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WORLD MARITIME UNIVERSITY

Malmö, Sweden

**THE UPGRADE OF MET FOR
PAKISTAN MARINE ACADEMY**

By

BASHIR AHMAD UNAR

PAKISTAN

A dissertation submitted to the World Maritime University in partial fulfilment of
the requirements for the award of the degree of

MASTER OF SCIENCE

in

MARITIME EDUCATION AND TRAINING

(ENGINEERING)

1995

DECLARATION

I certify that all the material in this dissertation that is not my own work has been identified, and no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.



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ABSTRACT

The world of today has witnessed drastic changes that have taken place in the shipping industry over a couple of decades. Technological advances, reduced manning, human errors (likely cause of most of the marine casualties): these demands necessitate the review, modification and update of the present system of education and training of maritime engineer in Pakistan Marine Academy (PMA).

Pakistan Marine Academy has launched a four year Engineering Degree Programme for their marine officers. Once this is approved, the Pakistan Marine Academy Cadet will receive a Bachelor of Engineering Degree in Marine Engineering. This dissertation looks at development in shipping and examines the conceptual changes in education and training and learning methods to cater to the needs of the international shipping industry.

In chapter two, a brief look is taken of the existing organisation in the PMA and its developments. Chapter three deals "Staff development programme" as to enhance their qualification and officers can be trained taking into account compatibility of the programme to the requirement of national shipping and international standards of training. Chapter four is a survey of maritime education system in the USA, France and Japan with a view to ascertain the extent to which maritime education and training in these countries have adopted to these changes. Chapter five focuses on the study of the human resource management of personnel working in PMA.

Finally I have put forward conclusions and a number of recommendations (Chapter six), which can be easily implemented and which in my opinion will help in further development of education and training in PMA.

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LIST OF ABBREVIATIONS

COC	Certificate of Competency
C/E	Chief Engineer
DGPS	Director General Ports and Shipping
ENMM	Ecole National de la Marine Merchande
EOW	Engineer Officer On Watch
GMDSS	Global Maritime Distress and Safety System
GRT	Gross Registered Tonnage
ILO	International Labour Organisation
IMLA	International Maritime Lecturers Association
IMO	International Maritime Organisation
INMARSAT	International Mobile Satellite Organisation
KW	Kilo Watt
LSA	Life Saving Appliances
MET	Maritime Education and Training
MEO	Marine Engineer Officer
MO	Marine Officer
NAVTEX	Narrow-band Direct Printing Telegraphy System for Transmission and Reception of Maritime Information Officer On Watch
OOW	Officer On Watch
PMA	Pakistan Marine Academy
QWS	Qualifying Watch Service
STCW	International Convention on Standards of Training, Certification and Watch keeping 1978
SUNY	States University of New York
USMMA	United State's Merchant Marine Academy
USCG	United States Coast Guard
WMU	World Maritime University

Chapter 1

Introduction

1.1. Objectives

International trade is must for every country, both developed and developing. Sea link are of vital significance for trade between two countries. Pakistan is a maritime nation with about 800 Kilometers sea frontier. About 90% of our trade is carried by sea, as total self sufficiency is extremely difficult if not totally impossible to achieve. It is not out of place to mention here that sea transport will continue to be the prime vehicle of world commerce since it has the lowest cost per ton-mile and can move a great quantity of goods over long distances.

Pakistan has its merchant fleet for which a complete management system is required to run shipping efficiently. Consequently, well-trained and highly educated personnel are required and to supply the manpower to the international maritime industry.

International trade benefits both sides. At the national level, the position of Pakistan in the maritime field is critical in international context. Demand of Pakistani seafarers on Foreign flags vessels, which was already under rated, is further decreasing. The trend of reduced level of manning on board modern ships also warrants a broader knowledge and skill base for the few seafarers left on board. Relevant circles in Pakistan are greatly concerned with this maritime situation and feel that it warrants immediate corrective action.

There is therefore no doubt that the need for the upgrade of the MET facility is of paramount importance to the Pakistan Maritime Academy.

This paper has been prepared in order to identify and define basic terms of reference which are necessary to upgrade the present two year training scheme of the marine engineering faculty of the PMA to four years Engineering Bachelor Degree Course.

In this context the following four main areas dealt with, with the concept that will help the PMA in upgrading its marine engineering faculty.

- (1). Existing PMA organization
- (2). Development of Staff
- (3). Comparison - selected maritime institutions of the world
- (4). Human resource management in the MET.

1.2. Maritime Education and its environments

The primary purpose of any maritime educational and training scheme is to provide education adequate to ensure that vessels are operated safely and efficiently.

One of the social and professional functions of maritime institutions is to transfer knowledge, skills and attitudes to the students in order to transform them into responsible officers on board ships.

Shipping companies being the customer to the services provided by the maritime colleges, play a pivotal role in the improvement of maritime education and training, it is logical to expect influences from them.

Pakistan being the member of the International Maritime Organisation and the signatory of the Standards of Training, Certification and Watchkeeping, the Director General Ports and Shipping (DGPS) has been actively working in compliance with this convention to include national and international requirements into educational and training schemes in order to produce well-trained and competent sea farers to navigate the ship safely, to optimise the operational cost, to achieve high degree of reliability, to protect marine environments from ships. These are the demands which call for higher standard of training.

1.3. Identification of problems

Advance in the modern technology makes it essential to update our knowledge and facilities. Progress is never ending progress and over time, the world has witnessed dynamic changes in maritime technology. Nevertheless, a sound knowledge of fundamentals provided the best preparation for coping with future changes in technology, and so it is vital that maritime administrations and the shipping industry are satisfied with the level and the quality of education component. Consequently the need for improved educational standards and professional skills of ship board personnel is inevitable.

