

# Education, Manpower and Employment Growth: The Emerging Female Seafarers in Taiwan

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## ABSTRACT

*Taiwan has allowed women to have navigation education for already 15 years. Although the number of women who got seafarer qualification is significantly increasing, the number of hiring women seafarer is relatively low because shipping industries are shackled by traditional gender stereotypes. The shipping industry in Taiwan heavily depends on foreign seafarers, and with the large amount of upcoming retirement from national seafarers, the gap of land base manpower management is directly impacted. This research analyzes the manpower of female seafarers and development potential in Taiwan through literature and secondary information review. This research found out that, globally view, European OECD countries have the most women seafarers. Most of these female seafarers serve on cruise ships, which is different from Taiwan. Most women seafarers in Taiwan serve on container fleet and are in charge of navigation related job. In the navigation workplace, women have been treated unequally around the world. However, women's nature characteristics such as soft and prudent are extremely meet the qualifications of ship manipulators. Shipping industries should explore and develop female seafarers, introduce them at the proper timing to reach win-win situation as well as create the niche for Taiwan's navigation education, shipping industries and female seafarers.*

**Keywords:** *Women seafarers, Navigation education, Shipping industry, Navigation manpower*

## INTRODUCTION

Seafarer, considered as a higher-risk and physical-strength-needed job, has been regarded as a traditional male job. Navigation education in Taiwan had focus on male students as the target group for development. But by the end of 20th century, postmodern feminism and gender equality gradually became significant trends in the global study, Taiwan's navigational education also started to allow female students to enroll in 1993. 4 years later, the first woman who passed National special examinations for professional and technical personnel for seafarers and persuaded shipping company to grant her on board license after a 1-year negotiation. She became the first female seafarer in Taiwan in the Post-Navigation era. Since then, the number of women who receive navigation education has increased gradually year by year, the number of female students even more than one-third in some navigational faculties. With the increasing number of women who got seafarer qualifications, Taiwan's navigational education plays an important role in global navigational education and navigation human resources.

Under the trend of market demands are greater than supplies, the quality and ability of seafarers are possibly losing focus, and relatively the shipping risk is significantly elevated. Therefore, the purpose of this study is to construct the development trend and manpower of female seafarers, to drive shipping industries in Taiwan introduces women as seafarers. Shipbuilding technology in order to meet the requirements of shipping industry – the trend of building large-sized ship, automation and high-speed, the

competencies of seafarer already transferred from physical-power-needed to intelligent-needed. The work needs to control the intelligent automatic machines, so the modern vessel controllers require more cautious and careful characteristics. With the popularization of women's education and development of gender workforce in Taiwan, higher navigation education also inherited fifty-year teaching experience, which nurtured and created abundant female navigation manpower. However, the mindset of Taiwan shipping industries regarding the navigation manpower still subject to traditional gender stereotypes, which prefers to spend lots efforts in searching of seafarers in the global seafarer market, rather than develop its own local female manpower. This research studies women in Taiwan navigation higher education, National seafarer special examinations and the demand of manpower in the shipping industry through review literature and secondary information, survey and conduct in-deep interview to analysis female navigation manpower in Taiwan.

The tendency of female knowledge economy stage is an irresistible trend. With the abundant manpower of Taiwan's female seafarers, it will benefit the navigation safety and complement land basic management manpower shortage, if the shipping industry can escape from traditional gender stereotypes and introduce this abundant female navigation manpower. The conclusion of this study can provide sufficient evidences to the shipping industry, the National navigation education and female seafarers so that they can make decisions after referring it.

### LITERATURE REIVEW

Internationally, the most completed study which related to Women Seafarers is from Belcher, P., Samposon, H., Thomas, M., Veiga, J. and Zhao, M. at Seafarers International Research center (SIRC) which belongs to Cardiff University, who are appointed by the International Labour Organization (ILO) in 2001, to investigate the employment policy and working practices of women seafarer around the world. They surveyed seafarers/ female seafarers, unions, owners, training firms and other agencies to implement a full-scope of surveys which is relevant to female seafarers. In 2003, the report was published on behalf of ILO. The report indicated that only 1-2% of seafarers is women among more than 1.25 million seafarers globally, and most of them serve at accommodation department on the passenger vessel or ferry services in OECD countries (Belcher , P., Samposon, H., Thomas, M., Veiga, J. and Zhao, M., 2003). From the interview with the ship managers, the report mentioned, even under the gender equality rules and laws, employers still have strong gender stereotypes when hiring women, and would rather to choose hiring men.

