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SHANGHAI MARITIME UNIVERSITY



WORLD MARITIME UNIVERSITY

Shanghai, China

**Analysis of ship registration system and study on
selection of ship registration system for China**

By

Wu Haotian

China

A research paper submitted to the World Maritime University in partial
fulfillment of the requirements for the award of the degree of

MASTER OF SCIENCE

In

INTERNATIOANL TRANSPORT AND LOGISTICS

2013

DECLARATION

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

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

Wu Haotian

.....

Supervised by

Professor Shi Xin

Shanghai Maritime University

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ABSTRACT

Title of research paper: **Analysis of ship registration system and study on selection of ship registration system for China**

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

In the development of the world economy, shipping has played a decisive role position, China as a maritime nation, its stronger dependence on marine. The number of China shipowners registered their ships in the flag of convenience increase constantly. The flag of convenience has occupied a considerable proportion of China fleet. It has caused much loss of state capital and exchange revenue, and it affect China fleet expansion and shipping industry. Therefore, to meet the need for the development of maritime transportation as well as the goal of strengthening nationality fleet, how to keep the stability of China's fleet, how to attract the flag of convenience vessels of Chinese Controlled register back to China and which policies implement for these ships, which all have become urgent problems.

The thesis is mainly divided into three parts:

The first part introduces the definition, types and history of ship registration system.

The second part introduces the development and current practice of ship registration system in china, current situation of China fleet flagging out and analyzes the causes and harm.

The third part is based on the analytic hierarchy process to evaluate ship registration system in four aspects of economy, service, restrictive, effect. The election scheme is China current strict registration system, open registration system and two kinds of second ship registration system. Through a comprehensive evaluation of ship registration system and to analyze the problems and causes of China fleet flagging out. And therefore, the paper puts forward some measures of attracting the flag of convenience vessels of Chinese Controlled register back to China.

KEYWORDS: Ship resignation system, Second ship resignation system, International ship resignation system, Flag of convenience

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List of Abbreviations

AHP	Analytic Hierarchy Process
GRT	Gross Register Ton
RT	Register Ton
DWT	Dead Weight Ton
NIS	Norwegian International Ship Register
NOS	The Norwegian Ordinary Ship Register

1. Introduction

1.1 Research background

Shanghai, the world's largest cargo port, you will find that almost all foreign flag reflected people eyes, a large number of Chinese ships registered abroad and flying the flag of convenience and the number of China international voyage ships account for more than half of gross tonnage, which it can't help worrying. However, from the national development and the long term, Chinese ships don't choose their port to have ship registration, which is obviously not conducive to the overall strength of China's maritime development. So the primary problem in front of China is in what way reform, how to reform to promote the healthy development of China's shipping industry.

1.2 Purpose and significance of the research

For China the phenomenon of flagging out means that the outflow of capital, tax reduction, its crew reduced employment opportunities, which also affect the healthy development of China Classification Society and other supporting services, damage China's position and image as a big shipping country.

In my opinion, it is necessary to deeply study the ship registry system and look for the factors considered by shipowner when they registered ship, combined with China's legal environment and the actual situation to discuss countermeasures to improve the Chinese ship registry system, based on domestic and international law and the conventions. These are in order to try to attract shipowners back China registered. It has a certain reference significance to solve the Chinese shipping industry facing fleet shrinking (mainly flagging out), and develop China's merchant fleet.

This paper is used the analytic hierarchy process (AHP) by combining quantitative and qualitative analysis to contrast the different practices of different countries on ship registry system. And this paper comprehensively analyzes the factors including economy, service, restrictions, and politics that affect the owner choose the ship registration country and it proposed a decision-making method to the owner of ship. At same time, it combined the actual situation of China shipping development to put forward suggestions to the Chinese nationality of the ship registry system.

1.3 Literature review

Flag of convenience ship is a product of open registration system, and has become a considerable part in today's world fleet number. Along with its

development has been more and more countries to accept, and its development has been widespread concern of scholars home and abroad.

The phenomenon of flagging out in China is increasingly serious, which will influence the China shipping industry. Many experts analyzed whether affect China's position in the international maritime organization, whether impact on national security and whether influence the domestic shipbuilding industry, which these questions have been analyzed by Chen Jihong (Chen J. , Research on Flagging Out in China, 2011), Liu Xunliang and Lv Ming who are professionals. They think that basically it does not affect position in the International Maritime Organization of China, is also very difficult to weaken China as the shipping power status.

In terms of the open registration countries, from its growing ship registration data proved the rationality of its existence to the international society. In recent years countries implemented open registration system, intensify the ship safety management, trying to abolish defects, improve the ship's international image of open registration, which, to a certain extent eased past high accident rates and poor shipping safety condition, and these has changed attitude of IMO to open registration system. Yang Jiyue (Yang J. , 2011) and Sun Yi (Sun, 2012) think from new practices of open registration countries can be found in the enlightenment to China ship registration system: China should perfect the existing ship registration system; draw lessons from open registration countries attracting ship registration measures; expand national fleet, and establish the second system of registration according to China's specific conditions.

Cheng Ruxing (Chen R. , 2008) holds that according to a nation's own situation, it is necessary to make a good use of convenient flag vessels registration for

choosing a relatively safe and convenient operating environment and convenient conditions of ship registration in daily management and cost control.

On establishing a second of registration system, the experts gave their opinions: Chen Jigong (Chen J. , Research on Improving Countermeasures Ship Registration Service for Shanghai International Shipping Center, 2012) thinks China need to focus on the purpose of establishing international ship registration system, not rushed to implement long-term international ship registration system. China's priority is to set up and improve the system of shipping policy; to reform tax and fee system and ship finance system of Chinese shipping industry and to increase the shipping policy of legislation and implementation. Guo Hui (Guo H. , 2010) thinks China needs to speed up the legislation system for the conditions for registration, registration procedures, registration fee, etc. Accordingly, by reference to the international current practices, China should combine with national conditions to develop. Yuan Xue (Yuan, 2012), Sun Yi (Sun, 2012) and Hao Jing think the implementation for second registration system is not only a simple operation of the system, but also need to constantly improve the related supporting policies. Ai Yazhao (Ai, 2004) thinks that China is not necessary to implement international ship registration system, large amount of flagging out in China is not aim at looking for cheap labor abroad, but avoiding domestic high taxes and lag of ship financing environment caused by ship operating costs increase, and China adopts the international ship registration system which cannot solve the basic problem with the maritime industry.

2. Overview of the ship registry system

2.1 Definition of ship registry

As the definition of ship registration, Chinese scholars' descriptions basically consistent, such as:

Famous jurist professor Si Yuzhuo said in the book "maritime law theory": Ship registration is the administrative action of giving the ship nationality and giving it to the rights and obligations, which is the legal facts that those have some rights for the ship apply to the ship registration authorities authorized by the state and submit relevant documents, and then the ship registration authorities conform the statutory conditions of registration after reviewing, finally issued corresponding certificate in the name of the country.

Professor Yu Li also thinks, "The ship registration is based on the relevant international conventions and national laws and regulations to register the ship owner, operator, name of ship, technical performance data etc."

Australian scholar D.W.Greig holds: “the ship registration is to prove a fact of registration; it shows the means that the ship is entitled to hang the specific national flag.”

According to above definitions, the ship registration system is a legal system formed by standard ship registration laws and regulation. When meeting the requirements of the relevant countries the ship can be registered in this country. After obtaining the certificate, it is demonstrated that the vessel belongs to that country and accept the jurisdiction and protection of the country.

2.2 History of ship registry system

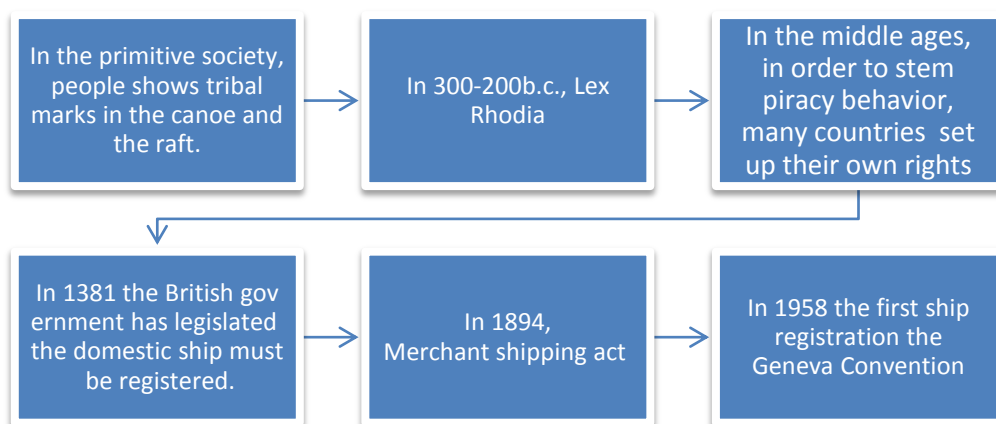


Figure 2-1 History of ship registry system

Source: The Study of the Ship Registration System *Shanghai Maritime University (2007)* (Zhang L. , 2007)

The ship registration system has a long history, in the primitive society, people shows tribal marks in the canoe and the raft, formed the original of registration system; Lex Rhodia rules that countries have management on marine and the ship sailing on it, which laid a foundation of registration system for the first

piece of law; After the middle ages, piracy is rampant. In order to be able to stem this kind of behavior, maintain national maritime trade activities smoothly, many countries set up their own occupation rights in specific waters and protect their ships according to international custom and international treaty. These provisions promote the international development of ship registration system and make the ship's registry system recognized internationally, which have greatly developed the registration system. In 1381 the British government has legislated the domestic ship must be registered, and only British ships can transport goods to and from Britain. Merchant shipping act (1894) changed trade restrictions into the ship registration tool to develop into a comprehensive set of laws, which is the foundation of all modern maritime law. In 1958 the first ship registration the Geneva Convention on the High Seas was born and this is the first international convention for ship registry.¹

2.3 Types of ship registry

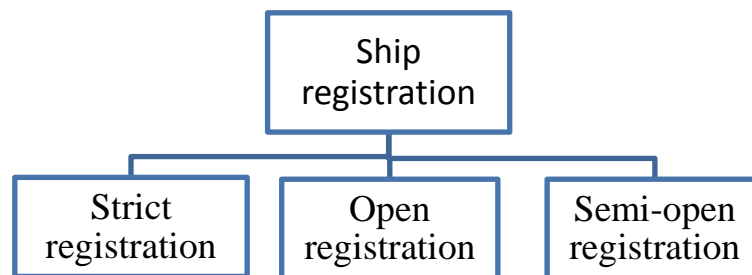


Figure 2-2 Types of ship registry

¹ (Ai, 2004)

