

On the Unbalanced and Backward Education for the Senior Maritime Professionals in China

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Abstract

The question of education for senior maritime professionals continues to be a hot topic of discussion because the education of senior maritime professionals has been conducted in a backward and unbalanced manner year after year. This is due to the absence of a far-sighted maritime education and personnel training policy, in addition to the interactions between market fluctuations and shipping technology. This article focuses on the relationship among seafarers, the shipping market and the existing training system under two unbalanced circumstances: “excess seafarer labour supply relative to demand for ships” and “shortage of seafarer labour supply relative to demand for ships”. The article then reflects on the direction that the two major international shipping entities, China Mainland and Taiwan, should take for the training of future senior maritime professionals.

Key Words: Maritime education & training; Seafarer; Shortage; Seafarer training; STCW

I. Basic Problems of the Seafarer Market

Changes in the seafarer market are largely dominated by market demand and supply forces. During times of economic slowdown in the shipping industry, many seafarers are unable to work in the industry and it is even difficult for students in maritime education institutions to

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find internships. While a global shipping boom causes serious shortages of seafarers. Since the Second World War the seafarer market has never been stabilized; the most remarkable example is none other than the 2008 global financial crisis.

On the eve of the financial crisis, the world was enjoying economic and industrial growth, leading to a shortage of seafarer labour, which in turn caused a vigorous development of seafarer labour supply. For example, there were over a hundred seafarer education and training agencies in China Mainland by 2010.²² The decline of the shipping industry triggered by the financial crisis has immediately turned the seafarer labour shortage into seafarer labour surplus. Due to the poor “flexibility” of the labour supply, it cannot cope or adjust with the new situation till now.

The reasons for this are very simple. Generally speaking, it takes four to six years of training for a newly recruited student to become an operating officer for international shipping routes, while it may take seven to nine or more years to train a managing officer. On the other hand, it takes only eight to nine months to build a new ship from scratch. When it comes to market functions, the shipping market is affected by ever-changing international trade patterns and economic activities, and changes may be triggered at any time, or may be cyclic.

Under such conditions, as far as the demand and supply theory, elasticity theory and market equilibrium theory in economics are concerned, it is impossible to reach equilibrium between the activities of the seafarer market and those of the shipping market. In addition, judging from market forecasting theory and the forest-building personnel training concept, it is extremely difficult for maritime personnel training agencies to meet the needs of the shipping market.

II. Seafarer Employment Mobility Analysis

Under the macro conditions, the economic cycle and changes in world trade frequently break the balance between demand and supply of the seafarer labour market. On the micro level, seafarer mobility adds new variables to the already complicated seafarer labour market. Seafarer labour mobility may be described on the following levels:

²² According to the statistical data of The Annual Bulletin on Seafarer Management 2010 issued by the Maritime Safety Administration of the People’s Republic of China, at the time there were 69 maritime institutes and 59 seafarer training agencies in China.

1. The first level is the mobility of seafarers within the shipping industry. This can be between different ships or between onboard posts and shore-side posts. During periods of high economic growth, seafarers often move between different shipping companies to seek optimal levels of pay.
2. The second level is graduates from maritime training institutions joining the shipping industry, or personnel in the industry returning to maritime institutes for further education and training.
3. The third level is cross-industry personnel mobility. On this level, seafarers end their seafaring career to seek work opportunities in other industries or simply retire.

Of the above three levels, graduates from maritime institutions increase the supply of seafarers while mobility inside or between companies does not affect the overall number of seafarers employed by the shipping industry. Unidirectional cross-industry mobility and retirement substantially affect the supply of seafarers within the shipping industry. An important reason for attrition is that during maritime education and training, many students majoring in maritime affairs transfer to other more popular majors for various reasons. Students specializing in maritime affairs often choose onshore occupations upon graduation, and furthermore many of those choosing to work on board ships opt to leave within a few years.^{23 24}

