A New Era of Maritime Education

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Imparting quality education is an ongoing process and the role of good faculty and infrastructure facilities cannot be undermined. IMU is making efforts to give a new direction and set academic standards in imparting quality maritime education. For this to happen, the need for academic programs supported by strong values of research is felt like never before. IMU must set forth an example in this direction.

KEYWORDS: EEZ; maritime education; Indian Maritime University; nautical science; marine engineering; naval architecture; ocean engineering

INTRODUCTION

Engineering activities for ocean environment involve design, construction, erection, operation, maintenance and repair, dismantling of artefact at sea and in coastal (or, littoral) areas which may be mobile, floating, submerged or fixed structures for civilian purposes or military use. Till about 1960's most of the above activities were only limited to ships involved in coastal activities such as fishing, dredging and providing services to ports trans-oceanic transportation of commercial nature or military purpose. With the advent of oil exploration and production, a lot more was asked of these engineers who were dealing with ocean related engineering activities. These included a much broader scenario of design, structural and hydrodynamic analysis, fluid structure interaction, erection at sea, different kinds of operation and maintenance enhanced by port and harbour development, coastal zone protection and management, environmental issues for clean oceans and decommissioning of old structures. This was supported by deeper scientific studies based on actual data acquisition in oceanic areas affecting global climate and human interaction such as disasters like tsunami etc or environmental pollution. Broad disciplines of engineering sciences such as hydromechanics, structural mechanics, engineering design, production technology, environmental science and oceanography remain the same. But their application in different areas varies giving rise to various specifications.

India has a coastline of over 7500 km, and a population of over 1 billion (one-seventh of the world population) are dependent, directly or indirectly, on the marine resources available along its exclusive economic zone (EEZ). Together with neighbouring countries in the northeast (Bangladesh and Myanmar) there is more than 5 lakh square kilometres of coastal ocean in their EEZ that is yet to be properly managed. There are major rivers including the Ganga and the Brahmaputra; thousands of square miles of wetlands, embayment and estuaries; and over 2000 islands. Monsoons and ensuring floods that affect about 2 billion people around the Indian Ocean and their economics every year dominate the climatic patterns. Thus, a third of the world population lives near only 15% of the available world coastlines without full benefit of modern maritime management and utilization to cater to the needs of the country and to make it self sufficient and globally competitive, education has a major role to play. Through there are a number of academic institutions catering to different disciplines of marine science and technology, one cannot consider this enough for a country having a size as that of India nor does it indicate or reflect the quality and standard of the

maritime education imparted. We discuss below a few prints related to higher maritime education.

LEVELS OF EDUCATION AND TRAINING

The requirements of skill and knowledge levels of industries and institutions in maritime industry are varied. Broadly, there are three levels of training and education prevalent in India today. They are discussed below.

- Operational level training is required for supplying the skilled manpower at ground level. The skills required are based on job types such as welders, fitters, machinists in a construction or maintenance or repair industry. On board ships such skills are utilised for deck and engine crew for maintenance jobs during ship operations. In either case such skills are imparted to people at the ITI level after formal school education up to class X level. Many organisations have their own in-house training facilities to provide these skills to those eligible after they join the organisation as trainees. There are enough training facilities in the country to cater to the demands of the industry at this level.
- Supervisor level education and training required to be given to higher secondary level students for a period of 3 years. At this level while imparting skill training in one or more trades, theoretical knowledge in application of these skills is also given. This is required for doing the supervisory role on shop floors, for doing drawing and CAD work in design offices and working as petty officers in the merchant or naval vessels. Normally such training was previously offered at the polytechnic level and was known as diploma programs in engineering. But with increasing technology complexity in industries, a 3 year training program is necessary after 10+2 level of education. A normal 3 year education after higher secondary level education in India leads to a graduate degree in Arts, Science or Commerce (BA, B.Sc. or B. Com.). It is proposed that a 3 year B.Sc. Program in various engineering disciplines may be introduced in the country. The Indian Maritime University has recently introduced a 3 year B.Sc. degree program in Shipbuilding and Repair in its Kochi campus. IMU Visakhapatnam campus is contemplating a similar program of B.Sc. in Naval Architecture and Shipbuilding for naval artificers of the Indian Navy as a fully sponsored program by the Indian Navy.
- Higher level education leading to a graduate degree in engineering after 4 years of study in a particular engineering discipline after higher secondary school, two years of education after graduation leading to a post graduate degree in engineering, five years of science training leading to an M.Sc. degree in a discipline of maritime science after higher secondary, Management degree after the graduation degree and finally the Ph.D. program. Due to techno-globalisation, the higher level skill and, to some extent, knowledge is now available globally but at a premium.

