

Social Impacts on the Maritime Education – a Case Study of National Kaohsiung Marine University in Taiwan

Jia-Shen Hu, Shyy Woei Chang & Che-Tsung Chen
National Kaohsiung Marine University, Taiwan

ABSTRACT: Recent developments in Taiwan toward the technology intensive country, the employment of cost effective foreign labors by shipping companies, the widespread of universities and the internationalization of shipping industries propose considerable threats on the quality assurance of maritime education. A resultant crisis for lacking on-board seafarers with managerial levels has urged the consolidation of governmental, private and educational organizations in the attempts to further improve the quality of maritime education and to promote the on-board career incentives. The process from the formulation of problems to the implementation of strategies undertaken by the National Kaohsiung Marine University (NKMU) is reviewed. A chain reaction initiated from the degradation of students' entry performances due to the widespread of universities has formed a viscous cycle leading to the outsourcing of foreign human resources by shipping industry. Strategies in the aspects of course reform, joint ventures of lectureship with shipping industry, pre-courses for students' extended career plans and the establishment of educational center that consolidates the departments of navigation, marine engineering and fishery in NKMU are illustrated.

1 INTRODUCTION

Economic developments in Taiwan heavily rely on the importing and exporting trades via marine transportations. Port cargo throughputs in Taiwan steadily increase from 20 million tonnages in 1971 to 280 million tonnages in 2004 [1]. Since year 2000, Taiwan's commercial fleets have rated as the world top 10 countries that continue to expand and reach 23.7 million tonnages in 2006. Along with the growth of commercial fleets, the percentage of Taiwan fleets with national flag is steadily reduced as a combined effect of China's economic bloom and the cross-strait policy implemented by Taiwan government. Taiwan government prohibits direct trades between Taiwan and China. Cargos transporting between Taiwan and China are required to be transferred through the third party such as Hong Kong or Macao special administrative region. As a result, a considerable amount of Taiwan fleets is changed into Flag of Convenience (FOC) vessels that occupy about 77% of entire commercial fleets in 2004 [2]. The ship owners with national flag, mostly for those controlled by governmental shareholders, are forced to urge government to amend its policy on recruiting the foreign on-board crews in order to regain their competitive niches. Since 1994, Taiwan government allowed the foreign labors to work on the ships with national flag. After only one year, the percentages of on-board foreign seafarers rapidly grew to 26.8% and 73.2% for the managerial and operational levels respectively [3]. As a result, the number of Taiwanese seafarers has considerably

reduced from 30,000 in 1970 to about 7,000 in 2005 although Taiwan's commercial fleets are constantly expanded. These current developing trends of increasing FOC vessels and recruiting cost effective foreign labors also observed from other developed countries which certainly affect the sea-going career opportunities for the graduates from maritime educational institutes.

Another trend of development that affects the maritime education system in Taiwan is the overwhelming increase of universities at the occasion experiencing considerable reductions in birth rates. Taiwan government has implemented a 10-year educational reform that amends the educational policies to large extends. In the respect of higher education, the introduction of free-market mechanism and the promotion of establishing private universities have affected the operation of maritime education system. The number of universities and institutes of technology is increased from 58 in 1994 to 142 in 2003. The increasing rate of undergraduate students from universities and technical institutes is 177.27% over the last decade. While the number of university in Taiwan is expanding, the birth rate is annually reduced. The decreasing rate of birth is about 15,000 persons per year since 2003. At year 2015, all the universities and institutes of technology will face the annual decrease of students entering the university. The dramatic increase of undergraduate students as a result of university expansion indirectly imposed negative impacts on recruiting students into maritime educational institutes in Taiwan. Furthermore, several vocational high schools ceased their departments

specialized in navigation and marine engineering. These vocational high schools, which are the major sources of students for the maritime technical university, establish new departments with general interests to meet the demands of the newly established universities. The shortage of students available for the departments of navigation and marine engineering not only degrades the quality of students entering these maritime institutes, but the efforts required for the maritime institutes to educate these students in order to comply with the STCW Convention are increased. With the shortage of educational funds as a result of university expansion and the degradation of student entry quality, a chain reaction that leads to the shortage of qualified seafarers for shipping industries in Taiwan is stimulated. In resonant with the increased FOC vessels and the increase of foreign seafarers, the maritime education system in Taiwan has suffered twofold threats in the respects of providing quality graduates and promoting incentives for sea-going practices. A series of educational plans are accordingly formulated and implemented by the maritime educational institutes in order to resolve these difficulties. The social impacts on maritime education system in Taiwan within the last decade and the strategies formulated by NKMU are described.