2.3.1 Strict registration system

1. Overview

Strict registration refers to the certain restrictions for ship registration, such as the restrictions of owner's nationality, the crew nationality and the documents required for registration. In Britain and the United States, the ship registration system belongs to the strict registration system. Many countries in the world have adopted this registration system; China is also using this registration system.²

2. Characteristic

Strict registration, also known as the normal registration, is adopted by most countries in the world. The state of registration often has various constraints, such as plenty of relevant documents required and many restrictions on the crew and ship owner.³

3. Advantages and disadvantages

² (Zhang L. , 2007)

³ (Ai, 2004)



Effectively supervise and manage on their ships
 Restrict unqualified ships
 Safeguard the security of maritime traffic
 Reducing the possible casualties and property losses
 Good for marine environment
 Protect its owner business interests
 Helpful to the national implementation of macroeconomic regulation and control
 Promote employment and safeguard the interests of the crew

Shipowner can't hire cheap foreign crew
 High tax rate

4. Present situation

Table 2-1 Counties in Strict registration system

Flag States	Age	No Vessel			Million GRT			Avg.RT		
		2010	2011	2012	2010	2011	2012	2010	2011	2012
Greece	23.6	1586	1579	1582	41.2	41.8	43.1	25977	26472	27244
China	21.5	3856	4066	4135	36.1	40.4	42.2	9362	9936	10206
United Kingdom	28.0	3634	3630	3631	12.4	11.9	11.8	3412	3278	3250
Italy	22.6	1508	1523	1526	16.9	18.0	18.4	11207	11819	12058
Germany	23.7	822	825	820	15.3	15.4	15.5	18613	18667	18902
Japan	18.0	5226	5299	5396	14.7	15.0	15.2	2813	2831	2817
United States	28.0	3634	3630	3631	12.4	11.9	11.8	3412	3278	3250
South Korea	22.8	1895	1914	1909	12.3	11.9	11.4	6491	6217	5972
India	18.5	1304	1325	1330	9.3	9.8	9.7	7132	7396	7293

Indonesia	19.7	5643	5881	5921	8.6	9.1	9.5	1524	1547	1604
Malaysia	15.5	1437	1494	1503	8.3	8.2	8.1	5776	5489	5389
Netherlands	14.7	1177	1249	1264	7.0	7.7	7.8	5947	6165	6171
France	21.8	539	550	554	6.6	6.8	7.0	12245	12364	12635
Turkey	24.6	1319	1349	1358	5.9	6.5	6.6	4473	4818	4860
Russia	28.2	2291	2322	2319	6.0	6.1	6.0	2619	2627	2587
Philippines	30.3	1388	1387	1388	5.2	5.2	5.2	3746	3749	3746
Belgium	16.6	190	200	203	4.5	4.5	4.5	23684	22500	22167

Source: World Fleet Monitor (CLARKSON, 2012)

Table 2-1 lists from 2010 to 2012, 17 countries adopted strict registration system whose total tonnage ranked the top 30 in the world and compared these countries from the vessel age, vessel number and average tonnage. First of all, we can see, most of the vessel age is more than 20 years, and after calculation, the average age is 22.2 years. The oldest Philippines, ship age reached up to 30.3 years, the minimum age of Holland for 14.7 years. In 2012, from the comparison of the number of shipping, Indonesia and Japan are both more than 5000 ships, respectively 5921 vessels and 5396 vessels, and the least is Belgium having only 203 vessels,. From the total tonnage, the gap is not big, in addition to Greece and China be way ahead, respectively 43.1Million ton and 42.2Million ton, the average gross tonnage is only 13.8Million ton. Through the comparison of various countries ship average tonnage, we can clearly see the ship, the tonnage of Greece, Belgium and Germany is relatively large, respectively, 27244 tons, 22167 tons and 18902 tons, Indonesia has the largest number of ships, while average tonnage of ship is only 1604 tons, ranked the last, which shows Indonesia is generally small tonnage of ship. Additionally, the average tonnage of strict registration countries is 8832 tons.

2.3.2 Open registration system

1. Overview

Open registration system refers to the looser registration system that does not have so many requirements for the ship registry.

This kind of open registration state is internationally called "open registration country"; the flag obtained from this country by registration is called "flag of convenience". Ships flying the flag of convenience are known as the vessels flying flags of convenience. Open registration countries or regions, such as Panama, Liberia, Honduras, Costa Rica, Somalia, Hong Kong, the Carmen islands and Cyprus, generally no strict conditions, or almost no restrictions, any ship owners only need to set up a company formally in these countries or regions and put the ship in the company, you can apply the registration of ships.

The product of open registration system is the flag of convenience, the flag of convenience refers to after selection of flag, by avoiding economic and other controls, shipping company is willing to maximize private benefits and minimize the cost of private. Open registration, as a service, sold to foreign owners who want to meet the needs of escaping domestic financial and other constraints.⁴

2. Characteristics

⁴ (Zhang L. , 2007)

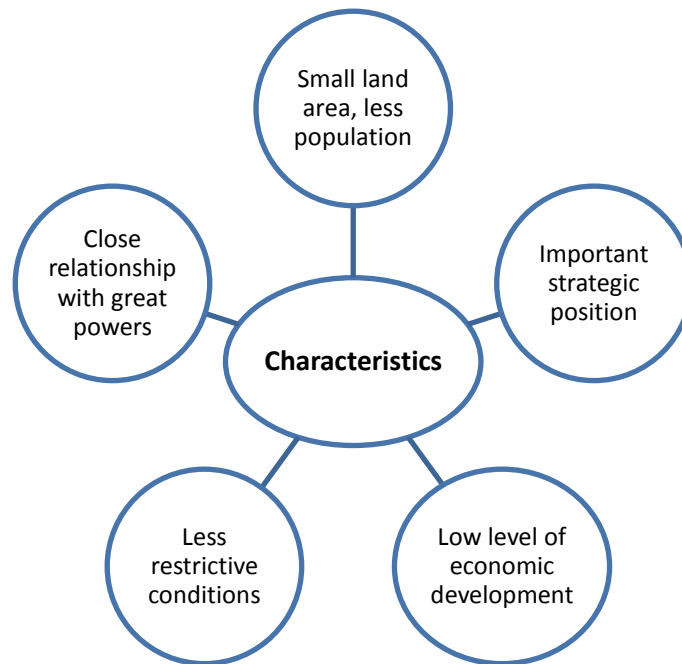


Figure 2-3 Common characteristics of open registration countries

Common characteristics of open registration countries are: Land area is not large and less the population; the low level of economic development; less restrictive conditions; important strategic position, such as Cyprus and the Mediterranean; Close or special relationship with great powers, such as Panama and the United States.

3. Advantages and disadvantages



<p>Low operating costs</p> <p>Large the ship management areas</p> <p>Increase fiscal revenue for the open registration country</p>	<p>Cheap crew's benefit</p> <p>Not allowed to operate domestic shipping business</p> <p>The flag state can't provide timely assistance to shipowner when the ship encountered risk</p> <p>Not effectively for managing and controlling ships</p>
--	--

4. Present situation

Table 2-2 Countries in Open registration system

Flag States	Age	No Vessel			Million GRT			Avg. RT		
		2010	2011	2012	2010	2011	2012	2010	2011	2012
Panama	17.1	8373	8559	8637	207	219	224	24722	25587	25935
Liberia	9.8	2762	3039	3122	105.7	120.7	125.4	38269	39717	40167
Marshall Is.	8	1666	1921	2002	64	75.8	79.6	38415	39459	39760
HK	9.5	1764	1997	2097	55.1	67.2	73.2	31236	33650	34907
Singapore	9.4	1964	3232	3319	44.5	51.7	54.9	22658	15996	16541
Bahamas	14.4	1454	1463	1463	52	53.4	53.8	35763	36500	36774
Malta	12.6	1731	1836	1853	37.8	43.1	44.9	21837	23475	24231
Cyprus	11.5	1037	1037	1045	21.2	21.3	21.7	20444	20540	20766
Antigua & B.	11.3	1299	1330	1340	10.8	11.2	11.3	8314	8421	8433

Bermuda	13.2	165	165	166	10.6	11.1	11.3	64242	67273	68072
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Source: World Fleet Monitor (CLARKSON, 2012)

Table 2-2 lists from 2010 to 2012, 10 countries adopted open registration system whose total tonnage ranked the top 30 in the world and compared these countries from the vessel age, vessel number and average tonnage. First of all, we can see, most of the vessel age is about 10 years, and after calculation, the average age is only 11.6 years. The oldest Panama, ship age only has 17.1 years; less than average age adopt strict registration system countries, and the minimum age of Marshall Is has 8 years. In 2012, from the comparison of the number of shipping, with the world the highest number of shipping of Panama, 8637 ships, is also the first to implement open registration system. Only 166 ships registered in Bermuda, the average number is 2504. From the total tonnage, the gap is so big, Panama is ahead of 224 million ton, followed by Liberia, 125.4 million ton, the least amount of Antigua & b. and Bermuda is only 11.3 million ton, which average gross tonnage is 70 million ton. Through the comparison of various countries ship average tonnage, we can clearly see Bermuda has the highest average tonnage, but the least ship number and total tonnage which shows that the ships registered in Bermuda are new build ships. The average tonnage of other countries is 31559 ton, exceeding largest average tonnage of Greece that adopted strict registration

2.3.3 The semi-open registration system

1. Summarize

The semi-open registration system is also called the second ship registration system, that is, a country set up a new registration system similar to flag of convenience system for home owners. The second ship registration system doesn't change the original traditional ship registration system (the first ship

registration system). And in order to distinguish it from the traditional ship registration system, so it is called the second ship registration system.

It is known that strict registration country has the strict conditions for ships flagging-in, such as the ship owner, the crew nationality, the documents of registration required, etc. Conversely, open registration countries are relatively easy to flag in; therefore, they attracted a lot of ships from strict registration countries to become the flag of convenience ship. And accordingly, the owners' own nation has to face the fierce situation that fleet shrink, capacity decrease, the crew of falling employment, weakening in the competitiveness of the international shipping market.

The flag of convenience in international shipping industry is quite prevailing, according to statistics, the global number of flag of convenience of flagging out already accounts for about two-thirds of the world's merchant ships.

