

Proposals for the New Maritime Education System in Asian Countries

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Abstract : *The maritime education and training is executed in Asian countries according to The International Convention on Standards of Training, Certification and Watch keeping for Seafarers(STCW). However, mainly basic training and education takes in maritime universities, because this convention is minimum requirements to become junior mariner. So, until now researches have not developed to the stage of discussing how maritime universities of advanced shipping countries should pursue the direction of education in the new eras. Korea and Japan as the leading shipping countries in Asia, need to take initiatives in building a new education system in order to foster the next generation maritime expert. To enhance the professional abilities of maritime technologists in the new era, element design of science and technology relating to maritime issues and a new education system based on an amalgamation of maritime education and scientific and technological education were discussed.*

Key words : *Future specialized education of maritime universities, Comprehensive and integrated maritime education, New maritime education system, Maritime education curricula, Special syllabus, Design of future education framework*

1. Introduction

Rapid economic growth of developed countries caused a large wage difference in the international seafarer labor market and it brought a resultant loss of international competitiveness to shipping companies. To respond to this situation, shipping companies shifted their fleets to flag of convenience system and number of the employment for foreign seafarers has been increased(Japan Shipping Exchange, 2004~2006). The outcome is a stagnant demand of domestic seafarers. The Republic of Korea has already been in such a situation.

Even if the number of graduates employed as seafarers reduce, human resources are indispensable to sustain maritime-related industries. However, society does not require merely career professionals to perform duties on board, rather, dynamic abilities to play an active role in shore-work supporting maritime related business as technologists by making use of their experience at sea.

For the above purpose, the future of specialized education in maritime universities, with education to obtain seafarers' certificates of competency at it's core, is expected to promise on comprehensive and integrated education that produces technical experts in the maritime field. Researches have not

developed to the stage of discussing how maritime universities of advanced shipping countries should pursue the direction of education in the new era. Until now, there are some papers to study the maritime education system in dormitory and training ship only in Korea(Chae et al., 1997; Nam, 2006), but there is no paper to investigate the adopted maritime education system in detail in Asian countries. Korea and Japan, as the leading shipping countries in Asia, need to take initiatives actions to build a new education system in order to foster the next generation type of maritime technologists.

2. Investigation of current seafarers status

In order to obtain the Self-Sufficiency Ratio(R_{ss}) of seafarers in shipping companies, we have submitted the questionnaires to the big 3 shipping companies and referred some documents in Asian countries, such as Korea (HYUNDAI, HANJIN and STX), Japan(NYK, MOL and "K"LINE) and China(COSCO, CS and SINOTRANS). Moreover, the questionnaires about the job Opportunity ratio(R_{jo}) of nautical students graduated was also carried out in major maritime universities of Korea(Korea Maritime University and Mokpo Maritime University), Japan(Kobe

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University, Faculty of Maritime Sciences) and China(Dalian Maritime University and Shanghai Maritime University).

2.1 Self-sufficiency ratio

Fig. 1 shows the average duration of embarking and vacation for deck officers in Asian countries. For instance, the about 5~6 months are of engaging to the service of the ship when embarking to the ship before the vacation of 2~3 months. This is, one group of seafarers must be prepared for shift. Therefore, the standard value of the R_{ss} should be 200% in a normal shipping company.

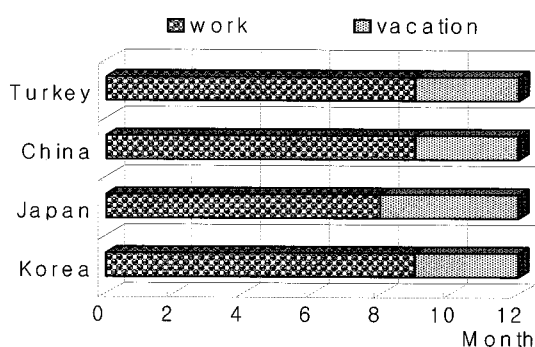


Fig. 1 Periodic duration of work/vacation for officers in Korea, Japan, China and Turkey(based on 1 year)

In order to investigate the scale and the actual condition of dependence on foreign seafarers by introducing Self-Sufficiency Ratio (R_{ss}) as an index. And the R_{ss} is defined as the below given formula (1) :

$$R_{ss} = \frac{N_{sum}}{N_{nec}} = \frac{N_{sum}}{(N_{sh} \times N_{av})} \quad (1)$$

