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WORLD MARITIME UNIVERSITY

Dalian, China

Study on Officer Supply in Mainland China

By Cao Yali

The People's Republic of 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

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ABSTRACT

TITLE: STUDY ON OFFICER SUPPLY IN MAINLAND CHINA

DEGREE: MSC

Seafarers are the most important human resources in shipping enterprises, and officers occupy a critical and considerable position of all the staff in the marine industry. So it is necessary and urgent to keep a sufficient quantity of officers with high quality and reasonable structure in order to guarantee ship safety, which indirectly protects lives in the sea and clean marine environment and ensures the sustainable development of shipping industry. The problem of officer shortage has been of great concern both worldwide and in Mainland China for many years. The latest BIMCO/ISF 2010 report declares that crew especially officer shortage, will become the challenge confronted by marine industry in the future. International and domestic shortage of high-quality officers makes it most significant to protect the supply of officer by means of developing a reasonable officer human resource and keeping the stability of officer by all relevant parties in the marine industry.

In recent years, the living standard of Chinese people has been rising continually, at the same time working conditions on shore and social welfare have also been improved. However, the number of people who are now willing to engage in the occupation of seafarer is declining. With the development of the world economy and the growth of international trade, the demand for high-quality officer still increases. As a result, the imbalance between officers' supply and demand occurs in domestic and international labor markets. Facing the inevitable development trend of shipping industry, the countries which have sufficient high-quality crew team will take charge of the shipping market initiatives. Therefore, the supply of sufficient high-quality officers should be paid more attention by all the related parties in marine industry to make China a powerful marine country. This paper studies the supply of officers in China by using system theory and model. Through the deep study on condition, trend of the officer's supply and demand in Mainland China, this thesis summarizes some reasons such as macroscopical and microcosmic factors that lead to the imbalance between the supply and demand. According to what has been analyzed, this paper

proposes some effective solutions to the problem.

Key Words: Demand and Supply of officers; Marine Education; Seafarer Training;
Shipping Enterprise; Crew Service; Quality System; Attracting and
Retaining

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LIST OF ABBREVIATION

BIMCO	Baltic International Maritime Council
ISF	International Shipping Federation
IMO	International Maritime Organization
IMEC	International Maritime Employers' Committee
Drewry	United Kingdom Drewry Shipping Consultants Company
SIRC	Cardiff University seafarers' International research Centre
IMEC	International Maritime Employers' Committee
ISO	International Organization for Standardization
IMO	International Maritime Organization
MSA	Maritime Safety Administration
STCW	International Convention for the Standards of Training, Certification and Watch keeping for Seafarers 1995 as amended
COSCO	China Ocean Shipping (Group) Company
DWT	Deadweight Tonnage

Study on Officer Supply in Mainland China

Chapter 1 Introduction

Shipping industry is one of the most essential sectors in the world. As the human resource, seafarers play the most important roles in the shipping industry. However, the development trend of the seafarer is not satisfactory. According to Baltic International Maritime Council (BIMCO)/International Shipping Federation (ISF) 2005 report, there would be a shortage of 27, 000 officers by the year of 2015 (BIMCO/ISF, 2005). BIMCO/ISF statistics in 2010, the most recent one, still showed that the shortage of the number of officers reached 12,481 (BIMCO/ISF, 2010) . In fact, labor shortage in this crucial industry will not only do harm to the economy of a single country, but also to that of the world. Obviously, the skilled manpower in marine sector is becoming a rare commodity in both global market and Chinese labour market (FANG, 2007) .Fundamental steps should be taken by China through training, developing as well as maintaining the manpower so as to have a strong pool of skilled manpower resource for the marine industry. In the following part of the paper, the issue will be further analyzed.

The paper is divided into 7 chapters. The first chapter summarizes the purpose and significance of the topic. The background of the study issue from both the world and Mainland China markets is explained in the second chapter. The third chapter is the research methodology used in the paper. In the fourth chapter, the author identifies the special situation and challenges in Chinese mainland officer markets. The fifth chapter analyzes the reasons for the unbalance between the demand and supply of the officer. The sixth chapter proposes the recommendations to solve such unbalance. In the last part, based on the previous analysis and research, the author concludes that training and retaining the high quality officer are most significant in the current

situation.

Chapter 2 Research Background

2.1 Global Situation

2.1.1 Research and analysis of the officer's supply and demand on board in the world

As an international occupation, seafarer is the most critical human resource in domestic and international maritime industry. Considering the sustainable development of the shipping industry, the relationship between supply and demand of seafarers worldwide (maritime human resources) has been the major concern of International Maritime Organization (IMO), governments and maritime enterprises of all maritime countries. Internationally renowned institutions to investigate and predict the relationship between supply and demand of global seafarers include Baltic and International Maritime Conference (BIMCO), the International Shipping Federation (ISF), the International Maritime Employers' Committee (IMEC), United Kingdom Drewry Shipping Consultants Company (Drewry) and Cardiff University seafarers' International research Centre (SIRC). BIMCO, with a century's history and 2700 members, is the world's largest private shipping units. BIMCO and ISF worked together to carry out the research on seafarers human resources earlier than 1990. By issuing questionnaires to various maritime administrations and shipping companies to obtain the raw data, they made a further study on the relationship between supply and demand conclusions on the basis of statistics and analysis, predictive modeling, combining with expert advice and considering the results of the related factors, and released the report of Human Resources (BIMCO / ISF manpower Survey). The report is updated once every five years. The report enjoys a high reputation in the international maritime community and is regarded as authoritative survey of the supply and demand of seafarers worldwide. Each update of the report not only reflects the global seafarer supply and demand situation but also predicts the future seafarer

supply and demand trends, so the report is widely cited in the world marine industry. So far, BIMCO / ISF totally has released five research version, 1990, 1995, 2000, 2005 and 2010.

According to BIMCO/ISF (2010), manpower for seafaring is being provided by five main supply regions, namely OECD countries, Eastern Europe, Africa/Latin America, Far East (comprising the Far East and Southeast Asia) and the Indian subcontinent. OECD and Far East countries are still the major contributors of officers to the shipping industry showed by the latest 2010 report. According to the report, the OECD and Far East countries offer about 60% of the world's total officers in which Far East contributes about 29.5%. This report also reveals that more seafarers are available in Eastern Europe in recent years, accounting for 21% of the world's officers. In terms of ratings, Far East is still the largest supply region, occupying about 37%.

As for the problem of seafarer shortage in the world, according to the report, it seems that the number of seafarers has increased because of the more education and training opportunities provided in more countries such as India and Philippines. However, the emerging suppliers of the seafarers such as India and some countries in Asia are merely able to provide large numbers of ratings but not officers. Therefore, the shortage of officers is still the biggest concern in marine industry. Actually, the seafarer shortage is attributed to factors such as an ageing workforce in their age of retirement and the difficulty in recruiting seafarers with sufficient experience and qualifications (BIMCO/ISF 2010). Obviously, one of the contributing factors to this problem is that more and more officers are not remaining at sea; instead, they choose to work onshore. It is indicated from this latest BIMCO/ISF report that while the supply and demand for ratings are currently in balanced situation, there are still some shortages of officers, such as senior officers and engineers in some labor markets. Especially in tankers and offshore support vessels there still exists recruitment and retention problems. Besides, while there are few problems on ratings supply, the current and future supply of officers with senior management ability, especially

engineers, is still concerned in the Far East and Indian subcontinent.

According to the latest research report BIMCO/ISF 2010, the global supply of officers is 637,000, while the supply of ratings is 747,000. The shortage of senior crew still exists. Studies have shown that certain level and some of the officers of the ship's senior crew will still be shortage in 2015, especially the number of officer on tankers and offshore supply vessels. The officer's overall shortage is 2% -11%. As the economic environment improves, other serious problems will appear.

Over the past decade, several other agencies issuing reports on maritime human resources and global seafarers' relationship between supply and demand have always proclaimed the same officer shortage predicted results to the world. For example, in 2007 , International Maritime Employers' Committee (IMEC) survey showed that a shortage of skilled crew in the world had become more and more serious, and that the shipping industry human resources crisis has become worse than estimated in the past, especially the officer shortage increased up to 10%, 5 times higher than the number reported on BIMO/ISF 2005. In May, 2008 UK Drewry Shipping Consultants (Drewry) released a research report announcing that officers supplied worldwide was 499,000 in 2008, while the demand was 533,000, which fully showed that officers were still insufficient with the shortfall of 34,000 people. While in 2012, the number of global supply officer was 540,000, the number of demand was 630,000, and the shortfall increased from 34,000 in 2008 to 83,900 people (Drewry, 2008). In February, 2009, Drewry released the 2009 Report of Human Resources (Manning 2009) using the Global Manpower Model. The report of Drewry concluded that the officer's supply was 517,000 in 2009, at the same time the officer shortage reached 56,000.

2.1.2. International response to the shortage of officers in the world

In order to cope with the global problem of officer shortage, Millers the Secretary-General of the International Maritime Organization (IMO) appealed that the global seafarer shortage should be paid more attention by each country at the meeting

of the International Maritime Organization in February 2005. In November 2008, such organizations as IMO, the International Labor Organization, BIMCO, ICS / ISF, Intercargo and Intertanko NGO Roundtable and International Transport Federation of Association jointly launched the movement of “being the seafarer (go to sea!)”. The specific objective of the campaign is to enable the job of seafarer to become an attractive option for the young people with ability, and to wake up their awareness that seafarer is a proud occupation. International Maritime Organization hopes to give the coordination of services for campaign of improving seafarer recruitment initiated by the international shipping industry and governments. It believes that the job of seafarer will be a viable occupation choice for the younger generation. In order to attract more attention of the global seafarers, IMO determines the theme of 2010 World Maritime Day as “2010: Year of the Seafarer”, and the day of June 25 each year thereafter as Seafarers’ Day.

2.2 The Situation in Mainland China

Governments, marine institutions, shipping companies, international organizations and research institutions have different arguments about officer shortage around the world and the reasons for the shortage of officer cause debate forum. While the relationship between supply and demand of officer in Mainland China has the distinct characteristics.