Zhao, M. (2001a, 2001b, 2003) and Thomas, M. (2004, 2006) studied the career of female seafarers on passenger vessel and the ferries in European countries to understand the employment policies, sexual harassment issues in the workplace, as well as the issue about resignation and transfer into land base job. The study shows that female seafarers who resigned and transferred into land base related job still can highly elaborate their experiences on the sea. It also pointed out that those female seafarers suffered serious sexual harassment on the sea. In June 2006 periodical from the former National Union of Marine Aviation Shipping Transport (NUMAST), 76% of female members who are seafarers have been suffered sexual harassment. Furthermore, 47% of them indicated that they were treated unequally due to gender discrimination in the workplace (NUMAST, 2006).

During 1986 to 1993, Hansen and Pedersen (1996) and Hansen (1996), Hansen and Jensen (1998), Hansen, Nielsen and Frydenberg (2002) used occupational medicine as research background, surveyed a series of physical and mental medical research on 6,788 Danish female seafarers. The research found

out that: when women engage in the non-traditional job, they face higher difficulties on adjusting lifestyles and emotions, as a result of leading a higher probability to get sick than men.

One China research, Li-Jun Zhao, Long-Yun Pu (2005) and Li-Jun Zhao, Tao-Chang Zheng (2005) indicated that although China is the major country who supplies global seafarer human resources which develops almost 6,000 seafarers annually, the development for female seafarers is only at Shanghai Maritime University(SMU) from year 2000 to recruit deck department female navigation students. In 2004, among the first 18 graduated female students, only 2 engaged in navigation related job.

Because the education and development of women navigation is relatively late in Taiwan, the study which is related to Taiwan seafarers is also very limited, Jiunn-Liang Guo, Gin-Shuh Liang (2009) use hierarchical regression analysis to understand female students' motivation and impact of incentive mechanisms for working on the ship. The research indicates that salary, job characteristics, interests, preferences and social relationship, etc. have positive impact on on-board working motivation for women. The conclusion also suggested that shipping companies should take serious consideration on women to see if they are suitable for sea workplace or not, so that to adjust the development direction for women on navigation education.

After reviewing foreign literature which is related to female seafarers, most of the literature is in European countries and focus on accommodation services on the passenger vessels and ferries. In addition to some of the literature use medical background to analysis medical history of female seafarers, use focus groups or in-depth interview approach as research methods to discuss workplace gender issues, it is rare to research or discuss career development for female seafarers.

#### **NAVIGATION MANPOWER DISTRIBUTION AND FEMALE SEAFARERS IN TAIWAN**

According to The Worldwide Demand for and Supply of Seafarers 2005, which was released by BIMCO/ISF in 2006 indicates that the navigation officer has been mainly supplied by the OECD (Organization for Economic Co-Operation and Development) countries for a very long time. But according to the statistics in 2005, 58% of the navigation officer at management level in OECD countries is more than 50 years old. With the highly dependent on physical strength in the shipping workplace, the retirement trend must happen within 10-15 years. When that time comes, the global navigation manpower gap will gradually emerge. They estimated that officers in 2010 will reach to 21,000, and then increase to 27,000 in 2015 lately. The research also indicated that the supply of the seafarers will gradually shift from OECD countries to the Far East, India and Eastern European countries, among these countries, Philippines and China are considered as the most potential supplier (BIMCO/ISF, 2006).