²³ Most Chinese seafarers are not graduates of 4-year undergraduate programs from key domestic maritime colleges. Judging from the situation at job fairs for graduates from maritime colleges in recent years, over 50% of graduates are unwilling to work on board ships. Even those who choose to work as seafarers intend to retire from the seafaring career in the coming years, while less than 20% plan on taking seafaring as their life long career. The stability of the seafaring occupation is under heavy threat, and the country's education system for seafarers is inefficient and hardly able to increase the quantity of China's seafarers. Some maritime colleges claim to be cradles of seafarers, but that too was only in the past. Following China's economic development, improvement of people's living standard and the reality of the one-child policy in China, this problem is even more severe. We should carefully study China's seafaring education system and create a solution that controls recruitment of 4-year undergraduate students in maritime specialties. The system should also vigorously develop junior college maritime education, and have a fair admission system to bring out the best of the limited maritime education resources in China. See Gu Jianwen, Seafarer Resources and Development of Seafarer Market in China, *Water Transportation Digest*, No. 10, 2005, p. 28. (in Chinese)

²⁴ As stated in the 2010 Work Report from the Seafarer's Working Committee of China Shipowners' Association, "the shortage of qualified seafarers is a difficulty not only troubling the global shipping industry, but also confronting Chinese fleets. Seafarers in China, especially officers, leave ships for shore-side work for various reasons. The high attrition rate has aggravated the shortage of seafarers." The attrition of officers in ocean-going ships may be illustrated with two cases. Case I: In a large shipping company with 3,200 seafarers, the attrition of officers has arisen from 1999 to 2008, with an over 0.5 attrition to recruitment ratio since 2005. Case II: A seafarer dispatch service agency recruited approximately 1,800 graduates in 1996. The attrition rate of those with 3-5 service years was roughly 25%, the attrition

There are many reasons for the attrition of such personnel, including family factors, economic factors, social transformations, and industry restructuring. Obviously such problems cannot be solved by shipping companies themselves, or even by the shipping industry as a whole. However, with the participation of individual companies, the support and attention of the shipping industry and society, this attrition can be reduced by a large extent.

Moderate external attrition is necessary for smoothening of the promotion system, but a substantial increase in external demand will lead to the loss of balance in the seafarer labour supply structure. For example, with the rapid expansion and development of shipping and ports in China, there was a very urgent demand for personnel with relevant marine engine knowledge, and the officers in training were employed before they finished training. Taken optimistically, this was good for opening the channel for promotion. Viewed from another angle, however, the average competence of officers in this period might not be as solid and refined as that of officers in the previous period.

The above discussions do not cover the movements and changes of the international seafarer market accelerated by the situations described by the economic theories of “replacement”, “elasticity” and “preference,” which arise from shipowners’ employment of seafarers of specific nationalities due to considerations for expenditure, service quality, ability or preferred nationality.

According to the data in the Baltic and International Maritime Council/International Shipping Federation (BIMCO/ISF) Worldwide Demand for and Supply of Seafarers, Main Report (Tables 1 and 2),²⁵ when the international officer market is in short of supply, those filling the gap are mainly from less developed Eastern European and Central European countries. However, when the market is oversupplied, those cut from the market are seafarers from the Far Eastern region. Despite their growth in number, Chinese seafarers are mainly employed by shipping fleets controlled by or relevant to China, and few of them are employed by international fleets.^{26 27}

rate of those with 6–8 service years was about 40% and the attrition rate of those with 9 or more service years exceeded 50%. In addition, the attrition rate of graduates from 4-year undergraduate programs was slightly higher than that of junior college graduates. See Weng Yuezong, Analysis of Ship Officer Resources under the Goal of Building a Strong Seafarer Country, *Navigation of China*, Vol. 34, No. 2, 2011, pp. 79–80. (in Chinese)

²⁵ BIMCO/ISF Manpower 2010 Update – The Worldwide Demand for and Supply of Seafarers, Main Report, University of Warwick: Institute for Employment Research

²⁶ Manning – Annual Report 2012, Drewry Maritime Research, 8 May 2012.

