Chapter 4

HISTORY AND DEVELOPMENT OF MARINE ENGINEERING

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HISTORY AND DEVELOPMENT OF MARINE ENGINEERING

4.0 Introduction

Sci-Tech Dictionary defines marine engineering as the design, construction, installation, operation and maintenance of main power plants, as well as the associated auxiliary machinery and equipment, for the propulsion of ships.

The engineering discipline is concerned with the machinery and systems of ships and other marine vehicles and structure. Marine engineers are responsible for the design and selection of equipment and systems, for installation and commissioning, for operation, and for maintenance and repair. They must interface with naval architects, especially during design and construction.

Marine engineers are likely to have to deal with a wide range of systems, including diesels engines, gas turbines, boilers, steam turbines, heat exchangers, and pumps and compressors; electrical machinery; hydraulic machinery; refrigeration machinery; steam, water, fuel oil, lubricating oil, compressed gas, and electrical systems; equipment for automation and control; equipment for fire fighting and other forms of damage control; and systems for cargo handling. Many marine engineers
become involved with structural issues, including inspection and surveying, corrosion protection, and repair.

Marine engineers are generally mechanical engineers or systems engineers who have acquired their marine orientation through professional experience, but programs leading to degrees in marine engineering are offered by colleges and universities in many countries.

4.1 History and Development

Early history records India's maritime traditions and trade links with different parts of the world. Her supremacy over the sea as well as her attractive cargo was enviable. It was no wonder that different merchants from far off lands came to India in search of wealth, prosperity and settlements. But these were all peaceful expeditions purely for trade, and were never converted into military action till the arrival of the European traders who changed the complete equation of this sea-borne trade.

India's rich maritime tradition often evokes nostalgia of its early heritage history. Lucid accounts of these traditions have been mentioned at different points of time. Some of them can be traced to the Mohenjodaro and Harappa civilizations where Indian people displayed tremendous skills in maritime enterprise. India perhaps has the oldest port in the world in Lothal, on the estuary of the Sabarmati adjoining the Gulf of Cambay, in the State of Gujarat. It was built by the Harappans before 2300 BC. The Ramayana and the Mahabharata indicate India's contact with the other parts
of the world. The Rigveda too is important evidence. There have been references in Sanskrit, Pali languages and in the Bible of the voyages undertaken by the Indians. Explicit references to India’s seafaring activities can be obtained from art, sculpture, paintings and epigraphic, monumental and numismatic evidences of different periods. Besides, the Rajyasurya sacrifice in the Mahabharata and Digvijaya of Arjun and Nakul furnish ample evidence of the relations between merchants engaged in sea trade both inland and overseas, depicting India as one of the foremost countries having her own well-equipped ships of varying categories and sizes engaged in various trades during the Vedic period.

As Dr. Radha Kumud Mookerji observes in his book “A History of Indian shipping”, for full thirty centuries India stood out as the very heart of the Old World, and maintained her position as one of the foremost maritime countries.... Great ports grew in wealth all along the coast of India especially in the “Magadhan Period (500BC)”

It was no wonder then boat India was termed the “proud mistress of the eastern seas”. Her strong teak-hulled ships constantly ploughing the oceans made traders and merchants envious but most importantly, everyone appreciated her “attractive cargo”, viz, peacocks, elephants, cattle, embroidered woollens, resplendent silks and cotton yardage manufactured indigenously or imported from China, which made their way to different parts of the world. Indian ships carried almost every variety of spice, pearls,
rare gems noted for their beauty and size as part of the cargo.

It was the adventurous merchants from India who sought far off lands in search of wealth, prosperity and settlements. Various periods in India’s ancient history show trade links with the Phoenicians, Jews, Assyrians, Greeks, Egyptians and the Romans in the pre-Mauryan and the Mauryan periods. In the south, it was the Andhras who evinced keen interest in maritime activities as far back as 1000 BC. So also in north, the Kushans were equally excited by the prospect of trade and culture of the country.

The Hindu kingdoms, both in the north and south, began to assume positive roles in shaping and guiding the maritime activities and forging religious and cultural progress in the Far East via Malaya, Indonesia, Burma, Thailand and extending as far as China and Japan in the East and Africa and the Mediterranean countries. These remarkable achievements placed India at the top of the civilized world.

However, with the advent of Arabs and later the Muslims, both of whom were daring and adventurous seafarers, India soon began to lose its unquestioned supremacy in the maritime world. With commercial contacts and development of trading colonies on the east coast of Africa extending to the Far East and China to South India and Malabar on the west coast, the foreigners had virtually captured the entire sea trade. Close on the heels of the Arabs and the Muslims were the Moghuls who by then had consolidated
their power and position over the entire country. They somehow showed minimal interest in maritime activities and conquest by sea.

Then came the European among whom Vasco de Gama, the famous Portuguese navigator was the first to reach the Indian shores. On May 11, 1498, his ship San Gabriel reached Calicut, a thriving port then on the west coast. Soon the Portuguese established trade links with the Persian Gulf and East Africa. The Portuguese had a fairly long and successful period of stabilized maritime activity on the Indian coast. Meanwhile, another formidable competitor, the Dutch, were waiting in the wings to strike at a suitable opportunity as they were by then trading in some of the far eastern areas. Thus by the middle of the 16th century, they succeeded in dislodging the Portuguese from their entrenched position, and secured control over their settlements except in three small establishments on the west coast, viz., Goa, Daman and Diu.

But the Dutch supremacy was short-lived with the British entry into the maritime sphere. When the British merchants saw the rich cargo from India which the Portuguese and Dutch ships carried, they were tempted, and soon proceeded to India with an eye to enter these profitable trades.