So many shipping powers are taking steps to try to make their move overseas citizen ship return to register their nationality, national flag, and the second of registration system is one of the measures taken in many countries. This registration system parallelly co-exists with their original registration system, unified in a country's ship registry system. Of course, according to the international conventions and domestic legislation, dual or multiple nationalities cannot be accepted. Ships those are going to register the second flag must cancel the original registration, return to the home country of registry.⁵

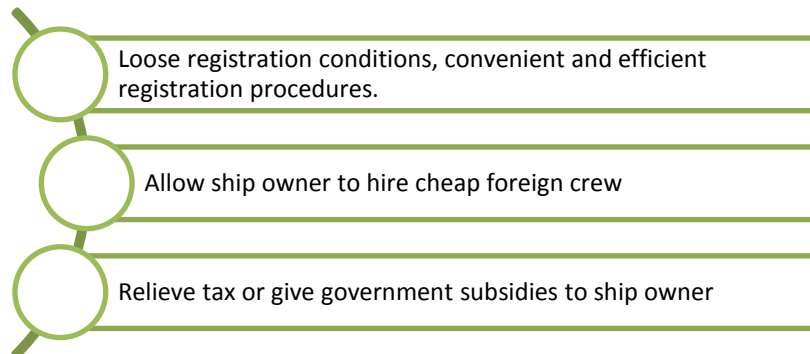
⁵ (Yuan, 2012)

In the process of operation, the second registration system divided into two forms as the place of ship registration is different:

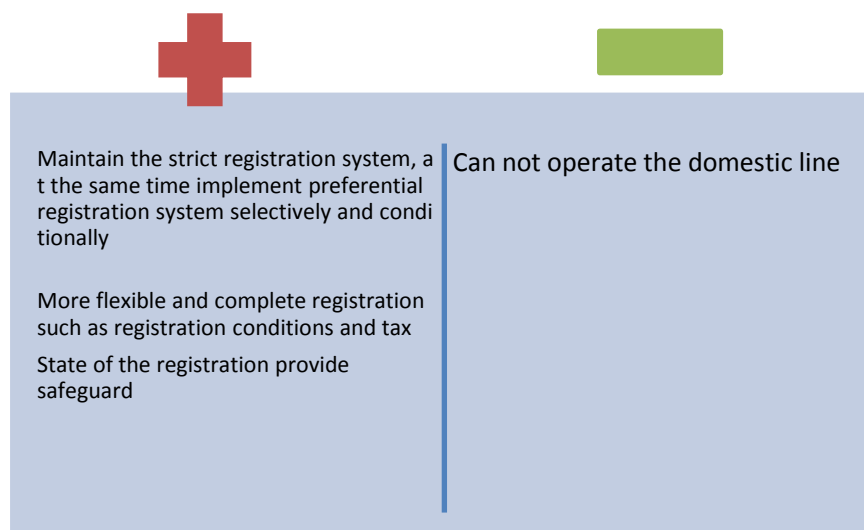
Off-shore ship registry	International ship registry
<ul style="list-style-type: none">• a country opened an outside ship registry that territory outside their home country, and implement a set of different ship registration system from local. Generally traditional maritime countries build a new ship registration system in its colonies or possessions. At the earliest, the United Kingdom set up its overseas ship registry in its territorial Isle of Man in 1978. Subsequently, many countries have adopted such a registration system, such as France in Kerguelen Island, Portugal in the Madeira Islands, and Netherlands in the Netherlands Antilles.	<ul style="list-style-type: none">• a country set up an ship registry in own territory for their own ships on international voyages, and implement registration system for foreign shipping companies as well, and paralleling with original traditional ship registration system. Norway is the world's first implementation of this system, the provisions of the international ship registration system in 1987 by the Norwegian International Ship Register Act. Subsequently, this form of registration system was adopted by Denmark, Germany, Luxembourg, Sweden, Brazil and other maritime countries.

Second registration system are basically by relief ship taxes and registration fees, reduce crew standards and relax restrictions on crew nationality to reduce the operating costs of the ship in order to enhance the competition force of their own ships in international shipping. The reason why this system using by many of the traditional maritime countries and achieved more satisfactory results, as the system is the traditional ship registration and open registration system combined, complementary advantages. The formation of second registration system is more conducive to the development of transportation capacity of the maritime countries, and this system is a result of long-term interests game between the government with the ship owners, which not only maximize the interests of ship owners, but also enable the country to achieve the protection of crew employment, promote economic development and enhance their own shipping international competitiveness goals.

2. Characteristics



3. Advantages and disadvantages



4. Present situation

Table 2-3 Countries in Semi-open registration system

Flag States	Age	No Vessel			Million GRT			Avg. RT		
		2010	2011	2012	2010	2011	2012	2010	2011	2012
Isle of man	9.9	394	416	425	11.9	13.1	13.6	30203	31490	32000
Norwegian Int'l	15	489	467	462	12.9	12.5	12.5	26380	26767	27056

Danish Int'l	15.8	472	489	491	11.4	11.4	11.5	24153	23313	23422
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Source: World Fleet Monitor (CLARKSON, 2012)

Table 2-3 lists from 2010 to 2012, 3 countries adopted semi-open registration system whose total tonnage ranked the top 30 in the world and compared these countries from the vessel age, vessel number and average tonnage. Their gap is obviously small because semi-open registration has a short history. The average vessel age, average vessel number and average tonnage is 459 vessels, 12.5 million tons, and 27492 ton, respectively.

Table 2-4 The comparison of three systems

Registration system	Age	No Vessel	Million GRT	Avg. RT
Strict	23.0	2263	13.8	8832
Open	11.7	2504	70.0	31559
Semi-open	13.5	459	12.5	27492

Source: World Fleet Monitor (CLARKSON, 2012)

From Table 2-4 we can clearly see the difference between the three registration systems, for the strict registration, the vessels are generally old. Although number of vessels is large, gross tonnage and average deadweight ton are less. Thereby, strict registration countries have older vessels, whereas open registration countries have many new built vessels because of low registration fee and loose restrictions. So the situation of vessels in open countries is contrary to strict registration countries. In the 1970 s, the second registration system was implemented, so the number of vessel is less, the vessel age is young and the vessel size is generally large. So it is obvious that the second registration is very attractive to ship owners. Additionally, many countries in order to prevent flagging out, have adopted the second registration system.

The Table 2-5 shows the detail of second registration countries.

Table 2-5 Second registration countries

Brazil	Registro Especial Brasileiro (REB)
China	Hong Kong
	Macao
Denmark	DIS
	Faeroes
	Faeroes (FAS)
France	French Antarctic Territory-Kerguelen Islands
	Wallis and Futuna Islands
Germany	GIS
Italy	Second register
Netherlands	Netherlands Antilles
New Zealand	Cook Islands
Norway	NIS
Portugal	Madeira (MAR)
Spain	Canary Islands (CSR)
Turkey	Second register

United Kingdom

Anguilla

Bermuda

British Virgin Islands

Cayman Islands

Channel Islands

Falkland Islands

Gibraltar

Isle of Man

Turks and Caicos Islands

Source: ILO The impact on seafarers living and working conditions of changes in the structure of the shipping industry JMC/29/2001/3

3. Ship registry system of China and the status quo of flagging out in China

3.1 The development course of China's ship registry system

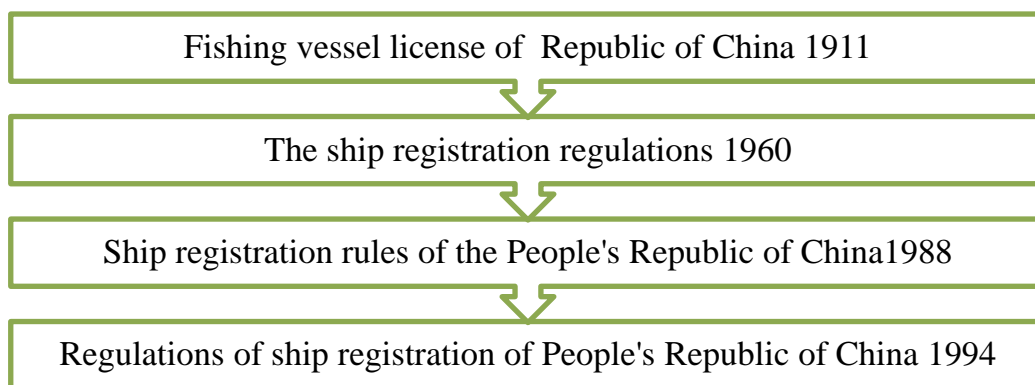


Figure 3-1 development course of China's ship registry system

Source: Reform of ship registration system in China(He, 2002)

Jiaxing ship culture museum has lots of collections such as shipping certificates at the beginning of the first year of the Republic of China and the beginning of the establishment of the People's Republic of China, including wooden sail-ship registration certificate issued by East China Military

Administrative Committee and Inland Waterway Bureau of Ministry of Communications in the 1950s and the fishing vessel license from the first year to the eleventh year of the Republic of China.

According to different periods of economic development situation and the surrounding environment requirements, in terms of ship registration, China's relevant legal system and the law is constantly changing, from the " The ship registration regulations 1960 " to "Ship registration rules of the People's Republic of China1988", then to " Regulations of ship registration of People's Republic of China 1994".

The current "Regulations of ship registration of People's Republic of China" was revised "Ship registration rules of the People's Republic of China" in 1988, published in June 1994, and implemented in January 1995. Regulations of ship registration of People's Republic of China " clearly stipulates the port supervision institutions of the people's Republic of China is the ship registration authority that is responsible for the ownership of the ship, the nationality of the ship, the mortgage of the ship and the ship bareboat charter registration, etc.

In accordance with the spirit of "the United Nations Convention on Conditions for Registration of ships ", China's registry system is the strict registration system which is in line with China's national conditions. In "Regulations of ship registration of People's Republic of China", it is explicitly stipulated that a ship is going to register in China, which ownership must belong to Chinese people (including legal and natural persons). The ship owner's residence or principal place of business of the ship owner must be within the territory of China. The Chinese investor's contribution shall not be less than 50% when the registered capital of the business entity contains foreign funds. And the crew of the

Chinese ships shall be Chinese citizens, but the ship owners could hire foreign crew under the conditions that they have reported to the Ministry of Transport and received approval. The specific terms are as follows:

1. Ships owned by citizens of the People's Republic of China whose residences or principal places of business are located within the territory thereof;
2. Ships owned by enterprises with legal person status established under the laws of the People's Republic of China and whose principal places of business are located within the territory thereof, provided that foreign investment is involved, the proportion of registered capital contributed by Chinese investors shall not be less than 50%.