Conventions/wisdom is that seafarers are not permanently placed in sea-based jobs, after a certain time they look for shore-based careers.

Unemployment is a great social evil. Reduced manning on ship board creates not only

a problem to the training institutes but the problems of employment for perspective seafarers. An educated person's frustrations become the cause of unrest in the society. The competitive factor in view of reduced manning has forced training institutions to upgrade their training standards. The future ship will require reduced but highly specialized crews to operate ship economically and safely. However we can make an effort to widen the scope of employment through the upgrading of education and training programme.

Statistics show that 80% of all collisions and groundings are due to human error. Every shipowner knows that safety is mostly synonymous with efficiency and sound business in the long run. To minimize this human error factor in marine accidents calls for the modification and upgrading of educational and training programmes.

The problem areas touch on the preceding paragraphs are all in one way or other related to the maritime education and training. Summarizing the preceding paragraphs we can extract micro-objectives.

1.4. Micro-objectives

- (1). The status of seafarer is to be brought in parallel with the shore-based members of the society.
- (2). Attraction of the seafaring career shall be increased.
- (3). Maritime education and training institution's needs for continuous and productive operation shall be realized by the authorities, and provision for the same be made in the long term planning.
- (4). Sufficient number of maritime personnel be made highly qualified and trained in specialised maritime fields so that enough well qualified maritime personnel are available to represent Pakistan at international conferences/ symposia/ seminars.

1.5. Macro-objectives

- (1). Review and updating of the MET structure, facilities and curriculum, to suit the changed technology and environment shall be made through the guidelines given by

the Maritime Education and Training Council.

(2). The scope of utilisation of the maritime education and training shall be broadened.

(3). Linking of the MET institutions with the national education system and affiliation with international maritime educational and training institutions shall be encouraged and made effected.

Chapter 2

Existing Pakistan Maritime Academy Organisation and its Development

2.1 Background history

Pakistan came into being in 1947. During the period 1947 to 1962, the maritime training was carried out in the traditional way of on-the-job training, as during the aforesaid period the Maritime Academy was not in existence.

The engineering cadets were recruited by the various marine workshops and nautical cadets commonly termed as deck cadets were recruited by the Shipping Companies. The basic entry qualification was matriculation in science (ten years of school education). After 1962 the entry level was upgraded to an intermediate science level (twelve years of education).

A Mercantile Marine Department was set up at Chittagong (then in East Pakistan) in the year 1962. After separation of East Pakistan from the country in the year 1971, the country was left without any Merchant Marine Academy. An immediate action was taken by the Government of Pakistan to build a new Marine Academy. It was re-established temporarily in Haji Camp at Karachi in November, 1971 and named Pakistan Marine Academy (PMA).

During the period from 1971 to 1978 the main construction of the new campus was accomplished. The Academy was finally shifted in its existing premises at Mauripur Road, Karachi in June, 1978.

The purpose-built campus has an area of 136 acres in the North-west of Karachi harbour. It comprises an Administration/ Instructional Block, Officer's Club, Cadet's Residential Block, Workshop, Simulators, Jetty, Swimming Tank, Play Grounds, Medical Centre, Mosque, Bank, Post office, Seamen Training Centre and a Residential Colony for both officers and staff of the Academy.

Between 1978 and the present, the Pakistan Marine Academy has placed the Maritime Education and Training system in Pakistan on a new footing. The PMA imparts training for both Engineering and Nautical branches to qualify engineering or deck officers in Merchant Navy.

In spite of a number of difficulties and constraints, the PMA endeavours to continue the Maritime Education and Training system in Pakistan and continues unrestricted recruiting of cadets. In the past, private shipping companies used to recruit personnel directly. This led to haphazard training of potential seafarers. Following continuous efforts on the part of Academy, the Maritime Administration has formulated and implemented national rules that only the Marine Academy can recruit fresh entries for engineering and nautical branches, thus the policy of direct cadet entry via the shipping company was suspended.

2.2. PMA profile

The duration of training at the Academy stretches over a period of two years, divided into four terms allowing two months for vacation during summer and 15 days in the winter.

The STCW convention of 1978 entered into force for the Government of Pakistan on the 10th. July, 1985. The Academy conducts the courses to meet the training requirements of International Maritime Organisation (IMO).

For affiliation with Karachi University the PMA had to upgrade the curriculum in all fields including workshops and laboratories. Consequently in 1986 the PMA was affiliated with the University of Karachi for the award of B.Sc. degrees in Maritime studies to its graduates.

A new project regarding affiliation of the Pakistan Marine Academy with the Dawood College for Engineering and Technology, in Karachi has been launched. It will be completed shortly. Once this is granted, the affiliation with the Engineering College, the engineering cadets will get a Bachelor of Engineering Degree in Marine Engineering.

A number of foreign students were also trained in the PMA. The cadets of those countries who received the training were from Malaysia, Saudi Arabia, Islamic Republic of Iran, Ethiopia, and Srilanka. On passing out from the Academy, these cadets were awarded B.Sc. (Maritime Studies) degree by the University of Karachi in accordance with the syllabi approved by the University of Karachi, IMO and the Ministry of Communications, Government of Pakistan.

In 1986 the PMA installed a "RADAR ARPA SIMULATOR", a "SHIP MANOEUVRING SIMULATOR" and an "ENGINE PLANT SIMULATOR", offered by the Government of Japan under the grant-in-aid scheme.

The PMA is also recognised as a branch of the World Maritime University, Malmö - Sweden for the conduct of IMO specialised short courses and seminars, etc.

2.3. Training facilities

Modern and scientific techniques are being adopted to train the young seafarers to stay abreast of the fast growing world of automation and computerisation. Audio and visual aids, video films, library stocked with text/reference books, well equipped laboratories and workshops, models of machinery and other gadgetry fitted on board vessels are available for improving effective training.