The East India Company was formed with the arrival of the British traders. In 1600, it received a charter from Queen Elizabeth granting the monopoly of the eastern trade. Trade under such rights was profitable to the British, and soon the entire trade was controlled by the East India
India maintained her status as the world’s leading industrial country even up to the beginning of the 19th century. Industrial revolution in the West had its impact on India. Rural, village based artisans began to crumble in the 18th century after the death of Aurangzeb made life insecure and trade difficult. The transfer of economic and political power into the hands of Britain which had become the centre of growth of modern industry was a major turning point in shaping the industrial development in the country for a long time.

Being an island nation, the British soon set about obtaining supremacy over the sea not only to defend itself but to establish its control over other European powers who were posing a threat. The Royal Navy was the most powerful force in the world for almost 250 years till the beginning of the 20th century. At that time, another contender emerged on the maritime horizon, i.e., the French. It did not take long for the British to scuttle the French power, and they were defeated at Trafalgar in 1805. With the French fleet practically non-existent, the British naval power reasserted its supremacy not only in the European waters but also in India and the East.

After the formation of the East India Company (EIC), trading activities of the British increased, and within a few years, they began to acquire ships, first by charter and subsequently owning about 16,000 gt of
shipping and employing roughly 2,500 seamen. Till 1857, when the English Crown took over, the East India Company held sway, expanding its trading activities and establishing factories, first in Surat, then in Bombay and Calcutta and finally overseas in their own country. They felt the need to expand their mercantile marine and protect their naval ships mainly from the Dutch and French attacks as well as from other foreign quarters.

While the British were contending for the “place of pride” with their European adversaries, two formidable forces posed a serious threat to the British supremacy the Siddis of Janjira and the Marathas under the powerful Sidoji Gujar and later under Kanhoji Angre.

The conquest of India and South East Asia by colonial powers, coupled with the Industrial Revolution in the 18th and the 19th century in the West changed the complete equation of this sea-borne trade. Ships were fitted with steam boilers which turned the paddle and complemented sails initially and soon replaced them. Coal burning ships with steam engines became the order of the day.

Though the British were the ones to build such ships, India did not lag behind, Records reveal that from 1735 onwards a fascinating period dawned in the history of ship-building. The art of ship-building was being perfected, and large ships with sails and masts were being built. Ship-building activities under government patronage were seen in Bombay. The great master ship-builder were the Wadias. Lowanji Nasserwanji Wadia
and his sons soon began to build ships of all sizes required by the Board of Directors of the East India Company for both commercial purposes and for naval protection.

The British controlled a vast expanse of the territory from Canada to Australia which brought unlimited trading opportunities. Men and commodities were required to be transported to and fro continuously. It was natural, therefore, that financially sound and professionally managed shipping companies were formed, and eventually prospered. The Peninsular and Oriental Shipping Company (P&O) can trace its origin somewhere here. Utilisation of shipping services by men and families going on “home leave” and returning for employment, the commencement of the carriage of “Royal Mail” by sea in liner service were important developments during this period. The ship’s sailing programme was announced well in advance and was followed without exception.

All this was not possible without assistance and the active support of the East India Company and the British Government.

By the beginning of the 19th century, the East India Company’s monopoly on the sea trade ended and many other shipping companies were permitted to start regular voyages to India. However, Indian owned shipping remained mainly as small sailing vessels plying from ports on the west coast to Persian Gulf and Africa and from East coast to Burma. All other trades were controlled by shipping companies owning large ships.
which had by then changed to steam for propulsion.

The formation of Mackinnon Mackenzie, and Company changed the shipping business in India. Mr. Robert Mackenzie who arrived in Calcutta in 1856, had set up an oil goods import-export business, and was involved in coastal trading in the Bay of Bengal. He was also the agent for General Steam Navigation Company. A few years earlier, in 1847, Mr. William Mackennon also arrived in Calcutta, and a partnership firm was established by Mackinnon and Mackenzie. The main interest of the company was chartering vessels between India and Australia.

Soon British merchant ships began to take interest in the development of shipping in a systematic manner both inland and overseas. Mackinnon and Mackenzie Company was probably the first India based shipping company owned by British traders. It started a shipping company owned by British traders, the Calcutta and Burma Steamship Navigation company, which was founded on September 29, 1856.

The company plied its ships regularly between the ports and won the coveted contract to carry Royal mail, and the vessels carried the imposing prefix RMS. The Royal Mail guaranteed minimum revenue beyond carriage of cargo and passengers. In October 1862, the rapidly expanding company was re-organized and re-named the British India Steamship Navigation Company (BI). During its formative years, the company faced tremendous competition from other European companies, but soon it gained monopoly.
over coastal trade as well as Indo-British trade. Subsequently, the company was engaged in a ruthless competition with its competitors, some of whom were fledging Indian companies, which folded up.

With the opening of the Suez Canal in 1869, trade between India and Britain increased manifold as travelling time had reduced. The P&O and the BISN became very prosperous. This new-found prosperity helped these companies to sustain heavy losses in areas where fierce competition existed. The competitors were mostly Indian companies who were vying to enter coastal business. Thus Indian shipping could not take root.

In 1894, Shri Jamshedji Tata started the Tata Line in partnership with Nippon Yusen Kaisha of Japan. He chartered two British and two Japanese ships and began monthly operations between India/China/Japan, an area serviced by P&O. To run business ethically on low profit margins, the Tata Line charged a freight of Rs.12 per 40 cubic feet. This amounted to undercutting the monopoly of P&O as they were charging a freight of Rs.19 per 40 cubic feet. To retaliate, the P&O dropped their rate to Rs.1 ½ and cotton was carried free! The Tata Line was unable to match the P&O rates and folded up within a year. Following its closure, P&O restored its freight to Rs.19 per cubic feet.