2.2. 1 The status quo of shipping in Mainland China

Along with sustained and rapid economic growth owing to the reform and opening up policy in China, shipping industry has also undergone rapid development in Mainland China. According to the statistics of the Ministry of Transport (2011) , the amount of water transport, water transport cargo turnover in 2011 had an increase of 996.2% and 2630.8% respectively compared with that in 1977, with an average annual growth of

7.3% and 10.2%. At the end of 2011, taking into account of the merchant fleet with 1000 gross tonnage or more, China had a total fleet capacity of 11,560 million dwt, accounting for 8% of total world merchant fleet capacity, ranking fourth in the world after Greece, Japan, Germany. At the end of 2011, 31968 berths were available in Chinese ports, 5532 of which were in coastal ports and 26,436 in river ports. Up to 2011, the ports in Mainland China had taken up 12 seats of the top 20 cargo throughput port. Further more, 8 of the top 10 ports around the world are in China. From the view of statistical data, Chinese waterways and port construction, fleet, cargo throughputs have been ranked high in the world. All in all, China has become a veritable maritime power of the world.

2.2.2 The status quo of seafarer industry in Mainland China

China's economic development boosts seafarers' education and training in the country. As the Party of 1978 Seafarers' Training, Certification and Watch Keeping for International Convention (hereinafter referred to as the STCW Convention), China is one of the first parties that entered white list of countries which full implement the STCW Convention published by IMO. For a comprehensive, full, effective and sustained performance of STCW Convention, China has established a perfect education, training, examination, assessment and certification of management laws and regulations system for seafarers. Maritime institutions and training institutions establish and operate a quality management system, which plays an important role in effectively ensuring the training of crew competency ability to meet the requirements of the STCW Convention.

Maritime institutions and training institutions in China are responsible for seafarers' education and training. According to the latest statistics, in Mainland China the number of the crew with the qualifications working on ocean-going vessels is 341,000 , the number of crew with the qualifications to work on the coastal of the ship

is 145,000 the number of crew with the qualifications to work on inland vessels is 507,000 (MSA, 2012). The large number of high qualified seafarers plays its due role to alleviate the problem of seafarer shortage in domestic and international seafarers labor market. The development of Chinese crew market closely contacts with the environment of the development of Chinese shipping industry and the world economy.

The year of 2008 is a watershed, when the adjustment of shipping market experienced from the top to the bottom like a roller coaster. Before 2008, prosperous shipping market had led to a rapid increase in ship capacity, which promote market demand for crew but spawned a number of new problems, for instance, the structure of crew team was irrational; the skills of crew decline; crew management is lack of innovation, and the crew pay continued to rise, which formed a certain pressure to the ship production safety and business management. Along with the financial crisis that started from 2008, the crew market has changed along with the shipping industry. Nowadays, the crew market is also facing many new problems, such as frequent flow of crew, the decline of the skills of the crew, the thought impetuous problem of the crew, crew' s structural contradiction of supply and demand . To the future crew market from the supply point of view, an increasing number of college graduates become another option for the ship owners. From the new shipbuilding trends, the large-scale modernization of new ship hoists the requirements of the crew with knowledge and quality. Obviously, the shipping industry has transformed gradually from the labor-intensive industry into a knowledge, capital and technology-intensive industry. Meanwhile the crew will transforms from a simple technology-based one into the complex one with the skills in technology, management, operations and legal knowledge.

2.2.3 The role of China seafarer industry in the world market

Currently, the international crew of the global demand is about 1 million, of which the Philippines, India, Indonesia and other countries occupy half of the global market, while the crew from China only occupy less than 4% of the international market, which is obviously disproportionate with the position of China one of the largest maritime countries in the world. The following Table 2.1 reveals the world's top 10 states exporting crew to the international market. Comparing the situation between China and Philippines from the table, the later is in the absolutely leading position to develop and utilize the crew resource. There are nearly 50 crew training institutions in Philippines, many of which are co-invested with the ship owners. Most ship owners appraise the Filipino crew for their loyalty, strong sense of service, and good knowledge of English. As a result, Filipino seafarer industry occupies the highest share of the crew market in both operational level and support level. However, as a populous country with a rich labor resources and maritime education and training system, Chinese crew always stays at the low proportion of the international seafarers group, although the wages of Chinese crew have been continuously improved in recent years.

Table 2.1 The top 10 countries exporting seafarers in the world

	manage level		operation level		support level	
	country	%	country	%	country	%
1	The Philippines	20.8	Philip	37.6	Philippines	50.6
2	Ukraine	10.5	India	8.6	Ukraine	6.2
3	Poland	8.3	Ukraine	8.4	India	5.2
4	Russian	8.3	Russian	6.2	China	4.8
5	India	7.2	China	5.7	Indonesia	4.1
6	Croatia	5	Poland	4.5	Poland	3.9
7	Korea	4.6	Indonesian	3.9	Myanmar	3.4
8	China	4.2	Myanmar	3.3	Russian	3.2
9	Indonesia	3	Romania	3	Latvia	1.9
10	Romania	2.8	Croatia	2.6	Romania	1.9
	total	75.2	total	83.7	total	85

Chapter 3 Research Methodology

3.1 Research Question

There is no doubt that shipping industry is facing a global imbalance of supply of seafarers, especially qualified maritime officers. In the reports of the above agencies, shortage and its consequences to the maritime industry have been researched and predicted, however, little research has been carried out on the causes leading to the problem and the solutions to tackle the problem. This paper thus intends to focus on the question of why the imbalance between the seafarer' supply and demand takes place in Mainland China and how the maritime related factors can contribute to tackle the challenges in the market so as to increase the supply of suitably qualified seafarers.

3.2 Methods of data collection

Both quantitative and qualitative methods are used in this study to gain unique and important insights into the research problem. The paper explores the issue from the side of seafarer supply and the side of the demand as well as the government bodies such as Maritime Safety Administration (MSA). The first method of data collection is qualitative research where opinions and perceptions of a shipping company, MSA and seafaring institution are derived respectively through face to face interviews. The interviews objects include the general manager of a bulk ship management company, director of the seafarer department of the MSA and the principle of one seafarer training center. The interview questions focused on the current situation of seafarers market and its shortcomings. The interview took an average of one hour respectively.

The second data collection method involves questionnaire survey, which was

conducted in seafarers who had received the training before working in a seafarer training center. Therefore, the response authenticity is of high value. The survey is a useful and effective tool to get an all-respect opinions, attitudes and descriptions. This questionnaire consists of open-and close-ended questions. The later is multiple choice questions. Questions were arranged according to issues that would answer the research questions. The issues derived from prior interviews include: (i) acknowledgement of the imbalance of officers in the market, (ii) the possible causes of the imbalance of officer (iii) role of the government and (iv) possible solutions to the challenge in the officer market. Questions were designed along these issues in order to collect most relevant data in answering the research questions on the reason for the trouble in the officer market and effective methods to train and attract and retain qualified seafarers. The survey was conducted at the classrooms in the training center using the impersonal drop-off method. Sixty eight questionnaires were distributed to 68 students, of which 22 were seafarers with second officer certification, 23 were chief mate onboard the ship and 23 were captains from different shipping companies. In terms of age profile, 40% of respondents were in the range of 30–35, 42% were in 25–30 and 18% were in the 35-40 range. All the collected 68 questionnaires were usable, yielding a 100%.

Chapter 4 The Deep Study on Condition and Trend of the officer ' Supply and Demand in Mainland China

4.1 The supply of the ocean officer

In China, the officers are trained and supplied by Maritime Institutions. According to the regulations on seafarers issuing rules, the seafarers must accept the maritime education for more than two years before getting the certification of the third mate or third engineer. The seafarers should get the related education in the marine institutions .Therefore, supply situation of officers can be revealed by the enrollment scale of marine institutions.

4.1.1 Officer recruitment from college students

1) Seafarers' education and training system in China

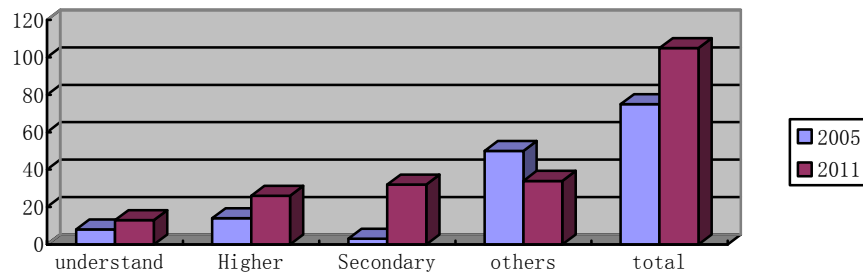
In China, seafarer students accept high maritime education in colleges and training in maritime institutions and seafarers' training institutions. Maritime colleges and institutions normally are organized by the Ministry of Education or Ministry of Transports or the local government, and most seafarers training institutions are operated by enterprises, institutions, social groups or individuals. Education authorities take charge of the academic education management of maritime institutions. Maritime Safety Administration is responsible for the management of the seafarers training institutions, supervision of seafarer education and training to make sure related marine law and regulations can be implemented.

2) The ways of maritime education and training

Chinese seafarers' education and training system includes all training required by the STCW Convention. Maritime education is divided into three levels, Undergraduate Maritime Education (4 years), Higher Diploma in Maritime Education (Higher Maritime Vocational Education) (3 years), Secondary Specialized Maritime Education (secondary navigation vocational education). There are also three other ways of further education to cultivate senior officers. The way to cultivate ratings is a four-month introductory training with the beginning of high school graduates and a six-month internship at sea for sailors and mechanic qualification certificate. Since 2005, China has maintained sound development momentum of seafarers' education and training institutions. According to the China MSA, in 2005, there were 75 institutions engaged in the education and training of seafarers, including 8 undergraduate colleges, 14 colleges (vocational), secondary (vocational) 3, other education and training institutions 50. As of the end of 2011, the number of all kinds of seafarer education and training institutions has reached, in which 13 undergraduate colleges, 26 colleges (vocational), 32 secondary (vocational), other education and

training institutions. The comparison of training institutions statistical between 2005 and 2011 is shown in Figure 4.1.