China locates at Western Pacific, with more than thousand miles of coastline and deep hinterland; it has fully developed shipping industry this century. According to the Review of Maritime Transport 2008 which was published by UNCTAD (United Nations Conference on Trade and Development), it shows that China's ship's DWT (Deadweight tonnage) ranked only second to Greece, Japan and Germany. The gross tonnage also ranks fourth in the world. There are 3,303 ships which are 1,000 gross tonnage and above (UNCTAD, 2008). Relatively, the demand of navigation manpower is also very large. Zhao-Lin Wu & Jing-gen Chen (2008) and Li Yong & Yu-Liang Zhao (2008) indicated the total number of national seafarers is up to 484.5 thousand, including ocean-going merchant seafarers which are 17 million people in 2005. While the expatriate manpower supply the world's shipping manpower approximately 4.2 million people, Taiwan is also one of the major suppliers. China develops more than 6,000 navigation human resources, but within the 6 University navigation faculties, only Shanghai

Maritime University limit to recruit 15 -20 female students (Li-Jun Zhao, Tao-Chang Zheng,2005). This shows that China apparently still has many limitations for women to engage in the navigation field.

### Human Resources Structure of Global Female Seafarers

Navigation education has been targeted male students for a very long time. Due to the rising sense of gender equality and feminism in recent centuries, the number of women who entered men's workplace or engage in male-oriented navigation education is relatively significant. According to the maritime education and training institutions students number survey report which was published by ILO in 2003, it shows that Svendborg International Maritime Academy (SIMA) College in Denmark is in the first place, has 1,618 students. When it comes to the ratio of women in the Maritime College, the top goes to FNB College in Spanish, which is the 25%. For the traditional European countries, which have developed their power on the sea such as United Kingdom, Portugal, Denmark and Sweden, etc., women only engage in navigation education for 4.62% -6.23% on the contrary. Overall, women in maritime education are about 10.8%. The report also indicated that during 1997 to 2001, in the major maritime European OECD countries (Sweden, Denmark, Norway, the United Kingdom, etc., total 8 countries), among total 101,703 seafarers, 9,302 were female 9.15%. And around the world, 68% of female seafarers were working on ferry, 26% on the passenger ship service, and only 6% on the cargo service (Belcher et al. 2003).

### Taiwan Navigation Education Gender Distribution

According to a gender education analysis report from Taiwan Ministry of Education in 2009, the ratio of women who received higher education in OECD countries in 2006 is that: the ratio of 2-year-college and technical colleges is 54.19%, universities and graduated schools is 54.09%, and Ph.D. is 45.73% respectively. This data shows that women has a greater number than men in receiving higher education in the developed countries. Comparing with the gender related statistics in Taiwan, from 2000 to 2008, among those who were awarded as bachelor's degree, 51.59% is female. This means that, on the average, there are more 6,605 women than men who receive this degree every year (Ministry of Education, R.O.C. 2009). This result not only represents that the gender equality on Taiwan education, but also shows that the rising of women's awareness which is progressively affect the change in labor market. One of the most significant changes is that Taiwan women start to engage in non-traditional-female-education for the navigation education.

After the popularization of higher education in Taiwan, the number of women who entered navigation education is getting higher each year. According to the survey of this study which was conducted in March 2008, the number and gender distribution of Maritime Academy of Taiwan is shown in below Table 1.

**Table 1. The number and gender distribution of Maritime Academy of Taiwan**

Unit : People, %

School Name	Department	Number of students		Sub-TTL	
		Male (%)	Female (%)		
National Taiwan Ocean University	Merchant Marine Department	261 (62.44)	157 (37.56)	418	
	The Navigation division of Transportation and Navigation Science Department	167 (79.90)	42 (20.10)	209	
	The Power Engineering Division of Marine Engineering Department	212 (94.22)	13 ( 5.78)	225	
National Kaohsiung Marine University	2-year of College	Department of Shipping technology	48 (61.54)	30 (38.46)	78
		Department of Marine Engineering	85 (98.84)	1 ( 1.16)	86