Subsequently, there were many such shipping companies who could not sustain the freight war. It is estimated that between 1860 and 1925, approximately 102 shipping companies with a capital of Rs.46 crore were
registered and a large number of them perished in the trade war. Many of these companies were started by great patriots like Shri V.O.Chidambaram Pillai and Shri Nur-ul-Huq Chaudhari. Many businessmen and common men had contributed to these ventures. The aspiration of locals who were ruled over by a foreign power could not match commercial interests of the companies from the ruling country. It is needless to say that both the BISN and P&O had the support of the government.

While there were measures like imposing higher rates of duties on goods carried by non-British ships, the Dutch and the French had succeeded in obtaining favourable terms. Indian ships were not shown any mercy resulting in severe setbacks, while British ships received further fillip through the support of Sir Bartle Frere, the Governor of Bombay. Despite the domination of BISN, Indian quest for a foothold in the shipping world continued. After the opening of the Suez Canal, BISN enjoyed an unprecedented success as they were firmly entrenched and had established monopoly over the coastal trade not only in India but also in the adjoining countries like Ceylon, Burma and Persian Gulf.

4.2 Maritime Education – a Historical Perspective

Going back in time, it will dawn upon us that shipping or sailing never required a lot of equipments or a plethora of knowledge, rather it needed courage and spirit of adventure & ecstasy in playing with imminent danger. With the passage of time, navigation changed from an art to a
science. Initially, it was stars and moon showing the position and time, which later gave way to sextant and different chronometers. Even vessel making was not a big science till the 18th century. It was after the Industrial Revolution, when vessel engineering underwent drastic change that vessel size increased dramatically, and the simple rowing was converted to propeller-based rowing and engine-based power. Both the structural side of the ship and the power plant side registered tremendous change overs in the last century, steam power plant changed to diesel power plant, then to gas turbine plant. In the meantime, sextant has given way to Global Positioning System (GPS) or Differential Global Positioning System (DGPS) system. Also the type of cargo carried across the continents has changed very much over the years. It was coal in the early part of last century, and petroleum in the later part of the century, may be Liquefied Natural Gas (LNG) in this century.

These developments have necessitated the presence of large number and variety of skills amongst seafarers. Imparting of these skills required a formal education system, and this led to growth of marine education industry globally.

India has been a seafaring nation for centuries. India’s maritime history goes back to Indus Valley Civilisation when an active trade existed with Mesopotamia and Egypt. The Eastern coast, then known as Kalinga, used to trade heavily with East Asian countries. Evidence of active
seaborne trade from Western coast to Middle East also exists. The new era started with East India Company’s trading between India and Europe.

Our first training institute was started by Ismail Yusuf, the then proprietor of Bombay Steam Navigation Company in 1910 at Worli, Mumbai, which latter got shifted to Nhava in the outskirts of Mumbai. It happened to be the first marine training institute in South East Asia. It came to be known as Training Ship Rehman in 1972. The first Government initiative came in 1927, when Royal Indian Marine’s largest troop ship, after many fittings, was converted to mercantile marine training ship named Training Ship Dufferin. TS Dufferin had trained 2,656 cadets by 1972, when it was decommissioned. It was replaced by Training Ship Rajendra, which was meant for training 250 cadets at a time. Later when it was felt that the out-put needed to be increased, a shore-based structure - Training Ship Chanakya, came up in New Mumbai and TS Rajendra was decommissioned.

There have been several efforts to bring the TS Rahaman under the auspices of Government. In 1973, the foundation had received notices from the Government for acquisition of its entire campus for Oil and Natural Gas Corporation. However, it continued to maintain its independent identity by the grace of the late Prime Minister, Indira Gandhi. Various new courses were introduced with passing time, keeping up with training developments in Europe.
India’s maritime training history runs parallel to the rise and fall of TS Rahaman and TS Dufferin.

4.3 OECD Countries to Third World Countries

The Organisation of Economic Co-operation and Development (OECD) countries have historically been the center of shipping, and hence a source of seafarers. They have actually explored the whole world. So naturally, prior to colonization of Asian and African lands, both the worker and the master categories of people came from the same European countries. With colonization of Asia, came the Laskars (natives of Asia) who were taken as seamen on the British ships, because of illness or mortality or ‘wastage’ of British people. Two Laskars were taken as a substitute for one British seaman although together they were earning far less.

Since the end of Second World War, concomitant to growth of maritime industry in East Asia and other developing nations, people of various nationalities joined the seafarer community. The shipping industry lost its sheen in the OECD countries owing to the emergence of alternative career opportunities, which were equally compensating in a less harsh or even comfortable environment. The wastage of officers of OECD countries at the training level increased drastically, and very few people preferred the on vessel assignment after the age of 50, even though they were capable of handling the ship as a Master.
The results of *BIMCO-ISF 2000* report confirm that the centre of gravity of the manpower industry has continued to move away from most of the traditional maritime countries in Europe, North America, Japan, etc., towards countries in the Far East, the Indian sub-continent and Eastern Europe. The share of OECD countries in total seafarers has come down to 27.5% from 31.5% in the last 4 years from 1995. With the developed standard of living such a trend is not expected to reverse.