A language laboratory with latest facilities helps the trainees, especially the foreign students, in improving their command of the English language which is so important to assimilate and comprehend the academic and professional subjects. A most modern computer laboratory is recently being set up both with a view to familiarise the cadets with computer technology and the learning of Nautical and Engineering subjects.

On the practical side, the Academy has facilities to train Nautical cadets in seamanship, sailing, signalling, rowing, boat handling and Engineering cadets in bench fitting, machining, welding, wood work, air-conditioning, water treatment, running and operation of machinery, etc. Visits to various industries, ships and shipyards are arranged frequently for this purpose.

The academy is also conducting post-sea experience refresher courses, to prepare the officers for their certificates of competency examinations and short courses for seaman as required by STCW convention of the International Maritime Organisation, a sub-agency of the United Nations Organisation.

The Academy is the major source of maritime manpower, which provides employment opportunities for national seafarers on national ships. It is therefore necessary for developing countries to prepare their manpower to cope with changes and modern innovation.

2.4. Other Maritime Training Institutions in Pakistan

The SEAMEN TRAINING CENTRE, which is located within the boundary walls of the PMA, is responsible for conducting mandatory courses under STCW convention such as FIRE FIGHTING, FIRST AID and SURVIVAL. It is a separate administration unit and is working in close co-operation with the PMA.

The PAKISTAN NATIONAL SHIPPING CORPORATION MARINE COLLEGE, conducts the preparatory courses for certification of competency examination. This college also conducts mandatory courses for Life Saving Appliances (LSA).

APPRENTICE TRAINING CENTRES: Three main workshops are recognised by Maritime Administration in Pakistan. These are (a). Karachi Port Trust Workshop, (b). Pakistan National Shipping Corporation Workshop, and (c). Karachi Shipyard and Engineering Works. The successful engineering cadets of the PMA join one of these workshops which provide practical training for three years before going to sea.

The Karachi Port Trust STAFF COLLEGE, arranges the courses and seminars for the port personnel from time to time or when needed.

The NATIONAL INSTITUTE OF OCEANOGRAPHY is concerned with survey and research related to seabed, sea mining, marine life and pollution.

Apart from these Maritime Training Institutions, the Zoology department of Karachi University conducts courses in marine biology.

2.5. Infrastructure of MET

To find out in what way the Maritime Education and Training system in Pakistan operates, obviously we must start with the PMA. The PMA, is a premier Maritime Education and Training institution in the country with highest degree of specialisation

in shipping and offers a comprehensive range of courses for the students and personnel from the maritime industry.

The PMA is a recognised branch of the World Maritime University and with its association with leading Maritime Education and Training institution in and outside Pakistan, the Academy is able to constantly upgrade its training programmes and offer new ones to meet the requirements of the marine industry.

The main areas of training and education presently undertaken by the Academy include,

- (a). Pre-sea,
- (b). Post experience,
- (c). Modular.

Pre-sea: Deck cadets are provided with academic, vocational and professional training suitable for successful careers at sea. They must be fit mentally as well as physically to suit the ship's environment. Emphasis is placed on the development of the cadet's character, self discipline is included as a part of training.

The course for engineering cadets is designed to develop the knowledge and skills at levels to meet the international standards. Thus enabling them to develop their character, discipline and a sense of responsibility.

Post experience: These courses are designed for seafarers with sea-going experience. The object is to provide training and education for the acquisition of sound knowledge, skills and attitudes for the various grades of competency. The range of post experience courses include:

1. Preparatory courses for 1st. Class part B (Steam).
2. Preparatory courses for 1st. Class part B (motor).

3. Preparatory courses for 2nd. Class part B (Steam).
4. Preparatory courses for 2nd. Class part B (motor).
5. Second mate (Foreign going).
6. Third mate (Foreign going).

Modular: These intensive courses are of a specific nature. The successful completion of modular courses is a prerequisite for the issuance of Certificate of Competency by the Maritime Administration. The courses presently offered are summarised as follows:

- The PMA (under Seamen Training Centre, housed with in boundary of Academy) conducts mandatory courses for seafarers in Sea Survival, Basic Fire Fighting at Sea, and Basic First Aid at Sea.
- Three weeks course in "Electronic Navigational Aids (Operation).
- Three weeks course in Radar Observer. The course is conducted on "Live" radar equipment and provides extensive "Hand-on" experience.
- A one week course in Radar Simulator. Conducted on a very modern computer-aided radar simulator.
- A one week course in Oil Tanker Familiarisation, which is mainly intended for junior officers and key ratings who have specific duties and responsibilities related to those duties, in connection with cargo and cargo equipment on petroleum tankers and are required to undertake this course under the STCW convention.
- A one week course for marine engineer officer watchkeepers, satisfying the requirements of STCW 1978 regulations III/4.
- A one week course in Chemical Tanker Advanced Operations, conducted in accordance with STCW convention for Master, Chief Engineer, Chief Officer, Second Engineer and any other person who is likely to have immediate responsibility for loading and discharging.

2.6. Marine college

Following a growing need of a merchant fleet and its allied organisations and for a maritime industry with reasonable number of ships, it has been an established fact that no merchant navy can ever promote the best interests of the nation unless it is manned by the nationals of the country.

For the purpose, it was proposed to have a Marine College, headed by Commandant Pakistan Marine Academy, and to impart training to both engineering and nautical cadets as there exist no post graduate centre for maritime education.

Ratification of the STCW convention by Pakistan put Pakistan under international pressure to set up such a college. The IMO missions were invited by the Government of Pakistan during January 1984, March 1986, and October 1989. These missions recommended that there must be marine college within the premises of the PMA to overcome deficiencies in Maritime Education and Training system in Pakistan.