Table 1 Supply of Seafarers in Main Regions of the World from 2000 to 2010 (Unit: 1,000 People)

		2000	2005	2010	Rate of change from 2000 to 2010
Officers	OECD countries	147	133	184	25.2%
	Eastern/Central Europe	62	95	127	104.8%
	Africa/South America	35	38	50	42.9%
	Far East	128	132	183	41.9%
	India/Middle East	32	68	80	150.0%
	Total	404	466	624	54.5%
Ratings	OECD countries	191	174	143	-25.1%
	Eastern/Central Europe	107	115	109	1.9%
	Africa/South America	89	115	109	22.5%
	Far East	332	226	275	-17.2%
	India/Middle East	104	96	108	3.9%
	Total	823	721	747	-9.2%

Table 2 Historical Development of Seafarer Supply

	1990	1995	2000	2005	2010
China	9,905	29,009	34,197	42,704	51,511
World	403,000	409,000	404,000	466,000	624,000
Percentage in global supply	2.46%	7.09%	8.46%	9.16%	8.25%

Despite some controversies over the survey methodology, the practical significance of the survey data is that it proves that there is a shortage of highly competent seafarers in terms of quality and structure, that is, the shortage of officers for special ships, high-tech ships, and super-sized and extra-large ships, who have great impact on the industry though the demand is not large.²⁸

²⁷ The major seafarer labour exporting countries and regions in the world are: the Philippines (28.1%), Russia (6.8%), Eastern Europe (16.6%), China (6.2%) and India (5%). The Philippines dominates the international seafarer market, supplying about 200,000 seafarers to the international market each year, among which 150,000 serve ships of European shipowners, and 50,000 serve ships of Asian shipowners mainly from Japan. The seafarer training facilities in the Philippines are backward, the number of officers provided is insufficient, and the educational level of seafarers is low. There are no seafarer resources in developed countries in Europe. Due to the disintegration of the Soviet Union, the economies of Eastern Europe have suffered a downturn, and as a result the number of seafarers has risen, as many people are willing to work on board ships. But they mainly occupy Atlantic shipping routes. India is a country with a large population, an advantage in the English language, in addition to a rapidly developing supply of seafarers. Most major liquid cargo ships in the world use Indian seafarers. Demand for international seafarer labour is rising, with intense competition. The wages of Chinese seafarers rise year by year, but are still lower than the international market average. China exports about 20,000 seafarers each year, of whom 80% work for ships in Asia, and few of whom enter the European and American markets. See Zheng Lei, A Tentative Discussion on the Measures for Developing Seafarers in China under the Manila Amendments to the STCW Convention, *Proceedings of the Fourth Guangdong Maritime Advanced Forum*, Guangdong: Guangdong Provincial Association for Science and Technology, 2012, pp. 525-528. (in Chinese)

²⁸ Since there are three obvious errors in research report released by the Baltic and International Maritime Council (BIMCO) and the International Shipping Federation (ISF), the data can only be used as reference. First, we should understand the limitation of the questionnaire survey method adopted by the BIMCO/ISF for surveying the supply and demand of worldwide shipping manpower (officers) and the accuracy of the

III. Problems Resulting from the Supply and Demand Imbalance

The consequences of the unbalanced seafarer market can be analysed from two viewpoints: “excess seafarer labour supply relative to demand for ships” and “shortage of seafarer labour supply relative to demand for ships.”

A seafarer market of seafarer labour surplus leaves shipowners more choices. The consequence for seafarers is that they struggle to find appropriate positions in such a situation, and will feel abandoned. In addition, students studying to become seafarers struggle to find internship opportunities, to say nothing of a suitable entry-level job. This situation prevents the shipping industry from becoming an attractive industry for young people. A market of seafarer labour shortage will stimulate the investment in maritime education and training, but many shipping companies will suffer losses due to higher wages and lower quality employees.

The evolution of a market mechanism in which “seafarer labour supply outnumbered demand for ships” is as follows:

1. First, the most direct advantage is in regards to shipowners. As shipowners can select excellent seafarers in this market mechanism and may reduce expenditure due to lower spending on seafarer wages.
2. Second, the main impact on seafarers in such a market is their employment and promotion opportunities. In terms of employment, seafarers who have the opportunity to work on board ships will be reluctant to leave their jobs, which will prolong the rotation cycle of seafarers and aggravate the situation of few ships to work with; in terms of promotion opportunities, in a market where supply exceeds demand, the time of work at one position is prolonged, which in turn extends the promotion cycle, and thus seafarers may have to seek a job they are overqualified for in order to make a living.
3. Third, training agencies which cater to market demands for high-quality staff, will raise all training test thresholds in the name of quality control.