Well, the third world countries constitute more than half of the whole world and education standards in many third world countries have developed only in the last 50 years. India, in particular, has developed a very high standard of education system. Thanks to Lord Macaulay, India is the second largest English speaking nation only next to the United States (US). Indian Naval officers have done very well in ship operation across the world, and they have already made a name for themselves. The Far East countries, more or less, supply the ratings to the industry.

India is in a typical situation, where there is the largest pool of scientific manpower staying along with the largest pool of unemployed youth. India is also fast gaining recognition as the Information Technology (IT) hub in Asia. Notwithstanding the upcoming career opportunities, it is difficult to expect a substantial drop in unemployment in near future. So keeping all these things in view, India can be expected to provide a very large number of people both in officer and in rating category, because of
the inherent advantages considered above. What does it mean for an entrepreneur in terms of opportunities?

He has to create awareness in the market. Shipping, as a career has so less visibility in the market than the mass of people staying away from the coast have hardly heard about the merchant vessels. Preference for a career in Merchant Navy has gradually declined since, the 1980s. Previously, aspirants were drawn in by prospects of visit to various foreign lands and a handsome salary. Development of the “new economy” and growth in knowledge based firms made comfortable jobs, which were more rewarding, available offshore. Now the preference of the masses has changed from marine career to new economy jobs.

In earlier times, ratings used to come from coastal Gujarat and Tamil Nadu where people were quite accustomed to sea and sailing. The deck side and engine side officers usually came from North India and East India. Since the last two decades, the Gujarati community has increasingly shied away from shipping career as proliferation of chemical industries and consequent entrepreneurship has offered better alternatives. In today’s times, when the demographic structure of Indian seafarers in the official hierarchy has almost remained same, the ratings are drawn from states like Orissa, Bihar and Uttar Pradesh.

The interested entrepreneurs are typically from North India and West India who are trying to tap the talents in developed areas only. They can act
proactively and open the same avenues in Eastern India, which, we believe, would surely pay off in the future. So the latent demand in our country itself is very high. One needs to zero on the actual areas in India. It helps to remember that India is far from uniform in nature as far as the economic standards are concerned. It will take all the campaigns and patience to convert the latent demand to the explicit demand.

Also such entrepreneurs can expect to attract the potential candidates from other third world countries like Philippines, Bangladesh, etc., to study in the institutes here. Today, those people are going to institutes in United Kingdom (UK) partly because they have been historically going there and partly because unavailability of such avenues in the vicinity. An Indian entrepreneur can advertise itself in such countries and try to draw them by offering them scholarship. In fact, an awareness campaign alone may suffice.

A competitive analysis would show that there is the biggest threat to Indian seafarer community, and hence Indian marine education sector may come from the superfluous pool of Balkan area professionals who have been rendered unemployed after the disintegration of erstwhile United States of Soviet Russia (USSR). They are ready to take up assignments at a very lower level of emolument. They are from the naval background, so their quality is undoubtedly good. That could offer the competition at the officers’ level.
In the case of the Chinese pool, their technical qualification is as competitive as Indians, but lack of English knowledge impedes their entry into world market. However, they have developed high level of maritime education with three maritime universities. It is not easy to predict when they would become comfortable with English as a communication medium. Steps are already being taken by the Chinese Government itself to promote English in the country.

Philippines not only possesses a global seafaring experience but also an English speaking populace. However, the seafaring community from the country lacks requisite level of expertise on technical matters, an area of concern for the global shipping industry.

Based on the above factors, we believe that it would not be overoptimistic to establish a marine education infrastructure in India that caters to the seafaring community of many of the developing nations.

4.4 **Indian Regulatory Practice Facilitates or Impedes?**

The highest body of shipping regulation in our country, Director General of Shipping (DG Shipping), housed in Jahaz Bhavan, Mumbai is responsible for the operational development of the maritime industry in India, and hence the marine education sector. India, being a signatory to International Maritime Organisation (IMO), implements all the guidelines through DG shipping. Continuous evaluation, persistent efforts and guidance of DG Shipping have played a significant role in India in making
her a major maritime nation.

At the time of inception of IMO, India might have been a backbencher. The scenario has changed now, with Indian seafarers in great demand, Indian training standard highly recognised, Dr. C.P. Srivastava holding the highest seat in IMO for four consecutive terms, and India becoming a centre of rapid economic development, India has now a greater say in the affairs of IMO. However, there are many places where, as was pointed out by people interviewed during the survey, DG Shipping failed to keep up to expectations.

Before the Standard for Training, Certification and Watchkeeping (STCW) guidelines in 1995, the government bodies were carrying out most of the education and training. Very few players, like big shipping lines, including Shipping Corporation of India and Great Eastern, were granted permission to carry out their own training institutes for captive use. With IMO-STCW'95 guidelines, DG Shipping liberalised the policy and invited the private players to take up the responsibility.

When DG shipping gave licences to private players to set up the institutes, it used its due diligence very sparingly; people with inadequate capability have also got the licence. DG Shipping restricted itself to setting up the minimum infrastructure and associated facilities requirement guidelines on pen and paper. Results, as opined by the participants, are poor quality of training, lip service to the infrastructure and even worse, dud
certificates. DG Shipping is taking the responsibility of approved institutes to the extent of inspection, but do not bother about what the non-approved institutes are doing or what the students of such institutes are facing. A few unfair activities spoil the impression about the standard of overall Indian maritime education. The youths once burnt could leave the marine career by stopping ten more aspirants to join.

The regulatory practice needs to be more vigilant and must be responsible for smooth conduct of action in the market. Liberalization increases their responsibility instead of decreasing.