3.2 The practice of Ship's nationality registration in China

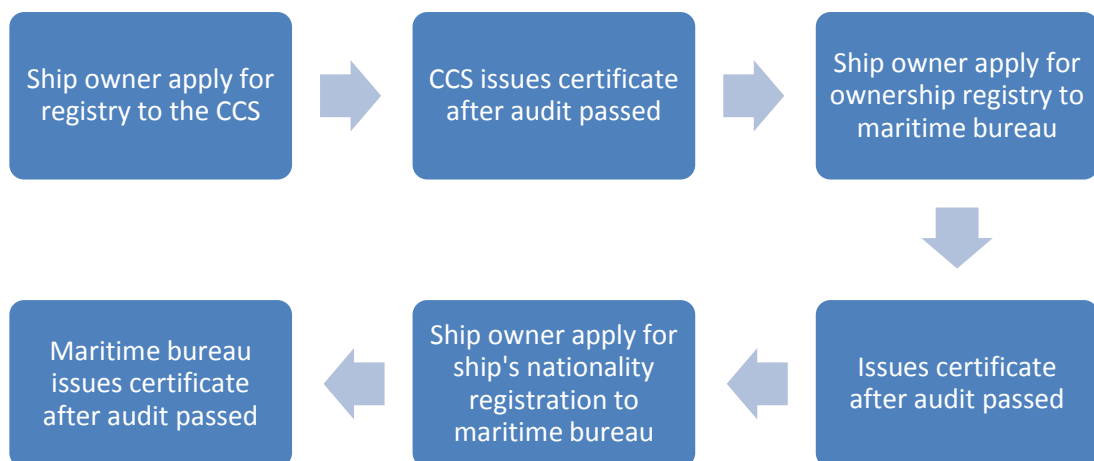


Figure 3-2 The ship registration procedures

Source: <http://wenku.baidu.com/view/bca730a4284ac850ad024260.html>

Table 3-1 Required certificates

Required Certificates
Ship's ownership certificate
Marine technology certificate
International Tonnage Measurement Certificate
International Load Line Certificate
Cargo Ship Safety Construction Certificate
Passenger Certificate
Passenger Ship Safety Certificate
Cargo Ship safety Radiotelegraphy Certificate
International Oil Pollution Prevention Certificate
Ship Navigation Safety Certificate

Source: <http://wenku.baidu.com/view/4b37284769eae009581bec39.html>

The above detailed requirements can be seen that, in addition to clearing the order of ownership and nationality, and avoiding dual nationality of the ship, whether it's asking ship after inspection to obtain corresponding certificate of technical qualifications, or request ship by a qualified operator operation, the ships' safety is principally considered during the nationality registration. The No. 6 announcement of the Ministry of Communications in 2004 provisions that "It is forbidden that ordinary cargo ship converted into a hazardous liquefied cargo ship and different kinds of hazardous liquid cargo ships converted each other. What's more, hazardous liquefied cargo ship rebuilt of international service is prohibited domestic transportation. In addition, new hazardous liquid cargo ships must obtain approval of the department in charge of transportation, provided that they want to engage in domestic transportation." Those are all further safety requirements for the registration of Chinese nationality.

3.3 Analysis of the status quo of flagging out in China

3.3.1 The status quo of flagging out in China

The number of Chinese foreign nationality ships is rising year by year. According to the data of Fair Yearbook in Lloyd's Register, the number of Chinese foreign nationality ships increased from 1130 ships in January 2006 to 1609 ships in January 2010, an average annual increase of approximately 100. At the same time the deadweight ratio of foreign nationality ships also increased from 54.45% to 61%. According to the Ministry of transport and Maritime Bureau statistics, as of the end of 2011, the number of international ships registered in China is only 1198 ships; the gross tonnage is only 23960000.

Table 3-2 The number of China fleet

Date(until)	The number of ships		DWT of foreign nationality ships(10k dwt)	Percentage of foreign nationality in total DWT(%)
	Total	Foreign nationality ships		
Jan. 2006	2893	1130	35656	54.45
Jan. 2007	3184	1314	38162	54.21
Jan. 2008	3303	1403	50531	59.53
Jan. 2009	3499	1555	55594	59.91
Jan. 2010	3633	1609	63426	61.00

Source: The Yangshan Port of China: Innovation in the Ship Registry System (Chang, 2012)

3.3.2 Analysis of the reasons for flagging out in China

For the flagging out of China, the reason mainly has the following three aspects:



Figure 3-3 the reason of the flagging out of China

3.3.3 The damage of flagging out for China

The status quo of China's flagging overseas, not only with China's current situation does not match, but also have a negative effect on all aspects of the national economy, shipping industry and national image to a great extent, including the following aspects:

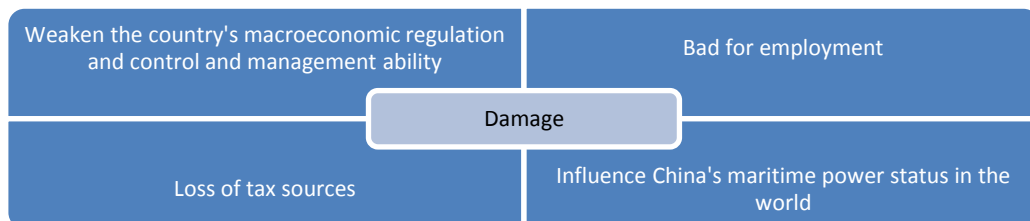


Figure 3-4 Damage of flagging out for China

1. Flagging out will weaken the country's macroeconomic regulation and control and management ability. Because in law the flag of convenient ship in China belongs to the foreign ships, so China has no right to direct control and supervision and management, also can't know exactly what these changes in assets and gains profit and loss situation of the ship. All of those lead to hardly provide effective supervision of state-owned assets, and differently implement macroscopic readjustment and control according to the development of the national shipping market.

2. Flagging out will lead to loss of tax sources. Because of fierce competition many enterprises try to have tax evasion and tax avoidance. For the ship has liquidity, it can transfer from one to the other country as an object of taxation.

3. Flagging out is not conducive to China's employment of seamen. According to the "Regulations of ship registration of People's Republic of China", the crew of the Chinese ships shall be Chinese citizens, but the ship owners could hire foreign crew under the conditions that they have reported to the Ministry of Transport and received approval. Although the crew of Chinese-funded flag of convenience are mostly Chinese crew members, but there are a lot of hiring foreign crew, mainly because low cost of some foreign crew, and they possess high English level, which will undoubtedly have a certain impact on the Chinese crew employment.

4. Flagging out will influence China's maritime power status in the world. Due to the large number of new ships have flagged out one by one, the Chinese veteran fleet is facing aging seriously. Average ship age of flag of convenience

is only 10 years, but Chinese veteran fleet is 21.7 years, much higher than the international average age of 16.2 years. Technical condition of Chinese ship team gradually deteriorated, when receiving the PSC inspection, retention rate increased heavily, which seriously damage to the China as the shipping power status around the world.

4. Evaluation of the ship registry system based on the Analytic Hierarchy Process (AHP)

4.1 theoretical method of Analytic Hierarchy Process

The AHP (Analytical Hierarchy Process) is a systematic decision analysis method proposed by American University of Pittsburgh professor Saaty in the nineteen seventies. This method is a systemic analysis method of combining qualitative analysis with quantitative analysis, and it is a powerful tool for the analysis of multiple targets and multiple criteria in the complex system. It is clear, convenient, wide application, and AHP method is convenient for popularization, which become an easy and feasible method to analyze question, solve problem s and make decision-makings in people's work and live.

AHP method has got the attention of numerous experts and scholars at home and abroad, because of its wonderful characteristics including simple principle, clear structure, and the combination of qualitative and quantitative. Therefore, this method is widely used in regional economic development evaluation

system. Based on AHP method, three kinds of ship registration system (open registration system, strict registration system and semi-open registration system) is studied. Accordingly, using AHP to analyze three kinds of registration system of typical countries - China, panama, the Bahamas, Norway and Britain, through various angles to evaluate and select the most suitable registration system for China, finally give some suggestions for improvement of China's ship registration system.

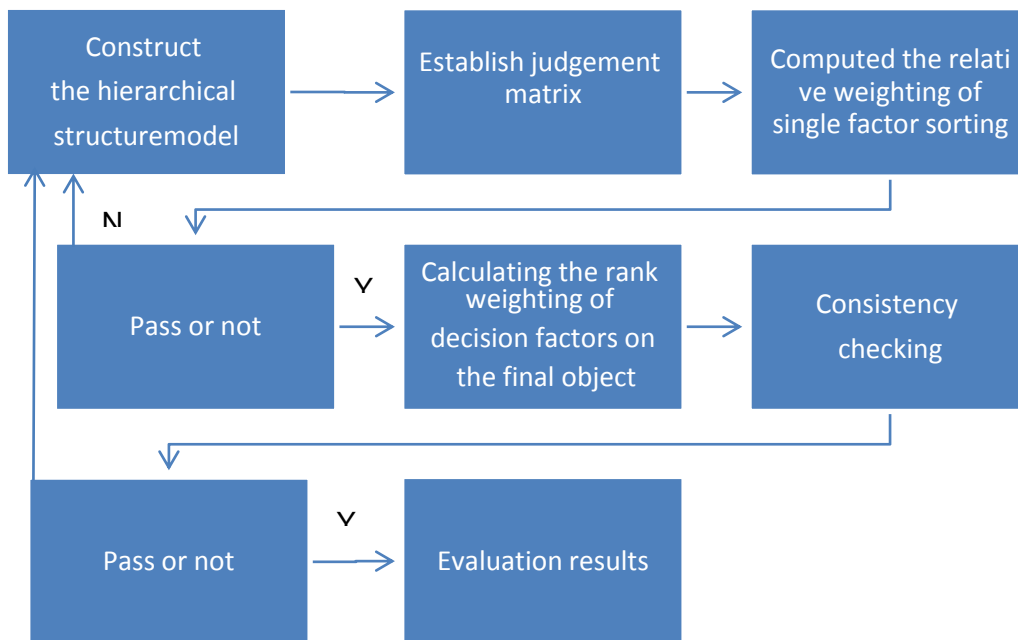


Figure 4-1 AHP Processing

Source: <http://wenku.baidu.com/view/18e64c03581b6bd97f19ea12.html>

4.2 Structuring Evaluation Index System

Through the further understanding of ship registration system, you can see there are kinds of ship registration systems in the world, as well as a variety of system each has advantages and disadvantages in practical application. For most of the owner, if all conditions are the same, they will surely choose

register in their own country, flying their own flag and equipped with domestic crew members. But in fact, national policy, the environment and cost there are apparently different. Thereby, as a ship company, the most concern is cost as cost directly linked to finally interests of company. So the price of preferential registration system is attracted to the ship owners. In addition to the price, the owner will consider the state service. Because many countries although the registration price is low, the service does not keep up with other country, resulting in the registration procedure chaos, complex, which will directly or indirectly cause the loss of the owner. Other countries also have their own restrictions on the ship registration and political aspects factors, both will be the owner's considerations. So from the owner's interests, we use AHP to evaluate different services from multiple perspectives. In terms of the existing research, we can divide select factors of ship registration country into four main aspects including economic, service, restrictions, and politics. The indicators decomposed from the four aspects can constitute a complete set of evaluation index system. Important degree of each index system is different, and different ship registry system of countries relative to different indicators has different comparison between advantages and disadvantages, which may constitute a different level of structure system, and provide the structural basis of relatively complete for the analytic hierarchy process. Therefore, in this sense, analytic hierarchy process is a suitable decisions method for ship owner to evaluate ship registry system and choose optimal ship registry system. Concrete evaluation index is as follows.