statistical forecast method as well as its mathematical model. Second, we should assess the validity of the worldwide officer shortage data released in the research report in light of objective facts. Third, we should understand the motivation for the constant release of worldwide shortage data of officers by the BIMCO/ISF. See Wu Zhaolin, Nature of the Shortage of Officers and China’s Coping Measures, *World Shipping*, Vol. 34, No. 11, 2011, pp. 2~3. (in Chinese)

The direct result of the above three aspects is that many excellent and qualified seafarers will leave their seafaring positions to seek jobs in other industries. On the other hand, seafarers with relatively low levels of competence will be eliminated by this mechanism. The more far-reaching impact of this phenomenon is a job market with intense competition for few positions, little opportunity for promotion, and low expected income. This situation makes seafaring a less attractive industry to individuals considering seafaring as their career. As a result, the lack of newcomers foreshadows the future shortage of seafarers.

The evolution of the market mechanism in which “demand for ships outnumbers supply of seafarers” is as follows:

1. For shipowners faced with few seafarers looking for work aboard ships, they have no choice but to attract seafarers by offering better working conditions, higher wages or more promotion opportunities. Moreover, some shipowners, by lowering their original seafarer competence standards will seek to employ lower-ranking seafarers which they might have been unwilling to accept in the past. In addition, the shipowners, at that time, may solve the problem by choosing other seafarer supply channels, including engaging foreign seafarers.
2. For seafarers, they will not only have more job choices, better wages, improved working conditions, and greater opportunities for promotion, but will also gain more job experience in such a market.
3. For training agencies, besides the advantages gained in student recruitment and training, the impact that causes the most concern is that in order to meet market demand, the quality and quantity of training as well as the examination and certification system may have their original standards lowered during this period.²⁹

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²⁹ There are many seafarers training centers in China, of which few are of good quality. Most of the centers simply provide training on seafarers' performance of contracts, while almost none of them truly improve the competencies of Chinese seafarers. See Gu Jianwen, Seafarer Resources and Development of Seafarer Market in China, *Water Transportation Digest*, No. 10, 2005, pp. 28~29. (in Chinese)

³⁰ Due to the serious shortage of professional teachers, practical teaching resources and resources for student internships (vessels for teaching and training in addition to onboard internship opportunities), some colleges which lack the necessary conditions for setting up maritime specialties have also started to recruit students. These conditions are required for maritime education and training in China. An obvious contrast has been developed between the rapid expansion of maritime education and seafarer training and the lack of real improvement in maritime education and seafarer training in China. The relaxing of standards for setting up maritime specialties and the lowering of operating conditions for seafarer training agencies,

Under such a market mechanism, the seafarer selection and elimination mechanism is relatively weak, the service time of officers is too short, and new seafarers are anxious for promotion, which leads to the backsliding of average competence. In addition, some companies unscrupulously poach seafarers from other companies, which can lead to the employment of incompetent seafarers. As a result, ship operation and service quality are impacted, as are maritime safety standards, which raise the risk of maritime accidents.³¹ From a cause and effect perspective, the effect of expanded student recruitment and seafarer training in the period when “demand of ships outnumbers supply of seafarers” is in fact a cause for the future surplus of seafarers.³² Shipowners’ strategy for employing seafarers from other supply channels during such a period will also aggravate the new problems arising from future changes of supply and demand.

IV. A Strategic Reflection on the Supply and Demand of Qualified Professionals

Professional maritime education no longer focuses on traditional knowledge and technology education, but instead stresses that advanced maritime professionals with international competitiveness should have “one kind of spirit”, “two kinds of competence”, “four kinds of awareness”, and “five skills”.³³ In other words, high-quality professionals that are trained through maritime education should have the following core competencies:³⁴

though favorable for expanding China’s maritime education and seafarer training, can hardly resolve the shortage of officers in China and across the world. See Wu Zhaolin, Nature of Shortage of Officers and China’s Coping Measures, *World Shipping*, Vol. 34, No. 11, 2011, pp. 1~4. (in Chinese)

³¹ The reality is that the legal knowledge of both seafarer dispatch agencies and seafarers have yet to be strengthened. Problems such as: failure to follow regulations, operation without proper licenses and unfair tuition charges, despite repeated attempts to prevent them, are common. Seafarers are recruited through the promise of high wages or arbitrary arrangements. As a result, seafarers lack competence and credibility, tempted by higher pay or position. This situation has destroyed the order of seafarers’ normal employment and mobility, and is also criticized by shipowners... A labour market lacking proper management and regulation loses credibility with shipowners and damages seafarers’ interests. See Hao Mingli, A Study on Problems in China’s Seafarer Labour Dispatch Market and Countermeasures, *Navigation*, No. 3, 2012, pp. 66~69. (in Chinese)