Techno-globalisation or trading in technology across national boundaries is a natural outcome of the present scenario. It means that technology can be purchased for a price from anywhere in the world. This is distinctly different from trading in products. Technology can be of various types such as design methodology, process of production, changes in a standard process, information technology, software for design and analyses etc. Traditionally a major part of technology used to be skill-based, i.e., could be carried out in a straight procedure by the work man after adequate training. But in the present scenario of rapidly changing technology and competition, the demarcation between skill and knowledge is fast disappearing and the designer/ constructor/ manager is frequently asked to take cognitive decisions for improvement and trouble shooting. It is now common to address issues in the context of globalised economy and to recognize industrial competition that will be focussed on knowledge. What this means is that, to be successful in a knowledge-based economy, there has to be continuous innovation in products and services which must in turn be supported by investment skill, knowledge, creativity and education. Technological knowledge has a shelf life of three to five years in the present technology growth scenario which highlight the value of education and training. It is obvious that knowledge cannot be continuously acquired and traded without the support of higher level label education of good quality supported by research and development.

THE INDIAN SCENARIO OF HIGHER EDUCATION IN MARITIME AREA

The case of marine engineering education in India is very fascinating. Where as all other degree programs have to adhere to norms of engineering education set by the All India Council of Technical Education (AICTE), the institutions offering the marine engineering program leading to a degree in marine engineering with the main objective of grooming the fresh and aspiring young manpower to face the shipboard challenges have also to satisfy norms set separately by the Directorate General of Shipping (DG Shipping) based on STCW requirements of IMO. A specific departure from other regular degree programs is the introduction of a six months on-board-ship training program in lieu of the project requirement. Similarly, a three year B.Sc. degree program starting with one year diploma followed by two years training is given in nautical science following the norms of the University Grants Commission (UGC) and DG Shipping. Due to comparatively high salary levels graduates in marine engineering and nautical science are eager to join ships as seafarers and find ready employment in Indian and foreign flag ships. However, this is not the case with similar graduates in western countries who get comparable salaries in shore-based jobs and hence, are reluctant to choose a sea career. This has led to an acute shortage of sea faring officers to man ships. To bridge this gap of manpower shortage, IMO has approved of specific training programs, through STCW convention, of one-year duration for graduate engineers (GME Program) of some disciplines and two-year duration for diploma holders for joining ships as marine engineers. Perhaps due to good quality training and the advantage of communication through English language, Indian degree holders are well sought after by companies for manning their ships. Seeing a business opportunity in training sea farers at various levels, a number of private institutions have sprung up all over the country providing IMO approved training to sea farers. Also many of these institutions as well as other multi-disciplinary engineering colleges have gone for offering 4 year engineering degree program in marine engineering and one-year diploma in nautical science and these programs are well sought after by prospective students. Today there are numerous institutions, mostly privately managed, offering marine engineering degree program and diploma in nautical science degree. A number of Government institutions, details of which are given later, also offer these programs. Two of these institutions provide polyvalent courses covering both marine engineering and nautical science in a four-year study program. Interestingly, some of these institutions are having collaborative programs with foreign ship management companies either to train their officers or for employment of the institution's own graduates. There is no postgraduate degree program in these areas in the country.

