enterprises in international shipping within the free trade zone without the limitation of less than 49%

foreign equity and without the necessity of Chinese parties being the biggest shareholder; it is even allowed for foreign companies to hold dominant control in the domestic joint ventures of the shipping industry, with these policies, foreign investors are more likely to show interest in investing on the shipping industry in China, more foreign investment will be introduced, and China's shipping industry can be developed.

3.1.3 Shipping-supporting Policy

Policies supporting the development of shipping service industry, the book *On Implementing the Plans on China (Shanghai) Pilot Free Trade Zone and Promoting the Construction of Shanghai International Shipping Center* mentioned to provide better high-end shipping services in the Shanghai FTZ by encouraging the utilization of information, professionals, capital and other resources. The supportive policies include:

Firstly, to develop the trade of derivation products from shipping freight index. To be specific, By vigorously developing shipping information, to rise the dry bulk freight index (BDI) of large import trading on the basis of freight index originally set by Shanghai, so as to reinforce the status of Shanghai shipping information on the international market; in the meanwhile, to construct a platform for exchanging trading information, for providing information of ship trading, and for exploring the cluster effect of Shanghai shipping information.

Secondly, it is to find the Shanghai School of Advanced International Shipping. More emphasis should be put on the role of shipping personnel by setting up specialized education institutions for training shipping professional in an effort to make the Shanghai School of Advanced International Shipping a "business card" to cultivate high-end personnel for the shipping industry of Shanghai.

Thirdly, to enact the FTZ Arbitration Rules. The rules for arbitration in the free trade alone, by drawing upon the advantages of many international regulations and other

arbitration rules have established and improved a number of advanced systems. The rules of FTZ have been greatly progressed to a wider range with a higher level of openness and flexibility, which helps business parties choose Shanghai as the place to work out their disputes, so as to raise the competitiveness of the Shanghai international shipping industry in globally.

3.2 The Development of Shanghai's Shipping Industry

3.2.1 The first stage of Shanghai shipping industry

In the year 1990, the decision of developing the Pu-dong District was officially proposed to build Shanghai as the leader of the Yangtze River Delta and to make it international centers in economy, trade, finance and shipping. To connect Shanghai with foreign countries, the idea of International Shipping Center has also been put on the agenda. In 1996, with Shanghai as it center, the construction of the International Shipping Center radiating the Yangtze River Delta regions has begun.

During the construction, the government has been the most important impetus. In 1996, in cooperation with the Ministry of Transport of PRC, the Shanghai Shipping Exchange—the only international shipping exchange in China up to now—was established. In addition, the government has also introduced a series of preferential policies and invested a lot of money to solve the problems of poor infrastructures and port conditions of the Shanghai Shipping Center, to improve the efficiency and technology for the development of large-scale ships.

The rapid economic growth of the Yangtze River Basin, the middle-lower reaches of the Yangtze River in particular, has considerably boosted the harbor services in the area, making the Shanghai Port a busy scene. During that period, the annual cargo volume of the Shanghai Port has exceeded100 million tons every year. Even if when the pace of development has slowed down because of the competition between different ports in

Southeast Asia, it has generally managed to keep a good momentum in the 1990s. The goal of a cargo volume of more than 200 million tons didn't keep us waiting for long, and has been realized in 2000, when Shanghai has ranked to the 4th in cargo volume compared with other international ports. At the same time, the container business at the Shanghai Port has made great progress by producing a cargo volume of 5 million tons and ranking 6th all around the world. By and large, the development of the Shanghai international shipping industry at this stage is unsatisfactory with room for improvement in all aspects, because both its hard strength of port facilities and soft strength of policy environment are to be explored. Improved facilities and increased volume is mostly caused by economic development of the hinterland, however, the foreign trade may still remain at a relatively low level and did not show any urgency for construction. The development of the SISC at that time, due to the limited economy and lack of attention, was a slow process.

3.2.2 The development of Shanghai shipping industry

From 2001 to 2008, Southeast Asia has been greatly impacted by the financial crisis, after that, its economy has resumed recovery and led to the booming of the shipping industry, thus providing favorable conditions for the development of the SISC. With China's entry into WTO in 2001, the SISC has seen an opportunity for flourish. Subsequently, the government has gradually relaxed the market threshold of shipping and finance, and Shanghai has welcomed a large number of world-renowned shipping companies and financial institutions, while some of the advanced shipping services brought about have caught the attention of Chinese parties. In this way, more and more attention has been paid to the development of the Shanghai international shipping industry while problems have been revealed and the focus have been shifted from hard environment to soft environment.

In 2005, the Shanghai Yang-shan Deepwater Port was built, great progress in

infrastructures has been made in the SISC, and the condition of Shanghai Port has been considerably improved. On one hand, the cargo volume and container volume at Shanghai Port have broken one record after another, making it the NO.1 cargo port since 2000 and the 2nd in terms of container volume since 2007 all over the world. On the other hand, the soft strength of the Shanghai international shipping industry has also been reinforced to some degree. Since 2000, Shanghai has been working on reforms on clearance modes by optimizing clearance process, reducing operating hours and improving efficiency. As for shipping finance, Shanghai has also been a leader for domestic ports. With its favorable financial environment, Shanghai has become more and more attractive to domestic and foreign banks, insurance companies and other financial institutions; this is also a great benefit to the SISC and can bring a lot of money and related services for Shanghai's shipping industry.

As can be seen from above, the development of the Shanghai international shipping industry has been strengthened from both the soft aspect and the hard aspect, and has drawn more and more attention; with the introduction of advanced enterprises coming from abroad, much more have been brought into consideration such as the shift from hard environment to the soft strength. Though achievement of the Shanghai international shipping industry has begun to appear, it still does not change the status quo of its relying on "world factory" for larger cargo volume.

Since then, the stage of strides and transformation has begun. With US subprime mortgage crisis gradually spread from the financial sector to the real economy, China did not manage to escape. Slumps in international trade have greatly reduced the demands for China's shipping services, and the market has met a rare overall decline, which have cast serious negative impact on the Shanghai international shipping industry.

In 2009, the volume of Shanghai Port declined to a rare level, the growth speed slowed down, retrogress was brought about by large facilities, and the shipping industry was on

the verge of transformation. What's more, the emergence of the "economic crisis" has made Shanghai more aware of its development. Over the past two decades or so, the Shanghai international shipping industry has been following a rapid track of development, thus leaving many problems neglected or unattended. The crisis revealed the deficiencies in building the Shanghai international shipping industry, prompted the government and the academia to find better measures in favor of the construction of the Shanghai international shipping industry.

Through joints efforts, breakthroughs have also been made in the development of the Shanghai international shipping industry during that period. For instance, the shipping facilities have been widely improved, the volume of the ports has been increased, and the hard strength has been reinforced. By 2014, the cargo volume has risen up to 752 million tons as ranking the top，and the container volume to 7.285 million tons as being World NO.1 for five years, making the Shanghai Port widely acknowledged as an international port. After realizing the significance of soft environment, China has made it a point to shift its focus of development to modern service industry to support the development of the Shanghai international shipping industry in 2009. All the central and local governments have pulled together to deal with problems in the process of establishing the Shanghai international shipping industry, introduced a series of preferential policies, attracted a large amount of investment, optimized policies and regulations, regulated the financial markets and the level of information technology to make dramatic improvement for the soft competitiveness of Shanghai.

In 2013, the State Council officially issued the construction plan, approved the establishment of the Shanghai FTZ, and clearly directed to provide better shipping services. The establishment of the Shanghai FTZ created a perfect opportunity for improving the soft environment in the Shanghai international shipping industry, promoted the effect of a modern shipping service system with quality service and overall, making Shanghai closer to its goal of an international shipping center.