Figure 4.1 The comparison of training institutions in Mainland China between 2005 and 2011



Source: The Maritime Safety Administration of China Transport Administration

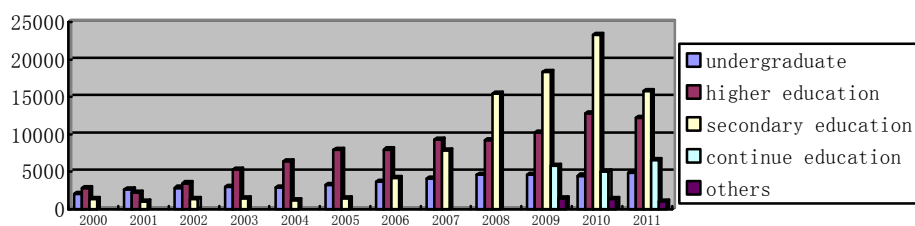
3) The recruitment of the maritime institutions

Table 4.1 The statistics of recruitment of maritime institution in Mainland China from 2000 to 2011 years

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Undergraduate	2067	2637	2855	2955	2869	3271	3702	4094	4604	4589	4475	4823
Higher education	2813	2225	3453	5280	6401	7959	7973	9290	9182	10215	12085	12170
Secondary Education	1373	1051	1387	1468	1153	1462	4155	7864	15472	18315	23324	15767
Continue education										5835	5788	6582
Others										1417	1353	1025
Total	6253	5913	7695	9703	10423	12692	15803	21248	29258	40371	47025	40367

Source: 2012 MSA Seafarer management annual report

Figure 4.2 The statistics of recruitment of maritime institutions in Mainland China from 2000 to 2011 years



4.1.2 The number of students who get the certification by passing the exam

According to the statistics of Maritime Safety Administration, the average rate of passing the exam for getting the certification of the third mate and engineer is 50.32%. The prediction formula for the number of students who pass the examination and get the certification:

$$P_n = Y_n \times e$$

Y_n : the number of persons who take the examination for getting the third mate or third engineer certification .

E.g.: the average rate (whichever is 50.32%) in the examination to get the certification

P_n : the number of person who get the certification after passing the exam.

So, the prediction of the number of students who can pass the exam and get the certification can be show in table 4.2.

Table 4.2 The prediction for the number of person who got the certification by passing the exam (Unit: person) from 2010 to 2014.

	2013	2014	2015	2016	2017
Undergraduate Education	4589	4475	4823	5271	5271
Higher Education	12085	12170	9683	9683	9683
Secondary Education	23324	15767	7349	7349	7349
Continue Education	6582	2799	2799	2799	2799
Others	485	485	485	485	485
Correspondence Course	6791	3544	2573	2573	2573
Total persons taking exam	53856	39240	27712	28160	28160
Total persons passing exam	26928	19620	13856	14080	14080

4.1.3 The prediction for the supply of the officer

In 2011, according to the statistics of Maritime Safety Administration of China, there are a total of 156,000 ocean shipping mariners with the valid seaman books, about 62,000 of which are officer in Mainland China. But the officers contain: (1) teachers

with a valid certificate and seaman books in sailing vocational education and training institution (2) the officers working on land in the shipping companies or government bodies. (3) people suffering from a work injury or disease. Actually the number of available ocean-going officer is about 60,000. Considering the factors affecting China's ocean-going supply officer, China's ocean officers quantity supplied prediction formula as following:

$$W_n = W_{n-1} \times (1-C) + Z_{n-1}$$

W_N : number of supply Ocean officer in year of n ;

Z_{n-1} : the number of person who get the third mate or third engineer in the year of (n-1)

C: turnover rate of ocean officer (2010 in 7.0%, year-on-year increase of 1.0%).

So, the predicted number of the supply is shown in Table 4.3.

Table 4.3 The prediction of the supply of the officer in Mainland China in five years

Time	2013	2014	2015	2016	2017
Supply of officers	88380	108237	118116	120160	121022

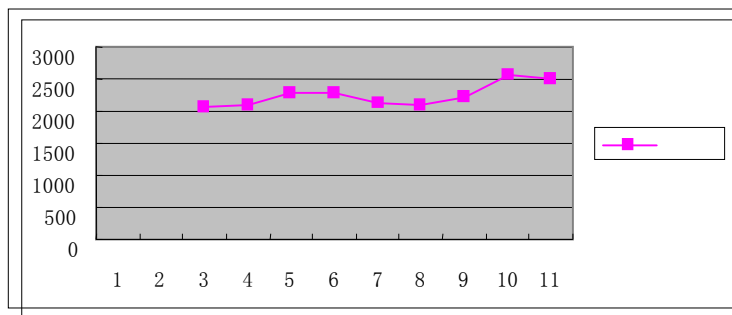
4.2 The Demand of Officers

The demand for ocean- going officer in the future shipping will be mainly built on the demand of the transport fleet, combined with the safe manning demand of the international and domestic demand.

4.2.1 The development trend of ocean-going fleet in China

According to the Statistical Bulletin of China's highway and waterway transportation industry, during the past 10 years, the ocean-going fleet trends in China is shown following figure.

Figure 4. 3 The ocean-going fleet trends in China during the past 10 years



Source : 2002-2012,the Statistical Bulletin of China's highway and waterway transportation

4.2.2 The development trend of Ocean-going fleet for the next five years in China

As shown above, over the past 10 years the development of China's ocean-going fleet was smooth, so the secondary exponential smoothing method can be used in the prediction, and the forecasting formula is:

$$F_{t+m} = a_t + b_t \times m$$

$$a_t = 2S'_t - S''_t$$

$$b_t = \alpha \div (1 - \alpha) \times (S'_t - S''_t)$$

$$S'_t = \alpha X_t + (1 - \alpha) S'_{t-1}$$

$$S''_t = \alpha S'_t + (1 - \alpha) S''_{t-1}$$

In formula:

F_{t+m} : the predicted value of m years ahead;

X_t the number of observations in t year;

S'_t : the exponential smoothing value in period t

S''_t : secondary exponential smoothing value in period t.

$$\text{Take } S_0 = S''_0 = (X_1 + X_2 + X_3) \div 3$$

To minimize the mean square error, take $\alpha = 0.9$. Therefore, in accordance with the preparation of the statement of prediction formula, as shown in Table 4. 4 shows the available $S'_0 = S''_0 = 2341$

Table 4.4 chart of secondary exponential smoothing method

Time	t	Xt	St ´	St ´´	a	b	F t+m
2003	1	2040	2073	2104	2042	- 279	2145
2004	2	2071	2071	2074	2068	- 27	1763
2005	3	2082	2081	2080	2082	9	2041
2006	4	2278	2258	2240	2276	162	2091
2007	5	2284	2281	2277	2285	36	2438
2008	6	2137	2151	2164	2138	- 117	2321
2009	7	2079	2086	2094	2078	- 72	2021
2010	8	2213	2200	2189	2211	99	2006
2011	9	2562	2525	2491	2559	306	2310
2012	10	2486	2498	2497	2499	9	2865

The prediction equation is derived according to the above calculation:

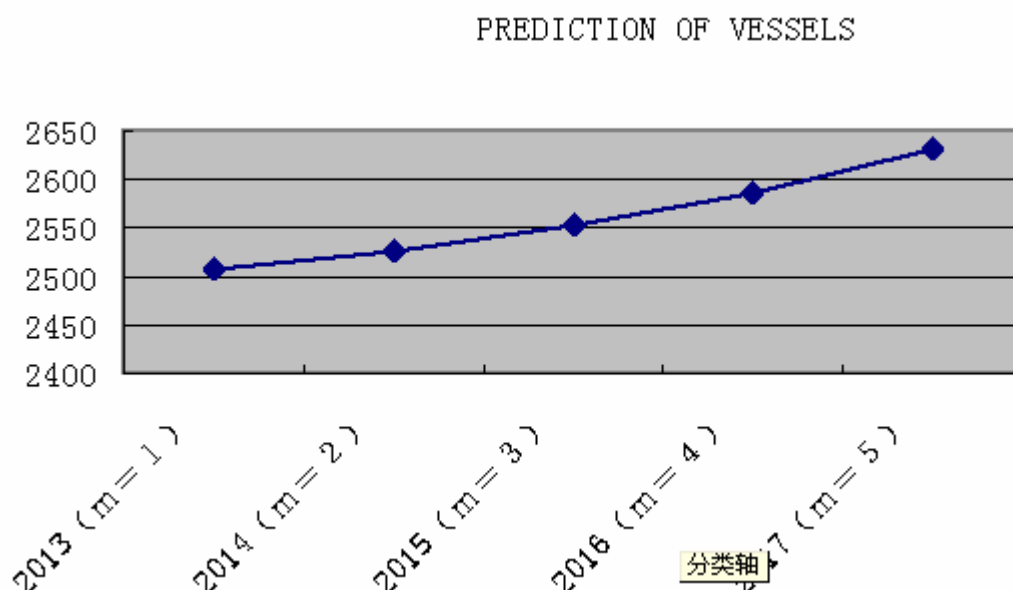
$$F_{t+m} = 2\,211 + 99 \times m$$

Then, the number of ocean-going vessels over the next five years can be forecasted like the Table 4. 5. According to the tabular data of table 4. 5, the developing trend of the ocean-going vessels in the next five years can be draw as shown in Figure 4.4.

Table 4.5 the number of China's ocean-going vessels in the next five years

	2013 (m=1)	2014 (m=2)	2015 (m=3)	2016 (m=4)	2017 (m=5)
Predictions for vessels	2508	2526	2553	2586	2631

Figure 4.4 The Prediction for the development of the ocean-going vessels in Mainland China in the next five years



4.2.3 The demand for officers by China ocean-going fleet

The prediction quantity demanded of the ocean-going officer can be calculated by the formula (Jia, 2012):

$$Q = S_t \times C \times F_m$$

S_t : predictive value as the target year for the number of ships;

C : the manning of officers on single-ship (of 10);

F_m : manning coefficients (whichever is 1.85).

So, put number of ships in Table 5 into the equation obtained, the officers demand by China's ocean-going fleet in the next five years can be predicted as shown in Table 4.6.