The need for a well equipped Marine College with post graduate training facilities to produce technologists in various discipline of maritime technology in order to meet the requirements of shipping and other associated maritime sector was indicated.

For development and upgrading the MET system in Pakistan, the proposed Marine College (to be located within the premises of the PMA) in collaboration with the Pakistan Marine Academy is certainly a step towards better post-graduation centre for maritime education and also will broaden the spectrum of Marine Sciences and Technology, available within Pakistan.

2.7 Marine Engineer's training, certification and proposed changes

Presently students aspiring to obtain certificates of competency as marine engineer officers, have to undergo a separate segment of practical training at Karachi Shipyard

and Engineering Works, and Karachi Port Trust after completing a front-ended two years shore-based training programme at PMA. The new upgradation programme intends to amalgamate the workshop training segment with the predominantly theoretical shore-based segment of training in order to provide a integrated training programme which would offer more effective training to future marine engineers.

It is felt that the integration will be able to save training time as theoretical and practical segments will be closely correlated.

The proposed programme is structured to fulfil the requirements of STCW 1978 convention, and also accommodates the needs of the present staff-structure in the shipping industry.

The proposed system of examinations and certification are in total harmony with the overall national objectives and also will meet the following needs:

1. To enhance the standard of training and certification for marine engineers in Pakistan.
2. To raise the general standard of PMA, to simulate and allow for the "Continuous education" concept to achieve self sufficiency in science and technology.
3. To produce competitive seafarers to serve on foreign flag vessels to earn foreign exchange for Pakistan.
4. To increase the flexibility for smooth change-over from the existing to the future system and able to deal with and safely adopt to different displays and type of equipment to perform the same or extended tasks.

The flow chart as shown in the Table 2.1 is for the Pakistan's merchant marine officer training scheme. This is expected to simplify the system of marine engineering personnel. This course will form the basis for his future executive responsibility, both ashore and afloat.

At this point it is necessary to give an outline of the four years upgraded degree course including sea-time requirements for certification. The entry requirement for cadets who intend to join the MET system to become a marine engineer are a high school certificate (ten years of school plus two years of college education), with Physics, Mathematics and English as majors. All cadets must pass a medical check-up. Selected cadets will undergo a four year shore-based course.

Table 2.2 - table 2.5 shows a fair idea of future trends for four year degree programme of training at PMA.

The first year of cadet training course will be totally theoretical concentrating upon Engineering mathematics, English, General chemistry, Engineering drawing, Workshop theory and practice, Physics, Islamic studies, Pak-studies communication and Marine engineering.

A characteristic segment of 2nd., 3rd., and 4th. Year programme will be the inclusive of professional and technical subjects. All students must participate in scheduled workshop training.

On completion of the four-years course, students who successfully passed final examination will be granted a Bachelor's degree in marine engineering. Such engineers are qualified to serve on board merchant vessels (unlimited power) as junior engineers, uncertificated.

On completing 12 months shipboard service as Jr. Engineer (watch keeping engineer), the student is entitled to appear for oral examination jointly conducted by DGP&S and PMA for Third engineer certificate of competency. Successfully candidates will be granted certificate of competency as engineer officer on watch (EOOW).

Holders of certificates of competency (COC) as EOW have to serve on board merchant vessels for at least for a period of 12 months as EOW to be entitled to appear for written examination of COC-marine engineer officer (MEO) Class II. Eighteen months service on board merchant vessel as MEO Class II will entitle the holder of certificate for automatic upgradation to MEO Class I.

The examinations associated with front-ended training programmes are conducted at the educational institutions with an external assessor from the maritime administration.

Hence the interim and the new examination and certification plans propose that examination be conducted jointly by PMA and the Director General (Port and Shipping) wing at PMA.

It would be helpful in claiming equivalence of various certificates of competency to the postgraduate diplomas or degrees, if the involvement of national educational authorities into these examinations could be facilitated through PMA.

2.8 Future strategic plans for improvement.

As Pakistan has great potential for improvement and development in the maritime field. With the introduction of automation and computers over the last few decades, there is an entire change in the structure of the shipping industry and the education system. Still there is much to do in the future. Consequently the maritime system of education must be provided with necessary feedback to upgrade the standard of education to keep pace. In order to achieve development in this area, the following considerations can be focused upon:

- The Academy is intended to meet the training requirements of IMO. Keeping this very aim the training aids and other faculties are being upgraded constantly to keep pace with the rapidly changing technology in the maritime sector.

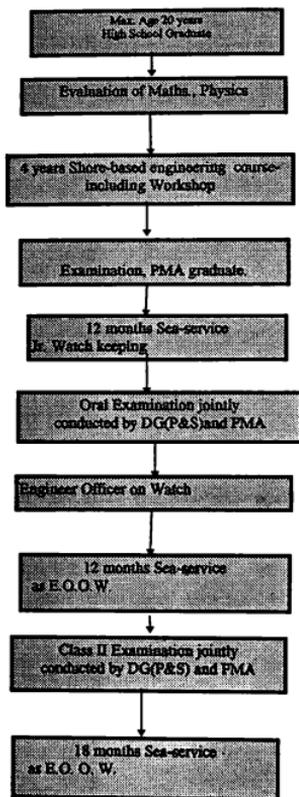


Table 2.1 Proposed Training and Certification System for the Pakistan Merchant
Marine Officer (Engr)

- The curricula and syllabi are constantly scanned, revised and updated to keep abreast of the significant technological changes.

- Laboratories and workshops must be updated from time to time, so that obsolescent equipment can be exchanged with newer types. Also the library needs to be provided with the latest books/magazines.

- Refresher and revalidation courses for existing officers need to be conducted regularly to enable them to update, especially for those who teach and train the cadets.