³² The number of students recruited by maritime institutes in China grew from 22,785 to 53,996 from 2006 to 2010, and it is estimated that the number of ocean-going officers supplied by China will increase from 73,643 in 2011 to 134,339 in 2015. The serious imbalance between supply and demand will prevent many seafarers from working on board ships. See Li Ning and Lian Qingyun, Supply of China’s Ocean-going Officers: Forecast and Countermeasures, *Marine Technology*, No. 2, 2012, pp. 73~75. (in Chinese)

³³ (1) “One kind of spirit” means professional dedication. Having a resolute and correct political direction is a basic requirement for maritime professionals. They should love the nation and love the company where they work. They should be responsible and dedicated to their work. They must strictly abide by a sense of organizational discipline. They should be hard-working and have the spirit to be dedicated to the development of China’s shipping business. (2) “Two kinds of competence” means physical competence and psychological competence. Seafarers should be healthy both physically and psychologically. They

1. They should be versed in professional maritime knowledge, international conventions, relevant laws and regulations, and able to keep updating their knowledge base;
2. They should master an extensive range of knowledge, including comprehensive knowledge in economics, management and humanities, especially a mastery of international maritime legislation, and be able to deal with international maritime affairs;
3. They should have a good command of foreign languages, especially listening and speaking ability in order to compete in the international seafarer labour market;
4. They should be aware of relevant marine transportation safety and environmental protection issues;
5. They should abide by a code of professional ethics, value team spirit, and be aware of the importance of obeying orders; and
6. They should have practical operations skills and be able to solve problems independently.

need to be able to endure the inclement natural conditions and difficulties resulting from a life spent at sea. They should be good at managing interpersonal relationships. Those working in coastal areas should be able to confront intense competition and adjust to the social environment. (3) “Four kinds of awareness” refers to economic awareness, legal awareness, environmental awareness and awareness of obedience. Traditional maritime education focused on teaching knowledge and skills, but it lacked adequate training on economic awareness, legal awareness and environmental awareness. Economic awareness requires that maritime professionals should know how to operate and make a profit. Legal awareness requires that maritime professionals should not only know various international and domestic laws and regulations relevant to their specialty, but also strictly obey such laws and regulations. Environmental awareness requires that maritime professionals do their best to prevent pollution and protect the marine environment on their respective posts. (4) “Five skills” means management and leadership skills, foreign language skills, work skills, adaptability to changes and innovation skills. They should be able to use English to smoothly complete their work and participate in foreign exchange activities. In modern enterprise operation activities, scientific and effective management will bring huge benefits. Thus, in modern maritime education, training of leadership and coordination skills should become a part of the curriculum. Also, seafarers should be innovative, which is a general requirement for modern seafarers. See Lin Honggui, Training of Ocean-going Maritime Professionals: A Preliminary Discussion, *Modern Business Trade Industry*, No. 3, 2007, pp. 75~76. (in Chinese)

³⁴ Wang Zuwen, Worldwide Supply and Demand of Officers and Development of Higher Maritime Education in China, at http://www.sol.com.cn/xinxiupdown_winland/zhishu/editor/uploadfile/dalianhaishi.pdf, 2 November 2012. (in Chinese)

However, the above expectations are an indirect illustration of the problems in the current education and training of officers in China beyond the level of supply and demand.³⁵

In light of policy measures to cope with diverse problems in seafarer development such as a serious lack of seafarers, low competence of seafarers, unreasonable seafarer team structure, scarcity of officers, abundance of ratings, further aggravation of seafarer mobility, serious attrition of high-quality seafarers, and serious lack of seafarer professional training mechanism, the Ministry of Transport of the People's Republic of China launched Ten Measures for Accelerating the Development of Seafarers in 2008.³⁶ These measures, by moderating requirements on degrees, strengthening requirements on experience, moderating theoretical examinations and strengthening operational tests, attempt to solve outstanding problems in the development of seafarers, improve seafarers' competence, and promote the scientific development of the seafarer team. However, it seems that a gap always exists between these relative measures and the training of officers with expected competence.