During this period, the development of the Shanghai international shipping industry has also made a qualitative leap. Hard environment such as infrastructures, port size and soft environment like laws and policies, financial insurance, information distribution all have been greatly enhanced, besides, increasingly integrated shipping functions, ever optimized shipping services as well as the establishment of FTZ have brought good opportunity for development.

3.3 The Impact on Shanghai's Shipping Industry

The establishment of Shanghai free trade zone has a profound impact on the shipping industry, the specific performance in the following three aspects:

3.3.1 Financial Leasing

Financial leasing is mainly adopted in two basic forms: one is to set no limit on the minimum registered capital for stand-alone subsidiaries or single vessel subsidiaries in the pilot FTZ; the other is to allow financial leasing companies to supervise factoring business related to the major business. The influence of the establishment of the Shanghai FTZ on Shanghai's shipping industry is mainly reflected in tax, market access and the scope of business and so on. Currently, the system of company registration in China has set a minimum capital of the companies, therefore, the decision to set no limit on the minimum registered capital for stand-alone subsidiaries or single vessel subsidiaries in the pilot zone has greatly reduced the barriers to entry. The independent subsidiaries set by companies engaged in financial leasing in the FTZ, as an independent legal entity, will improve the ability to manage and dispose of assets and reduce financing costs while contributing to the development of shipping finance industry.

3.3.2 International Ship Management

International ship management is mainly about setting up wholly foreign-owned

companies of international ship management. According to different bodies of ship management, it can be divided into three types: owner ship management (voyage charter and time charter included), charterer ship management and third-party ship management (also known as professional management). Ship management companies are companies with professional management knowledge and relevant qualifications, which are commissioned by the owner of the ship and are responsible for the security and other aspects with certain management fees. The level of ship management in a country reflects part of its soft power.

In other countries, the ship management companies enjoy a relatively longer history, a quite considerable scale and rich experience. The world's top five shipping companies are: VShips Ship Management Company, Columbia Ship Management, Barber International Ship Management, UK Oriental Group and Executive Ship Management. Now the country has several ship management company size is not large, the major shipping companies established a ship management company mostly original crew, Marine sector shape.

Presently, the ship management companies in China are of a relatively small size, the ship management companies set by major shipping companies are mostly based on their original maintenance management and sea-ship management. Although China is an international power in shipping industry, the level of ship management is limited and the professional ship management companies are till at an initial stage.

Take the Shanghai A Management Ltd. as an example, this company owned a total of 47 ships in June, 2013.According to the updated inspection mechanism of Tokyo Memorandum, 41 of the 47 ships were high risk ships (HRS)and the rest 6 of them standard risk ships (SRS). In addition, the updated inspection mechanism of Tokyo Memorandum has included corporate performance under regulation; the level of a ship management company is directly related to the frequency of PSC inspection with its

ships. Since January 1st, 2014, ship management companies with low performance have to face higher supervision costs than those with high performance. In establishing wholly foreign-owned international ship management companies, the chub effect is quite enlightening, that is, to drive domestic shipping companies to improve their management level for the international standards as soon as possible through fierce competition.

3.3.3 Ocean Cargo Transportation

Ocean cargo transportation can be promoted in the following two ways: first, to ease the restrictions on foreign investment in joint ventures and Sino-foreign cooperative companies engaged in international shipping industry; second, to allow Chinese-owned or Chinese-controlled flag ships to pilot the costal piggyback business of import and export container between Shanghai Port and China's other coastal ports.

In line with the policy of "to allow the establishment of wholly foreign-owned enterprises of international ship management" in international ship management, the idea "to ease the restrictions on foreign investment in joint ventures and Sino-foreign cooperative companies engaged in international shipping industry", it means to relax some limitations and to return the function of corporate screening and elimination to the market. Outside the pilot FTZ, the proportion of foreign investment in Sino-foreign joint ventures of international shipping was currently stipulated by the *Ship Registration Ordinance of People's Republic of China*, according to which, "Ships bought at principal places of business in accordance with the law of the People's Republic of China and belonging to business entities within the territory of People's Republic of China shall be registered. However, in the case of legal bodies with foreign investment in its registered capital, the Chinese investor's contribution shall be no less than 50%."

According to the *International Marine Regulation of the People's Republic of China,* "in case of Sino-foreign joint ventures of international shipping and international ship agency business, the proportion of foreign investment shall not exceed 49%". The

removal of the restrictions on foreign investment can help foreign shipping companies set up wholly foreign-owned subsidiaries in the free trade zone. Management skills and management ideas are introduced by lowering threshold, more advanced international shipping companies can expand the market competition, and the vitality of the state-owned shipping companies can be enhanced through competition.

At such a difficult time, Chinese shipping companies, especially COSCO and China Shipping, are suffering successive losses, while most of the ships of these shipping companies are identified with non-five star flags. Take the COSCO Container Lines Co., Ltd. as an example, it owned 94 ships in June, 2013, among which 32 were from China's mainland, 15 from Hong Kong and 47 from Panama. With the implementation of the policy to "allow Chinese-owned or Chinese-controlled non-five star flag ships to pilot the costal piggyback business of import and export container between Shanghai Port and China's other coastal ports", the tradition of ships with non-five star flags being unable to carry out costal piggyback business will be a history, it is therefore great news for Chinese shipping companies with non-five star flag ships. Since the Shanghai Port is located at the hub of costal piggyback business, the berthing of container ships will greatly increase its volume and consolidate its status.

The construction of the Shanghai FTZ should fully integrate Wai-gao-qiao Port and Yang-shan Port. The comprehensive development of shipping finance business with freight derivatives trading as its core, international shipping and brokerage business of marketization and standardization as well as international ship management and transport will help to enhance the soft power and realize the level of modernization and globalization of Shanghai's shipping industry.

Chapter 4 Evaluating System of Shopping industry

4.1 Principles for Evaluation Systems

The evaluation system should be designed under the principles below:

1. Objectivity. All the information should be taken from the statistics and reports released by authorities, such as *London Maritime, Shanghai Statistical Yearbook*, and *Zhoushan Statistical Yearbook* and so on.

2. Completeness. In addition to port transportation, the shipping service industry is also related to policy, finance, law, information and other aspects, therefore, an international shipping industry should be evaluated not only for its transportation condition but also from other economical and systematic perspectives to ensure a complete evaluation system. Meanwhile, uniform standards are also required in the evaluation system to avoid missing or repetitive factors in the measurement.

3. Hierarchy. In the process of designing evaluation systems for complex subjects, hierarchy can be of great help to sort out the logic relations and deepen the understanding of the objects. Evaluation indicators should be presented at different levels with the lower level explaining the upper level, which makes the evaluation system more specific and quantifiable. Weights of the evaluation indicators at the same level stand for various degrees of importance; this can accurately measure the development of shipping services with a right understanding of the focus.

4. Quantifiable. The evaluation of shipping service quality in the FTZ is about measuring and comparing the development of shipping services at different ports, only by making the evaluation system quantifiable in standards, can the service be

comparable.

5. Importance. Important indicators of the shipping industry in the FTZ should be considered when selecting evaluating indicators, namely the indicators that would greatly influence the shipping industry. Different indicators reflect different aspects and features of the elements, so they must be strictly distinguished as primary and secondary to highlight high indicators with prominent impacts.