2 SOCIAL IMPACT FACTORS TOWARD MARITIME EDUCATION

In the last decade, several social events that impact the development of maritime education systems in Taiwan are inter-correlated to form a viscous cycle which provides considerable threads on incubating qualified seafarers. These social events include the Educational Reform, the Cross-Strait Trading Policies implemented by Taiwan government, the compliance with STCW Convention and the Internationalization of major Shipping Companies. A net result of these inter-correlative social events causes the considerable shortages of qualified seafarers. Impacts of these social factors on Taiwan's maritime education system are illustrated as follows.

2.1 Educational reform

The 10-year educational reform in Taiwan is treated as an important policy with the attempt to improve the qualities of educational systems from primary schools to postgraduate institutes. The program of educational reform encouraged the establishment of private universities. The concept of free market mechanism for competitions between universities with more flexibility in setting the tuition fee and the gradual decrease of government subsidies for the

national universities are the main focuses for the higher education system. One of the most decisive influences through this educational reform program that affects the development of maritime education is the widespread of universities within the last decade. Fig. 1 depicts the growths of universities and the entry rate of university during the period of educational reform.

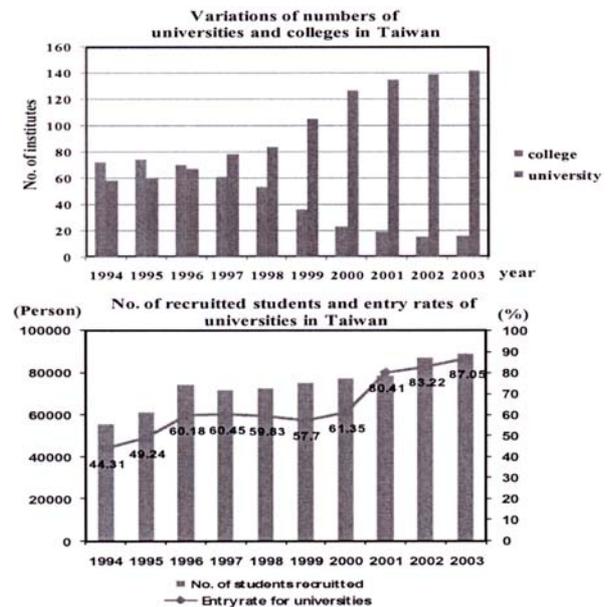


Fig. 1. Growths of universities and entry rate of university in Taiwan during the period of educational reform

At year 2003 as indicated in Fig. 1, the entry rate of university hits 87.05% which still keeps increasing until 2006. But the averaged dropping rates from the universities in year 2000 are less than 2% [4]. The expansion of universities with fancy graduation rates affects the vocational education to large extends. More high school students devote themselves to the university track without considerations of entering the vocational education system. This development trend certainly squeezes the domain of maritime sectors in the higher educational market. Furthermore, this trend motivated several vocational maritime high schools to close the departments of navigation and marine engineering due to the difficulties in recruiting students and arranging funds for sea-going practices. In this respect, five vocational maritime high schools closed the department of navigation and three vocational maritime high schools ceased the department of marine engineering. In year 2005, only 274 and 208 vocational high school students graduated from the departments of marine engineering and navigation respectively. This shortage of vocational high school students incurred considerable influences on the quality of students entering the vocational maritime university such as NKMU. As an illustrative example, the students needed by the departments of navigation and marine engineering of the maritime universities for the two-year vocational program leading to bachelor degree

are more than the students applied for these two departments in 2006. This problem, however, has been foreseen by the maritime universities. The departments of navigation and marine engineering of these maritime universities have started to recruit students from the mechanical sectors since 2004 in the vocational domain. As indicated in Fig.2, the entry rates from the maritime and mechanical sectors are respectively kept at about 40% and 20% respectively.