In fact, a retrospective view of the evolution of the international seafarer labour supply market over the past fifty years will demonstrate that the supply and demand of seafarers is not only closely related to the development of the shipping market, economic and social development of various countries, income of nationals of various countries, as well as the maritime transportation policies and labour export policies of various countries, but also related to the maritime education certification system of various countries.

³⁵ An expert has pointed out five problems in a study on the current situation and problems of China's seafarer labour dispatch market: 1) the present number of ocean-going seafarers is too small, 2) existing officer training is unable to adequately expand, 3) the seafarer examination system is irrational, 4) efforts in monitoring the labour market are inadequate, and 5) seafarers working abroad do not have high competence. The fifth point includes the lack of four abilities on the part of seafarers: their inadequate learning awareness, their poor English communication skills, the neglect of dispatch seafarers' culture difference and work ability, their lack of passion for work and their inadequate awareness of obedience. See Hao Mingli, A Study on Problems in China's Seafarer Labour Dispatch Market and Countermeasures, *Navigation*, No. 3, 2012, pp. 66~69. (in Chinese)

³⁶ I. Implement seafarer E-government; II. Establish comprehensive seafarer competence assessment programs to determine seafarer competence by their abilities; III. Establish an officer internship program to improve their competence; IV. Strengthen seafarer competence assessment and improve their practical operation ability; V. Eliminate the restriction on students at maritime institutes that they should be subject to operational evaluation before a theoretical examination; VI. Regulate the correspondence training model in order to establish a channel for a promotion of ratings; VII. Train teachers to meet the needs of seafarer education and improve training quality; VIII. Prolong the qualification requirements for the promotion of third officers and fourth engineers to second officers and third engineers from 12 to 18 months; IX. Ensure that seafarer competence exam scores are valid for three years and eliminate the restriction on the number of make-up exams; X. Adjust the educational requirements on officers and improve team structure. See Jiao Hai Fa [2008] No. 141, Ten Measures for Accelerating the Development of Seafarers, 27 March 2008.

A prime example of this is the maritime education certification system. The maritime education certification test department, as a part of the public service system, is often a department with the slowest response due to its bureaucratic style. The work style of such departments often aggravates the problems of advanced maritime professionals. The root of the problem is the inflexibility of the education system's student recruitment method, which often recruits students who "aim to get a degree" instead of those who "aspire to follow a seafaring career". This situation is more often found in East Asian societies, primarily Taiwan, South Korea, Japan and China Mainland. The natural result is a waste of educational resources, and the exclusion of students "aspiring to follow a seafaring career" from the test system.

Also, to maintain the maritime education certification test's professional, neutral and detached nature, and to prevent collusion between officials and businessmen, the public service system has always not been able to coordinate with the market mechanism. To say nothing of coordination in regards to the reflection and forecasting of the ups and downs of the shipping market as well as changes in market supply and demand. Of course, it is very difficult to forecast the ups and downs of the shipping market, and thus it might be better not to forecast.

Maritime education is one of the cornerstones of shipping development, and cultivating advanced seafarer labour will improve the shipping industry of a country, although this is not always the case.

For example, the three major shipping countries, Greece, Japan and Germany have a different approach to seafarer education. Based on data from the Review of Maritime Transport 2011 issued by the United Nations Conference on Trade and Development (Table 3),³⁷ the three major shipping countries' ships of 1,000 gross tonnage (GT) and above account for 27.82% of the world's total and whose deadweight tonnage account for 41.10% of the world's total. These countries have prominent maritime culture and historical background related to the shipping industry, but they do not maintain a large training system for advanced maritime professionals to maintain their leadership in the modern shipping industry.³⁸ In

³⁷ China Mainland's number of vessels accounts for 9.40% of the world total, and deadweight tonnage 8.63%; China Hong Kong's number of vessels accounts for 1.83% of the world total, and deadweight tonnage 2.97%; China Taiwan's number of vessels accounts for 1.70% of the world total, and deadweight tonnage 2.63%. See United Nations Conference on Trade and Development, Review of Maritime Transport 2011, at http://unctad.org/en/Docs/rmt2011_en.pdf, 31 October 2012.

