

Marine Education and Research Development in Malaysia

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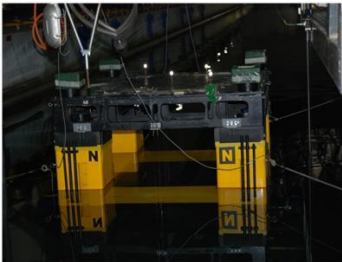
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Graphical abstract



Abstract

The development of local capabilities and research and development is one of the most challenges of the shipbuilding and offshore industries in Malaysia. The Industrial Master Plan has proposed five strategies thrusts for the long term viability of the marine transport sub-sector to overcome the challenges. As the shipbuilding and offshore industries in Malaysia rapidly grow, the characteristics of higher education and institution has changed in field and expertise, upgrading curriculum and cocurriculum, accreditation system, to responded the industrial need. Universiti Teknologi Malaysia as the only one university run in ship and offshore engineering has runned several programmes to meet the demand such Global Outreach Programme, Student Tranning Programme, Shipyard Visit, and research collaboration with shipyards and other international universities around the world.

Keywords: Marine education; research and development; ship and offshore industries

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1.0 INTRODUCTION

Shipbuilding and offshore industries in Malaysia has existed since the 1900s. In 2011, the industry that consists of ship builders, ship repairers and marine equipment manufacturers recorded approximately RM7.05 billion (USD2.34 billion) in revenue [8]. In the last three years, the number of new builds for local market is relatively consistent between 160 to 180 vessels each year, but in terms of tonnage, the production increases from 100 thousand to 165 thousand. This uptrend indicates that local ship builders are now engaged in building bigger and relatively more complex vessels.

The Malaysian shipbuilding and offshore industries are divided into two regions as shown in Figure 1. The first region is in the peninsula area located in Lumut, Perak; Port Klang, Selangor; Kemaman, Terengganu and Pasir Gudang, Johor. The second region is Sarawak and Sabah in the East of Malaysia. In this region, the earliest Malaysian shipyard was built at Kuching Sarawak. Totally, there are about 120 registered shipyards in Malaysia.



Figure 1 Cluster of shipbuilding and offshore industries in Malaysia (Anuar)

The shipbuilding and offshore industries in Malaysia falls under the purview of Ministry of International Trade and Industry (MITI). In 1996, MITI has launched strategies for development of various industries called as the Industrial Master Plan (IMP). In the IMP, the shipbuilding and offshore industries is part and parcel of the marine transport sub-sector of the larger transport equipment industry.

The marine transport sub-sector comprises two segments which is shipbuilding and ship repairing. The shipbuilding segment

includes the building of cargo vessels, ferries, tug boats, leisure craft and yachts and fabrication of offshore structures. The ship repairing segment includes the maintenance, repair and overhaul of ships, boats and leisure craft.

During the period of the Second IMP, 1996-2005, focus of the shipbuilding and ship repairing segment were on construction of small ships and boats, and vessels of up to 30,000 deadweight tonnes (DWT), including leisure craft and yachts, effort to promote ship repairing activities such as maintenance, overhauling and refurbishing of vessel and fabrication and assembly works of offshore structure in line with the increase activities in oil and gas exploration. Total exports of marine transports products grew from RM882 million in 1996 to 2.2 billion in 2005. Exports of production platform amounted to RM1.9 million, followed by yachts and other vessels and tug and pusher. Major export destinations were Nigeria, Singapore and Myanmar.

In the Third IMP period 2006-2020, the development focus of the subsector includes enhancing domestic capabilities in the building of smaller vessels of up to 30000 DWT, encouraging greater involvement in ship repairing and maintenance activities, increasing activities in the fabrication of offshore structure and intensifying skills upgrading.

Total investment in marine transport sector is currently RM750.2 million which were shipbuilding, ship repairing and the manufacture of metal fabricated products mainly for the oil and gas industries. Most of the investments in the sub-sector were domestic sources including public corporations and state government. All the projects were located in Sabah and Sarawak.

■2.0 ISSUES, CHALLENGES AND STRATEGIES

Malaysia has been actively involved in shipbuilding and ship repair. Compared to the advanced countries of the shipbuilding industries such as Japan and Korea, Malaysian's capacity is currently lower in many ways. One of major limitations lies in the shortage of locally trained marine engineers and naval architects who are needed to support the development and growth of the industries. There are several factors to be considered regarding the issues such as government policy, institutional and regulatory frameworks.

The naval architect is not only for ships but also for floating, production and storage facilities used for the oil and gas operation. The Malaysian marine engineers within the oil and gas industry are on par with their peers from other developed countries. Most of local engineers are well equipped with the technical knowledge, but they are lack in leadership and communication skill. The industries need more engineers who can think creatively and to be innovative.