- Skills of the human resources cannot be restricted to lecturer level, but be enhanced at the management level as will play a vital role in the further upgrading development strategy.

- The factor of human resources cannot be ignored. Incentive, motivation, job description are the vital factors concerning employee job satisfaction. Due consideration must be given for further development and upgradation of the Maritime Education and Training system in Pakistan. This aspect will be dealt with later in this study.

FOUR YEAR PROGRAMME OF TRAINING

**SEMESTERS
I -III - V - VII**

**SEMESTERS
II -IV - VI - VIII**

19 WEEKS CLASSROOM INSTRUCTIONS/ PRACTICALS	2 WEEKS EXAMINATIONS	6 WEEKS SUMMER VACATIONS	20 WEEKS CLASSROOM INSTRUCTIONS/ PRACTICALS	2 WEEKS EXAMINATION	1 WEEK PASSING OUT PARADE	2 WEEKS WINTER VACATIONS
--	----------------------------	--------------------------------	--	---------------------------	---------------------------------	--------------------------------

52 WEEKS

a - CLASSROOM INSTRUCTIONS/ PRACTICALS	156 WEEKS
b - EXAMINATIONS	16 WEEKS
c - PASSING OUT PARADE	4 WEEKS
d - SUMMER VACATIONS	24 WEEKS
e - WINTER VACATIONS	8 WEEKS
	208 WEEKS
	4 YEARS

TIME AVAILABLE PER WEEK

$$\begin{aligned}
 55 \text{ MINUTE PERIODS PER WEEK} &= 6 \times 6 = 36 \\
 &= \frac{36 \times 55}{60} = 33 \text{ CLOCK HOURS}
 \end{aligned}$$

$$\begin{aligned}
 \text{INSTRUCTIONS} &= 31 \text{ CLOCK HOURS} \\
 \text{PARADE/EXTRA CURRICULAR} &= 2 \text{ CLOCK HOURS} \\
 \text{ACTIVITIES} &=
 \end{aligned}$$

NOTE: WINTER VACATIONS OF THE 8TH SEMESTER STUDENTS WILL BE UTILISED FOR PROJECT WORK OR MANDATORY COURSES (IF ANY) AS PER I.M.O. RULES

Source: Pakistan Marine Academy

Table 2.2

PAKISTAN MARINE ACADEMY

DEPARTMENT OF MARINE ENGINEERING

TEACHING TIME ANALYSIS

Duration of odd semesters (i.e. 1st, 3rd, 5th & 7th) is 21 weeks (19 weeks of teaching & 2 weeks of examinations). Duration of even semesters is 22 weeks (20 weeks of teaching & 2 weeks of examinations).

Academy runs 6 days per week. Six classes of 55 minutes each are conducted per day. Thursdays are marked for tutorials/industrial visits/regimental training or self study.

Semesters	Credit Hours per semester	Hours per week				Total weeks per semester (e)
		Contacts (a)	Lectures (b)	Labs (c)	Tut/visits (d)	
1st Semester	25	29	21	08	07	21 (19+2)
2nd Semester	26	30	22	08	06	22 (20+2)
3rd Semester	25	29	21	08	07	21 (19+2)
4th Semester	29	34	24	10	02	22 (20+2)
5th Semester	26	32	20	12	04	21 (19+2)
6th Semester	24	29	19	10	07	22 (20+2)
7th Semester	25	32	18	14	04	21 (19+2)
8th Semester	24	29	19	10	07	22 (20+2)
Total for four years course	204	(a * e) 4758	(b * e) 3200	(c * e) 1558	(d * e) 858	172

Note: Contact hours etc. have been calculated on the basis of periods/week excluding examinations/evaluation time.

Table 2.3

Source: Pakistan Marine Academy

PAKISTAN MARINE ACADEMY

DEPARTMENT OF MARINE ENGINEERING

TIME ALLOCATION (Broken down by discipline)

Semesters	Hours per week					
	Maths	Basic Science	Engg. Science	Engg. Design	Humnt. Soc. Sc.	Maritime or others
1st Semester	76	152	-	-	114	209
2nd Semester	80	140	-	20	120	240
3rd Semester	76	95	190	-	114	76
4th Semester	80	100	340	-	40	120
5th Semester	57	-	285	266	-	-
6th Semester	60	-	100	220	60	140
7th Semester	-	-	171	342	-	95
8th Semester	-	-	140	180	-	260
Total for each discipline	429	487	1226	1028	448	1140

TOTAL CONTACT HOURS FOR FOUR YEARS = 4758

Table 2.4 Source : Pakistan Marine Academy

PAKISTAN MARINE ACADEMY

DEPARTMENT OF MARINE ENGINEERING

DISCIPLINE-WISE CREDIT ALLOCATION

Semesters	Category/Credit hours					
	Maths	Basic Science	Engg. Science	Engg. Design	Humnt. Soc. Sc.	Maritime or others
1st Semester	4	6	-	-	6	9
2nd Semester	4	5	-	1	6	10
3rd Semester	4	4	8	-	5	4
4th Semester	4	4	13	-	2	6
5th Semester	3	-	12	11	-	-
6th Semester	3	-	4	9	3	5
7th Semester	-	-	7	14	-	4
8th Semester	-	-	6	8	-	10
Total for each discipline	22	19	50	43	22	48

TOTAL CREDITS FOR FOUR YEARS = 204

Table 2.5 Source: Pakistan Marine Academy

Chapter 3

Development of Staff

3.1 The role of MET at PMA

The aim of staff development in the maritime field is to establish a relationship between the individual and the organisation to achieve overall efficiency. It is a process through which individual's knowledge, skill, competence, and confidence are enhanced through teaching and training. Staff development is not only the obligation of the organisation to educate future maritime lecturers but also has to keep track of innovations in the maritime field.