The four-year undergraduate degree program in the area of naval architecture and/ or ocean engineering is conducted at IIT Kharagpur, IIT Madras, Andhra University and Cochin University of Science and Technology. The postgraduate degree program leading to an M.Tech degree in these and related coastal and offshore engineering is offered at these four institutions and also at IIT Delhi and IIT Bombay. Recently a five year dual degree program has been started at IIT Kharagpur and IIT Madras leading to both B-Tech and M-Tech degree. The total output of students from all these degree programs is about 150 per year though most of these students are trained in the specific professional courses, with their general engineering back-ground, about half of the students find employment in non-maritime sectors. A few students seek higher education. Thus only 30-40 percent of these graduates get absorbed by the maritime industries. Till about 4-5 years back the business of shipbuilding and related activities was stagnant. However, the present scenario is fortunately very different. Ship building, ship design and related activities are on a high growth path in spite of the industrial recessionary trend during the last two years. Both government and private shipyards are full of orders for the next few years and new shipyards are being set up. Most of the ships on order are for export and several international consultancy firms in these allied areas are opening shops in India. The buoyancy in the ship building market has given rise to very optimistic growth scenario in the maritime industry. Simultaneously the offshore oil and gas exploration and production sector is showing great promise of growth with a number of new offshore finds off the east coast of India. Also there are new developments in coastal protection and port infrastructure. There is an increased awareness of ocean studies related to weather forecasting. However, for the last two years the academic institutions have been unable to provide

the required human resource at entry level to the maritime industry related to design, analysis and construction in these areas.

The Indian Navy has a dedicated undergraduate program of naval architecture for its own officers at Cochin University of Science and Technology and a post graduate diploma program for its naval engineer officers at IIT Delhi. This human resource development program is highly inadequate for the projected requirement of the Navy. They are now in search of alternate programs to develop their human resource. Indian Navy does not have its own higher level education program for masters or research degree and they sponsor their officers to institutions of higher learning for this purpose in the required discipline. The DRDO is the research wing of Ministry of Defence which includes the Army, the Navy and the Air force. The DRDO has set up a Naval Research Board with a view to promoting research and development in areas of hydrodynamics, marine materials, marine systems, marine electronics etc., at various teaching and research institutions outside the DRDO.

Marine Science includes newly emerging and front line areas of Marine Geology and Geophysics, Marine Biology, Marine Ecology, Exploration and Exploitation of Marine Resources, Coastal engineering etc. The colleges and universities offering these courses include Goa University, Mangalore University, Madras University, Andhra University, Annamalai University, Cochin University of Science and Technology, Bhavnagar University, Berhampur University and IIT, Kharagpur. Research in these areas is primarily supported by the Ministry of Earth Sciences through their Ocean Science and Technology Cell (OSTC) program. The researchers from these institutions find employment in NIO, NIOT and various other Government organizations. However none of these institutions have achieved or are aspiring to achieve the reputation of famous international research institutions in these areas such as Woods Hole Oceanographic Institution or Scripps Institution of Oceanography.

The Ministry of Shipping which is the nodal agency for maritime technology development in this country has entered into the arena of maritime education rather late through establishment of the Indian Maritime University. Though the Ministry has a small funding for research and development, its approach towards R&D is not focused like that of OSTC or NRB. Perhaps the setting up of IMU will lead to an era of a well-defined and advanced education and research in maritime field.

INDIAN MARITIME UNIVERSITY

The Indian Maritime University (IMU) was set up by the Ministry of Shipping by an Act of Parliament on 14th November 2008 by combining 7 heterogeneous organizations of the Ministry of Shipping with the Headquarters of the University based at Chennai. Though the objectives set out in the act are quite lofty, it is worth mentioning two of them.

- It should embrace nearly all aspects of maritime domain including engineering, science and management;
- It should be an institution of excellence focusing on higher education and research of the highest international standards.

The IMU has desires to fulfill these objectives and has started functioning in the following manner.