Malaysian government has launched the Industrial Master Plan which contains well formulating and implementation of a comprehensive development plan to grow the shipbuilding and offshore industries well. The IMP has described six challenges in the marine transport sub-sector as follows:

- 1) Increasing global and regional competition
- 2) Rising costs of raw materials
- 3) Excess capacity
- 4) Shortage of qualified personnel
- 5) Inadequate Technology
- 6) Lack of infrastructure and support facilities.

One of the most challenges of the shipbuilding and offshore industries is the development of local capabilities and research and development.

In order to overcome the challenges, the IMP has proposed five strategies thrusts for the long term viability of the marine transport sub-sector:

- 1) Enhancing domestic capabilities in the building smaller

- vessels, repairing and maintenance activities,
- 2) Intensifying the upgrading skills and engineering capabilities.
- 3) Strengthening infrastructure and support facilities,
- 4) Strengthening the institutional support
- 5) Expanding activities in the fabrication of offshore structures.

Measures to strengthen the upgrading of skills and engineering capabilities include as follows:

- 1) Providing more technical programmes to upgrade the technical skills of the local shipyards;
- 2) Encouraging the upgrading of the skills in ship designing and engineering, metallurgy and corrosion control;
- 3) Promoting the attachment of experts in existing training institutes;
- 4) Collaborating with major shipbuilding countries in the upgrading of skills in marine transport.

■3.0 MARINE EDUCATION AND CAREER PATH

As the shilbuilding and offshore industries in Malaysia rapidly grow, the characteristics of higher education and institution should also change in field and expertise, upgrading curriculum and cocurriculum, accreditation system, to responded the industrial needs.

Many universities and institutions developed undergraduate degree into specific areas such as ship and offshore engineering in Universiti Teknologi Malaysia (UTM), offshore technology in Ranaco Engineering Training Institute, business and management in Netherland Institute and Maritime of Technology (NMIT), nautical science in Akademi Laut Malaysia (ALAM), maritime law and logistic in Universiti Malaysia Terengganu (UMT). The career path for Naval Architects and Engineers is production and design engineers as shwon Figure 2.

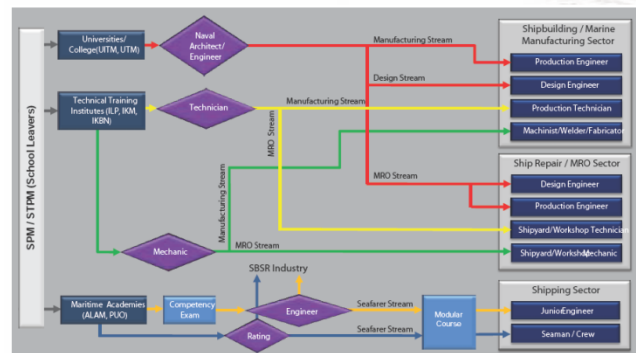


Figure 2 Marine education and career path in Malaysia [MSSR, 2014]

The Ministry of Higher Education (MOHE) currently does not have any specific and detail guidance and procedures in addressing important issues such as the subject content, learning outcome, a special committee has been established to review the course of the maritime and marine science education to eliminate overlapping subject content and curriculum between universities, competition between universities to hire limited of expertise and to expand teaching and research facilities.

The availability of the required talents and expertise by marine transport will become important. The strategies to meet the required talents and expertise include emphasizing on level of creativity, innovation and other enabling skills in the educational, encouraging greater collaboration between universities or training institute and industries to optimize the utilization of available

resources and facilities. Figure 3 shows an example of collaboration between UTM and industries on project based education and training.



Figure 3 Project based training by industrial speaker

The higher educations and institutions always update the programme to keep track with the latest knowledge and technology. Accrediation from industries and benchmarking with overseas well-kown higher education and institutions are one way of ascetaining the relevance of the curriculum and delivery methods. Benchmark exercise should reveal a number of strengths and weakness of the programme to enable reposition to remain competitive. Figure 4 shows discusson on marine and offshore programe between reviewer, UTM's staff and students during accreditation of syllabus.



Figure 4 Discussion between examiner, staffs and students

Global Outreach Program (GOP) is also introduced to the local Malaysian students by the government. The GOP is an international program designed to develop students to be global ready graduate. It is an initiative to encourage the mobility of students and to provide the opportunity for students to experience

the extraordinary environment of other educational institutes, academics, resources, and residential life. Figure.5 shows an example of Marine UTM's students conduct GOP to South Korea visiting several shipbuilding and offshore industries as well as universities.



Figure 4 Student Global Outreach Program by visiting shipbuilding and offshore industries

Malaysia has implemented Outcome Based Education (OBE) at all levels of education especially at higher institutions of learning which was firstly practiced since 1950s. The OBE is an education philosophy system which is organized according to several basic principles for the learners to practice in order to become successful in their life after graduation. The OBE is applied to ensure the programs properly accredited under the Malaysian Qualification Agency (MQA) for higher education for eaxmpla bachelor and diploma and engineering education council and marine department of Malaysia for courses under Standards for Training and Certification of Watchkeepers (STCW). The higher education or institution has emphasized their students to achieve eight learning outcomes as determined by the Ministry of Higher Education (MoHE). The learning outcomes are as follows:

1. Life Long Learning and Information Management,
2. Communication Skills,
3. Managerial and Entrepreneurial Skills,
4. Psychomotor / Practical / Technical Skills,
5. Knowledge,
6. Social skills and Responsibility and Professionalism,
7. Values,
8. Attitudes and Ethics

■4.0 RESEARCH AND DEVELOPMENT

The research and development (R & D) normally refers to future-oriented, longer-term activities in science and technology. Relationship between R & D and teaching is very close and indispensable. The UNESCO has described the approaches for effectively applying science, technology and innovative throughout the world. This organization also draws how developing and developed countries used them to achieve their goals.