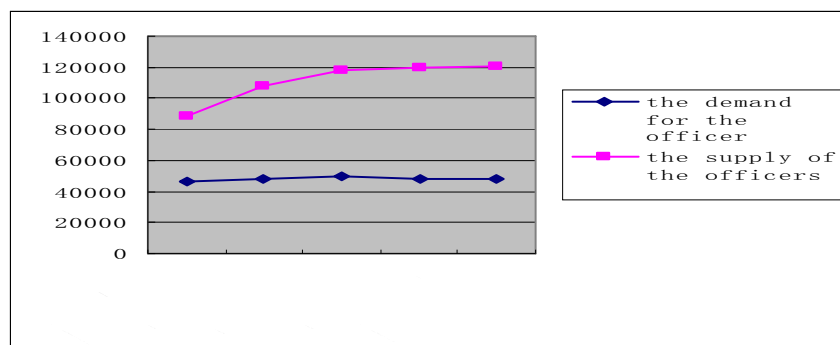
Table 4.6: Forecasting for Chinese ocean-going fleet officers quantity demanded

	2013 (m=1)	2014(m=2)	2015 (m=3)	2016(m=4)	2017(m=5)
Oceaning - vessels	2508	2526	2553	2586	2631
Demand for officers	46398	48230	50061	47841	47841

4.3 The analysis about forecast of the ocean-going officer' demand and supply

Figure 4.5 shows the prediction of supply and demand of the officers working on ocean-going fleet in Mainland China. Obviously, it can shows that there is serious imbalance in the officer' supply and demand ratio, and the amount of surplus ocean-going officers in China will has a rapid increase in the nest five years.

Figure 4.5 The prediction of the supply and demand of the officers working on ocean-going in Mainland China



4.3.1 Surplus of the officers

It is revealed on the figure 4.5 that from 2013 to 2017, the ocean-going officers will be oversupplied in the whole and the excess keeps at a fast speed for several years. Therefore, a large number of crew failed to find job on ships. Shown as the data, from the beginning of the 21st century, maritime capabilities of Chinese fleets increase rapidly, and the size and structure of the fleets has been optimized in order to compete in the marine market. For instance, the ships continued to develop in a large-scale, professional and modern trend. At the end of 2011, the total capacity of the coastal shipping vessels and ocean-going ships reached 5780,470,000 dwt and 6703,860,000 DWT respectively, which are 3-fold and 2.8 times of the capacity of coastal and ocean transport vessels in 2001. As can be seen from Table 4.3 during the last 10 years, China shipping fleet capacity and single vessel average dwt substantial increased, however the total number of ships increase slowly, and he number of ocean-going

transport ships even reduce 7%. (Sun, 2013) Taking into account the fact that the manning almost keeps the same on most vessels after the ocean-going fleet become large, the number of seafarers required by the ocean-going fleet did not grow or even decline in the last ten years. Obviously, the increase of demand for seafarers depends on the increase of the number of shipping fleet and manning level, but the demand does not grow exponentially.

According to the need of Chinese fleets (including the Chinese flag ships and flags of convenience vessels), the surplus officer in China is 9669 in 2011, accounting for 12.3% of the officer supply, and the number of which will reach 53,078 by 2015, accounting for 39.5% of the senior crew supply (Sun, 2013). Comparing with the need of fleet in China, the surplus of the officer in China will further exacerbate. What's worse, the number of seafarers exported cannot meet the demand of marine graduates. Therefore, the employment situation of the graduates from maritime colleges is not optimistic over the years.

4.3.2 The shortage of high-quality seafarers

At the same time, the high qualified officers are still in short supply for various reasons. Strictly speaking, the shortage of officers in China is not the shortage on the number, but on the quality and structures. This imbalance between supply and demand will further affect the healthy development of China's shipping industry. The urgent demand of the shipping market in Mainland China is the officer who can meet the modern large-scale and specialized requirement, especially of the management level (Qi, 2012). It can be proved by the fact that more and more foreign masters and chief engineers are employed by China Shipping Group in recent years, which is the largest container company in China. It can be expected that the fleet will continue to develop toward the trend of large-scale and specialized in the future, so the number of officer in demand will not significantly increase, but demand of the high-quality officers with the competency to manage and operate modern large-scale special ship will increase. At the same time, with the rapid development of Chinese shipping and shipbuilding

over the past decade, a large number of high-quality sailing personnel also demand in the field such like shipping business management, maritime administration, maritime education and crew training, maritime research, ships and equipment services, and other auxiliary maritime services. So, with the increase of trade volume of import and export and the implementation of the strategy of sea power, the demand of high-quality composite sailing talents or land-based units will continue to grow.

Chapter 5 The reasons for the unbalance between the demand and supply of the officer in Mainland China

5.1 Maritime Education and seafarer training

The key of the international competitiveness of the national shipping industry is high-quality compound maritime personnel, including port and shipping business management expertise, specialized shipping economic research talents, shipping finance and legal expertise, the expertise of the maritime administration, maritime science and technology. Besides, maritime expertise on board is also an important source of other types of maritime business, occupying the fundamental position in the maritime personnel structure. Obviously, the Maritime Education bear important mission to train and cultivate the internationally competitive seafarers with high-quality sailing expertise adapting to the economic and social development, as well as leaders in marine industry. In a word, the maritime education plays an important and fundamental role in the process of development of the shipping industry. In recent years, the internal and external environment of China has profound changed. On one hand, owing to the decline in the social status of seafarers, the vocation of seafarer is not attractive as before. On the other hand, the modern marine industry poses higher requirements for the comprehensive qualities of seafarer. Meanwhile, the significant change in the size and structure of China's maritime education increasingly affects the seafarer labor market and the development of nautical education.

5.1.1. The declines in the seafarer recruitment

(1) The technological and social development has led to the decline of seaman's social status. Sailing has played an important role in the history of world civilization. A large number of ancient navigators engaged in exploring new routes, new resources, and the field of nature unknown. They were not only the navigator, adventurer, even scientists. The captain was not only in charge of making the voyage plan, directing the operation of navigation and the management of the ship and cargo, and even responsible for recruiting crew, organizational sources, preparing for necessary materials, discharge and trading arrangements, even contacting for the ships repairmen. The captain was even in charge of the training and promotion of the crew. The Industrial Revolution in the 18th century made the human society undergone tremendous change. With the rapid development of shipbuilding and marine technology, maritime transport has become more safety and efficient. At the same time, the social division of labor is increasingly sophisticated. For sailing, the mariner were only responsible for ship sailing (including trade in goods, apparatus, equipment and maintenance of the power plant) and management of the cargo during the voyage, and the ship's management company on shore took charge of scheduling Manning of Ships, sailing supplies equipment, loading and unloading arrangements. The professional organization and personnel on shore began to take charge of all the invention of modern navigation technology and the development of variety of sailing standards. Voyager became a specific occupation, employed by shipping companies, responsible for the implementation of the tasks of navigation.

Now real-time communication between ship and shore has achieved, and the shore-based sector can keep track of the ship sails and equipment operation, and voyagers can always get the technical support of the shore-based sector, receiving the instruction. As a result, the voyager position as a navigational decision-maker has weakened. Meanwhile, with China's sustained rapid economic growth, the income gap

of the land and sea is gradually reduced. On the other hand, over the last decade, the popular ship separation management mode adopted by the shipping companies affected the officers in such aspects as the reduction of opportunity of occupation development, the declined welfare and protection, and the lack of a sense of belonging. Meanwhile, the rampant Somali pirates increase the risk of sailing. All the above makes sailing careers social status and decency greatly reduced. Also, the low birth rate in China makes young man prefer to live together with the family for higher living standards. Under such condition, seafarer is not an attractive job any more, which will affect the quality of students in Maritime Institutions, and Navigation Majors' professional ideas and motivation for learning, thereby affecting the quality of the training for sailing.

5.1.2 The cost of the training of high-quality seafarers

As mentioned before, with the rapid development of shipbuilding technology and maritime technology, more and more large-scale, specialized and modern ships are built. Meanwhile, international community endeavor to make more strict requirements for maritime safety and pollution prevention. IMO continue to amend the existing international maritime conventions, and to establish new conventions; flag and port States have developed a variety of laws and regulations to regulate the maritime transport activities; flag, port and industry organizations carry on more strict inspection for ship safety, pollution prevention and crew competency. To respond such context, the shipping industry increases the requirement for the officer's knowledge and skills, management skills, foreign language proficiency, safety awareness and ability. With the implementation of the strategy of e-navigation, marine technology is undergoing a major revolution and progress. Sailing is developing toward the course of electronic, information and intelligence.

The electronic navigation is the collection of maritime information on board and ashore, integration, exchange, presentation and analysis for maritime safety security

and protection of the marine environment and improve the berth to berth navigation and related services by using the electronically coordinated ways. The implementation of the electronic navigational strategy poses new demands and challenges to the comprehensive qualities of the officers. Officers, management level crew in particular, not only require to learn to master the ever-changing variety of techniques, have strong leadership skills, have safety awareness and adaptability, being familiar with a variety of complex domestic and international standards and regulations, and use of a foreign language skilled, but also must possess a strong self learning ability. The increase requirements for officers' comprehensive quality reflected not only concepts in maritime education and models but also the selection criteria of the preparatory officer. The equipment requirements of the maritime institutions and the quality of teachers and students are more demanding.

5.1.3. The changes of Maritime Education pattern in China

To adapt to the trend of rapid development of the maritime industry, the traditional maritime institutions in China gradually increase the enrollment scale since the end of the 20th century. After entering the new century, the international shipping market has been recovering driven by the "China factor". During this period of time, many mariners are attracted by the position onshore, resulting in a serious loss of senior seafarers team personnel. At the same time, international maritime organizations and research institutions released a research report, predicting the serious shortage of global officers, coupled with the fact that nautical college graduates in China has long been in short supply. Taking all factors into account, the national maritime authorities began to adjust the policies of seafarers' training and certification and approved a new batch seafarers training institutions. Since 2006, the scale of enrollment in seafarer training and education has seen the growth.

By the end of the 20th century, there had been 66 maritime institutions, including 7

ordinary maritime colleges, 7 higher adult education institutions, 16 workers specialized secondary schools, 36 mechanic schools. Up to 2010, national maritime education and training institutions increased to 107, including 14 undergraduate colleges, 25 vocational higher education institutions, 28 general secondary professional schools, 40 other crew training institutions. At the end of the 20th century, the annual enrollment number of Maritime Institutions is 5,000, while it is more than 50,000 in 2010 (Sun, 2013). The enrollment statistics for the maritime education and training institutions can be shown in Table 4.1. The rapid expansion of the number and scale of enrollment in Maritime institutions meet the demand of the shipping market. However, most new established training institutions is lack of high-quality teachers and facilities as well as students with comprehensive quality, which obviously results in the shortage of high-quality officers in recent years. On the other hand, with more and more junior crew entering into the market, the graduates have fewer opportunities to practice and work onboard the ship, which poses a tremendous impact on the officer labor market and further affects the recruitment and training of maritime institutions. From the view of supply and demand in Maritime labor market, on one hand, the high-quality maritime talents is in shortage, on the other hand, ordinary Maritime graduates are oversupplied, which reflects the fact that Chinese high-quality maritime education resources is limited, and many maritime education resources are ineffective.