Today's maritime technology is progressing stupendously all over the world. The introduction of automation, the use of maritime communications, the application of computers, and micro-electronics and satellites has brought radical changes in the maritime field. To keep abreast with the technological changes in the maritime sector, the PMA has to evolve a pattern which is compatible with the requirements of the national shipping industry and the international standards of maritime education and training.

Thus, to develop good maritime lecturers, the PMA has to launch a continuing education post graduate programme for lecturers. In order to obtain the status of a bachelor's degree college the PMA needs affiliation with an Engineering University, whose one condition is that the staff's qualification must be upgraded to levels stipulated by the Engineering University/Engineering council.

3.2. Limitations and constraints of maritime lecturer

The marine lecturers are normally selected as practical marine engineers or navigators with Chief Engineer's certificate or Master Mariner's certificate respectively.

Being a professional teacher they need to be in touch with latest developments in pedagogical theory and practice, which certainly they are lacking. Also to ensure good education standards the lecturer must keep track of the increasing pace of technological development. The technical personnel recruited as maritime lecturer, have completed their studies over a decade or so ago and are not aware of recent technological changes and will naturally fail in their duty of teaching latest technology effectively.

It is accepted that a maritime lecturer with a background of maritime education and training could produce a far better result in maritime institution. To produce a good lecturer with rising academic standards, the updating of maritime lecturer must be a vital part of the activities of any academy to provide for sound maritime education.

The introduction of innovation into modern shipboard systems necessitates a review of the current curriculum. These technological changes to curriculum must be acceptable to all parties concerned, namely the government, the shipowning community and the future marine engineer.

Consequently the upgrading and enhanced learning of maritime lecturers must be encouraged as a means to redress the lag in technological awareness and updating. The impact of their increased applied knowledge on the quality of teaching would be to bring it to a higher standard. Also students will benefit directly from the increased quality of teaching. Their role in the institution will be enormous.

3.3. Staff development programmes

The staff development is a process which teaches individuals how ideally to be effective, and may be conducted at regular intervals which contributes towards overall development of the institution, as it enhances self confidence and competence of the individual. The aim of staff development is to establish a relationship between individual and organisation.

The purpose of this education level is to upgrade the qualification in the relevant field and provide knowledge to specialists with professional experience in order to obtain highly specialised staff for teaching, operation, research and education. After all, these institutions supply the required personnel to operate, maintain and run the nations ships.

The modern type of ships which were built with vast array of latest developed technology ranging from portable computers to satellites covering nearly every sector of the ship infrastructure. Today we see many technological break through in the way of new innovations in the marine engineering. These technological products extended from ship handling, stability and cargo handling, navigation, maritime communications and data processing system e.g. GMDSS, INMARSAT, NAVTEX to automation and control of the ship.

In order to update the teaching standard in the PMA, the upgrading of the lecturer who had a good professional knowledge with vast practical sea going experience will

certainly improve their quality of teaching. Conclusively, the upgrading of maritime lecturer can hardly be over-emphasised.

From a distinctly maritime perspective, the updating of maritime lecturer may be an important national issue and cannot be blissfully ignored, on the other hand it is equally relevant to consider how to convince the Government to set up a proposed teacher's training programme for the PMA within the existing financial constraints. The inconsistency of the shipping industry and the subsidised over-capacity of tonnage, leads to the government's reluctance to indulge in long-term planning for the PMA.

Every institution has a budget within which everything is to be accomplished. To develop the institution/training, the budget needs to be increased, often it is not possible for developing countries to cope with this aspect of upgrading as money always remains a major hurdle for the PMA.

The PMA is funded by the federal government. Providing the latest developed equipment, and enhancing the faculty and staff to update the quality of education provided within available budget is difficult task to meet.

However to overcome these existing financial and pedagogical difficulties, it is highly advisable to arrange short courses for maritime lecturers in the PMA on the relevant topics. A cost effective solution may be to have part-time lecturers, professors, and competent experts in the maritime field called in to conduct such courses for a specified period of time. The staff graduated from World Maritime University could provide tremendous help in organising such short courses.

The PMA can cross-subsidise the continuing education program for its lecturers by offering purpose-designed short courses to shipping companies in areas of their interest at a reasonable profit. This will not only provide some funds for staff

development but it can also serve to induce government to help in support of such projects. In addition, grants can be sought from affluent Shipping Companies. Existing upgrading facilities available in the country should be thoroughly explored through co-operation and communication with universities and other existing national institutions in the country. Maritime studies is a very vast subject. Training and education in some areas cannot be covered by the existing pool of national experts. It may become necessary to establish and maintain regional or international co-operation.

3.3.1 Training of Lecturers at WMU

At least two lecturers from the Pakistan Marine Academy are to be sent to World Maritime University (WMU) every year for higher studies to upgrade their qualifications. Because the WMU is the most comprehensive institution existing in the maritime field. The university has been introduced since 1983 for the maritime education and training courses for lecturers in MET institution as well. The courses are conducted in the areas of maritime administration of nautical and engineering, shipping management in port and in business, and protective measures of environment. Each course consists of the best obtainable balance of classroom lectures and practical training experience.

The objectives of the WMU are perhaps best explained in this quotation from Mr. C.P.Srivastava (Ex-secretary General of IMO). He says,

“WMU provides a critical element now missing but necessary for a coherent and comprehensive system of training and education, an international centre for advanced study for higher specialised personnel in developing countries including maritime teachers, surveyors, inspectors, technical managers and maritime administrators. The World Maritime University provides a pivotal link in the international system for training in the maritime sector. It complements, supplements, and strengthens the training activities now being carried out in the developing countries. It is

an unique institution which offers an advanced level of training in a number of different maritime fields at a single institution which is presently not available elsewhere”.