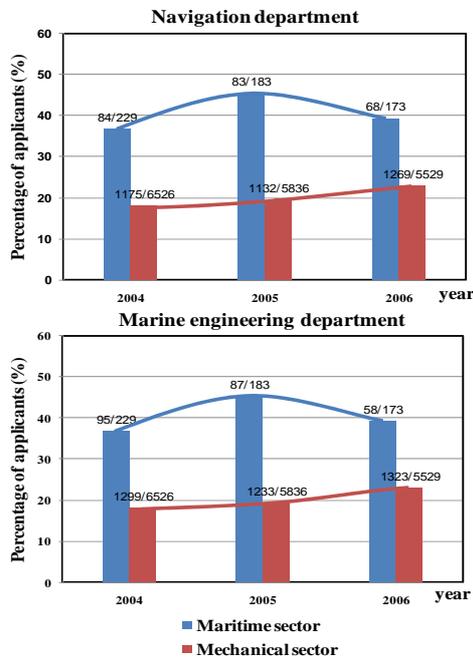


Fig. 2. Entry rates of students into departments of navigation and marine engineering for maritime universities

It is interesting to note that, although the education reform emphasizes the free competition, but there are still two systems, namely the general higher education and vocational education systems, which recruit their students from the senior high school and the vocational high school respectively. This condition is seen as the unfair competition by the universities in the vocational system but ensures the opportunities of higher education for the graduates from vocational high schools. A recent trend indicates a considerable market-shift toward the senior high schools as a considerable amount of vocational high schools is changed into general high schools. Nevertheless, although the policy of diverting student sources in the vocational sector is critical for quality assurance of maritime university, but the negative impacts on the developments of vocational maritime high schools are inevitable. A recent educational program linking the vocational high school, university and shipping company is formulated to solve this problem, which will be described in the later section.

2.2 Cross-strait trading policy

Taiwan's maritime universities keep very strong links with the shipping companies. Not only the career developments of students in the fields of navigation and marine engineering are majored in these companies, but these shipping companies are the solely supplies for sea-going practices as no training vessel for maritime universities are currently available. As a result, the increase of FOC vessels, which implies the less opportunity for the ships to port in Taiwan harbors, directly impacts the arrangements of sea-going practices for maritime universities.

China's economic bloom is indicated by the increased exporting and importing trades from 102.79 (1988) to 1760.69 (2006) billions US\$. The increased shipping markets in China have attracted the worldwide attentions. However, justified by the political considerations, Taiwan government prohibits the direct importing and exporting trades across Taiwan Strait. As a result, the number of FOC and foreign flag vessels owned by Taiwan's shipping companies is steadily increased since 1997 as indicated in Fig. 3.

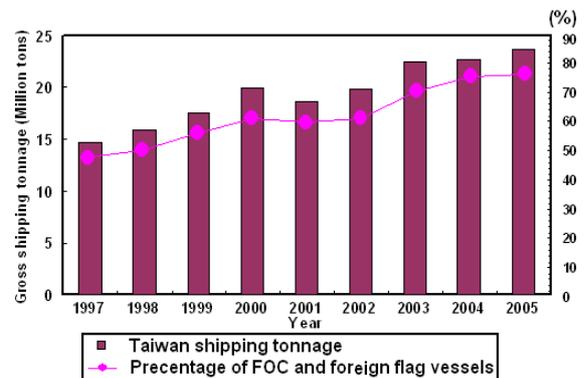


Fig. 3. Increases of Taiwan shipping tonnages and percentage of FOC and foreign flag vessels

The direct impact of increased FOC and foreign flag vessels is the considerable shrinkage of opportunities for sea-going practices. As an illustrative example, only about 40% of students in the departments of navigation and marine engineering in NKMU are allowed to fulfill their sea-going practices in 2006. Furthermore, due to the large increase of cost effective foreign labors in the FOC and foreign flag vessels, the on-board learning environment is modified. English proficiency becomes more important for the cadets as English language is often used for their daily communications. The establishment of friendly learning environment for the cadets in order to stimulate cadets' incentives for on-board career developments is now a complex issue for each captain in the FOC or foreign flag vessel. The on-board training courses for each maritime university in Taiwan are forced to be amended from the compulsory to optional courses since 2003. In comply with such modification, the

course modules in the departments of navigation and marine engineering are accordingly modified to large extends.