4.2 Factor Analysis

4.2.1 Infrastructures of Port

The availability of port infrastructures will directly determine the shipping efficiency, and scientific planning of the port infrastructures will facilitate the development of the shipping industry in the future. At present, the Shanghai's shipping industry is a world-leader in port construction, but still lags behind the globally leading ones in the storage equipment and the collection and distribution system. Seen from international examples, the establishment of FTZ will contribute to the construction of infrastructures at the shipping center, will help to improve the collection and distribution system, the storage equipment, the efficiency of cargo handling and ensure enough devices, among which the improvement of collection and distribution system is an important guarantee for highly efficient operations. Therefore, four secondary indicators of port infrastructures are included in this paper, namely the capacity of storage facilities, the capacity for handling cargos, the adequate capacity of the equipment, and the function for collection and distribution system.

4.2.2 Basic Shipping Trades

Cargo trade is the basis for the development of the shipping industry and the basic shipping trades affects trade goods and international transshipment goods in the

hinterland of the shipping center. With the establishment of the Shanghai FTZ, the customs procedures will be simplified, more traders from the hinterland will be attracted to declare export goods at the Shanghai Port, export goods from Southeast Asia will be transited at the Shanghai Port, and the trade goods will be improved in the hinterland. Therefore, the basics for the shipping trade include four secondary indicators, namely the prosperity of the port-centered industry, the container volume, the transshipment volume and the registered gross tonnage of the ship.

4.2.3 Human Resource Environment

Professionals, in control of the technologies, are a key factor in the development of the industry, thus making the shipping industry inseparable from highly proficient shipping staff. The overall quality of employees working in Shanghai's shipping industry is relatively low and they are mainly engaged in traditional supporting services requiring little technology and knowledge, hence the problem lies in the lack of advanced marine staff with relatively high master of technologies and knowledge in shipping technology, research and analysis on shipping information, shipping brokerage, ship management, shipping finance and insurance, maritime security, maritime law and maritime technical services. The construction of the Shanghai FTZ will attract more advanced shipping fellows into Shanghai, which leaves the primary task to continue to improve policy and other areas to retain advanced shipping professionals and to improve the quality of shipping practitioners. Therefore, human resource environment mainly includes two secondary indicators: the number of practicers at port or in shipping services, the proportion of the staff with or above bachelor degrees.

4.2.4 Basic Indicators of the Shipping Market

The basic indicators of the shipping market reflect the development level of shipping services, well-developed shipping services on the market are conducive to the

development of the shipping industry. With the further improvement of the Shanghai FTZ, the developed level of Shanghai shipping services, the management level of the shipping market, and the adaptability of the shipping market, namely the ability to afford uncontrollable factors will undoubtedly be enhanced. Therefore, three secondary indicators have been set for the shipping market, namely: the degree of perfection of the shipping service system, the level of shipping management, and the resilience in shipping.

4.2.5 Governmental Environment

The stable and rapid development of the shipping industry depends heavily on the policy supports from the government, the construction of the FTZ will show according demands for the administration of the government. Higher efficiency in the government will improve the competitiveness in the shipping industry of the country or region, thus contributing to faster development of the industry. For the sake of the short-term or the medium-and-long-term development, government support is an indispensable indicator in evaluating the shipping industry. Since the mechanism of socialist market in China's mainland has been just initiated, all the policies need to be improved, legalized and also need to be more transparent, and the government environment for the shipping industry will naturally be affected by the FTZ established in Shanghai. Therefore, two secondary indicators are set in government environment as the policy environment and the system of laws and regulations.

4.3Evaluation Standards

4.3.1Primary Aspects of the Shipping Industry

Establishing of the FTZ is conducive to further consolidate the basic cargo condition in the shipping center. A series of preferential policies launched by the Shanghai FTZ,

among which the policies to allow preferential tariffs and to simplify the customs procedures will attract more ships and cargo in the near area to export through the Shanghai Port and will further increase the business in the hinterland on one hand; and, on the other hand, the FTZ policy of costal piggyback business pilots “to allow the non-registered ships controlled by Chinese shipping companies to carry out tests of piggyback business” will be able to promote more transit cargo from Shanghai, to reclaim the transit business taken by competing ports, and to bring benefits to the amount of international transit business in Shanghai. The FTA has increased the business of both hinterland cargo and international transit goods.

4.3.2 Secondary Aspects of the Shipping Industry

One, easing the market access to international ship management. The Shanghai FTZ has made it a policy to ease the market access to international ship management and to allow foreign investors to run international ship management companies, this can help to communicate with the international market and enhance the management level of domestic enterprises. By listening to the voice of experience of the investors in ship management, professional management approaches can be used to reduce the loss of the ships, make full use of the money, information and people, and improve the quality and efficiency of ship management. Less barriers to enter the ship management market has attracted foreign investors to establish international ship management companies in the FTZ, promote the introduction of advanced management experience, and will continue to drive the development of shipping brokerage, ship supply and other business in Shanghai.

Two, relaxing the restrictions on ship registration. The Shanghai FTZ has relaxed restrictions on ship registration and allowed foreign investors to conduct registration business for ships with an investment proportion of more than 50%within the law so that foreign investors have gained access to carry out direct management of the ships, this

can stimulate the foreign investors' enthusiasm and passion, introduce more foreign fellows with advanced experience and expertise in management, and increase the number of five-starship fleets. Based on the previous international ship registration system, further innovations have been made, for example, to attract international ship registration by optimizing the process of relevant business, to improve the function of ship registration by refining the classification of tonnage and the number of ships at the Shanghai Port.

4.3.3 Derivative Services of the Shipping Industry

Shipping finance. The weakness of Shanghai shipping finance is closely related to the financial policies in China. Currently, strict regulations have been set on the offshore financial business because most of the international ships are Ships of Flag of Convenience due to tax incentives and other reasons, so there're many offshore business in shipping financial services. However, these regulations have also hindered domestic financial institutions from getting involved in the international shipping finance market. The FTZ has clearly allowed the financial institutions within the zone to carry out related business and relaxed restrictions on related companies which can promote the development of Shanghai shipping finance and is conducive to the construction of the international shipping center.

Shipping insurance. The development of Shanghai shipping insurance benefits from the FTZ. With the introduction and implementation of related policies in the FTZ, Shanghai has become a stronger attraction for the registration of ships, and will also increase the trade and port volume of Shanghai, which is a huge opportunity to develop the Shanghai shipping insurance. For the first few months after its function, insurance companies like PICC and Ping An have begun to launch shipping insurance centers in Shanghai, decentralization has been adopted for the supervisions on insurance agency, insurance product, senior executives and other aspects, a number of innovative systems and

initiatives have helped to foster the Shanghai shipping insurance market, increase the professional enterprises for shipping insurance services, and enhance the attractiveness of Shanghai shipping insurance.

Other aspects. The development of shipping information has increased the dry bulk freight index(BDI) of large exports from China, and raised the international status of Shanghai shipping information; the establishment of trade platforms for information has provided information of ship trading, realized the sharing of shipping information and reinforced the cluster effect of Shanghai shipping information. The establishment of the Shanghai School of Advanced International Shipping reflects the importance of shipping professionals. To set up specialized education institutions of professional shipping staff and to cultivate highly proficient talents for the Shanghai's shipping industry will help to create better maritime education and training function. In addition, specialized FTZ arbitration rules have been issued, a number of advanced systems have been improved, and great progress has been made in a wider range with a higher level of openness and flexibility, which is conducive to attract traders to choose Shanghai as the destination to solve the disputes, to improve the international influence of the Shanghai International Arbitration Center, and finally to improve the overall functions of the Shanghai's shipping industry.

Chapter 5 Modelling and Empirical Research

5.1 Analytic Hierarchy Process Model

5.1.1 AHP Method

Based on the indicator system of the influence of Shanghai FTZ on Shanghai's shipping industry in Chapter 4, the hierarchical structure in this paper runs comparisons between indicators of different levels with the 1-9 scale method and consistency tests, and gets the weights of the indicators belonging to different levels with YAAHP. Specific steps are as follows:

(1) To build judgment matrix to design questionnaires. Since the indicator system in this paper is simply divided into two levels, it can be directly scaled with the 1-9 scale method, and then draw pairwise comparison matrix according to different degrees of importance of the indicators.