N_{sum} : Number of registered domestic deck officers

N_{nec} : Necessary number of deck officers

N_{sh} : Total number of ships(including National flag, convenience flag vessel and chartered vessel)

N_{av} : Average number of deck officers to operate a ship

Fig. 2 shows the average R_{ss} of top three shipping companies in Asian countries. The dotted line illustrates the limitation of necessary R_{ss} for managing a company normally. As given in Fig. 2, the self-sufficiency ratio (R_{ss}) is lower than the self-sufficiency limitation for all investigated countries except Turkey since 2004 and China, also the lowest is belong to Japan with about 10%. Korea on the middle with about 100% R_{ss} , which confirms the shortage of officers. Moreover, many Korean seafarers have been

employed in foreign shipping companies. So It can be derived that the shortage of seafarers in Korea will increase year by year. The value of R_{ss} in China is larger than the self-sufficiency limitation, this result shows that there will be increase of Chinese seafarers employed by foreign shipping companies.

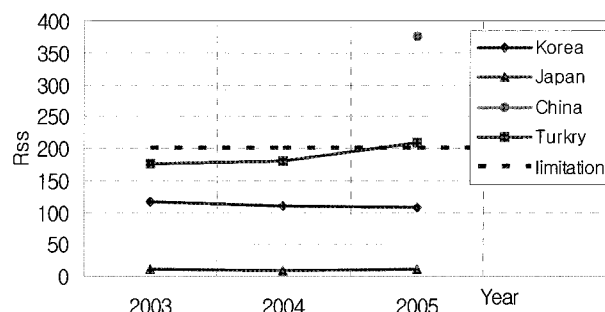


Fig. 2 Comparison of R_{ss} among Asian countries

2.2 Job opportunity ratio

In order to investigate the state of number of graduates employed as seafarers or maritime-related non-seafarers in each university, Job Opportunity Ratio(R_{jo}) is introduced as an index and defined as the below given formula (2) :

$$R_{jo} = \frac{N_{job}}{N_{grd}} \quad (2)$$

N_{job} : Number of graduates employed as seafarers or maritime-related non seafarers

N_{grd} : Total number of graduates from seafarers training course

Fig. 3 shows the average R_{jo} of deck officers in Asian countries according to results of investigation. The Job opportunity ratio(R_{jo}) of seafarers in Japan is the lowest one among Asian countries. The R_{jo} of seafarers in China is as same as Turkey approaches to 60%. However, in Korea, the Job opportunity ratio R_{jo} of seafarers maintains the highest values from 2003 to 2005 with about 90% average R_{jo} due to compulsory military service.

Fig. 4 shows the average(R_{jo}) of maritime-related non seafarers in Asian countries. From the Fig.4, the Job opportunity ratio(R_{jo}) of maritime-related non seafarers in Japan approaches to 30%, but the decrement inclination of the R_{jo} values of maritime-related non seafarers is noted recently. Worthy note, The R_{jo} of maritime-related non seafarers in Korea is the lowest one among Asian countries from 2003 to 2005. However, it is no doubt that a lot of graduates as

seafarers will change their jobs on shore after military service period. It must cause the actual increase of the Job opportunity ratio (R_{jo}) of maritime-related non seafarers in Korea.

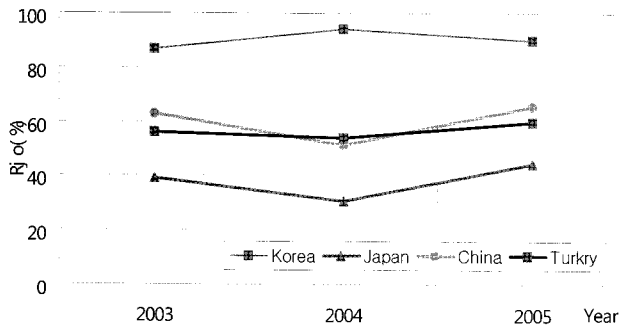


Fig. 3 Job opportunity ratio as seafarers in Asian countries

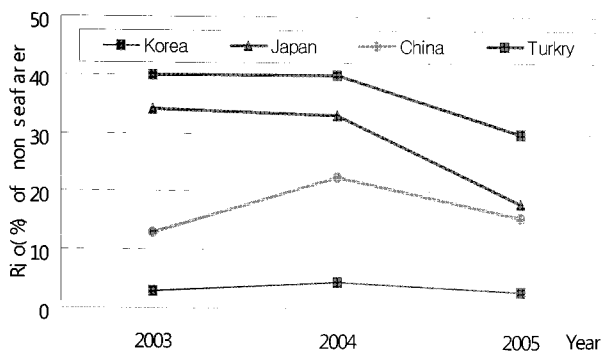


Fig. 4 Comparison of R_{jo} of maritime-relation non seafarers among Asian countries