2.3 STCW Convention

As an endeavourer of IMO to further improve the safety of ships and their equipments, the 1995 STCW amendments raised the standards for seafarers. These amendments were entered into force since 1 January 1996. Within these amendments, all detailed technical requirements are transferred to an associated Code with the required skills and competence to be clarified. These required skills and competences were reviewed along with the educational programs in NKMU. Adjustments of course modules to comply with 1995 STCW amendments were undertaken in NKMU since 2000. In particular, the use of simulators for training and assessment purposes has been recognized in 1995 STCW amendments. A large amount of governmental funds were invested to set the simulation centers in the maritime universities for training and educational purposes. In this respect, the impacts of 1995 STCW amendments on Taiwan's maritime education were positive. However, as 1995 STCW amendments require the administrations to maintain direct control over and endorse the qualifications of those masters, officers and radio personnel they authorize to serve on their ships, the systems of education, training and certification for seafarers in Taiwan were revised since 1995.

In Taiwan, the professional licenses of masters, officers, marine engineers and radio personnel are issued by the Ministry of Transportation and Communication (MOTC). Before 2004, all the examinations for the certifications of masters, officers and marine engineers were controlled by the Ministry of Examination (MOE). Candidates for this type of national examination have to hold the graduation certificates from the associated maritime departments. Having completed the required sea-going and working experiences, the successful candidates through these maritime professional examinations will be qualified to accept the professional licenses issued by MOTC. However, in order to fulfill the 1995 STCW amendments, MOE revised all the examination questions in comply with the codes. The format of test questions was converted into the type of choice question. Only the certifications of deck officer and marine engineer with operational levels are required to pass the national examination held by MOE after 2003. As the standards for the seafarers are raised in 1995 STCW amendments and the quality of students entering the maritime universities keeps degrading, the annually averaged pass rate for the seafarer tests

in 2004 hits the historically lowest level of only 6.188%. But the number of candidates entering these examinations in 2004 also breaks the highest record of about 1,600 persons as indicated in Fig. 4.

After year 2004, the pass rate increases steadily that reaches 13.31% in 2006 as seen in Fig. 4. The number of candidates considerably increases from those years before 2003 to the numbers about 1,500 after 2004 as depicted in Fig. 4. In the period of years 2000-2006, Taiwan experienced the economical recession. The increased number of candidates for seafarer tests is partially attributed to the attractive on-board payments during the economical recession. Nevertheless, the increased candidates for seafarer examinations also reflect the endeavourers undertaken by the maritime education system that promote the incentives of students to develop their sea-going careers. In the respect of low pass rate, several aspects are worth of study in addition to the degrading quality of students entering maritime universities.

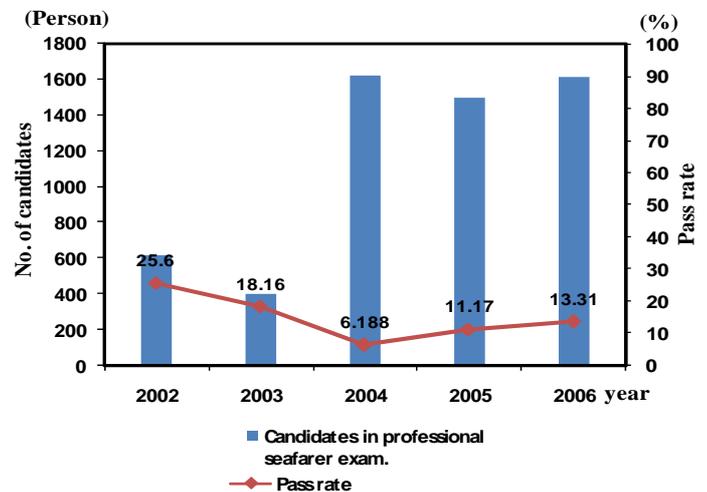


Fig. 4. Number of candidates and pass rates of national examinations for professional marine engineers and deck officers

The timing of considerable reduction in the pass rate of seafarer examinations coincides with the blooming of shipping industry triggered by the dramatic economic boom in China during the period of 1994-2006. The severe shortages of seafarers during this particular period hit Taiwan's shipping companies and result in several counter measures undertaken by these shipping companies which have made the educational problems worse. The formation of interactive chains triggered by the lack of seafarers and the 10-year education reform generates a viscous cycle that requires more efforts from the maritime universities in order to resolve the shortage of seafarers and to assure the quality of seafarers. Fig. 5 summarizes the important social factors and their impacts on the maritime universities.