(2) To operate on the judgment matrix. The sum and product method should be adopted to work out the eigenvector of the matrix, that is, the degrees of the importance.

(3) To run consistency test for the judgment matrix.

5.1.2Judgment Matrix of Primary Indicators

Through the questionnaires, the statistics is collected by a pairwise comparison matrix of the primary indicators, and the eigenvector of the matrix is worked out through the sum and product method. The results of the influencing indicators of Shanghai FTZ on Shanghai's shipping industry are shown in Table 5-1.

In Table 5-1, the consistency ratio of primary indicators in the judgment matrix is 0.0289,

hence it is considered consistent. Through the degrees of importance, it can be seen that among all the primary indicators, basic shipping trades is mostly affected by the establishment of the Shanghai FTZ, which is followed by shipping information, shipping financial market, market indicator, port infrastructures, human resource and government support.

Table 5-1The Judgment Matrix of Primary Indicators

Indicators of Influence	Port Infrastructures	Human Resource	Basic Shipping Trades	Market Indicator	Shipping Financial Market	Government Support	Shipping Information	W1
Port Infrastructures	1	3	1/5	2	1/4	2	1/5	0.0910
Human Resource	1/3	1	1/6	1/4	1/2	5	1/3	0.0583
Basic Shipping Trades	5	6	1	4	3	5	1	0.3228
Market Indicator	1/2	4	1/4	1	1/4	1	1/6	0.0965
Shipping Financial Market	4	2	1/3	4	1	3	1/5	0.1645
Government Support	1/2	1/5	1/5	1	1/3	1	1/7	0.0450
Shipping Information	5	3	1	6	5	7	1	0.2219

5.1.3 Judgment Matrix of Secondary Indicators

The methods to determine the weights of secondary indicators is exactly the same with that used for the primary indicators, hence the results is directly shown as follows:

(1) Port infrastructures. The results of the matrix calculation on port infrastructures are shown in Table 5-2 as follows. In Table 5-2, the indicator CI, namely the degree of consistency deviation in the judgment matrix of primary indicator BI, is 0.0023, hence it is considered consistent. Through the degrees of importance, it can be seen that among all the primary indicators of B1, the function of collection and distribution systems will be mostly affected by the establishment of the Shanghai FTZ, which is equipment adequacy ratio, handling capacity and storage capacity.

Table 5-2 The Judgment Matrix of Port Infrastructures

Port Infrastructures	Storage Capacity	Handling Capacity	Equipment Adequacy Ratio	collection and distribution system Function	W1
Storage Capacity	1	2	1/5	3	0.1159
Handling Capacity	1/2	1	1/7	1/3	0.1222
Equipment Adequacy Ratio	5	7	1	1/5	0.2446
Collection and distribution system Function	1/3	3	5	1	0.5172

(2) Human Resource. The result of the matrix calculation on human resource in shipping is shown in Table 5-3 as follows:

Table 5-3 The Judgment Matrix of Human Resource

Human Resource	Number of talents at port or in shipping services	Proportion of shipping staff with or above bachelor degrees.	W1
Number of talents at port or in shipping services	1	1/5	0.1680
Proportion of shipping staff with or above bachelor degrees.	5	1	0.8320

In Table 5-3, the indicator CI, namely the degree of consistency deviation in the judgment matrix of primary indicator B2, is 0.0000, hence it is considered consistent. Through the degrees of importance, it can be seen that the establishment of the Shanghai FTZ will bring reforms on the proportion of shipping staff with or above bachelor degrees, and then the number of talents at port or in shipping services, so as to improve personal qualifications in the shipping industry.

(3)Basic Shipping Trades. The result of the matrix calculation on basic shipping trades is shown in Table 5-4 as follows:

Table 5-4 The Judgment Matrix of Basic Shipping Trades

Basic Shipping Trades	Container Volume	Tonnage of Registered Ships	Transshipment Volume	Port-centered Industry	W1
Container Volume	1	2	1	1/3	0.2274
Tonnage of Registered Ships	1/2	1	3	1/4	0.2273
Transshipment Volume	1	1/3	1	1/3	0.1223

Port-centered Industry	3	4	3	1	0.4230

In Table 5-4, the indicator CI, namely the degree of consistency deviation in the judgment matrix of primary indicator B3, is 0.0039, hence it is considered consistent. Through the degrees of importance, it can be seen that the establishment of the Shanghai FTZ will greatly change the development of port-centered industries, and then the tonnage of registered ships, and last the transshipment volume.

(4)Shipping Market Indicators. The results of the matrix calculation on market indicators are shown in Table 5-5 as follows:

Table 5-5 The Judgment Matrix of Shipping Market Indicators

Market Indicator	Completeness of the Shipping Service System	Shipping Response Capability	Service Level	W1
Completeness of the Shipping Service System	1	7	2	0.7479
Shipping Response Capability	1/7	1	1/4	0.0722
Service Level	1/2	4	1	0.1799

In Table 5-5, the indicator CI, namely the degree of consistency deviation in the judgment matrix of primary indicator B4, is 0.0036, hence it is considered consistent. Through the degrees of importance, it can be seen that the establishment of the Shanghai FTZ will first improve the completeness of the shipping service system, then the shipping service level, and last the response capability of the shipping market.

(5)Shipping Financial Market. The result of the matrix calculation on the shipping financial market is shown in Table 5-6 as follows:

Table 5-6 The Judgment Matrix of Shipping Financial Market

Shipping Financial Market	Number of Insurance Companies	Shipping Financing Environment	Total Output of the Finance and Insurance Industry	W1
Number of Insurance Companies	1	2	2	0.4287
Shipping Financing Environment	1/2	1	4	0.4285
Total Output of the Finance and Insurance Industry	1/2	1/4	1	0.1429

In Table 5-6, the indicator CI, namely the degree of consistency deviation in the judgment matrix of primary indicator B5, is 0.0000, hence it is considered consistent. Through the degrees of importance, it can be seen that the establishment of the Shanghai FTZ is equally important to the number of insurance companies and the shipping financing environment, both of which can reduce the risk in the shipping industry, in addition, the Shanghai FTZ can also influence the total output of the finance and insurance industry.

(6)Government Support. The result of the matrix calculation on the government support is shown in Table 5-7 as follows:

Table 5-7 The Judgment Matrix of Government Support

Government Support	Policy Environment	Law and Regulation System	W1
Policy Environment	1	3	0.7500
Law and Regulation System	1/2	1	0.2500

In Table 5-7, the indicator CI, namely the degree of consistency deviation in the

judgment matrix of primary indicator B6, is 0.0000, hence it is considered consistent. Through the degrees of importance, it can be seen that the establishment of the Shanghai FTZ is equally important to the policy environment and the system of law and regulation.

(7)Shipping Information Environment. The result of the matrix calculation on the shipping information environment is shown in Table 5-8 as follows:

Table 5-8 The Judgment Matrix of Shipping Information Environment

Shipping Information Environment	Rate of Adoption of New Technologies	Shipping Information Level	W1
Rate of Adoption of New Technologies	1	1/8	0.1250
Shipping Information Level	8	1	0.8750

In Table 5-8, the indicator CI, namely the degree of consistency deviation in the judgment matrix of primary indicator B7, is 0.0000, hence it is considered consistent. Through the degrees of importance, it can be seen that the establishment of the Shanghai FTZ can significantly improve the shipping Information level, and can also increase the rate of adopting new technologies.