School Name	Department		Number of students		Sub-TTL
			Male (%)	Female (%)	
	4-year College	Department of Shipping technology	169 (87.56)	24 (12.44)	193
		Department of Marine Engineering	390 (97.74)	9 (2.26)	399
	5-year of Junior maritime College	Navigation division	138 (63.59)	79 (36.41)	217
		Marine Engineering division	191 (88.83)	24 (11.17)	215
Taipei College of Maritime Technology	Day time of 2-year of Junior maritime College	Navigation division	73 (89.02)	9 (10.98)	82
		Marine Engineering division	140 (89.74)	16 (10.26)	156
	Night time of 2-year of Junior maritime College	Navigation division	51 (86.44)	8 (13.56)	59
		Marine Engineering division	63 (96.92)	2 (3.08)	65
	2-year of College	Department of Marine Engineering	64 (88.89)	8 (11.11)	72
	4-year College	Department of Marine Engineering	45 (93.75)	3 (6.25)	48
	5-year of Junior maritime College	Navigation division	17 (85.00)	3 (15.00)	20
		Marine Engineering division	13 (100.00)	0	13
Industry-university post-secondary classes	Navigation division	21 (100.00)	0	21	
Sub-TTL		Deck department	945 (72.86)	352 (27.14)	1,297
		Engine department	1,203 (94.06)	76 (5.94)	1,279
Grand total			2,148 (83.39)	428 (16.61)	2,576

Source: Compiled from report of Statistics of the Ministry of Education R.O.C., 2008

Table 1 shows that there are total 2,576 students in Taiwan Maritime Academy in 2008 and 428 are female. Among them, 27.14% is from Deck Department and 5.94% is from Engine Department. Apparently, female students in Deck department are more than Engine Department. The most obvious number is at Merchant Marine Department in National Taiwan Ocean University, Department of Shipping technology of the 2-year of College and Navigation division of the 5-year of Junior maritime College in National Kaohsiung Marine University, the ratio of female students are 37.56%, 38.46% and 36.41%, which are all more than one third female in the departments. This indicated that Taiwan women who engage in navigation education are still mainly focus on deck department.

#### Human resources in Taiwan Navigation filed

Lu Shui-Tain (2004) surveyed 16 major merchant shipping companies in 2006 to investigate the navigation manpower, and it indicated that these Taiwan shipping companies planned to build approximately 146 new ships from 2004 to 2009. However, 62% of existing Masters and Chief Engineers who are in management level are over the age of 55, and 68% of them will retire in 2009. In other words, Taiwan's navigation manpower in 2009 will need 1,289 management level of Master, Chief Engineer, Chief mate and Second engineer. According to the statistics data from Lu Shui-Tain (2004), it shows that in 2004 the total seafarer number on the fleets which were operated by Taiwan shipping companies is 9,474. Among these seafarers, 4,059 are local (Taiwan) nationality and the rest of them are filled by foreign seafarers. Overall, total number of foreign officers and ratings is 5,415, which is 57.16%. The related numbers and distribution are shown in Table 2.

**Table 2. Seafarer nationality distribution of Taiwan's operated fleet**

Unit : People, %

Seafarer Nationality	Officers (%)		Ratings (%)		Sub-total (%)	
Local (Taiwan)	2,125	(52.35%)	1,934	(35.72%)	4,059	(42.84%)
Foreign	1,934	(47.65%)	3,481	(64.28%)	5,415	(57.16%)
Total (%)	4,059	(100.0%)	5,415	(100.0%)	9,474	(100.0%)

Source: Lu Shui-Tain (2004)

### Taiwan Women in Navigation Manpower

Taiwan women have entered the navigation filed for nearly a decade. According to the requirements of Ministry of Transportation and Communications, people who want to apply for the Officer Certification have to pass National special examinations for professional and technical personnel first, and then experience in ruled seagoing services. After that, Officer Certification application will be approved. According to the statistics data from Taiwan Examination Yuan, during 2004 to 2008, the average passing rate of the exams of Deck officer of 1st Class, Engineer officer of 1st Class was only 11% (Ministry of Examination, 2008). The numbers and gender distribution of passing Deck officer of 1st Class and Engineer officer of 1st Class exams in recent 5 years are shown in Table 3.