5.2 The management of shipping enterprise

5.2.1 The insufficient training of seafarers

The correct and enough training to crew is essential for shipping companies. However, very few shipping companies in China are able to implement a long-term training plan to human resources. Many shipping companies regard such training to as a project of high cost. Especially, when the shipping market is in depression, shipping companies tend to reduce the human resources training to control costs. Some shipping

companies that have no awareness of the importance of such training even stop any training. Some other companies know the importance of crew training, but they fear of the crew drain in the future, so they do not pay adequate attention to the seafarer training. Meanwhile, many Ocean Shipping Company trains the crew without scientific and systematic plan and methods. Also some company executives believe that access to work-related knowledge and skills is a personal thing of the crew, therefore, they are not only reluctant to invest in the training, but also reluctant to support them when some crew have the training opportunity at their own expense. This is the case of the shipping companies, whose services are produced to satisfy the derived demand for the transport of cargoes (Willingale 1998). Nevertheless, 'the quality of the industry ultimately depends on the quality of the people in it' (ICONS 2000). Horck (2004) argues that the industry should focus on the human element, rather than spend increasing amounts of money on bridge layout and increased automation.

5.2.2 The rigid management mechanism

Most major shipping companies in China are state-owned, and many of them have the rigid operating mechanism. After the reform in recent years, government management mechanism is still not improved; as a result shipping companies can not participate in the increasingly fierce market competition as a fully independent body. The shackles of government departments, to a certain extent, restrict the employment system of shipping company to adapt to the market. So, the companies' such rigid mechanisms are difficult to mobilize the enthusiasm of the crew, as following aspects: the structural imbalances in wages and the failure to realize the better hidden wages and benefits. The private marine companies are more flexible, for example, they usually pay the crew in the form of cash, by which the majority of enterprises do not need to pay personal income tax. In addition, the income gap between crew in operation level and officers is relatively small in state-owned enterprises, which usually cause the

psychological imbalance in officer's mind. Therefore, more and more officers chose to quit. That is why the high-quality talents cannot be retained by company.

5.2.3 The dehumanized crew management

Firstly, there are not enough measures applied to meet the psychological demands of the seafarers. Psychologists believe that interpersonal psychological needs can be divided into three areas: instinct, the need for self-affirmation and gregarious needs. Obviously, gregarious demand is one of the most important psychological needs to individual. Everyone has a gregarious need. On board, the crew, especially for the person from different countries, always fails to conduct proper and effective communication due to the language barriers, which can easily lead to them lonely and even cause abnormal behavior, seriously affecting the physical and mental health. Generally, according to the contract, the crew has to work at sea for relatively long time. During the time the crew has to keep more loose relationship with the family and society. Contact with family only on wireless communications and letters is not enough for them. The crew often seems helpless when they are faced with unfamiliar terrestrial environment on shore. So most seafarers are difficulties to adapt the life alternate between the sea and the land, but there is no mechanism available to help them. Seafarers as a special employee group need a more attentive service, rather than blunt management. They hope the companies to address their worries, including their family difficulties, their career planning, and holiday greetings.. However, most shipping companies overlook these details. In fact, many officers choose to give up their jobs onboard just because of the uncomfortable feeling caused by dehumanized management of shipping company

5.2.4 The shortage of support from onshore base

Ship as a standalone unit at sea isolated by the land base only keeps contact with the company on shore by satellite earth stations or radio. Because of the harsh marine

environment, sometimes the vessel need navigate more than a month at sea. To ensure the safety of navigation, a strong support from onshore base must be provided, including technical support, safety instructions and so on. However, since the financial crisis in 2008, most shipping companies are under high expression to get the profit, and even some of them are the facing bankrupts. To reduce costs, many shipping companies have to slash the budget in aircraft repairmen, fire rescue facilities maintenance and spare parts costs and so on, which not only affects the safe navigation of the ship, but also make most crew unsatisfied to the company because companies do not attach importance to their safety. Now many of the crew concern not only about the technical condition of the ship but also the company's shore base level of support when they choose to work for the shipping company.

5.3 The seafarer service institutions

5.3.1 The development of the seafarer service institutions

With the reform of economy in China and the prosperity of the international shipping market, shipping companies, vessels and seafarers have become the indispensable elements of economic development. Seafarers as the critical human resources become more and more active in the Chinese marine market. Since the mid-1990s, in order to meet the trend of international maritime development, the COSCO and China Shipping Group began to separate the crew team from the professional fleet management to establish of a professional crew company, which is considered as the primary prototype of seafarer services business in Mainland China. Afterward, the internationalization of logistics promoted ship manufacturing industry and shipping economy great prosperity. In Mainland China, for example, by the end of 2010, the number of international shipping companies developed from dozens to 1108, and the number of private domestic shipping companies reached 3100 from almost zero. By September 2010, there had been more than 1430 vessels engaged in the international voyages and more than 5,500 ships sailing in domestic voyages in Mainland China.

(Liu, 2011). When a large number of ships were put into the marine market, the seafarers were rigidly demanded and the crew services agencies appeared in the market. On one hand, the service agencies are required by seafarers. With the further reform of crew management mode, a lot of large shipping enterprises employ a greater seafarer out of contract. Competitive pressures forced the shipping companies no longer hire extra crew. Gradually, a lot of seafarers shifted from the original position in the marine company into the labor market to become the free seafarer. Due to the tremendous changes in the way of labor, the free seafarers will meet many troubles when they deal with the social security and welfare affairs etc., especially, when they have to work at sea for long-term. To address the troubles, a kind of entity was needed in the market. On the other hand, the ship owner needs the service from such agencies. For instance, many ship owners did not have the crew team itself for reducing the cost, they have a great need for the market to help them solve the problem of safe manning.

5.3.2 The role of seafarer service agency

Crew services are really required by the human resources market. In order to protect the basic rights of the crew and safeguard the harmonious and stable labor relations, the crew services must be standardized operated. According to the regulations, crew service agency shall establish and improve the service system to ensure the work efficiency. The detail functions played by the agencies can be summarized as follows:

First, crew service agencies are effective communication channels between crew and the administration authorities. According to the regulations, every agency shall establish safety and pollution prevention management system which must be audited by the maritime administration to ensure the maintaining applicability and operability. In addition, the agencies should establish the list of crew and crew files which records crew training, qualifications, safety record, state of health, etc. All the material must

be ensured the authenticity of its content, completeness and continuity, and should be regularly reported to maritime administration in writing on paper or electronic version. Meanwhile, the maritime administration also keeps the good communication with the agencies through the daily supervision and audit.

Second, crew service agencies safeguard the legitimate interests of the crew. According to the labor relations management mode in China, crew service agreement is signed between the crew service agencies and the crew; manning services agreement is signed by the employer or owner of the ship and crew service agencies. These complex but relatively well-defined labor relations provide seafarers an effective platform for the rights protection.

At last, the working conditions and job security of the seafarers could be further strengthened by crew service agencies. According to Chinese government regulations, crew services should fulfill the following obligations. First, crew service agencies should clearly define the crew wages, hours of work, methods and repatriation expenses, vacations, accidental death insurance, and responsibilities and obligations in crew manning service agreement signed by the crew service agency and the employers. Second, crew service agencies have the duty to inform the dispatched crew of the contract with ship owner. Third, crew services should not deduct the crew's wages paid by the employer for any reasons. Fourth, crew service agency shall supervise the employers to pay insurance premiums on time and provide the necessary services. Fifth, when the crew disappearance, die or meet other unexpected injuries, the crew service agency shall cooperate with employer to make the necessary remedial work and contingency plans. Sixth, crew service agencies may not hire unregistered crew. Seventh, the related service charges supplied by the agency shall be public and accept the examination from of maritime administrations. Eighth, crew service agencies shall truthfully provide the crew information about the ship, the shipowner, route and other relevant information for protecting the legitimate interests of the crew.

5.3.3 Problems caused by crew service agencies

1) The prevail vicious competitions disrupt the crew labor market

The quality of the seafarer plays an important role in the marine industry. However, the high-quality seafarer is serious in shortage in the market, especially reserve officer are even more inadequate. Therefore, even the salary level of the crew is higher and higher, the seafarer team building is very unstable. In the market, the crew considered more about the pay level, the ship condition and the ship-owners management level and popularity and other factors. Due to the different conditions between the different companies, the phenomenon of crew hopping is very common. Some companies, especially the small companies without enough time and money to train crews employ high-quality seafarer from other companies by higher salary, which disrupt the entire industry market (Rao, 2007). Obviously, the current flowing of the crew in a disorder way has seriously affected the market order and the safety of navigation.

On the other hand, in order to earn more intermediary fees, many crew service agencies chose to take the improper means when facing the competition. For example, malicious competition by lowing price is widespread, resulting in the seafarers assigned by China always remain with low quality. Most seafarers manning agencies only care about the number of seafarers assigned, not full the quality of the seafarer, which has seriously affected Chinese seafarers.

2) The unreasonable management and recruitment

In fact, the crew service agencies can not efficiently guide and manage the crew's performance of duties on board, leading the quality of the crew improve slowly. In order to reduce costs, most agencies would rather hire the seafarer requiring less

salary even if the ability of the seafarer is not satisfied. Owing to the shortage of officer, some agencies even sent the seafarers directly to the ship-owner without any exam and assessment, which has caused a great deal of risk to the safety of the ship. In the audit and management aspects, the most prominent problem is that the crew's employment records are not up to standard. The "crew service book" as the essentially record for the seafarer's service on board is the important statutory instrument for crew's examination application and job promotion. However, due to the complexity of labor relations and overlapping functions of the government bring barriers to the valid assessment and evaluation to the crew's qualifications. Many service agencies even help the seafarer make the false record in order to get the promotion. As a result, there are many officers with certificate have not the competence at all, which largely affect the market order and the quality of the crew team in Mainland China.