5.1.4The Total Weights of Different Indicators

Through matrix calculation, the weights of port infrastructures, human resource and basic shipping trades are shown in Table 5-9 as follows:

Table 5-9 Total Weights of Different Indicators

Primary Indicator	Secondary Indicator	Relative Weight	Overall Weight	Ranking
Port Infrastructures (B1) 0.0910	Storage Capacity(C1)	0.1159	0.0105	20
	Handling Capacity(C2)	0.1222	0.0111	19
	Equipment Adequacy Rate(C3)	0.2446	0.0223	15
	Collection and Distribution System Function(C4)	0.5172	0.0470	8
Human Resource (B2) 0.0583	Number of talents at port or in shipping services(C5)	0.1680	0.0146	17
	Proportion of shipping staff with or above bachelor degrees(C6)	0.8320	0.0437	9
Basic Shipping trades (B3) 0.3228	Container Volume(C7)	0.2272	0.0733	3
	Tonnage of Registered Ships(C8)	0.2272	0.0733	3
	Transshipment Volume(C9)	0.1225	0.0395	10
	Port-centered Industry(10)	0.4231	0.1366	2

Through matrix calculation, the weights of market indicator, shipping financial market and government support are shown in Table 5-10 as follows:

Table 5-10 Weights of Different Indicators

Primary Indicator	Secondary Indicator	Relative Weight	Overall Weight	Ranking
Shipping Market Indicators (B4) 0.0965	Completeness of the Shipping Service System (C11)	0.7479	0.0625	7
	Shipping Response Capability (C12)	0.0722	0.0118	18
	Service Level (C13)	0.1799	0.0222	16
Shipping Financial Market (B5) 0.1645	Number of Insurance Companies (C14)	0.4287	0.0705	5
	Shipping Financing Environment (C15)	0.4285	0.0705	5
	Total Output of the Finance and Insurance Industry(C16)	0.1429	0.0235	12
Government Support (B6)0.0450	Policy Environment(C17)	0.7500	0.0225	13
	Law and Regulation System(C18)	0.2500	0.0225	13

5.2Fuzzy Comprehensive Evaluation

The influence indicator system in this paper is to evaluate the influence of establishing the Shanghai FTZ on Shanghai's shipping industry. In this section, the strengths of the shipping industry in Shanghai, Hong Kong and Singapore will be evaluated on the basis of the evaluation model, indicator system and evaluation methods mentioned earlier. In the empirical calculations, with the fuzzy evaluation model of AHP and the ranking and weights of indicators invalid questionnaires, the multi-level fuzzy comprehensive

evaluation will be run to make final evaluations.

The valid questionnaires will be used to collect and sort out the proportions of A, B, C, D, E of each secondary indicators (e.g.: if 48 out of 64 valid questionnaires evaluate A for the indicator, then the ratio should be 0.75, so it is with B , C, D and E), and the data will serve as the basis for fuzzy evaluation.

5.2.1 Evaluation Sets and Evaluation Data

The evaluation grade of secondary indicators in the paper are ranked as A, B, C, D and E, which respectively stand for excellent (90-100), good (80-90), medium (70-80), passing (60-70), and poor (below 60) , and the evaluation sets will be defined as E = {E1, E2, E3, E4, E5}.

Table 5-11 Evaluation Form of Port Infrastructures

Primary Indicator	Secondary Indicator	Evaluation Grade														
		Shanghai					Hong Kong					Singapore				
		A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
Port Infrastructures	Storage Capacity	6	12	17	25	5	14	17	24	6	0	19	21	13	11	0
	Handling Capacity	12	13	25	17	1	15	24	16	8	0	19	24	12	7	0
	Equipment Adequacy Rate	11	16	25	12	0	16	18	19	9	0	17	25	16	4	0
	Collection and Distribution System Function	15	14	23	16	0	13	24	17	5	0	16	22	18	4	0

Table 5-12 Evaluation Form of Human Resource

Primary Indicator	Secondary Indicator	Evaluation Grade														
		Shanghai					Hong Kong					Singapore				
		A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
Human Resource	Number of Tanlents at port or in shipping services	5	17	30	12	3	17	27	13	10	0	22	21	15	8	0
	Proportion of shipping staff with or above bachelor degrees	4	18	31	14	3	22	14	18	12	0	23	24	8	7	0

Table 5-13 Evaluation Form of Shipping Condition

Primary Indicator	Secondary Indicator	Evaluation Grade														
		Shanghai					Hong Kong					Singapore				
		A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
Basic Shipping Trades	Container Volume	21	27	16	0	0	19	26	15	3	0	20	27	15	2	0
	Tonnage of Registered Ships	19	18	22	5	0	21	19	17	8	0	20	24	14	6	0
	Transshipment Volume	5	7	18	30	4	18	29	17	0	0	17	31	16	0	0
	Port-centered Industry	6	21	17	20	0	16	23	12	13	0	18	25	11	10	0

Table 5-14Evaluation Form of Shipping Market Indicators

Primary Indicator	Secondary Indicator	Evaluation Grade														
		Shanghai					Hong Kong					Singapore				
		A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
Shipping Market Maturity	Completeness of the Shipping Service System	7	15	21	20	1	16	23	15	10	0	17	25	12	10	0
	Shipping Response Capability	11	12	23	18	0	20	21	19	4	0	17	26	13	9	0
	Service Level	6	16	22	19	0	17	24	14	11	0	18	24	14	8	0

Table 5-15Evaluation Form of Shipping Financial Market

Primary Indicator	Secondary Indicator	Evaluation Grade														
		Shanghai					Hong Kong					Singapore				
		A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
Shipping Financial Market	Number ofInsurance Companies	13	20	18	15	0	24	21	16	5	0	23	24	12	4	0
	Shipping Financing Environment	8	17	21	15	0	22	20	16	4	0	18	26	12	6	0
	Total Output of the Finance and Insurance Industry	78	22	14	18	0	24	21	12	9	0	25	21	16	5	0

Table 5-16 Evaluation Form of Government Support

Primary Indicator	Secondary Indicator	Evaluation Grade														
		Shanghai					Hong Kong					Singapore				
		A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
Government Support	Policy Environment	14	27	18	9	0	17	27	10	7	0	23	25	16	3	0
	Laws & Regulations System	12	21	22	6	0	19	25	17	5	0	18	29	12	5	0

Table 5-17 Evaluation Form of Shipping Information

Primary Indicator	Secondary Indicator	Evaluation Grade														
		Shanghai					Hong Kong					Singapore				
		A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
Shipping Information Environment	Rate of the Adoption of New Technologies	11	17	29	9	0	22	24	16	4	0	28	17	16	3	0
	Shipping Information Level	4	25	23	12	0	17	24	8	12	0	23	22	7	9	0

5.2.2 Fuzzy Evaluation Results

Results of fuzzy evaluation of the indicators:

Firstly, as for the fuzzy evaluation of the secondary indicators, results are shown based on Table 4.13, 4.14, 4.15, 4.16, 4.17, 4.18 and 4.19.