4.5 Free Market Comes Calling

After the liberalization ushered in Indian economy in 1991 under the tutelage of Mr. P.V. Narasimha Rao and Dr. Manmohan Singh, the market autonomy has superseded the central autonomy and planning. Each and every sector is witnessing a sort of rebirth, new dynamism due to investment plans of domestic players and foreign players ready to grab a slice of market with opportunities galore. Shipping sector also has not gone untouched by it. The first sign of allowing the free market in the maritime training and education came in 1997 when DG Shipping allowed the private players to set up the training facilities on a commercial basis so as to meet the huge training demand in the wake of STCW deadlines.

Before 1997, there were very few Government training institutes along with the training arms of big shipping companies like TS Jawahar of
Great Eastern Shipping Company Limited (GE Shipping), Maritime Training Institute of Shipping Corporation of India (SCI) etc., whose seat capacity was always less than the number of interested candidates. So it obviously led to a big queue and backlog.

All the maritime courses can be broadly divided into three types, namely, the modular courses, competency courses and various familiarization courses.

Competency courses require high degree of infrastructure whereas the rest two types don’t require much. So in 1997, after the DG Shipping’s decision to allow the private players to come into this field, people who had experience in sailing and had the critical amount of money to pour into investment captured the opportunity. Since there was a scramble for those courses, the initial players, after putting up minimum infrastructure started offering various modular courses at exorbitant fees. This led to mushrooming of such institutes in Mumbai area.

With an attractive market, arrival of many players saw the course fees crashing down, and in the matter of two years many small academies became commercially unviable. Some of them are on the verge of closing down. The first fall out of free market was the arrival of businessmen with short-term profit making goals without any dedication for the quality of training. Guidelines were adhered to just in letter and not in spirit. Instances of certificates being issued for a fee without the actual training programme
also existed. DG Shipping, having only recently liberalized the sector, had not yet developed the control mechanisms to prevent such failures in the system.

In retrospect, one can see that free market itself is not as bad as its method of implementation. Allowing the private sector investment does not absolve the Government of any of its responsibilities. In fact, its responsibility increases to the extent that it has to supervise the modus operandi of so many players.

Probably this aspect of market dynamics has not been fully internalized by the regulating authorities.

In future, maintaining the discipline in the market would be the full responsibility of the Government authority, and it will dictate the quality and quantity of players. The free market would always be more favourable to the dedicated players delivering right kind of training, the students being its customers. It won’t be unusual even to wean away the students from the Government institutes. In our countries this market future may witness consolidation in near future, which is quite logical and warranted. So it may result in the existence of very few numbers of big players who would be providing the courses covering the whole spectrum. They would be undoubtedly open to scathing attacks from not only the domestic players, but also the foreign players.

So success of the free market in future will depend upon the
vigilance of Government and the maturing process of responding to the call of the market on the part of private players.

4.6 Onboard Training or Onshore Training

Onshore training is a theoretical training with various simulated practices and a little experience of actual onboard conditions. Onboard training is on the job training. A perfect learning system for a seafarer would be the correct amalgamation of both. The ratio of onboard and onshore depends upon maturity of shipping industry, operation strategy of ship operation, technological innovation.

Typically, in the preliminary phases of the industry cycle, the growth rate of the industry becomes disproportionately more than the ability of the market to supply the qualified personnel for the industry. So it automatically gives rise to taking people on board after minimum formal education and giving them onboard training while using them at the same time and expecting them to take up all concerned jobs just after learning them on hand.

However, when the industry is well into the growth phase, the market system becomes well developed to supply the candidates with proper qualification and attributes by making them go through a well designed course in a class room set up, intermingled with practical sessionals and simulation classes. The latter type people would be more equipped with theoretical background, who can pick up the practical aspects within no
time when they go onboard. At present time, the shipping industry worldwide is well into the growth phase.

Now, coming to the second aspect, which hinges on the operation strategy of the shipping companies, it is fair to assume that in a free market the companies would adopt all types of strategies to survive in the market. For good or bad, the shipping companies have been focusing on the cost reduction strategy in recent times. So a ship owner goes in for a minimum manning requirement on the board. Obviously, he requires them to be more knowledgeable, having a wide array of domain expertise, who can substitute a multitude of less knowledgeable personnel. It won’t matter were if such a person demands a high pay package. The benefits would flow in the form of less employee cost, less cost of coordination. It requires the people to be well educated in a formal system before they gain entry on to the board. It gives rise to the more onshore training.

The last, but not the least influential parameter, is the rate of change of technology employed. This is IT we are talking about here. This requires huge classroom training, as illustrated in the following section.

In India, at the entry level for the deck side officers’, mainly two courses are available, i.e., the first one being a three year B.Sc. Nautical Science graduation course and the second one being a three to four months course sponsored by shipping line. The basic qualification for both is 10+2 with Physics, Chemistry, Mathematics configuration, and the entry at sea is
at the level of cadet. The difference is in the sea time both have to spend to
go for further rank. The ratio is approximately 1:3 years for the graduates
and non-graduates respectively. The question that arises here is whether the
two years extra sea time the in latter course is equal to the three years
theoretical knowledge in the former? Are these people getting the
differential treatment on board?

We believe that more institutes need to come up to provide the 3-
year BSc. Nautical Science course. Given the present level of sophistication
in shipping, and how this level is expected to rise substantially in future, a
solid theoretical foundation is necessary, if one has a long term perspective
in mind. However, as far as short-term familiarization courses are
concerned, we observed that the shipping personnel themselves were quite
sceptical about the utilitarian value of the onshore training. We found that
shipping personnel tended to think that going for onshore training, for
whatever less or more number of days, actually ate into the number of
leisure days available on land. The argument mainly is whether the three-
ten days course is going to give one the practical feeling of the problems at
sea?