4.2.1 Economy

1. Tax: Tax fees is a big problem that the owner will consider in choosing the ship registration countries, because of high taxes directly influenced the cost. In today's competitive market, the China's ship registration fee is steady high, which is the main cause of flagging out in China. Flag of convenience ships usually pay a very low tax, or simply don't have to pay tax. Open registration countries charge registration fees and annual pension for income, and these costs compared with the freight revenue by the shipping company is negligible. However, according to relevant laws and regulations in China, Chinese ships should pay 6% sales tax (export goods), 33% of the income tax and surcharges for cargo transportation. In addition, such as buying a foreign ship need to pay 27.53% tariff and VAT. This makes the Chinese ship companies often have to choose to move overseas to avoid high tax.

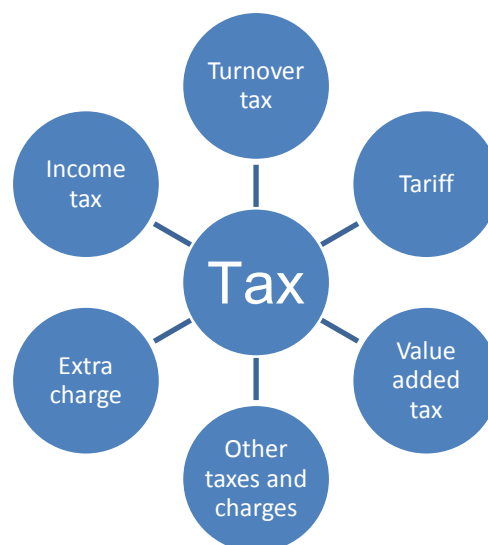


Figure 4-2 Tax

2. Registration fee: Registration fee is a one-time delivery fee at the time of ship registration. In order to encourage the ship to register in their country, some countries will reduce registration fee if the ship meets the requirements, which has attracted a part of the owners to register there.

3. Financing environment: Capital is the lifeblood of enterprise survival, and in the whole process of ship construction, shipbuilding enterprises must make the pledge that possessing plenty of money. Because of the increase in competition ability of international shipping market, contradiction of capital supply and demand increasingly becomes the bottleneck of enterprise development, so a good financing environment is a vital factor that owners must consider.

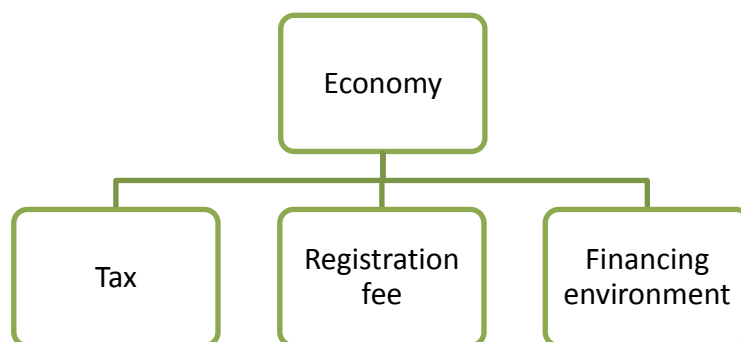


Figure 4-3 Economy

4.2.2 Service

1. Supporting services: As people constantly improve the understanding of the importance of service, low price service has not been pursued by consumers. Service value has been one of the important customer value factors. Service value is considered to be the ratio of customer pay and reward. From the perspective of the owner profits service value is how to meet the needs of owners by the ship registration countries, how to satisfy the value obtained by the owner's, and how to increase the profit of ship owner.

2. Efficiency of the service and registration process: Time is money, low service efficiency and multifarious registration procedure will bring owners many tangible and intangible losses, such money loss or damage of enterprise image.

3. Fleet management: Effective fleet management can reduce the risk of fleet, improve the operating efficiency of the ship, urge to meet a series of regulations and requirements and ensure safety.

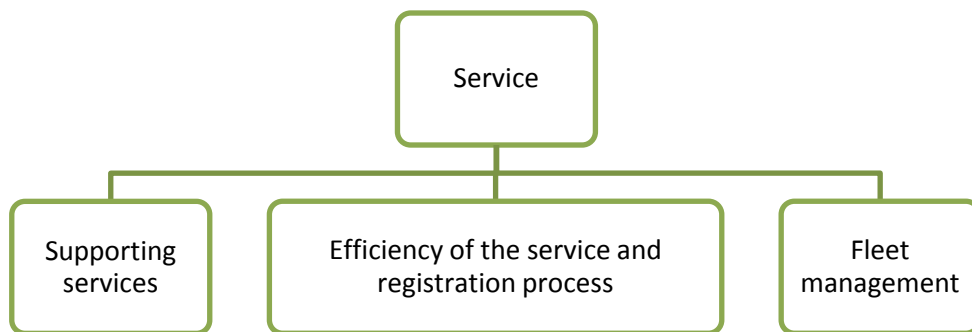


Figure 4-4 Service

4.2.3 Restrictive

1. Route area: For the protection of national sovereignty, so far, the world's major countries have not developed coastal navigation rights, that is to say, the ship hanging other countries flag cannot be engaged in domestic coastal shipping transportation.

2. Nationality of the crew: Under strict registration system, it is very strict for the crew number and crew requirements. For instance, the proportion of foreign

crew has strict restrictions. So many ship owners from developed countries have to choose their crew and makes cost increase. However, under the open registration system, it has looser requirements for the crew nationality, so from the cost considerations, the owner will choose open registration system.

3. Ship's condition: Under strict registration system, shrinking fleet, aging, low technical conditions and potential safety hazard are all serious problems. New built large ships are generally registered in the open registration system. So ship's condition under strict registration system is generally not better than that in the open registration system.

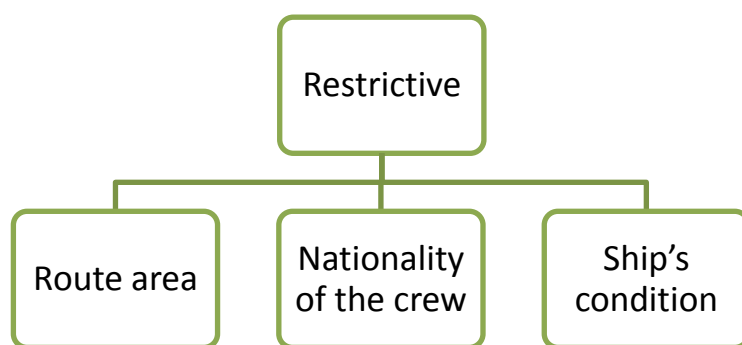


Figure 4-5 Restrictive

4.2.4 Effect:

1. Social credibility: Credibility is the government's influence and appeal. It is the objective result of the government administrative ability, reflects the degree of the authority of government, democracy, service levels and the rule of law construction. At the same time, it also reflects the people's satisfaction and trust to the government. Credibility as a kind of intangible assets is formed in

the development of long-term accumulates over a long period; reflect a kind of irreplaceable authority.

2. National Security: National security is also owner's consideration. In gulf of Aden and waters off Somalia, the events of pirates hijacked ship happening frequently. Government will send naval ships to protect the ship sail safely and protect the security personnel. So the perfect security of the country is the strong guarantee of ensuring safe navigation.

3. Transport convenience: Due to some political factors, some ships hanging certain country's flag can't be able to operate in a particular route or area. In view of this, many owners will use open registration to get rid of these limitations, so that they could seek more profit opportunities around the world. In the past, Chinese mainland and Taiwan have not been navigable, mainland China's goods must transport from Hong Kong and other places into Taiwan, resulting in a lot of inconveniences. So many political factors are ship owners' consideration.

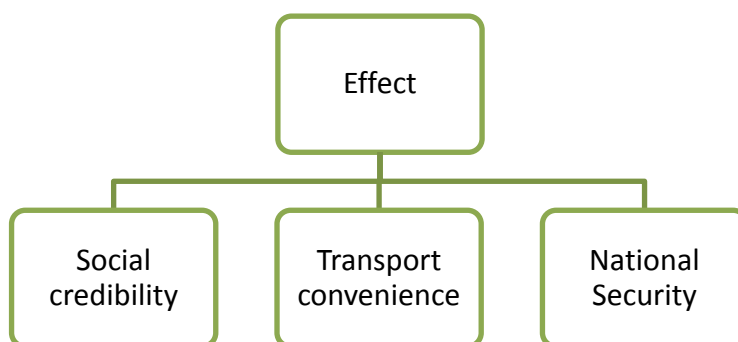
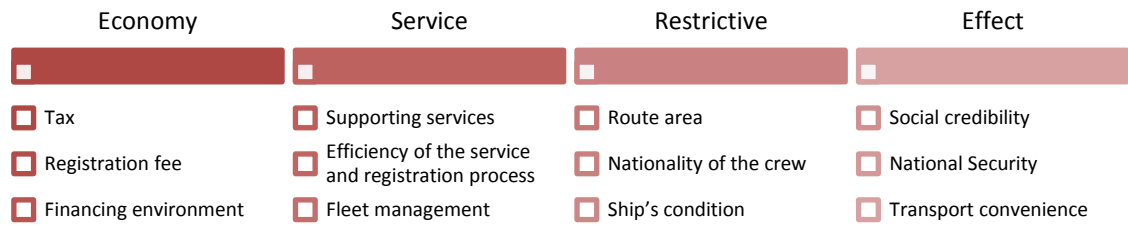


Figure 4-6 Effect

Table 4-1 shows the final evaluation index.