(1) Fuzzy Evaluation Matrix of the Secondary Indicators belonging to Port Infrastructures (B1)

C1-4：

0.0781 0.1719 0.2813 0.4063 0.06250.1719 0.2188 0.3750 0.2188 0.0156

0.1563 0.2656 0.4219 0.1563 0.0000

0.1875 0.2031 0.3438 0.2656 0.0000

(2) Fuzzy Evaluation Matrix of the Secondary Indicators belonging to Human Resource (B2)

C5-6：

0.0625 0.2500 0.4844 0.1406 0.0625

0.0469 0.2656 0.4688 0.1875 0.0313

(3) Fuzzy Evaluation Matrix of the Secondary Indicators belonging to Basic Shipping Trades (B3)

C7-10：

0.3281 0.4219 0.2500 0.0000 0.0000

_0.2969 0.2813 0.3438 0.0781 0.0000

0.0781 0.1094 0.2813 0.4688 0.0625

0.0938 0.3281 0.2656 0.3125 0.0000

(4) Fuzzy Evaluation Matrix of the Secondary Indicators belonging to Shipping Market Indicators (B4)

C11-13

0.1094 0.2344 0.3281 0.3125 0.0156

0.1791 0.1875 0.3594 0.2813 0.0000

0.0938 0.2500 0.3438 0.2969 0.0000

(5) Fuzzy Evaluation Matrix of the Secondary Indicators belonging to Shipping Financial Market (B5)

C14-16：

0.1719 0.3281 0.2969 0.2031 0.0000

0.1406 0.2969 0.3125 0.2500 0.0000

0.1094 0.3594 0.2969 0.2344 0.0000

(6) Fuzzy Evaluation Matrix of the Secondary Indicators belonging to Government Support (B6)

C17-18：

0.2031 0.4063 0.2656 0.1250 0.0000

0.1719 0.3592 0.3594 0.1094 0.0000

(7) Fuzzy Evaluation Matrix of the Secondary Indicators belonging to Shipping

Information Environment (B7)

C19-20:

0.1593 0.2813 0.4375 0.12500.0000

0.1406 0.3125 0.3281 0.2344 0.0000

Secondly, as for the fuzzy evaluation of the primary indicators:

(1) According to the information above, the weight vector of C1-4 (the secondary indicator belonging to Port Infrastructures B1) is:

W1-4= (0.1159，0.1223，0. 2447， 0. 5171)

The fuzzy evaluation calculation of the primary indicator B1 (port infrastructures) is :

B1=W1-4*C1-4= (0.1653， 0.2167，0.3595，0.2494，0.0092)

According to the principle of maximum membership degree, the port infrastructures (B1) of Shanghai is evaluated E3, a “mediate” grade.

(2) The fuzzy evaluation calculation of the primary indicator B2 (human resource) is:

W5-6=(0. 2500，0. 7500)

B2=WC5-6 *C5-6 = (0. 0508， 0. 2617，0.4727， 0.1758，0. 0391)

According to the principle of maximum membership degree, the human resource (B2) of Shanghai is evaluated E3, a “mediate” grade.

(3) The fuzzy evaluation calculation of the primary indicator B3 (basic shipping trades) is:

WC7-10= (0. 2272，0. 2272，0.1225，0. 4231)

B3=WC7-10*C7-10 (0.1913，0. 3093，0.2817 0. 2074， 0. 0077)

According to the principle of maximum membership degree, the basic shipping trades (B3) of Shanghai is evaluated E2, a “good” grade.

(4) The fuzzy evaluation calculation of the primary indicator B4 (shipping market indicators) is:

Wc11-13=(0. 6479， 0.1222，0.2299)

B4=(0.1135， 0.2323，0.6711，0.3051， 0.0101)

According to the principle of maximum membership degree, the shipping market indicators (B4) of Shanghai is evaluated E3, a “medium” grade.

(5) The fuzzy evaluation calculation of the primary indicator B5 (shipping financial market) is:

WC14-16= (0.4286， 0. 4286， 0. 1429)

B5=(0.1496， 0. 3192，0. 3036， 0. 2277，0. 0000)

According to the principle of maximum membership degree, the shipping financial market (B5) of Shanghai is evaluated E2, a “good” grade.

(6) The fuzzy evaluation calculation of the primary indicator B6 (government support) is:

W17-18=(0.5000， 0.5000)

B6=(0.1875’ 0. 3828，0. 3125， 0.1172，0.0000)

According to the principle of maximum membership degree, the government support (B6) of Shanghai is evaluated E2, a “good” grade.

(7) The fuzzy evaluation calculation of the primary indicator B7 (shipping information environment) is:

W19-20=(0.1429，0.8571)

B7=(0.1433， 0.3080，0.3437，0.2188，0.0000)

According to the principle of maximum membership degree, the shipping information environment (B7) of Shanghai is evaluated E3, a “mediate” grade.

The results of the multi-objective and multi-level fuzzy evaluation are:

W=(0.0910， 0.0583，0.3228， 0.0965， 0.1645，0.0450， 0.2219)

A=W*(B1 B2 B3 B4 B5 B6 B7) = (0.1556，0. 2956， 0.3562，0.2206， 0.0066)

According to the principle of maximum membership degree, with all the indicators of the FTZ affecting the shipping industry, the current development of Shanghai’s shipping industry is evaluated E3, a “mediate” grade.

Therefore, the fuzzy evaluation of the shipping industry in Hong Kong and Singapore is:

Hong Kong：Bl= (0.2841，0.3330，0.2967，0.0890，0.0000)

According to the principle of maximum membership degree, the port infrastructures (B1) of Hong Kong is evaluated E2, a “good” grade.

B2= (0.3202，0.2416， 0.2618，0.1719，0.0000)

According to the principle of maximum membership degree, the human resource (B2) of Hong Kong is evaluated E1, an “excellent” grade.

B3= (0.2822，0.3541，0.2255， 0.1250， 0.0000)

According to the principle of maximum membership degree, the shipping condition (B3) of Hong Kong is evaluated E2, a “good” grade.

B4= (0.2612，0.3592，0.2385，0.1484，0.0000)

According to the principle of maximum membership degree, the shipping market indicators (B4) of Hong Kong is evaluated E2, a “good” grade.

B5= (0.3415，0.3393，0. 2433， 0.0759，0. 0000)

According to the principle of maximum membership degree, the shipping financial market (B5) of Hong Kong is evaluated E1, an “excellent” grade.

B6=(0.2891， 0.3984，0.2188， 0.0938，0.0000)

According to the principle of maximum membership degree, the government support (B6) of Hong Kong is evaluated E2, a “good” grade.

B7= (0.3013，0.4174，0.1273，0.1540 ， 0. 0000)

According to the principle of maximum membership degree, the shipping information environment (B7) of Hong Kong is evaluated E2, a “good” grade.

A=(0.2966， 0.3597，0.2162，0.1237，0.0000)

According to the principle of maximum membership degree, with all the indicators of the FTZ affecting the shipping industry, the current development of Hong Kong’s shipping industry is evaluated E2, a “good” grade.

Singapore：Bl= (0.2862，0.3585，0.2705，0.0872，0.0000)

According to the principle of maximum membership degree, the port infrastructures (B1) of Singapore is evaluated E2, a “good” grade.

B2=(0.3360，0.3477，0.1836，0.1382，0.0000)

According to the principle of maximum membership degree, the human resource (B2) of Singapore is evaluated E2, a “good” grade.

B3= (0.2936，0.4057， 0.2063， 0.0946，0.0000)

According to the principle of maximum membership degree, the basic shipping trades (B3) of Singapore is evaluated E2, a “good” grade.

B4= (0.2692， 0.3889，0.1966， 0.1472，0.0000)

According to the principle of maximum membership degree, the shipping market indicators (B4) of Singapore is evaluated E2, a “good” grade.

B5=(0.3125， 0. 4041， 0.1875， 0.1005， 0.0000)

According to the principle of maximum membership degree, shipping financial market (B5) of Singapore is evaluated E2, a “good” grade.

B6= (0.3125，0.4063， 0.1875，0.0983，0.0000)

According to the principle of maximum membership degree, the government support (B6) of Singapore is evaluated E2, a “good” grade.

B7=(0.4130，0.3371，0.1540， 0.0960，0.0000)

According to the principle of maximum membership degree, the shipping information environment (B7) of Singapore is evaluated E1, an “excellent” grade.