Caroline in his study has categorized level research activities of 150 countries. Table 1 shows the scientific positions of selected ASEAN countries which indicate the approximate status of research in the countries. However, the ranking is not absolute, but it could be an indicator of approximate status of research activities in developing countries such as Malaysia. The poor ranking

indicates research performance of universities in developing countries less than satisfactory.

Table 1 R&D position of selected ASEAN countries, (Caroline)

Advanced	Proficient	Developing	Lagging
USA	Singapore	Uzbekistan	Malaysia
Japan	Spain	Argentina	Uganda
Germany	Portugal	Chile	Thailand
Canada	Poland	Mexico	Togo
Sweden	China	Pakistan	Philippines
UK	Brazil	Turkey	Vietnam
South Korea	New Zealand	Indonesia	Ecuador

In Korea and Japan for example, growing importance of research, development and innovations in research institute and universities led to the development of the shipbuilding and offshore industries. Similarly, Malaysian government also has emphasized the importance of research in universities by collaboration with shipbuilding and offshore industries in terms of initial design, model testing, construction and software development. In 2004, Malaysian government has spend the Gross Domestic Expenditure of R&D (GDERD) totalled RM2.84 billion as realization of the IMP. This GDERD is much less compared to USA RM1.1 trillion, Japan RM459.2 billion and Singapore RM7.3 (MOSTI).

It is important to support the IMP program with sufficient and adequate educational infrastructure and facilities. Among the facilities which can be designed for common used are as follows: Marine towing tank in UTM was established in 1996 and officially opened by our 4th Malaysian Prime Minister in 1999 and was upgraded to Marine Technology Center in 2003 by Ministry of Higher Education as shown in Figure 5. Other facilities are ship handling simulator in ALAM, training ship in ALAM and UMT and Marine power plant laboratory in PUO.



Figure 5 Towing tank in UTM

Malaysia currently also needs to develop more marine engineers and naval architects who specialize in offshore engineering to maintain the rapid growth of its oil and gas industry. For example, Malaysian International Shipping Corporation (MISC) collaborates with UTM in education and research in 2005, by given a fund of RM5 million over five years to invite visiting

professors from well known learning institutions abroad to Malaysia. Figure 6 shows staffs of UTM's visited FLNG in the shipyard at Johor. UTM also has signed research collaboration in offshore engineering with international oil and gas industries in 2013 as shown in Figure 7 and Figure 8.



Figure 6 UTM's staff visited FLNG in a shipyard



Figure 7 Research and development on floating structure

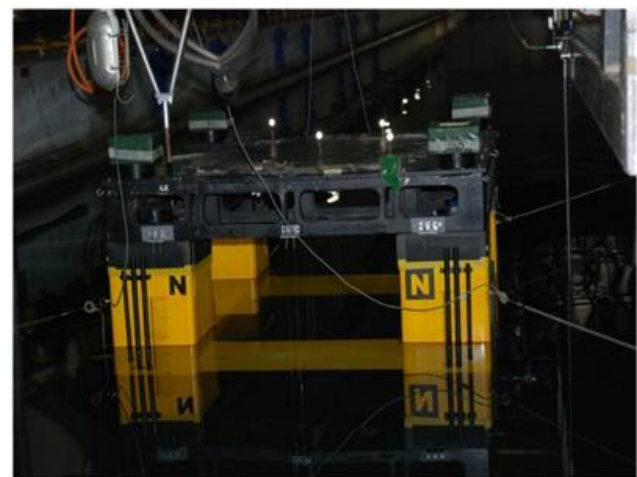


Figure 8 Test collaboration with an oil and gas industry

■4.0 CONCLUSION

The paper has raised several issues and challenges of shipbuilding and offshore industries in Malaysia. One of the major points lies in the lack of knowledge and skill of local marine engineers and naval architects who are needed to support the development and growth of the industries.

In order to overcome these issues and challenges, the government has launched the IMP strategies to develop the level of education in universities to upgrade graduates' knowledge and skill to meet the industrial demand. Several activities have been proposed as follows: upgrade curriculum and co-curriculum and facilities, employing international industrial background staffs, accreditation and Benchmark, OBE system and GOP programme.

Universities and institutions also were encouraged to make collaboration with shipbuilding and offshore industries in research and development in terms of model tests and software development to upgrade scientific position internationally.

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