The low pass rates of professional seafarers along with the increased demands from Taiwan's commercial fleets exert considerable pressures on NKMU. It is worth noting that most of the problems

summarized in Fig. 5 can not be completely solved by NKMU alone. Under such difficult circumstances, NKMU has to formulate a series of counter measures in order to assure the quality of graduates from the departments of navigation and marine engineering. Moreover, with the enhanced competitive advantages for Taiwan's shipping companies, the pace of internationalization of shipping industry in Taiwan is accelerated. As the pace of internationalization of Taiwan shipping industry is accelerated and the considerable decrease of birth rate that will hit Taiwan's universities on 2015, the number of FOC and foreign flag vessels is expected to be increased and the degradation of quality of students entering NKMU seems inevitable. If the number and quality of seafarers can not meet the future requirements of Taiwan's shipping industry, the process of internationalization at each major shipping company will result in the increased numbers of on-board foreign seafarers that worsen the current salutations experienced by NKMU. The inert-correlating scenarios initiated from the degradation of students' entry performances to the outsourcing of foreign human resources by shipping industry may become more severe if the adequate measures are not implemented at the correct times.

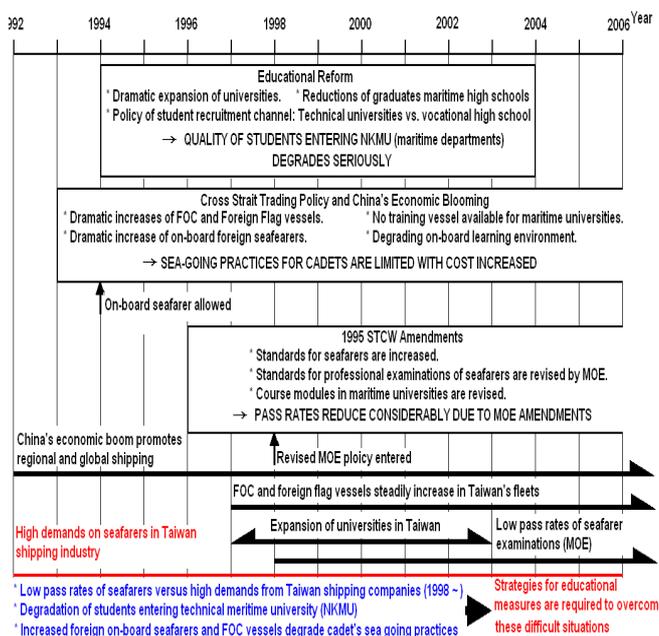


Fig. 5. Major social factors and their impacts on maritime universities (1992-2006)

3 STRATEGIES FOR QUALITY ASSURANCE UNDERTAKEN BY NKMU

NKMU has undertaken a series of measures to counter balance the impacts caused by the social events on the maritime education system as depicted in Fig. 5. Two main focuses of these measures during

the period of 2001-2006 are the quality assurance of graduates from the maritime departments and the promotion of incentives for sea-going career developments. Strategies to overcome the problems of student recruitments due to the reduction of birth rate, which will be in effect on 2015, are not addressed in this report. The on-going series of countermeasures implemented by NKMU in the period of 2001-2006 are summarized as follows.

■ Quality assurance of education.

Quality assurances of educational programs for the departments of navigation and marine engineering are the subjects of prime importance that initiate all the countermeasures undertaken by NKMU during the period of 2002-2006. The course reforms with the adequate treatments of sea-going practices and the appropriate adjustments of course modules in order to comply with the 1995 STCW Convention were performed. Qualities of educational and training programs established in the departments of navigation and marine engineering are now under constant reviews by DNV association since 2002. This initiative is fulfilled by entering the ISO system certified by DNV association. Due to the shortage of opportunities for sea-going practices, the compulsory sea-going course of 45 days is changed into the optional course and the period of sea-going practice is extended from 45 days to 6 months. In the revised educational program, only about 40% of students those express their strong incentives of sea-going career developments will be accepted for the 6-month on board training program. The remainders of students will entry the engineering or management courses to develop their second expertise during the 6-month period. This amendment in the respect of on board training program was immediately accepted by the shipping industry as the feedbacks from the investments on each cadet became more effective. The center of simulators is also established in the Seafarer Training Center of NKMU at this stage. As the Seafarer Training Center is a self funded department in NKMU, the financial burdens of operating and maintaining these simulators are released from the university funds. Government funds for building the training vessel suitable for incubating seafarers with operational level are under constant pursuits by NKMU since 2001 in order to further ensure and improve the quality of on board training programs.