There are over one hundred and fifty distinguished professors from all over the world attached to the university. The field training include as wide a practical experience as can be gained from visits to maritime training institution and visits to training at centres of advanced maritime technology in number of countries which provide the facilities for a such training.

A large and comprehensive number of papers have been regularly submitted on almost every international conference on matters pertaining to maritime education and training field with special relevance to those presented on the International Maritime Lecturer's Association (IMLA) conference. Consequently the WMU is a very suitable institution available for providing advanced education and training in the maritime field for the development of lecturers. The PMA also kept track of sending its lecturers to the WMU every year for higher education and training to raise the Academy status as an institution.

3.3.2 Research Programmes

Research programmes for lecturers constitute a cornerstone of the educational edifice for any institution. All lecturers should be generously encouraged to undertake research activities in their relevant field. Arrangements are to be made to allow for the access of the graduates up to Doctor of philosophy or Doctor of science degree which are of paramount importance

As such research will constitute a self-updating method for existing maritime lecturers. These will need to keep abreast of technological and scientific developments. The lecturers will not only extend horizon of knowledge in the

relevant field, but it is a check for his quality of teaching for which the lecturer will be benefited to a great extent.

Research has also proved to be quite rewarding individually and also in contribution to the nature and overall quality of the institution. In this way it may help in solving the university problems with quality. This is also a step ahead for the PMA and can advise the industry on invariable issues pertaining to maritime field and will earn a handsome dividend which may be utilised for Academy's upgrading projects.

Research will help the Academy to keep track of the needs of the industry, in addition the isolation of the MET system will be prevented. This could be termed as one of the objectives of the Academy. Also the prestige and social value of the Pakistan Marine Academy will be raised.

3.3.3 Seminars and Conferences

Lecturers from the PMA should be encouraged to submit papers and attend seminars, conferences, and workshops on Maritime Education and Training in particular and other areas of their particular specialisation. At these conferences, seminars. etc., participants from all over the world read their papers on selected specific maritime topics, that are of practical nature, problem- centred and innovative. It is expected that the lecturers will involve themselves in informal discussions with experts, intellectuals, heads of maritime training institutions, thus have more clear perception of the subjects being discussed.

Consequently they get the benefit of communication, and exchange of information. It is very worthwhile to attend such seminars/conferences to widen the horizon of the maritime lecturer in pace with the growth of the PMA.

3.4 Summary of proposed staff development programme

In the previous chapter an outline of the proposal to upgrade the Marine engineer's training programme to a Bachelor's degree has been discussed. The consequent need to upgrade the lecturer's qualification has been dealt with earlier in this chapter. Herein, the author provides a consolidated summary of the proposals concerning the PMA to help to raise the level of education of the lecturer enabling them to qualify to teach at an Engineering Bachelor's degree level.

The PMA should consider the following aspects during their upgradation programme with reference to staff development.

-Upgrading the standard of the MET institution requires raising of educational level of the staff through staff development programme.

-Upgrading within their professional areas will enable the staff to obtain relevant industry experience required to ensure that they acquire first hand knowledge about latest technologies.

- The credibility, prestige and image of each faculty member will improve when staff development is implemented. This will in turn result in improved reputation for the PMA as an institution of excellence.

-The endeavour to integrate the MET in the national higher education system will face less hurdles, as the staff will be adequately qualified.

-It can be expected that the shipping industry will benefit indirectly from upgraded staff standards, as far as safety and operation are concerned.

-The upgraded faculty member will be in a better position to train new entrants and make them more adaptable to new types of ships, enabling them to operate increasingly sophisticated vessels.

- Well qualified staff will operate, manage, and administer the infrastructure of the MET system, more effectively.

-Updated staff will be in a better position to provide courses for ship's personnel as required by new Conventions and an increasing volume of amendments.

-Staff exchange programmes could be organised with other Maritime Academies. Certain cost effective courses could be held jointly at a regional level.

Other developmental activities which will contribute to the success of the Bachelor's degree implementation programme are:

- Upgrade the existing library in the PMA with enough publications in the field of education and maritime field.

-The PMA already has the laboratories, workshop, simulators and other training facilities required for this updating project. It is necessary to meet the additional training requirements as approved by the IMO in the conference, held in London in July 1995.

-The services of the officers, graduated from the WMU could be utilised to design, structure, and organise most of the courses to be taught. Due consideration must be given to maritime industry requirements while designing these courses.

-Seminars and workshops to be organised in collaboration with the IMO, at the national and international levels.

-Furthermore it is not out of place to mention here that the very nature of maritime profession demands not only the professional competence but also the physical fitness and mental agreement for adoption to the hazards of sea life. In order to produce effective and useful young seafarers, it is essential that the students are exposed to the sea disciplines and environments at an early stage of their training in order to determine their suitability for maritime profession. In addition the PMA upgradation scheme shall be so designed that the graduates could also be absorbed in other non-maritime engineering professions. This consideration in particular, requires that the teaching staff of the PMA possess broader engineering expertise, beyond what is possible through ship board engineering job exposure

Chapter 4

Comparison of maritime institution of the developed countries

4.1. Concept

The objective of this chapter is to deal with the maritime education pattern used world-wide, specially in some of the developed countries. The infusion of new technology into ships has made it necessary for MET to provide a sound technological base to ship's personnel, as these MET institutions supply the required personnel to operate, maintain and run these ships. The philosophy behind this chapter is to highlight how most developed maritime nations have shown noticeable flexibility and adaptability to suit their specific requirements in the context of rapid development of changing technology.

During our field studies as organised by the World Maritime University, we were provided with an opportunity to visit selected maritime institutions. Moreover we were given lectures on number of MET related areas and provided comprehensive material on corresponding topics.