Are these short-term post-sea courses going to add substantial
knowledge to one’s 10-20 years actual seafaring experience? The shipping
companies themselves are also not serious about those courses even after
STCW guidelines. This gives rise to lukewarm attitude on part of the
candidates as well as the training institutes. It results in malpractice at places.

Beliefs and perception aside, it is a fact that formal education equips a person with intellect and attitude to take up the assignment. Those who are decrying offshore training are not looking into future.

4.7 STCW a Good Business Opportunity

Yes, it creates a business opportunity for some enterprising people for a very short term and strictly not on a continuous basis. IMO’S laying emphasis on STCW ’95 and insisting on the signatory countries to comply with the requirements by February 2002 witnessed the sudden rush of the training and education activities in many countries. DG shipping, in 1997, took a momentous decision of allowing the private players to set up their own commercial establishments to take care of the training needs which is in excess of the capacity that the existing infrastructure had at that time. This period witnessed a flurry of training institutes in Mumbai area especially.

The same business opportunity was not created when IMO came up with STCW ’78 guidelines. Its implementation started in 1984 only. The basic difference between 1978 and 1995 is in the concept of drawing a white list. Since IMO came up with an implicit threat of not including some intransigent ones in the white list, Indian regulatory authorities woke up to the ground reality.
As of now, approaching 2001, many such private set-ups have been rendered unviable, and they are on the path of close down or diversification, mainly in manning or IT education. So clearly, it was an opportunity for the early entrants. Seeing into the future, the probability of IMO’s coming up with another set of STCW guidelines cannot be discounted keeping in view the rate at which the industry’s face and structure change. But waiting for such an opportunity is tantamount to environment’s taking control of you. If you don’t want to be at the mercy of the IMO, then don’t wait. One has to look for opportunities in the present to build a solid foundation.

**4.8 IT - K(C)ritical Success Factor for Future Shipping Operation**

Information technology has shrunk the world, increased the efficiency and productivity of different economic activities, and has taken the centre stage in today’s world. How is shipping sector going to be shaped by IT? A question worth asking, and the answer is not very far away. Comparing across the industries, shipping sector has the minimum penetration of IT, although things are changing very fast.

Benefit of IT is intended to come from two streams – one, due to employment of software as the controlling mechanisms, thereby streamlining various operations and second, by the integration of different processes. The whole maritime industry consists of offshore vessels and the onshore official operation which typically consists of shipping companies
themselves, maritime insurers, shipping agents, ports authorities, component vendors and scores of other players.

The IT requirements of onshore official installations for various operations are not very different from those required in other organizations in different industries. Now focusing on the software requirement in ship operation and its integrated communication with the onshore players, it leaves a lot to be desired as of now.

The software required for a ship operation can be divided into technical software and the commercial software. The technical softwares are power plant maintenance software, loading software, navigational software, marine software, etc. Commercial softwares are cargo management software, port information software etc. Investment in IT on ships is not witnessing any breakthrough not because it is technologically not feasible, but probably because of the inability and unwillingness on the part of ship owners and the ship managers to focus on the long term benefits of investment in softwares rather than the short term benefits; meaning a power plant maintenance software would no doubt increase the operational efficiency of the plant along with the reduction in uncertainty while increasing the useful life cycle of the plant. This explains why the technological development in vessels has been very minimal over the last few decades even while technology in other industries has seen massive jump in the same period.
Today's shipping operation is experience driven, and very little is information and communication driven, although this is changing very fast. The difference between these two paradigms is glaring to say the least. The latter stresses the standardization of operation and real time communication to stay away from the future uncertainty or in other words minimizing the probability of failure on various fronts. Say, for example, problem coming up in a power plant in 50% of cases is of recurring nature. In today's time, the personnel cannot be expected to be with the same fleet for the entire lifetime. So why not put all the knowledge gathered till now in a repository and come back to refer to the database while required? So this gives rise to a database server on the ship itself or the server in the onshore office depending upon the cost of communication.

Communication technology would actually dictate the static volume of information and the software agents to carry on one hand, and on the other, hand, the frequency of communication. Right now the communication is being done by the satellites with different observatories, ports, etc. Since it is costly, only such communications are carried out which are of exigency nature and require a basis of compulsive attention. The cost of communication will depend upon the number of players willing to avail themselves of higher-grade services.

It is a chicken and egg phenomenon. Both of them would feed each other instead of one waiting for the other to act because of different
technology exploration and the proactive participation of different players to change themselves under the market forces as well as due to the urge for more intellectual achievement and stimulation. For example, for all management decisions on the board, the deck personnel can communicate to the onshore office various information. Various navigational parameters like the pressure and temperature conditions, current and a host of other associated parameters of an area in a certain range of the vessel are necessary to be communicated to the vessel on the real time basis for the safest navigation mode. It is easy to see how it could play a paramount role in not only constituting a prewarning system, but also a prevention system.

The future would witness the integration of all the softwares on board and the continuous communication of this offshore-integrated unit with outside agents. This would require more co-ordination between the engine side people and the deck side people whose complexity grappling capability has to go up. Though all the involved people would be the end ‘users, they need to be equipped with trouble shooting capability. So what does it spell for the education, training and development requirements of the vessel personnel?