3) The crew service agency still in monopoly position in the market which is difficult to guarantee the interests of the crew

The crew service agencies could easily get far more information than the common seafarer. So in the market, the seafarers are obviously in the disadvantage situation when they facing the crew service agency. In addition, since foreign ship-owners must pass domestic intermediaries to recruit Chinese seamen, domestic intermediary of seafarer agency became the direct purchaser in the main market. Undoubtedly, the fundamental object of the crew service agency is to make maximize interests. Therefore, the agencies are bound by lowering the seller's price (wages) to achieve this goal. In a investigation, 80% of the seamen said that the problems about "low wages" are the barriers impeding Chinese seamen to enter the international labor market. Many of them admitted that their most troubles are the low wages, unequal payment, wage deductions by expatriate's intermediary, not being paid on time and other issues. The ICONS report (2000) mentions that non-payment of wages, delays in paying entitlements to families, and even abandonment are additional abuses that contribute to the suffering of a large proportion of seafarers. And all the seafarer be

investigated agreed that low wages and shortage of the welfare are not conducive outstanding young people to engaged in professional seafarers, and will reduce the overall quality of seafarers. Here, it is important to note that the Maritime Labor Convention (MLC) (ILO 2006) pays great regard to the role of manning agents and crewing companies ,while it clearly states that a crew' s welfare, health should be take into account the different culture and background.

5.4 The seafarers

The tough work and a relatively low wages result in the loss of a large number of professional seafarers. With the decline of the social status of the Chinese crew, the flow of the crew became more frequent in recent years, so keeping the stability of crew team has become an important task for the ship-owners and crew management department. On one hand, due to the increase of the a variety of temptations in the market, a lot of crew begin to have the impetuous attitude, which make the crew less impatient or discontent, even leading to resignation. At the same time, psychological expectations of crew change which increase the flow of the crew. For instance, psychological expectations of the crew become higher and higher through comparisons between former classmates or former colleagues in many fields, such as, the level of remuneration, promotion, near route or far route, crew personal family situation. With the rapid economic development and the continuous improvement of people's living standards, the gap of salary between people on land and onboard is getting smaller and smaller. Therefore, graduates of the maritime institutes, especially graduates of undergraduate level are unwilling to work on ship, and the trend is to continue. In addition, the turnover rate in the crewmen working on board is also high, mainly due to the part of the officer who does not plan to work on board the ship for a long time.

On the other hand, operating a ship across the ocean is a special work, which is very different from other occupations. During sailing, every seaman on board plays unique

role and any one of them is irreplaceable, which reflects the professional independence of the crew. Ship is a closed system including various departments' joint cooperation and coordination, which reflects the occupational group of the crew. The crew on board at sea may meet the rough sea, wind, glaciers and other dangerous occurrences, which reveal the hard of the profession. The crew stays on the vessel all day, unable to accompany their family and friends, which reflect the tough of the career. All of these features indicate that in order to become a good officer, you must have good health, wealthy expertise, and good psychological adjustment capability. Especially, the crew on board the vessel sailing on the international routing may meet more tough troubles. During the long time on the vessel, the recreational activities are limited and the colleagues rarely work together every day. Due to not reuniting with family and friends, the seafarers feel difficult to release stress. According to statistics, more than 60% of the crew more or less has the mental illness. Facing these psychological pressure, some crew have taken the wrong ways to emission feeling, such as evasive, depression, denial of self-harm and other self-defense mechanism. If negative psychological crisis could not be fundamentally resolved, the seafarers easily get the mental illness. Therefore, many highly qualified officers choose to leave the vessel to the shore just because they could not bare this particular occupation any longer.

According to statistics, turnover rate of serving seafarers is about 3%, this proportion is estimated as the base of the whole country with more than 60,000 officers, then at least about 1800 officers will lost a year. According to the 2002 questionnaire survey results about Navigation Majors employment situation in China, only 46.9% of the students after graduation hope to wok on board the ship, and more than half of the total students choose to work on land (Sun,2013). With the rapid development of China's shipping industry and the eastward shift of the international shipping market, the contradiction between China's maritime professionals supply and demand will become severe.

Chapter 6 Recommendations to Solve the Imbalance Between the Supply and Demand of the Officer

6.1 The training institutions

In the labor market, the best way is to strike a balance between the number of crew' s supply and demand. Actually, the blind enrollment in Chinese universities ten years ago caused the general difficulties facing by the college graduates when they look for a job. So the lessons should be learned by the maritime education and training institutions .Obviously, properly understanding and handling the relationship between supply and demand of the crew is an important guarantee for the healthy growth of Chinese shipping industry. In the absence of quality of the education and training, doubled size of enrollment growth only bring the unemployment of seafarers and waste of educational resources.

Thus, facing the shortage of the high quality officer , the proper measure is to continuous improve the quality and level of Maritime Education and Training of seafarers in China in order to compete with other seafarer exporting countries in the worldwide labor market by which striving for greater share of seafarers assignment . In order to achieve the qualitative leap of the Chinese crew labor export business, the maritime education and training system in China should endure more deepen promoting and reform . These following efforts should be taken.

6.1.1 Clearly defining the position of maritime education, and building a reasonable , properly structured education and training system

Whether the position of maritime education in marine industry is correct or not directly affects not only the quality of maritime personnel training but also indirectly affects the stability of the marine talents. Chinese government has proposed the implementation of "sea power" strategy, and requires training a large number of highly qualified management personnel and nautical maritime personnel. Therefore, adhering to the variety level education is necessary. Taking into account the development of domestic and international shipping industry, demand for talent in sailing, marine education should be developed towards a multi-level, multi-directional, more open system including both academic education and vocational education system.

Multi-level maritime education means that it is not only to develop vocational education to meet the requirement of the shipping industry for the common operational-level maritime crews but to develop the academic education to cultivate the management level marine talents who understanding technology, knowing scientific management, gasping the ability to adapt to the rapid development of future marine technology .Currently, the higher vocational education should be developed as soon as possible so as to establish the coordination between all levels of institutional maritime education to adapt to the shipping industry development. For example, a college-level education and training institutions should commit to high-end systems, professional, high-quality education and training of the crew depending on its academic strengths and expertise. For the marine vocational institutes, they should dedicate to a particular, characteristics, career-oriented education and training of the crew to meet the characteristics need of the market. All in all, the enrollment of different level marine education and training should be dynamically adjusted base on the principle of "on-demand teaching" to promote the quality of the crew

Multi-directional means the students with different professional expertise should be cultured individualized in maritime institutes. The training to modern navigation technology can be focused on multiple directions to meet the development of students with different professional interests. To be open during the training to the seafarer means that more competitive sailing talent with a good command of foreign languages and excellent operational capabilities should be trained to meet the need of the international shipping market.

6.1.2 Promoting the internationalization of education and training of seafarers

More foreign high-quality maritime education and training institutions should be introduced into Chinese market, in order to reinforce the flaws of training to Chinese seafarers worked in foreign vessels. Through the above measures, the ability of Chinese maritime education will be enhanced, while international education and training of the crew can be promoted. So, the training philosophy and management system, teacher, professional knowledge, training programs, training standards applicable and source of students, should be encouraged to fully internationalized. In the future, more pure international, professional training institutes and more manning combined training programs should be supported and welcomed by all sides, so as to further enhance the quality of Chinese seafarers to meet the needs of the ship owner.

6.1.3 Promoting the shipping companies involved in the design and construction of the curriculum during the training

It is a common problem in China that the design of the curriculum in the marine education could not follow the steps of the development of manufacturing technologies. Long-term, the shipping companies are isolated with maritime

education which leads that the national maritime education and maritime personnel training is lack of rigid constraints.

Without the enough responsibilities and obligations, maritime education environment is bound to further deteriorate reducing the quality of maritime education. Therefore, in order to improve the course construction from the root, the active participation of the shipping companies must be relied on. Maritime institutions and shipping companies should voluntarily twin to reach an ideal mode of teaching. However, in reality, shipping companies tend to care about education as a "charity", meanwhile the marine colleges accept the cooperation from the enterprises with the feeling of grace. Therefore, it needs to develop relevant policies to promote enterprise to support marine education by which the shipping companies could implement responsibilities and obligations in the education. For instance, the shipping companies could send the senior captains, chief engineers to the marine institute working as a teacher through which the students will be profound impacted by the excellent seafarers. These measures are positive significance for promoting shipping company's participation in professional development, curriculum development and personnel training program development.

6.1.4 Strengthening the quality awareness and implementing the scientific and standardized quality control of the education process

Quality management system reflects the irreversibility of personnel training, and the target management and process closely ensure the quality of personnel training. The whole process of training includes the input of the teachers, teaching facilities, teaching materials and books, teaching management and other tangible and intangible factors; the process of teaching and studying; the output such as the improvement of the student's quality and the graduation of the students and so on. For the training institutions, the purpose of education quality management system is to strengthen the

control to the process of culture of the student' s knowledge, ability and quality, through the monitoring all aspects of whole process of personnel training in order to ensure an overall improvement in the quality of personnel to meet the employer's needs even exceeding the expectations of the employer.

Therefore, the various training institutions should establish the quality management system such as ISO 9000 to regulate the management of school. Meanwhile a modern school management system can be build by self-improvement and continuous improvement mechanisms, by which to change the concept of education and training of institutions as well as service awareness. Furthermore, through the process of documentation and quality records, the school management could be improved and standardized through the software. Finally, the establishment of quality management system could improve the school's reputation, increasing social and employer satisfaction with the school. Obviously, a sound quality management system has special significance (Bao, 2012).

6.1.5 Innovating the model of training, and comprehensively improving the overall quality of the assignment

More measures should be adopted to improve the overall quality and abilities of the assignment crew to face the competition in the international market. The international, systematic, high standards of maritime English proficiency test system should be introduced into China; innovating training model, encouraging the “ sandwiches mode” , “ order mode ” in the training of the seafarers; increasing the investment of training facilities and equipment in order to improve the seafarer' s practical operation skills and emergency response ability; trying to take measures to improve the seafarer' s non-intellectual qualities especially crew professionalism, service sense of obedience, responsibility, cooperation in the groups, and psychological characteristics of the crew; Chinese crew professionalism norms, as the professional

ethics and quality standard of the seafarer should be defined and trained as soon as possible in Mainland China; developing the re-training to seafarer the labor export agencies and shipping companies mainly so as to enhance the skills and professionalism of the crew, and gradually increase the share of Chinese crew on the special vessel in the international market manning to adapt to the needs of the crew assignment..