Table 4-1 Evaluation Index



4.3 Sample selection

1. China

China is a typical strict registration system, there are common characteristics of strict registration country, as above has been described in detail, here does not go into details.

2. Panama

Panama is the largest and earliest open registration country in the world, dating back to 1920. After World War II, the shipping industry emerged fierce competition, so the owners of the United States and other countries in order to save cost and win in the fierce competition, transferred all of their ships to the country that can provide free registration and can exempt from taxes. At that time, in terms of the registration of flag of convenience, Panama with its favorable conditions and a long history become most owners preferred. From 1950s to the end of last century, Panama only wants to pursue the number of ships, does not care about the quality of the ship, which made Panama notorious.

At the beginning of twenty-first Century, Panama has taken a series of measures to change the disadvantageous position in the shipping industry. For example, they have raised the standard of ship inspection and acceptance, implemented the penalty system, and promised that the ship won't be nationalized or confiscated by the government. By improving the system, Panama once again become the majority owner of a registered flag of convenience preferred. Panama accepts various kinds of ships register of all owners from any nationality, and they don't have any restrictions for vessel age, tonnage, ship owners and crew. Panama has a preferential tax system which a ship registered in Panama, pays an annual fee according to the gross tonnage of the ship and doesn't need to pay the business income tax, business tax, etc. The law of Panama No. thirty-sixth came into effect in 1995 provides a 50% reduction of ship registration fee discount for those who have registered more than 3 vessels in Panama and not less than 100000 tons of the total tonnage.⁶

3. The Bahamas

Bahamas is one of the more successful economic developments of the Caribbean region, economy of the three pillar industries are the ship registration, the tourism industry and the international financial services.

All kinds of ship belong to Bahamas citizens can register without any restrictions. The ship owned by foreigners in the registration, must meet the following conditions: the age of not more than 12 years; more than 1600 net tonnage of ships engaged in foreign trade transportation. Foreign ship owners

⁶ (Ma, 2007)

are going to register Bahamas, must meet the following conditions: the age of ship is not more than 12 years; and the ship needs to be engaged foreign trade transportation with more than 1600 net tonnage.

The Bahamas maritime bureau is responsible for the ship's registry. The Bahamas set up offices in Nassau and London to levy annual fee on the ship owner according to the tonnage.⁷

4. The UK

The UK is the traditional shipping powers, with many overseas colonies. Since the 1970s, due to the world shipping downturn and development of flag of convenience, the situation of flagging out in British is very serious, leading the number of ships reduced and a serious threat to the British sea power. In order to maintain the national shipping fleet, the British government has taken a series of shipping policies such as subsidies for the crew, relax restrictions for crew nationality, reduce social insurance fee, as well as in 1978 on the Isle of man to open second ship registration office, which is the world's first country set up offshore registration system. The UK is open for the ships of all nations, the registered ship can sail on any route; registration cost is low, and the ship owner and operator can enjoy tax; however, the ship's captain and chief engineer must hold a British or Commonwealth eligibility certificate in the Isle of man to register, in addition, there is no requirements for the crew's nationality.⁸

5. Norway

⁷ (Ma, 2007)

⁸ (Yuan, 2012)

Norwegian International Ship Register is a successful example of international ship registration system. Norway is the early European shipping powers, and the original ship registration system (The Norwegian Ordinary Ship Register, referred to as NOS) is very similar to the China ship registration system, which are both strict registration system. In 1978, the Norwegian ship owners have 96% hanging their national flag, however, by 1987, this proportion dropped to 38%. The main reasons are that the salary standard of Norwegian crew is too high; the social welfare burden is too heavy and economic cost of the ship is increasing. In order to change this situation, the government of Norway decided to build second registration system, namely the Norwegian International Ship Register, referred to as NIS. The government of Norway wants to use second registration system to discourage their ship owners to register in the foreign country or sell the ship, in order to maintain and develop the country's advantage in the shipping field and promote the recovery of the shipping industry.

A ship registered in NIS, hanging the flag of Norway, is regarded as a Norway ship in the law, under the condition that only engaging in international maritime transportation business. NIS is not only to open for their ship owners, but also open to foreign ship owners. Furthermore, the crew has no nationality request except for the captain. Additionally, the registration fee and patterns of NIS and NOS are basically same.⁹

Through the implementation of Norwegian International Ship Register, Norway ship team continues to expand the scale; the international balance of payments is improved; and also promoted the development of shipbuilding industry,

⁹ (Yuan, 2012)

insurance industry, freight forwarder and other related industries. Subsequently, Denmark, Germany, Luxemburg and other countries also have established their international ship registration system respectively.

Table 4-2 Comparison of ship registration system

	Type	Crew	Tax, Fee	Age of vessel	Fleet Ranking(2012)
China	Strict	limited	High	limited	9
Panama	Open	No-limit	Low	20	1
The Bahamas	Open	No-limit	Low	20	6
UK	Off-Shore	No-limit	Low	No-limit	11
Norway	International	No-limit	Medium	No-limit	16

4.4 Empirical Analysis of the evaluation of the vessel registration system based on the Analytic Hierarchy Process

4.4.1 Hierarchical structure

According to the above analysis, take flag state A which is the most suitable reference for China as the target layer, take the Economy, Service, Restrictive

and Effect as the rule layer and mark other 12 concrete evaluation index with number such as Tax(C1), Registration fee(C2), Financing environment(C3), Supporting services(C4), Efficiency of the service and registration process(C5), Fleet management(C6), Route area(C7), Nationality of the crew(C8), Ship's condition(C9), Social credibility(C10), National Security(C11), Transport convenience(C12) as index layer ,and order the 5 typical country of registration for evaluation and selection, so China (D1), Panama (D2), Take the Bahamas (D3), Norway (D4), UK (D5) as scheme layer. According to the above analysis, the most suitable for China flag A as the target layer.

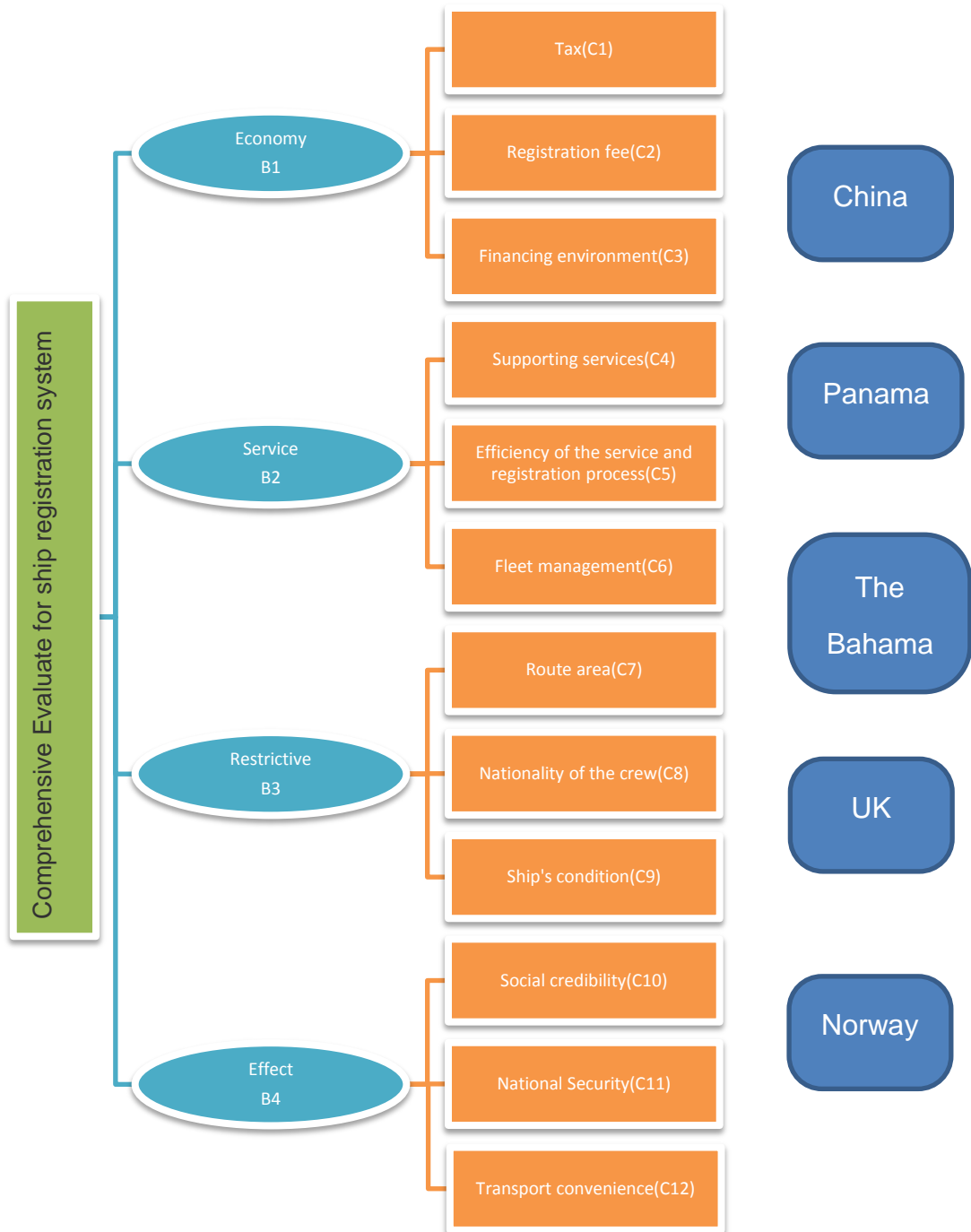


Figure 4-7 Analytic hierarchy process module

4.4.2 Hierarchy single sorting

Construct pairwise comparison judgment matrix. In accordance with the relevant standards, at first, we compare the importance of all elements to each other at all levels, and give a certain level of importance, usually 1-9 scaling method is used to construct an indirect judgment matrix, the following Table 4-3:

Table 4-3 1-9 Scale method

Scale	Meaning
1	Compare two factors, they have the same importance
3	Compare two factors, one is slightly important than the other one
5	Compare two factors, one is obvious important than the other one
7	Compare two factors, one is mightiness important than the other one
9	Compare two factors, one is extremely important than the other one
2, 4, 6, 8	The mid-value of these two adjacent judgment value
Reciprocal	Comparison result of these two factors transposed each other

Take for instance A-B matrix, for target layer A, the comparison results that the relative importance of every criterion layer factors is shown as in the Figure 4-8:

A-B	B1	B2	B3	B4
B1	1	3	2	4
B2	1/3	1	1/2	4
B3	1/2	2	1	5
B4	1/4	1/4	1/5	1

Figure 4-8 A-B weight

As a company, profit must be the top priority, so that economy is certainly in the first place. The state of registration provide preferential tax, relief for registration fee, a good investment and financing environment, which contribute to the interests of the owners. So owners in the selection of flag state value the economic factors at first. Furthermore, the owner according to the different routes, also care about restrictions of different flag state, for example, if the owners need to operate domestic routes, developing a new flag state or finding a second ship registration system is not very good choice as only the ships under strict registration system operate domestic routes. High salary and many restrictions for crew will cause the owner give up for registering in their own country, because cheap foreign crew can save a large sum of money; Low work efficiency is not adapt to the current situation, the ship owner will choose the registration country with high efficiency and good service; Finally, the political factor is also an important factor, but less important than first three factors. A great nation has good security with warships for protecting the ship and cargo security; the owner some business of its own is not navigable routes will also give up their registration. Some ship owners will also give up their own country because of unnavigable routes in their country.