- It has started consolidating the marine engineering and nautical science education system and setting standards for these degrees and diplomas in the country through affiliation. Being a new university it will take time to set its own standards and show it to colleges as a bench mark for affiliation. As a first step it has started offering B Tech program in marine engineering in Chennai (80 seats), Mumbai (40 seats) and Kolkata which was previously known as MERI (240 seats). It is also offering Diploma in nautical Science (DNS) programs in Chennai (60 seats), Mumbai (60 seats), Kochi (60 seats), Kolkata (60 seats) and Andaman's (60 seats). IMU Mumbai Campus offers a 3 year B. Sc. Program in Nautical Science and a 3 year B.Sc. Marine Science program which is a polyvalent course combining marine engineering and nautical science. IMU Mumbai also offers a PG Diploma program in marine engineering which is the previously run GME program. IMU must quickly set standards of teaching, laboratory facilities, library and practical training so as to claim the highest international standard in these areas. Only then can IMU justify

doing these programs under a government banner when already large number private players are doing the same job. Although a large number of seafarers from India find ready employment on board ships today, with about 3000 new seafarers coming out annually, is this demand for seafarers going to stay for a long period? What about shore based jobs required by these professionals after about 10 years of seafaring? The real test of an IMU degree will be the absorption of these professionals based on this mid-career requirement.

- IMU, being a government institution, has a role to play in capacity building of manpower in areas where there is requirement and not many private players are venturing into to satisfy this need. In this context, IMU has started a B. Sc. Program in Ship building and repair in Cochin Campus (40 seats) this year i.e. 2010. It is also planning to start a similar program of B.Sc. in Naval Architecture and Shipbuilding fully sponsored by the Indian Navy for the naval artificers at the Visakhapatnam Campus. It has started a 4 year B.Tech program in Naval Architecture and Ocean Engineering at IMU Visakhapatnam campus. With the increase in shipbuilding activity in the country, the placement of these graduates should not be a problem.

- In the area of post graduate education, IMU Visakhapatnam campus has started M.Tech program in Naval Architecture and Ocean Engineering and intends to start soon a similar program in Dredging and Harbour engineering.

- IMU Chennai is offering Masters Programs in shipping management, shipping logistics and maritime law. The success of these courses will depend on placement of these graduates in relevant areas. For the industry to absorb these management graduates, it is necessary for them to appreciate the fundamental strength of running these programs based on faculty, curriculum and foreign collaboration. IMU is actively pursuing these steps.

With technology changing rapidly, new graduate programs have to evolve which will give an edge to the nation in new and emerging areas. One such area identified by IMU is the B.Tech program in Marine Technology involving alternate marine propulsion systems and methods, engineering systems design etc. For the same reason, higher education, i.e. M.Tech, has to be in demand in various specialized areas such as sub-sea engineering, submarine and warship technology, ship production and management etc. Marine Science has to be a part of any maritime technology education since science is the foundation stone for any applied studies or engineering studies. IMU has to plan the marine science education in a big way to be one of the best in the world in the forthcoming years.

A University can claim excellence only if it is supported by research and development recognized by the world. There are a number of universities in India, including IITs, which look at engineering science research in a rather fundamental way measuring research output in terms of papers published. IMU should concentrate more on applied research leading to technology growth and indigenization. IMU Visakhapatnam campus is making efforts to get sponsored research projects and it has started its own research program leading to Ph.D. degree.

CONCLUSION

The need for education and training in maritime sector has been highlighted. Different levels of training are required in this sector to support the industry. The Indian scenario in the area of maritime education and research has been highlighted. The efforts of Indian Maritime University in this area have been elaborated. The need for science education has been highlighted. The vision of growth of IMU includes science education and expansion of post graduate education.

To have excellence in education in a university, good faculty and laboratory facilities are essential. IMU is making efforts in these aspects. To achieve excellence, it must set academic standards higher than those existing elsewhere, particularly in the private sector. For this to happen, all academic programs must be supported by research. IMU must pay special attention to this area of academic activity.