■ Lecture series conducted by major shipping companies.

Lecture series organized and delivered by major shipping companies launched the departments of navigation and marine engineering since 2003. This series of industrial lectures provide opportunities of mutual communications between the managers from

shipping companies and students. Future career developments for the students in the maritime departments are directly demonstrated by the industrial lecturers on the bases of mutual discussions. Employment contracts can be offered and signed during this lecture series. Weaknesses of students' performances can soon be identified and responded to the associated departments by the lecturers from shipping companies for further improvement.

Another aspect expressed in these lecture series is the long term career plan and opportunities for the students with sea-going career plans. A multidiscipline course module which consolidates the courses from the departments of navigation, marine engineering and shipping management is formulated. This program is designed for the students with the long term career goal in the shipping industry after several years of sea-going experiences. The basic knowledge in the respects of navigation science, marine engineering and shipping management will be beneficial for the officers of managerial levels in the shipping companies. Once again, this multidiscipline course module is widely accepted by Taiwan's shipping industry.

- Establishment of educational center for navigation, marine engineering and fishery.

The educational center for navigation, marine engineering and fishery was established in 2005 as an official center in NKMU. This center was approved by the Ministry of Education (MOE) with the attempt to formulate and implement the adequate measures on the annual basis to assure the quality of educational programs in these departments. Funds for operating this center are granted by MOE. During the recent two years, the text books of 17 subjects in the fields of navigation and marine engineering were published that included all the required knowledge for the operational level and partially the managerial level summarized in 1995 STCW Convention. The improvement of English proficiency for the students in the departments of navigation, marine engineering and fishery along with the review of accreditation system that was currently undertaken by MOE for maritime departments are the short-term objectives to be accomplished. Future plans to link the educational systems from the vocational high school to NKMU are formulated in order to extend the quality assurance policy from the university to vocational high school. The plan to edit and publish all the required text books for the departments of navigation and marine engineering of maritime vocational high schools is under revision by MOE. Similar to the lecture series conducted by shipping companies in NKMU, the NKMU lecture series implanted in the course modules of vocational high school are currently considered with the attempt to secure and

cultivate the students in the vocational maritime high schools.

It is worth noting that the educational program that consolidates NKMU, China Steel Shipping Company (CSSC) and the maritime vocational high school is currently testified in the department of marine engineering of NKMU. Fifteen students in the maritime vocational high school were selected to enter this educational program with the courses monitored by the department of marine engineering of NKMU. Upon the graduation from the maritime vocational high school, these students can directly enter the degree courses in the department of marine engineering. In NKMU, the sandwich courses with one year in campus and the subsequent year on board are arranged with the assistances from CSSC. Having completed two cycles of the campus and sea-going programs, these students are offered with bachelor degrees. Obligations for these students are two years of career developments in CSSC as the marine engineers after passing the MOE professional tests. However, justified by the MOE pass rates of these students entering this type of educational program, the promotion of such program to navigation department and other maritime vocational high schools will be considered.

4 CONCLUSIONS

Recent impacts of several major events on maritime educational system in Taiwan are illustrated and analyzed. The interactive chains triggered by the lack of seafarers and the 10-year education reform in Taiwan trigger a vicious cycle that degrades the quality of students entering the maritime university and leads to the outsourcing of foreign seafarers by Taiwan's shipping companies. Several counter measures implemented by NKMU in the attempts for quality assurances of students in the departments of navigation and marine engineering are described. This NKMU case study is served as a reference for the current development of maritime education system in the countries that experience considerable expansion of universities with intention to promote the pace of internationalization of their shipping industries.

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