A lot, as a matter of fact. Since all the things described above are not going to happen overnight, the training requirements will be felt in the first lap of development which will be followed by its formalization in the regular course. But before that happens, the training institutes, Government
or private, have to wake up to the call of the hour, first by understanding its far reaching implication, then proactive learning them selves and finally imparting the knowledge to the bigger body of existing seafarers. This is possible for the experienced sailors who have an eye for the future. They would have understanding of both the operational aspects of shipping and its IT potential. Such bodies or private set ups, apart from imparting the education only, can go up the value chain and as a part of strategy, implement the full ERP on a vessel. Doubting IT’s role in shipping would make one a blind sceptic. One needs both to create the opportunities and to grab them.

4.9 A Strategy Orientation for Education Business

Business opportunities arising out of short-term phenomenon like STCW guidelines cannot be sustained over a long period. Offering a few modular courses may not need a lot of investment. But in order to be able to offer the competency courses as well, one needs to put up the minimum necessary infrastructure, which is capital intensive. The infrastructure of Lal Bahadur Shastri Advance Nautical College (LBS) and Maritime Training Institute of SCI provides a hint of that. Though one may argue that both of them are Government funded, and the taxpayers have been generous enough in allowing such large expenditure, still it does not diminish the enormity of capital expenditure required on the part of a private body to offer similar set of courses.
As far as small players are concerned, it would be very difficult for them to survive because of low entry barrier. It is very easy to set up institutes offering modular courses with comparatively lower investment. Anybody can set up such facility within no time. Any such player adopting cost leadership strategy would itself bleed and make others bleed. It has already been witnessed in the market in recent times. For long-term maritime education business, it is only big players who can sustain in the face of market competition effectively. Big players, by offering a host of courses can attract a critical pool of candidates and can make them their repetitive customers, because the same people would come back again and again for different familiarization and competency courses. Such set-up requires investment running to several millions of Rupees. For providing nautical science courses, very huge investment is required. A strategy could be, coming together of several interested players and putting money into a single venture. This would obviously take slightly more time to get the returns.

The success of such a venture would actually require a solid communication strategy, believing that the quality of the training would speak for itself. Anyway the message transmission takes place by grapevine. But an active communication to the prospects would build up a loyal customer base over a period. Like, for example, targeting the fresh cadets would mean that they would come back to the same institute for
different courses. One can, of course, target by regional segmentation. Mass marketing would help more in this industry. When it comes to competition between such big private players and the Government or Government sponsored institutes, Government would be more willing to outsource all its training needs to the private companies. In the face of competition among the big private players, better quality would prove to be a competitive advantage.

Value addition in the courses offered and keeping pace with the changing trend, shall pull the crowd in future. Introduction of the IT related courses to make the people more conversant with the changing technology is one part of it. They must be offered along with the normal maritime courses. Indian Institute of Management, Ahmedabad is offering the course in Shipping Management, and is now collaborating with Indian shipping companies and foreign education bodies for spreading the course. Such a type of value addition will widen the scope of the industry itself.

The real opportunity could lie in shipping company’s willingness to outsource their personnel’s training requirement from the private bodies in the country. Till now, the shipping companies used to have their own training department where they offered the requisite courses for their personnel. Shipping Corporation of India and Great Eastern Shipping Company Limited have their training facilities. Similarly, many of the ship management companies and foreign shipping lines agents have their own
training institutes. There they train their own personnel as well as the other personnel for a fee. As a matter of fact, in a free market economy, the private bodies / institutes offering the training should be available from where the shipping companies can get their requirements outsourced. Also with changing technology, upgradation courses are increasing. Officers have to be continually trained in one or the other.

This training arrangement is highly capital intensive because of lot of infrastructure requirement. Small players won't be able to provide all the courses at a single outlet. On this score, the in-house arrangements actually prove superior. Again as far as the training for the operational procedures are concerned, they have the experienced personnel readily available on their pay rolls. So shouldn't they allow their experts to teach those who require the training? Again, such trainings are better customized when imparted in house set up. An assignment on SCI's LPG vessel would require different customized training from LPG vessel in GESCO. This asset specificity factor won't allow the outsourcing to take place on a large scale. As far as the shipping industry is concerned, there are many small players staying along with few big players. Such an industry structure has not added value to any of them. When the consolidation starts in the industry in the near future, the small players would be merged with big ones making the behemoth ones. Government assisted companies like SCI is anyway going to be divested, which will lead to its increasing efficiency
and size. So in a future industry structure when there would be a handful of big players, they can have their own training set up and fulfill their requirement. Private institutions may not have much business opportunities from this point of view.

A futuristic look would clearly reveal that the training requirements are two pronged. One is operational training, which is conventional, and the other one is shipping IT training which is unconventional. While the former training could be imparted by the in house people, the latter training has to be imparted by the outside people. Entire shipping company set up can be divided into offshore vessels and onshore installation. Penetration of IT is relatively low in shipping industry. The onshore IT installation requirement is just like that in any organization in any other industry. It could be streamlining the operation across various functions like marketing, finance; operation requiring various automated and integrated structure.

In case of the offshore vessel functions, normal operational procedures are also getting software control oriented, and hence their interface with the user is changing. For example, the demand for radio engineers on the board has fallen substantially. The arrival of GPS has meant the death of sextants.

The load distribution on different members of the ship structure and its possible failure scenarios can be very well analyzed on loading software. The communication methodology has transformed itself so drastically that
predictability and certainty of events have increased. The GPS users don’t have any troubleshooting knowledge. In case of its failure, they would be really at sea in high seas. Now with the arrival of ship loading software, plant maintenance, cargo management software, the control of things has become easier, which at the same time requires a different kind of skill.

Till now the shipping was thought to be cruising the high seas and entering the ports to load or unload the materials. But now shipping is being treated as a part of whole logistics chain. So not only sailing is important, but also real time communication, management and co-ordination between various players in the logistics chain in port are very important. The education and training requirement of the deck side people may require a revamp.