A =(0. 3235，0. 3809，0.1943， 0.1028，0.0000)

According to the principle of maximum membership degree, with all the indicators of the FTZ affecting the shipping industry, the current development of Singapore’s shipping

industry is evaluated E2, a “good” grade.

The results can be concluded in Table 4.20 below:

Table 5-18 Gradations of the Shipping Industries in Shanghai, HK and Singapore

Indicators	Gradations of Indicators		
	Shanghai	Hong Kong	Singapore
Port Infrastructures	Medium	Good	Good
Human Resource	Medium	Excellent	Good
basic shipping trades	Good	Good	Good
Market Indicators	Medium	Good	Good
Shipping Financial Market	Good	Excellent	Good
Government Support	Good	Good	Good
Shipping Information	Medium	Good	Excellent
Overall	Medium	Good	Good

5.3 Analysis and Discussion of the Results

By studying the results above, we can get that currently the shipping industry in Shanghai is still ata “mediate” level while that in Hong Kong and Singapore are at “good” level. As for the indicators, although the basic shipping trades, shipping financial market and government support of Shanghai’s shipping industry are graded “good”, they still face a gap when compared to the “good” and “excellent” aspects of Hong Kong and Singapore. And the indicators like port infrastructures, human resource, shipping market

indicators and shipping information environment of the shipping industry in Shanghai are at the “intermediate” level, hindering the further development of the Shanghai’s shipping industry. From above we can see that the establishment of the Shanghai FTZhas affected lots of areas in a descending order as firstly the basic shipping trades and shipping information, with the latter of which graded “mediate” and should be drawn upon to improve the level of shipping information and increase the rate of adopting new technologies; secondly the shipping financial market and shipping market indicators, while the completeness of Shanghai’s shipping service sees a gap between that of international standard and calls for improved market system and market response capability; thirdly the port infrastructures and human resource that are currently graded “mediate” for the lack collection and distribution system and advanced shipping professionals; and finally the government support, since government policies provide guidance and improves systems of laws and regulations offer solid protection for the development of the shipping industry.

The establishment of Shanghai free trade zone has a profound impact on the shipping industry, the specific performance in the three aspects: First, the establishment of Shanghai free trade zone will improve the ability to manage and dispose of assets and reduce financing costs while contributing to the development of shipping finance industry. Second, the establishment of Shanghai free trade zone can drive domestic shipping companies to improve their management level for the international standards as soon as possible through fierce competition. Third, the construction of the Shanghai FTZ should fully integrate Wai-gao-qiao Port and Yang-shan Port. The comprehensive development of shipping finance business with freight derivatives trading as its core, international shipping and brokerage business of marketization and standardization as well as international ship management and transport will help to enhance the soft power andrealize the level of modernization and globalization of Shanghai's shipping industry.

Chapter 6 Conclusion and Suggestions

6.1 Conclusion

The establishment of the Shanghai Pilot FTZ significantly initiates the fourth wave of China's reform and opening up with its policies bringing positive influences to many aspects of the Shanghai shipping industry. In financial leasing, the asset management and disposal capacity of financial leasing companies will be greatly improved and the costs of financing effectively reduced; in international ship management, domestic ship companies will meet up with the management standards of international enterprises as soon as it can be; in ocean cargo transport, the handling capacity of Shanghai Port will be enhanced and the international status of Shanghai Port will be consolidated.

Through a comprehensive study of the influence of establishing the Shanghai FTZ on the developing the shipping industry, the main factors are used to construct an indicator system for evaluating the influence. By combining the judgment matrix through expert scoring method and the indicator weights through AHP, the current development of the shipping industries in Shanghai, Hong Kong and Singapore are studied with fuzzy comprehensive evaluation. Finally, solutions are proposed to develop the Shanghai shipping industry, such as to provide basic support to build Shanghai into an international shipping center, to take the opportunity of establishing the FTZ, to develop appropriate policies, to attract domestic and international shipping necessities into Shanghai, and to improve the level and efficiency of public services of government departments in charge of shipping.

However, due to the limits of the author, there are still some deficiencies to be worked on in this paper. First, because of the complexity and relations of the factors, the

indicator system, despite serious thought, is far from perfection. Second, there’re inevitable errors in the data and information collected with questionnaires, it’s hard to avoid the presence of individual subjectivity and hence cause some errors. Third, there’s limitation in the evaluation methods. The two methods of AHP and fuzzy comprehensive evaluation cannot further improved.

6.2 Suggestions

6.2.1Suggestions for the Government

From the history of the world's major shipping industry, a typical growth path can be generalized as to introduce shipping companies with cargo volume and diversified policies and then to improve customer retention in the long run. Strong support from the national policies is a necessary condition for the construction of the shipping center. China (Shanghai) Pilot Free Trade Zone has been initiated since 2013 and has come to play a role in the construction of the Shanghai International Shipping Center and in the transformation and upgradation of the shipping industry. It is anticipated that the FTZ will continue to support the Shanghai Shipping Center with diversified policies in the following four aspects:

(1) To improve policy environment and customer retention

Despite certain diversified systems brought about by the FTZ, there’re still great gaps in tax, ship registration system and other aspects of the Shanghai Shipping Center compared with Singapore, Hong Kong, Pusan and other neighboring ports. In the future, the FTZ will continue to release relevant dividend policies to catch up with the main shipping centers and to attract the shipping companies. To be specific, one is to further adjust tax policies related to the shipping industry, to design practical policies concerning tax cuts and to refine the types of various shipping companies such as ship brokers, shipping and logistics companies and ship leasing companies and other tax

preferential terms, in order to enhance the comprehensive competitiveness of Shanghai by closing the gap between Singapore, Hong Kong and other advanced shipping centers; the other is to simplify the registration of ships, to clarify the regulatory process and the specific operations so as to attract more Chinese-funded ships with "flags of convenience".

(2) To attract advanced personnel and promote transformation and upgradation

Advanced shipping professionals are the basis for the shipping service industry, yet also weakness of the Shanghai shipping center. Over the past years, although the "*Implementation for Gathering Shipping Personnel*", along with other preferential policies, has been introduced by the Pudong New Area and other local areas to offer subsidies and preferential personal income tax for senior executives of the shipping companies and the education opportunities for their children, it's still far less than that of Singapore and Hong Kong and other places.

However, in the future, new breakthroughs will be likely to be made to attract highly proficient shipping personnel with following the solutions. First, by seizing the opportunity of international adjustments and the flow of staff in the shipping industry and working on personal income tax and other aspects of the shipping practitioners, to get in line with international major shipping centers and to gather international shipping professionals in Shanghai. Second, it is to introduce world-class training institutions of the shipping industry, to establish various training bases for cultivating more professional shipping personnel.

(3) To strengthen infrastructures construction and collection and distribution system

According to the Logistics Performance Index specified by the World Bank and the excessive reliance on road transport, it's clear that there is still room for improving the shipping facilities in the Shanghai Shipping Center, and it is expected to get improved in

the following aspects: first, to enhance the quality of storage equipment; second, to transform the inland waterways and to accelerate the inland water transport; third, to explore the possibility of building a collection and distribution system of "sea-air combined service" by integrating with thePudong Airport.

(4) To expand shipping finance and develop the shipping industry

The major international shipping centers of New York, London, Tokyo, Singapore and Hong Kong are also leading international financial centers, this kind of successful experience have shown that the developments of international shipping centers and international financial centers are mutually complementary and shipping finance is the important link to connect them. Therefore, even now as the bottleneck for Shanghai Shipping Center, the shipping finance industry will achieve great success in the future, and this has been confirmed through the offshore financial policy.