**Table 3. The number and gender distribution of seafarers exams in recent 5 years**

Unit: People, %

Year	Passing numbers	Deck officer of 1st Class				TTL	Engineer officer of 1st Class				
		Male (%)		Female (%)			Male (%)		Female (%)		TTL
2004	87	58	(84%)	11	(16%)	69	18	(100%)	0	-	
2005	195	102	(89%)	13	(11%)	115	80	(100%)	0	-	80
2006	257	134	(80%)	33	(20%)	167	90	(100%)	0	-	90
2007	224	99	(80%)	25	(20%)	124	100	(100%)	0	-	100
2008	453	154	(79%)	41	(21%)	195	254	(98%)	4	(2%)	258
TTL	1,216	547	(82%)	123	(18%)	670	542	(99%)	4	(1%)	546

Source: Compiled from report of the Ministry of Examination R.O.C, 2004-2008.

It shows from Table 3 that there are total 1,216 people passed the examination of Deck officer of 1st Class, Engineer officer of 1st Class which was hold by Ministry of Examination during 2004 to 2008, and Deck Department respectively admitted 547 men and 123 women for Deck officer. While Engine Department only got 546 people who passed the exam, but only 4 female engineers passed until 2008. This shows that when women consider navigation workplace as their career preference, the heavy operation in engine department still have restrictions for them. To sum up, from the gender analysis, the number of women who passed the examination is increasing year by year, which indicates that the accumulated female manpower is abundant. When cross-compared with Table 1, the annual number of female students who graduate from Taiwan Navigation departments is nearly 100, while the number of women who passed the national deck officer and engineer officer exam is 45 in 2008. This means that it is up to 45% female students who got the qualification of warrant-officer, which shows the potential of Taiwan women in navigation manpower.

### Current Hiring Status in Taiwan Female Seafarers

After navigation departments in Taiwan higher education started to enroll female students in 1993, these female students requested for their first On-board training in 1996. At first, Taiwan Ministry of Education and Ministry of Transportations tried to consult shipping industries to provide this internship opportunity, they were all rejected. Lastly, the largest scale shipping company-Evergreen reluctantly accepted, and created the first record on Taiwan maritime history that female students are on board for internship training. In 1998, the first Taiwan female Deck Officer officially on board on the container ship, until 2004, Taiwan passenger vessel and bulk carrier started to use female Deck Officer, women navigation is moving to a sprouted stage.

However, since then, women have a very hard time to enter navigation career. In 2006, Taiwan has only 3 shipping companies who hired female seafarers and the numbers are 7, 6 and 2. By 2007, the first

female Deck Officer group who entered navigation field was reaching the age which was suitable to get married, so they choose to transfer to the land base units or even to resign. This caused the sudden decrease of the female seafarer number to 5, 5 and 0. In March 2008, Yang Ming Marine Transportation which is state-owned enterprise started a policy to hire female Deck Officer and became the breakthrough on history.

In March 2009, the female Deck Officer extends to 58 people, on shore stand-by mates reached 7, the distribution of hiring companies and level is shown in Table 5.

**Table 5. Distribution of female Deck Officer's hired by shipping industry in Taiwan**

Unit: People

Shipping company	A	B	C	D	E	Sub TTL	TTL	
Ship category	Container	Container	Container	Container	Ro-ro Passenger			
Chief mate	0	3	0	0	0	3	29	58
Senior mate	2	2	2	5	0	11		
Junior mate	8	2	4	1	0	15		
On-board cadet officers	11	6	9	1	2	29	29	
Total onboard officer	21	13	15	7	2	58		
On-shore Stand-by officers	5	2	0	0	0	7		
Total hiring people	26	15	15	7	2	65		

Information shown in table 5 was consolidated by in depth interview with domestic shipping companies in March 2009 from this study. It shows that among 16 major shipping companies in Taiwan, only few of them hired female seafarers. The hired female seafarers mainly focus on working on the container fleet and limited at Deck department officers. There are no female seafarers at engine department. Among these, the most special one is High speed Ro/ro ship which is newly developed by Taiwan. That ship is a kind of light-type ferry which was recently developed for sailing between the Taiwan Strait.