³⁸ The total number of vessels over 1000 GT owned by European countries such as Greece, Germany, Norway, Denmark, Italy and the United Kingdom accounts for 29.82% of the world total, and deadweight tonnage 33.55%, but the total number of officers they have accounts for only 9% of the world total. See

comparison, famous seafarer supply countries such as the Philippines and several Eastern European countries are not able to secure the high development of their shipping business even with their larger number of seafarers. The crux of the problem is in the definition of advanced maritime professionals: are they important personnel, knowledge and skill resources, working partners for the future development of a company, or are they just technical personnel operating ships for a fixed time at the command of a company?

Table 3 Fleets Owned by Major Countries or Regions

Country/region (global ranking)	Number of ships above 1000 GT			DWT		
	Domestic vessels	Foreign vessels	Total	Domestic vessels	Foreign vessels	Total
Greece (1)	758	2,455	3,213	64,659,201	137,728,951	202,388,152
Japan (2)	7,24	3,071	3,795	18,942,573	178,287,143	197,229,716
Germany (3)	442	3,356	3,798	17,149,221	97,623,425	114,772,646
China Mainland (4)	2044	1,607	3,651	46,207,468	61,762,042	107,969,510
South Korea (5)	736	453	1,189	18,135,391	29,317,780	47,453,171
United States (6)	971	1,001	1,972	24,363,609	22,011,225	46,374,915
Norway (7)	818	1,166	1,984	14,850,693	28,127,239	42,977,932
China Hong Kong (8)	399	313	712	24,102,438	13,080,401	37,182,839
Denmark (9)	383	592	975	13,998,073	21,113,253	35,111,326
Taiwan (10)	97	565	662	4,096,790	28,863,160	32,959,950
Italy (13)	616	220	836	16,556,782	6,774,107	2,330,889
United Kingdom (14)	363	412	778	8,927,892	13,395,899	22,323,791
World's total	17,391	21,456	38,847	399,254,553	852,394,905	1,251,649,458

(Source: United Nations Conference on Trade and Development, Review of Maritime Transport 2011, at http://unctad.org/en/Docs/rmt2011_en.pdf, 31 October 2012.)

But the basis for this view cannot be taken as an excuse for the failure of China Mainland with a population of 1.3 billion to make active input in education of maritime professionals, nor can it be used as a pretext for Taiwan, a region famous for its maritime business and dependent on maritime transportation.

China Mainland has 1.55 million registered seafarers, ranking first in the world, but only 510,000 of them really engage in maritime transportation, including 156,000 seafarers with an ocean-going merchantman certificate, and 62,000 ocean-going seamen with officer certificate. There are less than 5,000 shipmasters and chief engineers respectively, including management level onshore shipmasters and chief engineers. The total number of shipmasters and chief engineers truly engaging in ocean-going shipping is only about 8,000.³⁹ Therefore, in light of the current demand of shipping companies, the supply of senior maritime professionals in China Mainland is inadequate to meet China Mainland's domestic demand.⁴⁰ This is not only

Drewry Maritime Research, Manning – Annual Report 2012, 8 May 2012.

³⁹ Zheng Lei, A Tentative Discussion on the Measures for Developing Seafarers in China under the Manila Amendments to the STCW Convention, *Proceedings of the Fourth Guangdong Maritime Advanced Forum*, Guangdong: Guangdong Provincial Association for Science and Technology, 2012, pp. 525~528. (in Chinese)

⁴⁰ According to the data in Review of Maritime Transport 2011 by the United Nations Conference on Trade

a commercial concern, but a warning signal for national security. An analysis of the current average income of citizens may uncover that with its wide gaps between different provinces and urban and rural areas, choosing to become a senior maritime professional can be very attractive to people with lower income because of the relatively high salary. Besides, of the expected 590,000 strong 2016 international officer market, the shares that China Mainland is set to occupy will not only be an economic index but an indicator of the competence of China Mainland's officers.⁴¹

For Taiwan, with its strong shipping capacity, there are also several unique questions that may have to be considered. First, will Taiwan be able to maintain its current shipping capacity without the education and training of senior maritime professionals? Second, will Taiwan's shipping market continue to grow at the current rate or will it sharply decline under the pressure of international economy and politics? Third, considering that the number of seafarers in Taiwan has dropped from 30,000 to 6,000 over the past few decades because of the abnormal interactions between senior maritime professionals and Taiwan's shipping market, what will Taiwan's next strategy for training maritime professionals be?