As expected, the FTZ is to expand the shipping finance business in the following aspects: firstly, to learn from foreign experience, make in-depth investigations of the market and design innovative products according to demands; secondly, to innovate the methods of assessing and avoiding risks based on the typical characteristics of the shipping industry, that is, to learn from foreign banks in developing shipping financing and to change the tradition of "valuing security guarantees and slighting credit assessment" by seeking collateral loans on the future incomes of the ship; thirdly, to build a team of specialized shipping finance personnel and to prepare qualified shipping staff.

6.2.2 Suggestions for Shipping Companies

(1) To improve the level of the shipping service companies

Through the comparison mentioned above, it can be seen that the secondary sectors of the Shanghai's shipping industry have formed a relatively complete industrial chain, but the function is still far from perfect. The traditional shipping service companies are

generally small in size, and often provide limited services at a low level, especially in shipping brokerage, freight agency, customs and other areas, most of them are small and medium enterprises in the unhealthy shipping market. Thus, the shipping companies should make joint efforts and improve their competitiveness through high-leveled mergers, as for those underdeveloped businesses with limited potential in integration, "survival of the fittest" should be the rule to eliminate them in favor of the development of other industries. Meanwhile, the government should also play its guiding role to raise the threshold of shipping service market in the advanced services such as ship registration, ship brokerage and other business, to exclude the enterprises not suitable for developing shipping business, to encourage self-improvement of the companies with strength, to introduce new shipping services, and to improve the level of the shipping service business by forming their own competitive advantages.

(2) To improve the level of shipping finance company

The establishment of the FTZ has brought financial preferential policies in interest rate marketization, foreign exchange management system, and so on, and to some extent, has also liberalized the shipping financial market. Hence Shanghai should make use of the construction of the Shanghai FTZ, and accelerate to innovate the shipping finance market system. For instance, to lift restrictions on the exchange rate system, to relax the standards for examining and approving shipping financial products, to improve the examination and approval efficiency, to attract capital inflows in the shipping industry, and to develop offshore financial business and broaden the offshore financial sector with controllable risks. At the same time, to support the development and innovation of shipping finance products in the financial institutions, to support Chinese financial institutions to try and develop localized shipping financial industries and products absorbed from foreign experience, to support specialized shipping finance companies in making the shipping finance market more specialized and diversified, and to enhance the competitiveness of China's shipping finance industry and level of shipping finance

services. The government will give way to the regulations of the market with relatively relaxed policies to enhance the gathering capability of shipping finance at the shipping center, and ultimately to promote the development and prosperity of shipping finance at the Shanghai International Shipping Center .

(3) To improve the platform of shipping information sharing

Shanghai's shipping information rely mostly on the data of the Shanghai International Shipping Institute, published data, it is scarce in sources and the information on the website is not comprehensive enough, narrowly update, and partially sharable.

Firstly, the government must accelerate the improvement of shipping information platform construction, promote the expansion and sharing of information channels, offer multi-channeled modes of publishing shipping information and build the Shanghai Shipping Information Center. Secondly, the releasing of information must be reviewed with uniform international standards to improve the accuracy, authority of information and to avoid misleading. In addition, timely and comprehensive information must be offered for the shipping companies and the government to get the latest news and make the right decisions. Thirdly, the shipping enterprises should cooperate with each other in sharing transaction information and data with accuracy and authenticity, complete the platforms for shipping trades, and ensure the real sharing of shipping information. Lastly, to promote the exchange of information with neighboring areas and even international shipping communities, to integrate the information in different ports, regions and areas, to gather shipping information and data on other factors as much as possible, and to achieve information sharing in much wider range.

(4) To enhance maritime education and training

The maritime education in Shanghai is mainly supported by the Shanghai Maritime University and the Shanghai Maritime Academy; apart from them, very few have been

working on the systematic maritime education. The government should fund the maritime education, set up specialized universities and institutions for maritime education and training, encourage universities to offer courses related to shipping, provide more channels for maritime education, launch specialized shipping training programs, motivate the introduction of highly educated people, and cultivate more specialized professionals. In addition, never get far from the international standards. To strengthen the exchanges and cooperation with advanced professional international institutions engaged in maritime education and to introduce the more advanced education experience of them, to enhance the management and education levels, to cultivate highly proficient shipping staff. What's more, incentives and preferential terms should also be offered to the advanced professionals such as shipping research funding, subsidies, Shipping companies should offer permanent residence or discount of house purchase, to attract them to live in Shanghai, to prevent the brain drain, and to ensure the quality and quantity of shipping personnel.

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Appendix:

Questionnaire about the importance of indexes

Dear sir:

First of all, it is thank you very much for taking time out of your busy schedule to fill this table. Duty questionnaire scoring table is designed according to my paper<The Influence of Shanghai Free Trade Zone to Shanghai International Shipping Industry>. The purpose is determines the relative weights of influence indicators by experts. The whole empirical analysis is completed by using the analytic hierarchy process and fuzzy comprehensive evaluation method, and the results reflect the relative importance of the index. Please according the table of the scaling of importance to rate the weight of influence indicators at the target layer and the criteria layer.

Table of the Scaling of Importance

Importance	Meanings
1	Two elements are equally important
3	The upper element is slightly more important than the lower one.
5	The upper element is obviously more important than the lower one.
7	The upper element is intensely more important than the lower one.
9	The upper element is extremely more important than the lower one.
2,4,6,8	The intermediate value of the result above.
Reciprocal	The degree of importance of comparing the lower element to the upper.

1. In the under table, there are six first indexes influence the development of Shanghai shipping industry, How importance the index at column than the index at the row?

Indicators of Influence	Port Infrastructures	Human Resource	Basic Shipping Trades	Market Indicator	Shipping Financial Market	Government Support	Shipping Information
Port Infrastructures							
Human Resource							
Basic Shipping Trades							
Market Indicator							
Shipping Financial Market							
Government Support							
Shipping Information							

2. In the under table, there are four second indexes influence the Port Infrastructures, How importance the index at column than the index at the row?

Port Infrastructures	Storage Capacity	Handling Capacity	Equipment Adequacy Ratio	collection and distribution system Function
Storage				

Capacity				
Handling Capacity				
Equipment Adequacy Ratio				
Collection and distribution system Function				

3. In the under table, there are two second indexes influence the Human Resource, How importance the index at column than the index at the row?

Human Resource	Number of talents at port or in shipping services	Proportion of shipping staff with or above bachelor degrees.
Number of talents at port or in shipping services		
Proportion of shipping staff with or above bachelor degrees.		

4. In the under table, there are four second indexes influence the Basic Shipping Trades, How importance the index at column than the index at the row?

Basic Shipping Trades	Container Volume	Tonnage of Registered Ships	Transshipment Volume	Port-centered Industry
Container Volume				
Tonnage of Registered Ships				
Transshipment Volume				
Port-centered Industry				

5. In the under table, there are three second indexes influence the Market Indicator, How importance the index at column than the index at the row?

Market Indicator	Completeness of the Shipping Service System	Shipping Response Capability	Service Level
Completeness of the Shipping Service System			
Shipping Response Capability			
Service Level			

6. In the under table, there are three second indexes influence the Shipping Financial Market, How importance the index at column than the index at the row?

Shipping Financial Market	Number of Insurance Companies	Shipping Financing Environment	Total Output of the Finance and Insurance Industry
Number of Insurance Companies			

Shipping Financing Environment			
Total Output of the Finance and Insurance Industry			

7. In the under table, there are two second indexes influence the Government Support, How importance the index at column than the index at the row?

Government Support	Policy Environment	Law and Regulation System
Policy Environment		
Law and Regulation System		

8. In the under table, there are two second indexes influence the Shipping Information Environment, How importance the index at column than the index at the row?

Shipping Information Environment	Rate of Adoption of New Technologies	Shipping Information Level
Rate of Adoption of New Technologies		
Shipping Information Level		

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