6.1.6 Increasing efforts to train the officers for the special vessels adapting to the international fleet trends.

Operating the special vessels at the international route is always on behalf of the "high-end and professional", revealing the overall competitiveness of one flag countries. In fact, the large quantities of professional officers are required variety special vessels such as the large oil tankers, chemical tankers, large multi-functional vessels, LPG carriers and LNG carriers, large container ships, engineering vessels, luxury cruises, drilling rigs and other special vessels. Meanwhile, more high quality and special professional officers are required on the normal vessels due to the developing of the technology for example intelligent engine, navigation automation systems, engine room automation systems and handling equipment automation systems, and so on. Therefore, some high-quality maritime education and training institutions should be chosen to improve their teachers, training and laboratory equipment, teaching materials and other aspects of the system in order to carry out special operations training.

6.1.7 Making the crew share the high-quality education and training platform in the whole country.

At present, most students in the seafarer training institutions are from inland

provinces, while the ship management agencies and crew education and training institutions are mostly in coastal areas. Therefore, it is actually necessary to break the limitation of the scope of regional authorization for training so as to form the healthy competition among the maritime education and training institutions. To achieve the goals, platforms for sharing of teachers, professional knowledge, facilities and equipment as well as basic cooperation should be established firstly.

6.1.8 Innovating the ideas of enrollment

The maritime institutions should work hard to do well in the recruiting propaganda links. The propaganda must be based on be responsible for both the school and the students. The content in propaganda must be comprehensive and realistic reflection of the school, academic, professional construction of the actual situation. Furthermore, varieties ways should be used to strength the effects of the propaganda such as the use of the news media, marine enterprises, and the school graduates. To build a solid base for maritime professional students, more work should be done to attract the excellent students in the inland provinces. Meanwhile, preferential lending policies should be implemented to help the poor students from inland provinces complete their studies successfully. Then, in full investigation of the shipping market, the seasonable enrollment ratio of undergraduate, specialist, vocational should be allocated to meet the need of the shipping industry. To training more high quality seafarers, both the continuing education and academic education should be attended. To avoid the separation between the marine education and the enterprises, the maritime institutions should try to cooperate with the marine enterprises during the enrollment. On one hand, the students can get the help from the company in the school, on the other hand, the company can recruit the excellent students after the graduation.

6.1.9 Strengthening students' professional ideological education

Maritime Institutions should look the patriotism, ideals and beliefs as an important part of education for students. Through a variety of carriers, the students in maritime institutes should learn about the high degree responsibility and mission. They should have interesting to seek their own value during the realization of national and collective interests. In addition, more measures should be taken to strengthen the students basically the only one child spirit of hard-working, love and dedication. In another words, the institutions should consciously train the students good professional ethics in order to adapt to future hard work on board. To be a good seafarer, in the school the students should learn the knowledge about unity and cooperation, solidarity teamwork and so on. The recent amendments and changes to each chapter of the STCW Convention and Code include new requirements for training in leadership and teamwork (International Maritime Organization 2010). Moreover, risk awareness education and anti-risk ability should be enhanced so as to make the students can calmly face a variety of risks and scientifically response. To make more students choose to work on board the ship, the teachers in school should help the students establish a correct concept of career and employment outlook. Meanwhile , more good seminars, social research, visiting, reports should be organized in the school so as to make the students fully understand the sailing, to love the sailing, to establish a sense of responsibility and mission

6.1.10 Reform and improve employment policies to the graduates in maritime institutions

Maritime Professional Employment policies should continue improve to adapt to the development of shipping industry, guiding and promoting the full employment of graduates in maritime institutions .Based on the reform of the employment policy in state colleges and universities, the graduates in the marine institutions should be more

considered by the policy to further promote the active participation of Chinese seafarer in international shipping competitive talent market .For example, the macro-control in the demand and supply of the graduates should be continue strengthened in order to keep the balance of the market. In addition, it is recommended to take effective measures, through legal means, to strengthen and encourage the awareness of students' work on a ship,.

6.2 The marine companies

6.2.1 Setting the tactic to attract and retain the high quality seafarers.

There was a common agreement from all interviewees from companies that it is a tough work to maintain the employee stable in the fluent human market. Obviously, a sound strategy used by the company will not only result in attracting more seafarers but also retaining the recruited seafarers. (DINWOODIE , J.,2000) The strategy includes satisfying the needs and ensuring considerations initially pledged are being implemented and satisfied. (BAIRD, M., 2005) This is illustrated by most interviewees from large marine company who mentioned that one of their current marketing strategies in recruiting employees is to offer and realize what the company initially promised to give their seafarers. The second important consent was to improve the situation by matching the needs of employees to the wants of employers. (CAHOON , S., 2008,) The third key point is to provide a mutual understanding and to match characteristics of a nautical studies cadet's needs prior to entering the maritime academy together with the company's requirements. The fourth key point is to attract employees by the rewards. The simple point is supported by survey respondents. It can be seen that the decision to take on seafaring career seems to rely heavily on tangible benefits, as respondents unanimously agreed that high salary and job security are very crucial reasons that attracted them to take on a seafaring career. Hence, the marine companies will have to find the sustainability of offering rewards

in contrast to benefits they will gain. The fifth point is that a good industry image will affect the employment brand positively.(B JERKE, R., 2007) There is a high level of agreement towards the seafarer a challenging unique career, assured financial income and guaranteed employment is the most attractive, followed by opportunity to travel and passion of the sea. Meanwhile, scholarships, family tradition and parent decisions did not play a major role in attracting person to the seafaring career (Fan, 2012). This result was unexpected as it reflects that the attractiveness of seafaring is still enduring, especially from the financial perspective. Therefore, employers who can successfully employ marketing practices that sell those factors can strengthen their employment brand for better recruitment of their workforce.

6.2.2 Establishing the sound management system in shipping companies

The role of the human factor in shipping accidents has been recognized by plenty of studies (UK P&I Club unknown date) and attention has been given to management systems that can improve ship safety and prevent pollution. With the improvement of the standard of safety management in the shipping industry, the marine companies are required to change the management towards the trend of systematic, scientific and modern. Following measures should be considered when establish and operate the management system.

(1), Fostering corporate culture and shaping the concept of enterprise value. The shipping corporate culture should be strengthened to reflect development prospects and the spiritual essence of the corporate. Corporate culture can play the role to enhance the flexible management in the enterprise. Furthermore, it will be able to guide the mariners to integrate their own development and enterprise development consciously, establishing a sense of owner of the enterprise. At last, it could create a unity, fraternity and harmony good working atmosphere to make the crew really feel the harmony and family and get the great warmth and incentives (Zhang, 2005).

(2) . Establishing the scientific system to strengthen the crew management.

Shipping companies should adopt the advanced human resources concept to establish and improve the human resources management system. The management system should focus on the aim to improve the overall quality of the crew and to perfect the service to the crew in order to mobilize the enthusiasm and creativity of the seafarers at sea. When making the human resources planning, the development of the crew and enterprise should combine with the talent market demand. Every crew could find their own space for the development through the education or training supplied by the companies. So, the shipping companies should increase the investment on the training for all the seafarers in different level .For instance, they could conduct the counterpart education and training to the crew according different actual situation of the crew relying on domestic or international maritime institutions, shipping companies and social training resources to improve the overall quality of the crew, especially in business skills, regulatory conventions, PSC inspection, professional ethics and other aspects of the management level. When developing the incentive and compensation systems, the performance evaluation should be in the center combine with morality and knowledge. Through reasonable evaluation system, the result of job evaluation will associated with the promotion, wage distribution forming the incentive and restraint mechanisms. For example, the officer with outstanding performance at work should be rewarded through flexible and diverse forms of incentives timely and widely publicized (Guo, 2009).

6.3 The seafarers themselves

Since the outbreak of the financial crisis, the international shipping market have occurred the sharp changes. Many seafarers in the Europe traditional marine countries return to work on board, meanwhile, the graduates from marine institution increased in these years, which leads to the fundamental change in the international seafarer

market In China, the supply of the seafarers in some positions has also changed from the shortage to the oversupply with the demand that has resulted in the unemployment of the seafarers in many cities. Especially, for the person just out of college or about to graduate from the maritime college who have met the big difficulty to find the job which has revealed in the market. The phenomenon will continue for many years, and this situation will be more serious, so more and more seafarers will get into troubles in the future. The global economic crisis continues to worsen, and the demand of crew plummeted, however the supply of seafarer continued to increase. During the tough period, many seafarers in China must face the challenge about how to improve the competitiveness to meet the higher requirement of the market. Obviously, the comprehensive literacy plays a decisive role when improving employability and competitiveness. So, as the seafarers, the following aspects should be continued to enhance and improve.

6.3.1 Improving the ability of communication in English

It is well known that the seafarers is a worldwide profession, and the common language used in shipping industry is English. At this point one should take into consideration the fact that the world's largest fleets are attached to either flags of convenience (FOC) or second registers and the nationalities of these fleets' crews do not correspond with the flags of their ships (ILO 2001). The last twenty-five or more years, eighty percent of the world merchant fleet is manned with multi-cultural and multilingual crews (Trenkner 2000) which sets the matter of multiculturalism and the management of culture under the spotlight. So, using English in both written and oral communication is the basic ability to be a qualified seafarer. Actually, most Chinese seafarers have good professional skill on board, however, few of them have the enough ability to use English, especially the writing and oral communication. As the cadets from Chinese on foreign vessels, they often failed to understand the job allocated by their foreign superiors because of their limited English ability, which

sometimes lead to the error in the work. Some seafarers in manage level could not keep smooth communication with the company by writing in English which affects the normal development of the shipping business. Moreover, due to the language barrier, some incidents have occurred in these years. Therefore, it is a normal fact that some Chinese seafarers were dismissed by the captain when they onboard the vessel only less than a month or two because the poor English level. Limitation on the usage of English makes the Chinese seafarers failed to occupy more shares in the international market. . Therefore, the seafarers in China must take advantage of every opportunity to improve the English speaking and writing skills in order to achieve the smooth communication (Huang, 2009).