2.3 Maritime education and training at maritime universities

Fig. 5 shows required subjects for graduation which are categorized to 3 groups as "basic subjects", "training" and "specialized subjects". Each country has own allocation of categorized subject upon to their own curriculum which has put emphasis on fundamental education, and specialized education. In order to emphasis consideration of nautical and maritime education as given in Fig.6, allocation of "nautical subjects" and "maritime subjects" in the curriculum investigated. The number of required credits are shown on the vertical axis.

The above trends means that, in the wake of the external factor of stagnant demand for Japanese seafarers, the university has changed its educational policy to climbing education for seafarers with a substantial science and engineering education in order to train technical experts in ship management who can work on board and on shore side. So the university has aimed to provide a university education

worthy of the name. According to results of investigation, maritime universities were aimed to increase the knowledge and skill of students in order to support maritime-related businesses in addition to core education to perform duties as ships' officer.

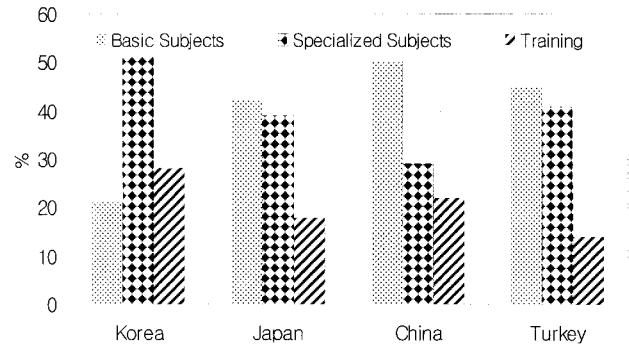


Fig. 5 Allocation of required credits on MET

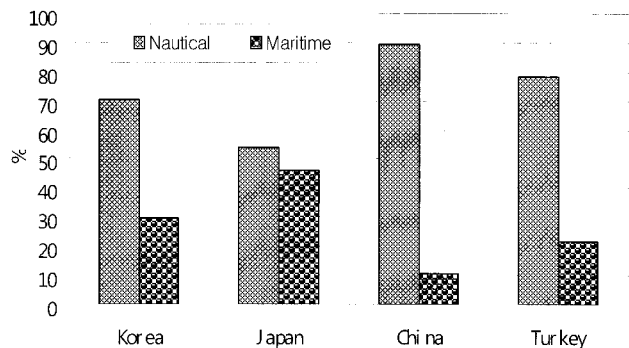


Fig. 6 Ratio of nautical and maritime subjects in specialized subjects

3. New maritime education system

3.1 Both type education

For the purpose of having multiple ability for maritime fields, universities are expected to provide a suitable education. In other words, maritime universities, with education to obtain certificates of competency at its core, should be premised on comprehensive and integrated education that produces technical experts in the maritime field, including education to prepare for a secondary career.

Fig. 7 is a schematic diagram of the two type education. Regardless of change in maritime community, educating marine officers will continue to be the central pillar of maritime universities. To acquire ship-operating skills, the nautical subject is main section. However, educating marine officers does not mean that society only requires future university graduates to perform duties on ships at sea. The

graduates will go into maritime industry and play an active role in shore-work supporting maritime related businesses. For this purpose, maritime universities are expected to provide a suitable education to support in mastering the knowledge about not only ship-operating but also maritime related business and shore-based maritime management. From this standpoint, based on an amalgamation of maritime education and S.T.E., the both wings type education should be established. The both wings type education, which can be likened to two wings of a bird, is based on the concept of meeting the expectations of the maritime community for human resource, providing various combinations of educational contents on each wing.

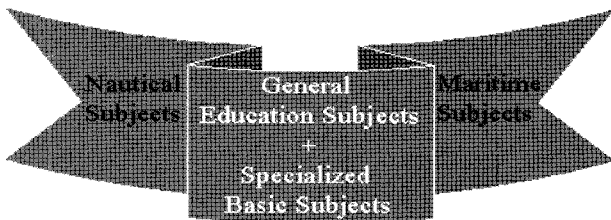


Fig. 7 Two type education

Focusing on the content of maritime subjects, based on analysis the necessary knowledge for maritime related industry and current curriculum /syllabus of maritime university, we made the suggestion for the content of maritime subjects as Table 1.