and Development, the total number of vessels with 1,000 GT and above (including national and foreign flags) in China Mainland was 3,651, accounting for 9.398% of the world's total; and the data in Review of Maritime Transport 2010 shows the percentage was 9.458%. However, according to the data of the 2010 BIMCO/ISF survey, China Mainland's officers only accounted for 8.25% of the world's total. This data illustrates that it seems that the number of officers cannot meet the demand of the fleets owned by China Mainland and there are no surplus officers from China Mainland to supply to the fleets of other countries.

⁴¹ According to a report from Drewry Maritime Research, the number of six kinds of vessels was 22,581 by the end of 2011, and is predicted to increase to 24,393 by 2016, with a compound annual growth rate of 1.6% (Table 1 below). The demand for officers is predicted to increase by 31,000 (Table 2 below). See Drewry Maritime Research, Manning – Annual Report 2012, 8 May 2012.

Table 1 Projected Fleet Changes to 2016

	Number of vessels in 2000 (1)	Number of vessels in 2011 (2)	Compound annual growth rate from 2000 to 2011	Number of vessels in 2016	Projected compound annual growth rate from 2011 to 2016
Oil tanker	2,884	3,130	0.7%	3,402	1.7%
Chemical tanker	1,618	4,045	8.7%	4,302	1.2%
LPG carrier	873	1,140	2.5%	1,201	1.0%
LNG carrier	127	358	9.9%	425	3.5%
Dry bulk	5,540	8,818	4.3%	10,185	2.9%
Container	2,500	5,090	6.7%	4,878	-0.8%
Total	13,542	22,581	4.8%	24,393	1.6%

(1) By 1 January 2000, (2) By December 2011

(Source: Drewry Maritime Research, Manning – Annual Report 2012, May 8, 2012.)

Table 2 Projected Officer Demand/Supply (unit: 1,000 People)

	1990	1995	2000	2005	2011	2016
Officer demand	448	427	420	476	560	591
Officer supply	403	409	404	566	544	575
Surface surplus (deficit)	-45	-18	-16	-10	-16	-16

(Source: BIMCO/Drewry Maritime Research/PAL)

V. Conclusion

Whether in a market in which “supply of seafarers outnumbers demand for ships”, or one in which “demand for ships outnumbers supply of seafarers”, the number of senior maritime professionals is always a consequence of the interaction between supply and demand. Underlying the fluctuating shipping market is the serious problem of an inadequate maritime education and training system, as well as an inefficient certification system. However, the more fundamental issue is the competence of senior maritime professionals produced under these systems. The spirit, qualification, awareness and abilities of Chinese senior maritime professionals continue to be a problem. An individual produced by a system whose competence fluctuates and quality varies, will be unable to truly enter the professional international maritime market.

China Mainland and Taiwan, which share a historical origin, have already surrendered leadership of global shipbuilding and maritime science and technology because of several hundred years of closed-door policies under which maritime culture was neglected.

This nation led the global shipping industry six hundred years ago and even today this nation is still equipped with the conditions for leading the global shipping industry. Yet to realize the goal of becoming a “strong seafarer country”,⁴² the real problem of unbalanced education for senior maritime professionals is yet to be carefully assessed, and the role of “senior maritime professionals” needs to be re-positioned.

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⁴² To realize the goal of becoming a “strong seafarer country”, the following three objectives must be achieved: 1. become a major country of seafarer labour export; 2. have high-quality seafarers able to meet the demands of modern, special and super-sized vessels; 3. have a strong voice on the international seafarer stage. See Weng Yuezong, Analysis of Ship Officer Resources under the Goal of Building a Strong Seafarer Country, *Navigation of China*, Vol. 34, No. 2, 2011, p. 78. (in Chinese)

版權頁

台灣海事安全與保安研究學刊 Journal of Taiwan Maritime Safety and Security Studies

雙月刊(Bimonthly)
ISSN 2077-8759

Vol 6, No 4, August 2015
2010 年 2 月創刊

www.safetysea.org



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2077-8759