From this angle, a private entrepreneur could have an opportunity. A private entrepreneur who could commit a lot of investment into this venture can make the set ups for imparting both the operational and IT training in a single outlet. But the people at the helm of such an affair should not only have vast experience in shipping, but also in general management, transportation & logistics and Information technology. It requires the balanced mix up of the operational people and IT people who could come up with customized IT solution for vessel management. IT based vessel management leaves much to be desired. There is a lot of resistance coming from the people who have been quite used to traditional methods. So the
future is, at best, a mixed one. It may not be prudent for someone to put up his investment in expectation.

4.10 Seafarer Demand Dynamics – Can We Predict

The demand for shipping and marine education is a derived demand; dependent upon, inter alia, the demand for new seafarers. While shipping volumes are undoubtedly going to increase in future, as openness in economies and trade volumes increase, demand for seafarers may not increase at all.

With the assumption of substantial increase in the trade, tonnage may increase proportionally, but obvious increase in the shipping personnel cannot be predicted. Small size ships are supposed to give way to big size ships to capitalize on economies of scale. As the number of personnel required to man a vessel does not increase in proportion with the carrying capacity of the vessel, actual increase in number of personnel might not result. In fact, greater automation is expected to lead to fall in the number of personnel.

However, seeing from another angle, the number of small ships may increase. With the concept of delivering value to the customers and the concept of just in time taking centre stage, the frequency of small shipments going across the seas may actually increase as it has already been seen in the case of inland logistics. This implies that the number of smaller sized ships could increase. The customer is often willing to bear a high cost
in return of savings in time and lower uncertainties. One can easily presume the number of such jaunties across Arabian Sea to Middle East or across the Bay of Bengal to countries like Malaysia, Indonesia going up as a result. In future times, the shipping logistics may undergo a drastic transformation where it will directly compete with in-land logistics. In the emerging structure we may see different tiers in ports.

For example, a small port in Maharashtra may feed to Mumbai, Mumbai to JNPT, JNPT to Colombo and Colombo to the next hub port. So it could be a case of increase in small size ships as well as mega size ships. Again due to increase in mechanization and technology, the personnel requirement in the vessel may not increase. So in the light of all these points discussed, the demand of the personnel may not be really optimistic.

Containerisation of cargo may throw a spanner in the whole business. With the degree of containerisation going up, the handling requirements are going down which means less personnel requirement.

Both these trends are opposite in nature. It is difficult to determine the equilibrium point which in turn would help us establish the net demand for both officers and ratings in times to come.

According to the BIMCO / ISF 2000 Manpower Update, there is the shortfall in the supply of quality officers by 4% compared to the demand in the market. But for ratings, there is sufficient margin in the demand supply scenario. The supply of the officers is the subjective matter as the barriers
include many things like cultural and language differences, lack of international experience, nationality restrictions that apply to many flags.

The demand for the Indian officers is dependent on the quality standards of the Indian seafarers and their acceptance by the world. The Indian officers have the global acceptance as to the standards in training, knowledge of English, and global maritime experience as well as their availability at comparatively low cost. This demand is expected to rise in future because of decreasing preference of the OECD nationals for sailing as a career. The other competing nations are lacking in one or the other field compared to Indians, but they are winning the market owing to lower cost. The gap in the global demand and supply for the quality officers can be well filled by the Indian officers. The only thing is, training should be at par with best in the industry to fix up the place permanently.

To retain the preferential demand enjoyed by Indian seafarers, there should be greater amount of training so that Indian officers are at the forefront of technology at any given point of time. This is possible by massive investments in marine education in the country.

4.11 Casteism still rules the Coast

The European countries have sailed through the world and the achievements are recorded on their names. With the history of success, emergence of early training facilities and global language of trade have given the advantage of visibility and recognition to Europeans in marine
world. The lack of interest of OECD national in shipping career has created the demand for other nationals. The new entrants are trying for their share of recognition as well as the position. But the preference of the shipping line will always remain the European or the OECD national even at the higher cost.

IMO has entered into technological collaboration with many countries and has set up the standards for each and every seagoing person. The question is, with the equal standard in training, education, language, experience, whether the other national will get equal status to OECD nationals?

When an Indian is of equal calibre as a British seafarer, does he get the equal rank with equal pay package? Whether one Filipino will master the Norwegian manned vessel? Is it not racial discrimination? If equality at all levels is not possible, then what is the use of equal standard laid down by IMO? Time shall give answers to all these questions.

India has recorded tremendous progress in a number of fields such as agriculture, medical science, industry, transportation, science and technology, communication, education, libraries, etc. Education is a powerful instrument of socio economic and cultural development, and it provides the nation with qualified manpower it needs: professional education, in addition to imparting knowledge, develops skills necessary for successful performance of the job. It should be respective to changing
needs of society relatively young, which is largely a product of the 19th century. Maritime industry has undergone many significant changes in 20th and 21st century in its outlook, functions, methods, techniques and ranges of services. So the need-trained marine professional in order to manage the ships and shipping industry in particular in a better way has been felt by the educational administrator of our country. As a result a few maritime institutes for imparting MET have emerged in our country during 1900 – 1995. Then later a number of institutes were established after private entry into the field after 1996. The emergence of MET institutes can be traced back to 1910, and their main objective was to provide the skilled manpower to man the ship. Keeping the demand for the marine professionals in view, the past decade witnessed a huge growth of DG Shipping approved MET institutes, reaching to a total number of 104 as on March 2008.
References


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