Table 1 New design of maritime subjects' contents

Subject Name	Subject Name
Ship Safety Management	Global Marketing
Marine Traffic Engineering	International Business & Economic Basis
Maritime Law	Bridge Resource Management
Ship Environment Engineering	ISM Code and PSC
Risk Management	Marine Insurance
Management Science Generality	Port and Terminal Operations
Transportation Systems	Shipping System

Through the two wings type maritime education, the maritime university graduates can content the needs of human resources not only for superior seafarers working on board, but also for shore-based maritime management. But the subjects one student can study in the period of university are limited. Under such a restriction, if they can't study all of

the knowledge of two wings education, special the maritime subjects, they should acquire the knowledge via other way, such as OJT or graduate school of maritime university.

3.2 Special raduate school of maritime university

A person acquires ship-operating skills during the undergraduate course and adds management abilities for a secondary career. The above suggests a "Graduate school for maritime specialists" to respond to career path education.

In the "Graduate school for maritime specialists", superintendent studies(SI), quality management(QM) and maritime business administration(MBA) will be important, in addition to maritime safety management and marine environmental management. The services of superintendent in ship management, which are increasing noticeably in importance, have been cultivated by conventional experience, and no systematized method has yet been established. The university is in a position to make an immediate response.

3.3 OJT(On the job training) programs

When we look at the maritime community, there has been a shortage of experienced seafarers who support maritime-related industries. Undoubtedly, on the assumption that the flow of human resources will continue as it has in the past, namely, from the maritime universities to the maritime industries via the shipping companies, it is inevitable that human resources will be exhausted. To sweep away anxiety about the imminent shortage and exhaustion of human resources in maritime industries, solutions should not only be sought according to a European type of career path, but also according to a Korean and Japanese-type of career path that enables to movement back and forth among educational, shipping, and maritime industry worlds. In Europe, such opinion seems to be general that human resources for secondary careers should be ex-captains or ex-chief engineers with experience at sea, and that new graduates should not be accepted.

As can be seen in Fig. 8, it is considered that the following patterns should be introduced in the scheme of the future human resources flow that enables to movement back and forth among educational, shipping, and maritime industry world.

- 1) University graduates are employed in Maritime related business, and sea experience is required in oder to perform duties on shore side
- 2) University graduates attempt a secondary career by going to a "Graduate school for maritime specialists"

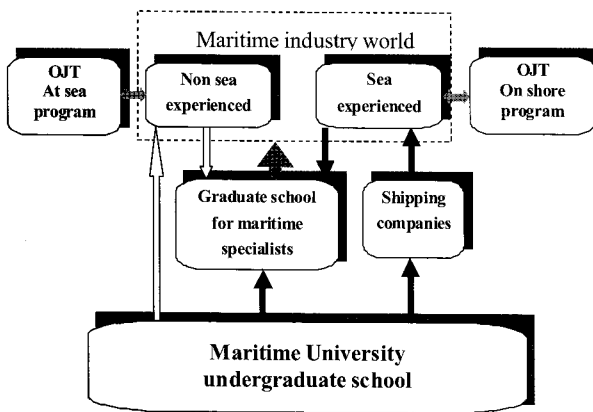


Fig. 8 Image on the job training

If any sea experience and/or management experience on shore is required of human resources in maritime industry world, a concept is needed to prepare programs that enable on the job training(OJT) at sea or on shore. Moreover, if a future educational career path is required, the educational field should prepare the programs that make it possible. At present, the educational aim of the graduate school in maritime University is training maritime specialists. When considering the demand of human resources in maritime industry world, the "OJT at sea program" and "OJT on shore program" in maritime university and/or maritime industry world should be planned and carried out in the near future.

3.4 Positive measures to avoid shortage of human resources in shipping developing country

Fig. 9 shows number of Korean seafarers in last decades(KOSWEC, 1981~2003). When compare number of Korean seafarer with Japanese as given in Fig.10(IAMU, 2006), a similar time-number of seafarers graph and decrease at number of seafarer in last decade observed in Korea and Japan. Number of seafarer decreased as a result of adoption of flag-of-convenience system and the manning of foreign seafarers by shipping companies in all-out efforts to survive in the international shipping competition. Hence, by decrease of number of national seafarers caused the less employment opportunity at sea for the graduates of Maritime Universities in Korea and Japan.