## **THE CHALLENGES OF DEVELOPING WOMEN NAVIGATION MANPOWER IN TAIWAN**

In Taiwan, women entered the navigation labor market still with a short period, so that gains and losses are still unclear. But in a non-traditional gender industry, the minority group is easy to face following challenges: entry barriers, working environment and management, development opportunities, etc. The details of each challenge are described below:

### **Entry Barriers**

Female seafarers entered navigation filed must face competition with foreign seafarers and national crews. Although foreign seafarers and local men seafarers have their own employment problems, in this traditional male-dominated industry, gender is still an important factor which can impact competitiveness at work. The entry barriers which were derived from gender differences include:

(1) Gender taboos and stereotypes:

Although the taboos of women in navigation workplace have gradually eliminated, in Taiwan, women entered this industry still with a short period, the idea of "hiring female seafarers" for some shipping companies is still hard to popularize. Take the findings in Table 5 for example, that idea is still not fully popularize no matter in Chinese or in Western world. Zhao (2001a, 2001b, 2003) and Thomas

(2004, 2006) both supported this point of view. This shows that how to eliminate gender taboos and stereotypes is still the important issue to reduce the entry barriers for women.

(2) Taiwan is focus on container fleet which is not suitable for developing female seafarers:

According to the most international studies (Belcher et al., 2003), ferry is more suitable for female seafarers to work. However, compared with Taiwan's shipping industry, the cruise industry is not prosperous and Taiwan does not have local cruise company. This creates entry barriers for women.

### **Working Environment and Management**

When it comes to the percentage of women in the navigation manpower, the ratio is still low and imbalanced. This not only caused the unfriendly working environment but also brought out some management problems.

(1) Women are rare and cannot form a "gender-friendly" work groups:

In the workplace where has large gap between the number of men and women, the minority group is easy to become the attention and discussion focus among peers. Furthermore, in most workplace, gender perspective has become the mainstream value and often ignores the feelings of the minority gender group. For navigation job, the boundaries between work and personal life is not clear, so when female seafarers are in this working environment, their behaviors will be paid close attention by their peers(men) or even become a discussion topic among peers. "No privacy" may be a source that causes working pressure. In addition, male-dominated value in the navigation working environment makes women more difficult to enter men's social relationship network, and cause the feeling of isolation among peers.

(2) Physical strength is still the factor which impact job performance:

The improvement of navigation facilities has greatly reduced the need of physical strength of seafarers, but, after all, navigation working environment is different from the land base. Handling ship consumes more physical strength than clerical or administrative or service job. Also, adapting a long-term life on the sea is still a test for physical condition. Therefore, even physical strength is no longer an entry barrier for women to enter navigation industry; it is still a disadvantage that will keep impacting women's competitiveness at work.

(3) Management problems:

Working environment not only causes torments for female seafarers, but also increases the workload of management team. Currently, only few women are in high level management position. Because of the gender differences, male leaders usually have more difficulties on reaching an interaction balance with women and also have more difficulties on taking care female subordinates' emotions and life. In addition, women need more personal privacy, but in this traditional male-oriented working environment, privacy is easily been ignored. With women's participation, many operations and work-rest patterns must do some adjustments to meet women's needs, and this will of course increase workload of management team.

### **Development Opportunities**

Career development has always been an important topic on managing seafarers. Everyone will consider future career development when joining a work no matter men or women. For female seafarers, it also exists several challenges on career development.

(1) Work-Family Conflict:

Seafarers who work on the sea for a very long period, they must sacrifice part of their family life. Under Taiwan's culture and traditional family gender roles, men are mainly in charge of working outside while women are mainly taking care of family. Once female seafarers got married, they must face more serious work-family conflict than men. This work-family conflict is the main factor that women are not willing to enter work or leave navigation work.

(2) Promotion opportunities:

Women are rare and still a minority group at navigation workplace. It is difficult for women to cross the boundaries to engage in men's social relationship network. This makes women in a less favorable competitive position than men especially when it comes to promotion opportunities, social relationships, work information, etc. Currently, there are fewer women in officer management position which makes female seafarers hard to find a mentor, and working experience is also impossible to pass down, which will also affect job performance. Thus, even women have equal opportunities to enter navigation field, because of the large gap between the number of men and female seafarers, women still get fewer promotion opportunities.