Thereby, in these four factors, according to the importance degree, the sequence is: economy, restrictions, service and politics.

Each column of the judging matrix will be normalized:

$$\bar{b}_{ij} = \frac{b_{ij}}{\sum_{k=1}^n b_{kj}} \quad (i=1,2,\dots,n)$$

Normalized judging matrix by column will be summated by row:

$$\bar{W}_i = \sum_{j=1}^n \bar{b}_{ij} \quad (i=1,2,\dots,n)$$

$$\bar{W}_i = [1.786 \quad 0.741 \quad 1.187 \quad 0.285]^T$$

Normalize this vector: $\bar{W} = [\bar{W}_1, \bar{W}_2, \dots, \bar{W}_n]^T$

$$W_i = \frac{\bar{W}_i}{\sum_{i=1}^n \bar{W}_i} \quad (i=1,2,\dots,n)$$

Then $W = [W_1, W_2, \dots, W_n]^T$ is the requested feature vector.

$$W = [0.447 \quad 0.185 \quad 0.297 \quad 0.071]^T$$

Calculate the largest eigenvalue :

$$AW = \begin{bmatrix} 1 & 3 & 2 & 4 \\ 1/3 & 1 & 1/2 & 4 \\ 1/2 & 2 & 1 & 5 \\ 1/4 & 1/4 & 1/5 & 1 \end{bmatrix} \begin{bmatrix} 0.447 \\ 0.185 \\ 0.297 \\ 0.071 \end{bmatrix} = \begin{bmatrix} 1.881 \\ 0.768 \\ 1.247 \\ 0.289 \end{bmatrix}$$

$$\lambda_{\max} = \sum_{i=1}^n \frac{(AW)_i}{nW_i} = 4.152$$

Consistency checking

In order to test consistency of judgment matrix, it is necessary to calculate the consistency index C.I.

$$C.I. = \frac{\lambda_{\max} - n}{n - 1} = 0.051$$

Compare C.I. with random consistency index R.I. The values of matrix R.I. in order 1-6 shown in the following table:

order	1	2	3	4	5	6
R.I.	0	0	0.58	0.90	1.12	1.24

If $CR = \frac{CI}{RI} < 0.1$, the judgment matrix has consistency.

$$CR = \frac{CI}{RI} = 0.045 < 0.1$$

So, matrix A - B has consistency.

Similarly, we can calculate other eigenvalue and eigenvector of judgment matrix in turn:

Matrix B1-C

B1	C11	C12	C13	W	$\lambda_{\max} = 3.025$
C11	1	3	1/2	0.334	
C12	1/3	1	1/3	0.142	C.R.=0.021<0. 1
C13	2	3	1	0.525	

Matrix B2-C

B2	C21	C22	C23	W	$\lambda_{\max} = 3.009$
----	-----	-----	-----	---	--------------------------

C21	1	2	3	0.539	
C22	1/2	1	2	0.297	C.R.=0.008<0. 1
C23	1/3	1/2	1	0.164	

Matrix B3-C

B3	C21	C22	C23	W	$\lambda_{\max}=3.009$
C21	1	1/2	2	0.297	
C22	2	1	3	0.539	C.R.=0.008<0. 1
C23	1/2	1/3	1	0.164	

Matrix B4-C

B4	C41	C42	C43	W	$\lambda_{\max}=3.009$
C41	1	1/2	1/3	0.164	
C42	2	1	1/2	0.297	C.R.=0.008<0. 1
C43	3	2	1	0.539	

Matrix C11-D

C11	D1	D2	D3	D4	D5	W	$\lambda_{\max}=5.095$
D1	1	1/5	1/6	1/4	1/3	0.050	
D2	5	1	1/2	2	3	0.276	
D3	6	2	1	2	3	0.376	C.R.=0.021<0.1

D4	4	1/2	1/2	1	2	0.185	
D5	3	1/3	1/3	1/2	1	0.114	

Matrix C12-D

C12	D1	D2	D3	D4	D5	W	$\lambda_{\max} = 5.122$
D1	1	1/5	1/4	1/2	1/3	0.062	
D2	5	1	2	4	3	0.412	
D3	4	1/2	1	3	2	0.258	C.R.=0.027<0.1
D4	2	1/4	1/3	1	1/3	0.092	
D5	3	1/3	1/2	3	1	0.176	

Matrix C13-D

C13	D1	D2	D3	D4	D5	W	$\lambda_{\max} = 5.055$
D1	1	1/2	1/2	1/3	1/3	0.125	
D2	1/2	1	1	1/4	1/5	0.074	
D3	1/2	1	1	1/4	1/5	0.074	C.R.=0.012<0.1
D4	3	4	4	1	1/2	0.289	
D5	4	5	5	2	1	0.439	

Matrix C21-D

C21	D1	D2	D3	D4	D5	W	$\lambda_{\max} = 5.133$
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D1	1	3	2	1/2	1/3	0.164	C.R.=0.030<0.1
D2	1/3	1	2	1/3	1/4	0.094	
D3	1/2	1/2	1	1/4	1/5	0.067	
D4	2	3	4	1	1/2	0.261	
D5	3	4	5	2	1	0.414	

Matrix C22-D

C22	D1	D2	D3	D4	D5	W	$\lambda_{\max} = 5.156$
D1	1	4	2	1/2	1/3	0.182	
D2	1/4	1	1/2	1/3	1/4	0.068	C.R.=0.035<0.1
D3	1/2	2	1	1/3	1/4	0.102	
D4	2	3	3	1	1/2	0.249	
D5	3	4	4	2	1	0.399	

Matrix C23-D

C23	D1	D2	D3	D4	D5	W	$\lambda_{\max} = 5.098$
D1	1	4	3	2	2	0.371	
D2	1/4	1	1/2	1/4	1/4	0.064	C.R.=0.022<0.1
D3	1/3	2	1	1/3	1/3	0.099	
D4	1/2	4	3	1	1	0.233	

D5	1/2	4	3	1	1	0.233	
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Matrix C31-D

C31	D1	D2	D3	D4	D5	W	$\lambda_{\max} = 5.036$
D1	1	4	4	3	2	0.413	
D2	1/4	1	1	1/2	1/3	0.088	
D3	1/4	1	1	1/2	1/3	0.088	C.R.=0.008<0.1
D4	1/3	2	2	1	1/2	0.154	
D5	1/2	3	3	2	1	0.257	

Matrix C32-D

C32	D1	D2	D3	D4	D5	W	$\lambda_{\max} = 5.013$
D1	1	1/2	1/3	1/2	1/3	0.089	
D2	2	1	1/2	1	1/2	0.158	
D3	3	2	1	2	1	0.298	C.R.=0.003<0.1
D4	2	1	1/2	1	1/2	0.158	
D5	3	2	1	2	1	0.298	

Matrix C33-D

C33	D1	D2	D3	D4	D5	W	$\lambda_{\max} = 5.068$
D1	1	1/2	1/3	1/5	1/4	0.063	

D2	2	1	1/2	1/4	1/3	0.099	C.R.=0.015<0.1
D3	3	2	1	1/3	1/2	0.161	
D4	5	4	3	1	2	0.416	
D5	4	3	2	1/2	1	0.261	

Matrix C41-D

C41	D1	D2	D3	D4	D5	W	$\lambda_{\max} = 5.068$
D1	1	5	4	2	3	0.421	
D2	1/5	1	1/2	1/4	1/3	0.062	
D3	1/4	2	1	1/3	1/2	0.097	C.R.=0.015<0.1
D4	1/2	4	3	1	2	0.261	
D5	1/3	3	2	1/2	1	0.158	

Matrix C42-D

C42	D1	D2	D3	D4	D5	W	$\lambda_{\max} = 5.099$
D1	1	6	5	3	4	0.485	
D2	1/6	1	1/2	1/4	1/3	0.057	
D3	1/5	2	1	1/3	1/2	0.089	C.R.=0.022<0.1
D4	1/3	4	3	1	2	0.227	
D5	1/4	3	2	1/2	1	0.143	

Matrix C43-D

C43	D1	D2	D3	D4	D5	W	$\lambda_{\max} = 5.377$
D1	1	6	3	4	5	0.483	
D2	1/6	1	1/3	1/4	1/2	0.056	C.R.=0.084<0.1
D3	1/3	3	1	1/2	1/3	0.117	
D4	1/4	4	2	1	2	0.196	
D5	1/5	2	3	1/2	1	0.148	

4.4.3 Hierarchy total sorting

1. Hierarchical sorting for criterion layer

Table 4-4 Hierarchical sorting for criterion layer

	B1	B2	B3	B4	Index weight
A-B weight	0.447	0.185	0.297	0.071	
C11	0.334				0.149
C12	0.142				0.063
C13	0.525				0.235
C21		0.539			0.100
C22		0.297			0.055
C23		0.164			0.030
C31			0.297		0.088
C32			0.539		0.160
C33			0.164		0.049

C41				0.164	0.012
C42				0.297	0.021
C43				0.539	0.038

2. First-level indicator hierarchical sorting for target layer

Table 4-5 First-level indicator hierarchical sorting for target layer

B-D	D1	D2	D3	D4	D5
B1	0.091	0.190	0.201	0.227	0.294
B2	0.205	0.081	0.082	0.253	0.379
B3	0.181	0.127	0.213	0.199	0.280
B4	0.454	0.059	0.108	0.226	0.153

From Table 4-2 and Table 4-3, It is clear show that the 5 countries in the sort of first and second grade indexes. In the aspect of economy, China is worse than open and semi-open registry country in the aspect of tax, registration fee and financing environment. And open registry country have many preferential policy on registration fee, semi-open registry country has good financing environment. Financing environment has been recognized as important element. So the semi-open registration system is better.