Nowadays, the increase magnitude of seafarers in China is roughly 20,000 by 2004, and the situation of such an increase has expanded still now, too. However, it is inevitable that the number of seafarers will decrease with the development of Chinese economic according to by the experience in Korea and Japan. Hence, it is necessary for maritime Universities of China to adjust education mode in order to avoid excessive of seafarers and adjust to the demand for the seafarers' market

and maritime industry in the future.

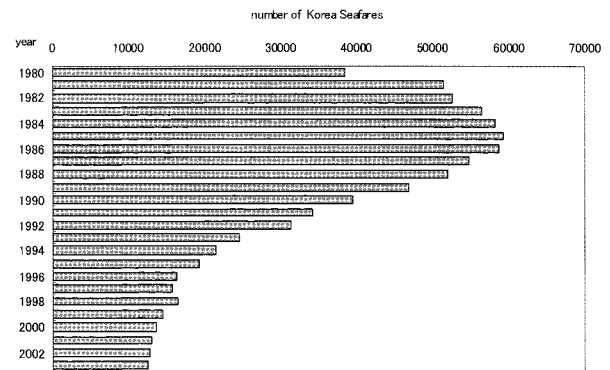


Fig. 9 Change history of Korean seafarers numbers for the past few years

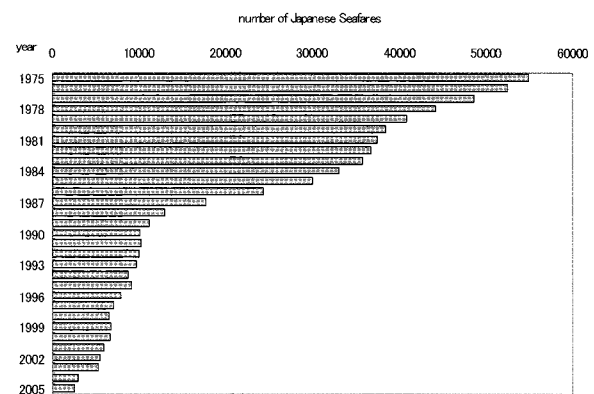


Fig. 10 Change history of Japanese seafarers numbers for the past few years

3.5 Cooperation of maritime education and training

Each university is trying to provide a highly developed education. Professional education comprises of a wide educational content, from theoretical knowledge to practical training. To maintain the world educational content at a high level, the entire teaching staff engaged in education and training are enquired to enhance their teaching skills and abilities up to a higher degree. It is a fact, however, that no university can possibly maintain a teaching staff with top-level abilities at a world level. While there are teaching staff with superior educational expertise, there are also those with little educational experience, knowledge and information on education techniques.

For maritime university to provide a high level of education, it is important that as many teaching staffs as possible study and absorb the expertise of teaching staffs at other universities on educational experience, knowledge and information, while sharing fresh ideas about education. To realize an action plan of inter-university international

"model-class" based on above idea, Asian Region Corridor link for model-class was organized by collaboration among the research project members so as to be able to continue this program.

Asian Region Corridor link for model-class is an idea to achieve a tangible result expected for The International Association of Maritime Universities(IAMU) activities, which is based on an international collaboration activity among IAMU member universities. Asian Region Corridor link for model-class is a next generation type "education skill level up program" utilizing IAMU-network of member universities.

4. Conclusion

In accordance with the questionnaires concerning the current situation of seafarers in shipping company and graduates from maritime University, the issue in shipping developed country was obtained and analyzed. And also, the education plan for training students or employees was proposed in order to adjust to the demand in maritime community. The main results are enumerated as following :

- 1) The shortage of seafarer was confirmed in shipping developed country.
- 2) The increase inclination of job opportunity as maritime-related non-seafarers for nautical graduates from maritime university of shipping developed country was confirmed for filling up a vacancy of Ex-seafarers in maritime industry.
- 3) The job opportunity as seafarers for nautical graduates from maritime university of shipping developed country was too low to satisfy the demand of maritime industry.

4) The new education system concerning OJT program is proposed available for solving the balance of maritime community in shipping developed country.

5) It is significantly essential to promote the cooperation of maritime education and training in Asian countries.

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