## CONCLUSION

The demand of navigation manpower in Taiwan is larger than supply. The ageing and retirement of National seafarers in management level causes a gap on navigation manpower supply. Developing female navigation manpower should be a workable solution. The reasons are listed below:

- (1) The ship has been combined with the high technology in recent years. Female seafarers will have a great person-job fit on operating and applying precise instruments with their nature characteristics. This will lead to the enhancement on job performance.
- (2) Under the trend of gender equality, there are more and more female students enroll in higher navigation education. These female students are highly interested in navigation career, and also have outstanding performance on their school works. If Taiwan can fully utilize these stable and high-quality human resources, it will definitely benefit the shipping industry in Taiwan.
- (3) Traditionally, there are some negative perceptions for female seafarers, but are gradually eliminated. Many shipping companies and male seafarers are willing to have women as their working partners. From an actual survey found that there will be no expected negative consequences when men and female seafarers work together.

To summarize the above discussions, the development of female seafarers not only can diversify the navigation manpower, but also can solve part of the quality and quantity problem on navigation manpower which Taiwan shipping companies are facing. However, there are still many challenges need to be overcome on developing female seafarers. Shipping companies must know that hiring female seafarers does not mean to meet the expectations of society, or considered as a promotion tool for corporate image. Shipping companies must indeed overcome the difficulties so that they can enhance the competitiveness of women effectively. Under the cost considerations, female manpower will start to deliver the desired outcome. This study has some recommendations regarding female navigation manpower development:

### **Establish a Female-Friendly Working Environment and Management Mechanism**

Developing female navigation manpower, shipping companies need to establish a gender-equal working environment. In addition to tangible working environment, mental environment is also important. With more and more women engage in the navigation field, more women will be promoted to managerial position, and gender differences will be gradually reduced. But before the number reaches the balance, shipping companies can consider establishing the following working environments:

#### **(1) Mentor mechanism**

For those female seafarers who newly enter navigation industry, male peers might unable to provide timely assistance for work, career planning and even life. But in navigation life, it is difficult to have a clear cut for seafarers' work and personal life. It will apparently impact work performance if they cannot adapt their navigation life. Similarly, work related problems will also impact the quality of life. To solve this problem, there is a need to establish female mentor mechanism to provide necessary advice and assistance. This assistance will help female seafarers to perform their job.

#### **(2) Socialization training**

Although female seafarers have received education at school and internship on the sea, they are more familiar with this male-dominated navigation environment. But before these female seafarers really on board, shipping companies can provide more training courses such as the orientation of working environment, possible coming problems and solutions regarding the gender differences, how to establish social networks, etc.. This can assist female seafarers to be socialized faster.

#### **(3) Management system**

Female seafarers need to adapt working environment on the sea when doing navigation job, but on the other hand, working environment also need to be adjusted to meet the needs of female seafarers. Traditional shift system, physical working environment, etc., can all be friendlier for women from this point of view. For example, the arrangement of near-coastal voyages, take gender ratio into consideration when form a team, the implementation of job sharing system for two female seafarers to solve the work-family conflict, etc... With the innovation on management system, it can solve many problems on developing female seafarers.

### **Reinforce the Core Competencies of Female Seafarers**

The purpose of developing female navigation manpower is to expect female seafarers can play their careful, soft and prudent roles at work and fully cooperate fully with their male peers to form a complementary advantage. Therefore, this should be a focus on developing female seafarers. This part can start from aptitude screen and reinforce professional competencies:

#### **(1) Aptitude screen and career consultation**

Work motivation is the critical factor that influences job performance and working engagement, and also is the drive that supports female seafarers to overcome many obstacles. Therefore, it is necessary to help students to assess their real working preference through various aptitude tests, career consultation, internships, etc. at the stage of higher education.

#### **(2) Reinforcement of professional competencies**

When taking characteristics into consideration, the careful, soft and prudent characteristics of female seafarers can complement men on communicating with people and operating the precise instruments. Hence, reinforcing English and Information and Communications Technology (ICT) application capabilities properly for female seafarers at the stage of higher education enables women to show their characteristics and build their unique competitiveness at work.

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