6.3.2 Establishing the sense of obedience and teamwork, and enhancing the confidence from the foreign ship-owners .

Every vessel is a moving factory, one units working independently. In the moving factory, any improper actions and negligence are likely to endanger the ship, cargo and crew safety. So, this requires the crew on board have both the concept of obey and teamwork which is an important principle to ensure the safety of ships. No matter captain or the ordinary crew should not look the work on board as the temporarily job so as to give the satisfied serve to ship owners and manning agency. Moreover, all the seafarers are sure to abide by the contract and fulfill their responsibilities and obligations, fulfill their duties at work in order to enhance the foreign ship owners confidence on Chinese crew.

6.3.3 To cultivate and exercise the manage ability

Nowadays, many Chinese seafarers have to work together with the crew from other countries on the boat, which require seafarers especially the officers in management

level seafarers have the high organizational skills, ability to command, coordination, control and decision-making ability. In practice, the seafarers should constantly exercise to improve their ability to manage on the boat so as to keep the safety of the seafarers and vessel. Despite the economic crisis led to the collapse of demand for seafarers worldwide market, but the demand for high quality of the crew is still very strong. As long as the majority of our seafarers can continue to improve their overall quality, trustworthy commitment, and effectively safeguard and protect the interests of ship owners and fulfill their own responsibilities, they will never have the risk of unemployment!

6.3.4 To establish a scientific career planning

It takes at least 8-10 years for the seafarer to be promoted to the master or chief engineer after graduating from the maritime institution .Due to the long term for waiting for promotion, many seafarer abandon the career to find the new job on shore. So, facing the diversified values in the market economy, every seafarer should learn to establish the planning “successfully completing the work on board and try to become dual compound talents of the land and sea ” instead of the plan of “to be the seafarer for the lifetime ” which was accepted by most Chinese seafarers before . Nowadays, a lot of outstanding masters and chief engineers who chose to work on shore have played the important role in maritime colleges, marine enterprises and Maritime Safety Administration because of their sufficient experience and knowledge about the vessel. Obviously, they can further promote the development of maritime industry in China (Wu, 2011).

6.4 Government Departments

6.4.1. Controlling the seafarer service agency more effectively

There is a lot of scholars and organizations that do research work about manning agencies and the role that they play in the seagoing labor supply system. As Cooper (2000) mentions, the instability of the industry is strongly affected by the role of agents, since manning agencies create a working environment, which promotes insecurity, stress and poor motivation among seafarers. The quality of the offered services by a certain percentage of manning agencies has been questioned several times, this owed to the fact that very often agents are involved in the recruitment of seafarers with fraudulent and falsified certificates. Rubullah (2003) also mentions that manning agencies have been involved in several cases of employment of seafarers on substandard ships and abandonment of seafarers in foreign ports. Wu (2004) and Amante (2004) have discussed the illegal activities of several manning agencies in China and the Philippines. In the new labor-supply nations of South and South-East Asia, at some stage in the process of entry to the industry, costs have been incurred by recruits and their families (ILO 1996). These illegal payments are long-standing malpractices well known in the industry.

According to current regulations in Mainland China, only the seafarer service agencies with the qualified certificate have the right to do the service business for the seafarers. However, just as mentioned before, most of the service agencies do not operate the business in the normal way. As the bridge between the foreign ship owners and Chinese seafarers, the seafarers service agencies should play the role to protect the rights of seafarer when supply the services ,however ,some of them offend the rights of the seafarer by diversity ways making the market chaos. Therefore, in order to successfully carry out the strategy to make more seafarer go out to occupy the share of the international market, it is an urgent job to control the seafarer service agency more effectively so as to earnestly safeguard the rights of crew.

1) Centralized manage the seafarer service agencies by the uniform authority

The problematic and illegal in many cases, operation of several manning agencies is part of the clouded and dark side of shipping, which exists along with the substandard ship operators and substandard ships (OECD 1996). Recognizing the issue, ILO (2002) supports that manning agencies should be supervised and prohibited from using means, mechanisms or lists intended to prevent or deter seafarers from gaining employment. Also it supports the idea that strict laws and regulations should be enforced, in order to ensure that no fees or other charges for recruitment are disbursed directly or indirectly, in whole or in part by the seafarers.

In fact, it is necessary for the government to strengthen the management to the seafarer service agencies in different district. In practice, the large quantity of seafarer service agencies should centralized managed in the coordination and harmonization way . One special commission under the MSA should be set up to charge the related affairs according the rules about the export of seafarers . The commission should develop the reasonable regulations and procedures in order to guide the agencies more effectively. Unless in the special situation, other government department should not involve into the work of the commission so as to form the uniform and standard management to the agencies .

Under the commission, the specialized information service center should be set up to collect and analysis the information about the World crew labor market circumstances. Meanwhile, they should in charge to guide the agencies to correctly understand the demand of market. Through this way, the policy and regulations can be appropriate adjusted to meet the requirement of the marine industry and protect the interesting of the seafarer. Moreover, the commission should inspection and examination the agencies regularly, once find the seafarers interesting was harmed, the agencies should be severely punished, or directly revoke the qualifications. At the same time, the agencies who can obey the regulation completely should be rewarded in order to

develop the crew assignment process towards this standardized and institutionalized direction. Finally, the agencies should be request to collect the information about the performance of the seafarers onboard the ship in order to continue improve the quality of seafarers. To the seafarer hired by the ship owner because of the poor performance, the agency should carry out the corresponding training and education to strength the ability of the seafarers (Hu, 2010).

2) Establish the special labor market for the seafarers

Another methods to supervise the seafarer service agencies is to establish the special labor market for the seafarer through reforming the policies that the seafarer in Chinese only depend on the agencies to find the job on the vessel owned by other countries . In the market, the seafarer could meet the ship owner and make the chose directly. This kind of special market may be set up in the cities where large number seafarers live in. Of course, the market should be led and unified managed by government departments .For example, the department should in charge of operation of the market and development and implementation of the regulations. Furthermore, the meeting for recruitment should be scheduled regularly where both the ship owners and seafarers are invited. During the meeting, they could make the two-way choice, and can be directly entered into labor contract. As the seafarer service agencies, they can operate depending on the government financial allocation. They also can depend on a certain amount of commission paid by the seafarers who sign a contract though the work of the agencies. During the operation of the market, considering the particularity of the crew career, government departments should set a series of standards such like crew minimum wage, standard working conditions, compensation for personal injury and other cases based on the provisions of the law or of the relevant provisions of international conventions. when conducting the supervise on the labor contract signed by the crew, if the contract does not meet the minimum requirements of the standard , the departments have the right to cancel the contract so as to protect the rights of the seafarers.

6.4.2 Try to make the seafarer as a carrier accepted by the society

First, more work should be done by the government to propagandize the seafarer to public so as to make more people know and like the seafarers. The culture and consciousness of marine in China were lower than other marine countries, so during a long time general public has little awareness of employees on board and even many of them look the seafarer as the tragic career. Therefore, to alleviate the prejudice of the public on seafarer must be attached importance by the government departments. For instance, the working form of the officers on the high-tech, highly automated, high large international vessels can be showed to the public by variety ways such as TV and Internet so as to enhance image of seafarer in people's mind. Similarly, a successful film about seafarers could enhance the seafarers' social status, guiding those who want to engage in maritime industry talent to join the crew team. Actually, the loss of occupational prestige causes a lot of influence on the seafarer. Occupational prestige mainly refers to specific social groups in society, the members of a profession in which a subjective evaluation of social hierarchy, this judgment is based on integrated assessment of the members in the society.

According to the "occupational prestige survey" released by the Chinese Social Sciences Academy, the rank of seafarers' occupational prestige is low and continues to go down in these years. The rank of seafarer dropped from 59 in 2008 to 68 in 2010, which has lower prestige than that of cleaners, nurse, cook and farmer which reflect the fact that the occupational prestige of seafarer is worse in the mind of most people. Owe to the negative impact of occupational prestige, many officers with outstanding skills and knowledge are flowing into the profession with high occupational prestige. Obviously, the development of the maritime industry in China can not continue without the seafarer, especially the high quality officers. The lost of high quality offices do harm to the society. So, government and the media should endeavor to make the community recognizes the dedication of highly professional crew, improving the seafarers professional recognition and reputation degree. Actually, in

recent years, very few positive reports about the seafarer can be found in the media. However, more and more negative news such as shipwreck or marine pollution which decline the already worse image of the seafarer. It is time for the government departments to recognize the problems and take actions to change the situation. The professional image of seafarers should be revealed through positive ways, such as show programs or other influential media, to reflect the seafarer' wisdom, bravery, professionalism and dedication, which will attract more young people to join the crew team.

Chapter 7 Conclusion

On the background of the economic globalization, the labor like other resource becomes the object of contention among countries in the world. During the long history, the seafarers are always looked as the important talents for the development of economy in countries. Today, labor export of seafarer industry also affects the competition of a country's participation in international economy.

In China, many seafarers were trained and sent to vessels flagged with different countries every year. However, in recent years, the supply of seafarer especially the officers meets many troubles in several aspects when facing the competition with other countries in the international market. First, the quantity of officer in Mainland China increased too fast, so, the supply of officer will be serious overcapacity in the future, which can be revealed from the deep study on the trend of the officer' supply and demand in Mainland China. Secondly, the high quality officer is serious shortage and unstable because of the serious loss. Furthermore, the supply of the officer working on board the special vessels is in serious shortage, which reflects the construction contradiction in the supply of the officer.

There are many reasons for the problems existing in the supply of officers, including training institutions, shipping companies, crewing agencies and seafarers themselves.

In order to solve the problem, to enhance the Chinese international shipping standards and establish the powerful marine country, efficient measures must be taken to make up the flaws in the supply of the officers. Crew training institutions should take reasonable steps to improve the quality of training to seafarers; shipping companies should improve the management system, and increase investment in crew training, to attract and retain high quality officers; crew agency shall provide reasonable and perfect service, effectively protecting the interests of the crew; crew themselves should take the initiative to improve the professional level, rational planning career development in order to meet market demand; government departments should gradually change their ideas to the international shipping market and adjust the strategy for meeting the international labor market for seafarers, which including at least following aspects: seizing opportunities to extend the shipping industry, improving the quality of human resources, and providing excellent seafarer export environment and sound social service system to meet the needs of international seafarers labor market and maintain the development of China's foreign trade.

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