In the aspect of service, semi-open registration system has convenient registration procedure, high-quality supplemental service. China has always implemented the strict registration, so it has advantages of easy management of fleet. But semi-open registration country is also good; it has ability to manage fleet. Open registration country doesn't have ability to manage vessel. So the Semi-open registration system is better than the other systems.

In aspect of Restrictive, if ship-owner needs operating domestic coastal liner and coastal loading and unloading, it must registry the ship in the country he wants to operate. Open and semi-open registry system don't have right to operate the domestic coastal liner. China has many restrictions on crew nationality and the proportion of foreign crew. The ship condition registered in china is worse than the ship registered in open and semi-open registration country. Because most of the ship registered in China operate the domestic coastal liner, the ship registered in open and semi-open registration country operate long ocean route. So the ship condition of long ocean route is better than domestic liner.

In aspect of effect, the social credibility of the ship in strict registration is reliable than open and semi-open registration. China has strong navy, and merchant ships can pass the dangerous district under the assistance of navy. So the merchant ships have security assurance. And accidents during the ship sailing can be well solved in time. But most of open registration country is small country and it don't have strong navy, comprehensive national strength is bad, so it hard to provide safe protection in ship sailing. But some route is not navigable for political factor, so open registration ship works.

3. Hierarchy total sorting of program layer

Table 4-6 Hierarchical sorting for program layer

	C11	C12	C13	C21	C22	C23	C31	C32	C33	C41	C42	C43	Total sorting
A-C weight	0.149	0.063	0.235	0.100	0.055	0.030	0.088	0.160	0.049	0.012	0.021	0.038	
D1	0.050	0.062	0.125	0.167	0.182	0.371	0.413	0.089	0.063	0.421	0.421	0.483	0.165

D2	0.276	0.412	0.074	0.094	0.068	0.064	0.088	0.158	0.099	0.062	0.062	0.056	0.142
D3	0.376	0.258	0.074	0.067	0.102	0.099	0.088	0.298	0.161	0.097	0.097	0.117	0.176
D4	0.185	0.093	0.289	0.261	0.249	0.233	0.154	0.158	0.416	0.261	0.261	0.196	0.223
D5	0.114	0.175	0.439	0.412	0.399	0.233	0.257	0.298	0.261	0.158	0.158	0.148	0.295

4.5 Results and analysis

By using analytic hierarchy process to evaluate three kinds of ship registration system, the result demonstrates that China is suitable for semi-open registration system.

In aspect of tax and registration fee, open registration countries have a preferential taxation, and tax accounted for high weight, so open registration countries have great advantages.

In aspect of Financing environment, from the American loan crisis to the European debt crisis, ship financing environment continues to worsen, and March last year. 13 ship financing banks have stopped the ship financial project in 19 ship financing banks in the world, ship financing is more and more difficult to obtain. But China's ship loans cost is too high, and China's financial institutions to the international business participation is relatively shallow, also lack of experience, so the Financing environment is not dominant. For the Semi-open registration countries with long experience and good economic base, so they have a relatively good financing environment.

In aspect of Supporting service and efficiency of the service and registration process, open registration countries mainly in order to make the ship registration fees, and the supporting services is not the focus of concern. Most of semi-open registration countries are the old shipping countries, has a mature service concept, so they do better in supporting services.

In aspect of fleet management, Strict registration system has a very strict and perfect fleet management system, because there are a lot of restrictions on ships, Therefore, management is relatively easy, and convenient flag state management is useless, but it will also greatly reduce its management cost.

In aspect of route area, the ship registered in own state can operate domestic coastal business, but the flag of convenience and second registration system just allow to operate international routes.

In aspect of Nationality of the crew, strict registration system for crew nationality has strict requirements such as the proportion of their own crew and foreign crew. So shipowners have to choose flag of convenience to employ cheap foreign seaman. However, the second ship registration system not only allow shipowners registry their ships in own state but also employ cheap foreign seaman, so the second registration system of ships in the Nationality of the crew has a great advantage.

In aspect of Ship's condition, mostly new building ships for long distance ocean transportation have moved to flag of convenience, just some small size ships and the ship need to operate domestic coastal line. So, the ship condition in china is worse than flag of convenience and second registration countries.

In aspect of Social credibility and National Security, China has a strong national strength, strong navy, a perfect system of Chinese maritime law and good reputation, so the Chinese in Social credibility is better than the flag of convenience. The ship registered in second registration system; nominally it is native ship, different from flag of convenience. So the social credibility of second registration system is not bad

In aspect of Transport convenience, the ship registered in China is allowed to operate domestic coastal line, but for some political reasons or some special reasons the routes are not navigable. At this time, ship-owner has to choose flag of convenience to register their ship. In a word, in need of operation of the domestic business, registered in the local state is the most convenient. Simply operate international routes, the flag of convenience can avoid a lot of political factors, but some convenient flag states take the road of obtaining registration number, blindly expanding fleet number, paying no attention to quality. The ship easily detained in the port for PSC inspecting. So choose a good convenient flag state is very important. The second registration system has good safety guarantee, preferential fee and lower limits. When it is not related to political factors cause it not navigable, the second registry at this time is the best choice.

In the process of calculation, analysis hierarchy process intuitively tells us the ship owners most concern about economic and restrictive factors, followed by the service and political factors. Therefore, China should be appropriate to reduce taxes, to relax the restrictions, to improve the quality of service, provided China wants to attract more ships.

More specifically, the international ship registration system belongs to semi-open registration system is the most optimal ship registration system for China's present situation. If China could introduce the international ship registration system, the owner will give priority to choose China as the ship registration.

5. Countermeasures and suggestions

The paper is used by analytic hierarchy process to evaluate three kinds of ship registration system. According to results, it is obviously to be seen China is suitable for semi-open registration system, especially for the international ship registration system. Finally, based on the results of the study, we put forward relevant suggestions:

1. Advocating introduce international ship registration system.

In recent years, Chinese shipping industry is developing rapidly, and the throughput of the major ports hit a record high. However, China is still carrying out the strict registration system which has stringent requirements for amount of contribution and nationality of crew, etc. and higher taxes and fees compel the ship owners to choose flag of convenient state.

International ship registration system develop the useful and discard the useless of two kinds of traditional ship registration systems: Compared with the strict registration system, the international ship registration system not only retains the control power of domestic ships, but also has humanity, which the registration conditions are loose, such as requirements for ship owner's

nationality, proportion of investment in ship construction. Thereby, it greatly enhanced the appeal, at the same time, deeply simplify the registration procedure. More convenient and fast registration is very conducive to making early navigation rights in order to improve the efficiency of the ship owners.

Norway in 1987, has established the International ship registration system first, then Denmark, Germany, Russia and other countries followed the example of Norway to establish and implement international ship registration system in accordance with their respective national conditions. China also needs to build the ship registration system with Chinese characteristics.

2. Improving the investment and financing environment for ship building

For China, single implementation of the International Ship registration system does not change the status quo of flagging out. Convenient procedure, quality services and flexible mode of operation are the main reasons for promoting cooperation with Chinese ship owners, foreign shipping companies or financial institutions. China is lack of financial products specifically for shipping, application and approval procedures are complicated, the conditions financing and repayment are harsh and lack of incentives, which are difficult to attract ships to register in China. China needs to change the environment of investment and financing, formulate supporting policies, increase the credit financing support, and encourage financial institutions to increase the export buyer's credit. These can start from source of demand and provide convenience for the owners. So China needs to build financial business platform to support for the development of international shipping enterprise and provide different shipping financial services products according to the different

characteristics of large and medium-sized, small and medium-sized international shipping enterprises.

3. Relaxing the provisions of the crew appropriately

The restrictive manning conditions under Chinese current registration, is obviously not conducive to international shipping competition in the international market. Appropriate relaxation on crew employment policies could easily achieve the purpose of reducing the cost and make full use of the international seafarer labor market. However, if like open registration system without restrictions for manning conditions, no clear stipulations on the welfare benefits, which is not beneficial to improve the wages and protect the crew labor. In order to guarantee the second registration system cause bigger impact on the Chinese crew labor market, the captain, chief engineer, senior crew and a certain proportion in the important position must be taken charge by Chinese crew members. And foreign crew could take charge of other positions on the conditions that they must have the foreign competency certificates by the relevant authority and verification of Maritime authorities in China. In addition, foreign crew wages are in accordance with their own countries.

4. Improving efficiency and working level

If the ship registration service cannot provide the service concept of the international competitiveness, which will make the ship owners cannot fit in because they are already accustomed to convenience, quality service of foreign registry. Therefore, China should enhance service consciousness of the ship registration agency and facilitate the registration process and service efficiency. China needs to send outstanding talents to advanced countries to

exchange learning, strengthen the training of employees, improve employee service concept.

CONCLUSION

The ship registration system has a long history and it has continued to evolve with the progress of the times and changes. Open registration system greatly shaken strict ship registration system, but because of its inherent flaws open, caused widespread concern in the international maritime community. The second ship registration system is a new system in the field of international ship registration, based on without changing the original traditional ship registration system, shall be formulated by the flag state government and with the original ship registration system implemented in parallel. It is a preferential registration system and supplement to strict registration system, and it is not to deny strict registration system, but in keeping the strict registration system and at the same time on the implementation of the specific ship conditionally and selectively. Many traditional maritime countries proved that the second flag registration system effectively solve the maritime economic development, security of life and property at sea, marine environmental protection and other issues, and alleviates the impact of the traditional maritime countries flags of convenience.

On December 21, 2011, the ministry of transport agreed to "Yangshan port in China" as a new port of registry. It is a new milestone, but for our country, the second registration of the ship is still in the initial stage, in order to better regulate the ship registration system in our country, it is necessary to conduct in-depth research on how to use the second registration of the ship in china.

The inadequacy of the present paper is: Since the second flag registration system in the country has not yet been fully implemented, the relevant research is still in the theoretical stage, also in the paper the accuracy of the data needs to be improved.

I hope this article can exert positive effects on the implementation of the second ship registration system.

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