4.2. The general trend

Before discussing the MET systems of the selected maritime institutions, it is appropriate to focus on various training programmes. Such as Front-ended programme, Sandwich-type programmes, Polyvalent officers training programmes, and a number of other programmes and number of systems such as unitary a binary etc., being used in some of the established MET institutions of the developed countries.

Maritime institutions in most of the European countries, the United States of America, and Australia have developed systems that incorporate certificate of competency (COC) awards into national education system. The national maritime administration is either directly or indirectly involved in the MET as they have to ensure international standards such as minimum requirement of STCW for the award of watchkeeping certificate of competency are maintained.

In almost these countries, the examination of students is conducted by the institutions themselves, whereas the marine administration in France and UK have retained direct control over safety competency of the graduates by taking the oral part of examination.

A greater emphasis is placed on laboratory and practical training of work is almost all these countries. Apart from this, all these institutions own and use simulators in their training programmes (RADAR, Engine and Ship Manoeuvring).

Let us discuss various training programmes and systems, widely used in different countries.

4.2.1 Unitary or Binary Education System

The unitary system has three stages of education namely primary, secondary, and tertiary. The first two stages are to be completed in school while third stage is undertaken in the university, whereas in the binary system, on completion of secondary stage the students have two options. Either he has to pursue university stream for further higher education or can opt to pursue the polytechnic stream for technical education. Not only that he can study for higher education as well. The binary system is most suited for MET; as officer's training establishments are usually polytechnics, colleges of advanced education or universities. Another observation about the MET Systems in leading developed maritime nations is that the trainee obtain an academic award (e.g. Bachelor's degree) along with COC as a result of the training.

The front-ended programme is oriented to academic award along with competency certificates. After the trainee obtain the minimum sea-time on board, the trainee will attend an under graduate course leading to an academic award. On obtaining the academic award the trainee is awarded the certificate of competency as watchkeeper, provided requisite sea-service is completed. The certificated watchkeeper can obtain higher COC by completing qualifying sea-time in the rank of watchkeeper and in some cases, passing an oral examination. Lack of sea going experience is a disadvantage in this system. Such type of programme is shown in table 4.1.

In sandwich type programme, the education and training programme alternates between shore-based education and ship board training phases. This programme is oriented to competency certificates and effectiveness of education and training. This

system covers all topics in the syllabus at various training stages. However in order to provide a higher knowledge, the syllabus covers some additional subjects. Such type of programme is shown in table 4.2.

In post-experience programme, the trainee has to obtain higher certificate of competency starting from the certificate of competency as watchkeeper, by undergoing various short preparatory courses and passing the examinations for the higher certificates, following completing qualifying corresponding requisite sea-time on board ships. Conclusively this programme is entirely oriented to a competency certificate, with a drawback that the trainee has to remain away from the education for a quite long period and is generally not eligible for any degree award. Such type of programme is shown in table 4.3

Currently, many changes are taking place in MET institutions. These changes have been precipitated by:

- # The introduction of modern technology in ships.
- # Shipping casualties and their impact on maritime regulations.
- # The shortage of potential seafarers in developed nations.
- # The need for MET to cater to the total training needs of the shipping industry.

As mentioned earlier in this chapter, after collating information obtained in course handouts during the MSc (MET) course at WMU and classroom notes, the MET System in selected developed countries are described below:

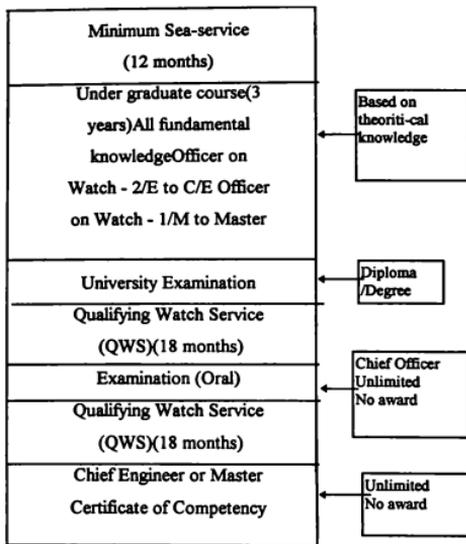


Table 4.1. Front-ended Type Training Programme.

Source: Classroom notes, WMU, MET 301: Maritime Education and Training Systems I (P. Muirhead)

College (Shore-based programme) (1 academic year)
Qualifying Sea- service (18 months)
College (Shore-based course) (1 academic year)
Qualifying Sea- service (18 months)
Shore- based course (1 academic year)
Examination
Qualifying Sea- service (4 months)
Certificate of Competency (OOW)
Qualifying Sea- service (6 months)
College (1 academic year)
Examination (Diploma)
Qualifying sea- service (36 months)
Certificate of Competency C.E/ Master (Unlimited)

Table 4.2. Sandwich Type Training Programme

Source: Classroom notes, WMU, MET 301: Maritime Education and Training systems I (P. Muirhead)

Sea-service (36 months)	
Preparatory Course (Shore-based) 3 months (Optional) College	
Certificate of Competency OOW. Engine / Deck	← No award
Qualifying Sea- service (18 months)	
Preparatory Course (Shore-based) 3 months (Optional)	
Certificate of Competency Chief Officer (Unlimited)	← No award
Qualifying Sea- service (18 months)	
Preparatory Courses (Shore-based) 3 months (Optional)	
Certificate of Competency Chief Engineer / Master (Unlimited)	← No award

Table 4.3. Post-Experience Type Training Programme.

Source: Classroom notes, WMU, MET 301: Maritime Education and Training systems I (P. Muirhead)

4.3 French maritime education and training (MET)

France has introduced dual purpose programme (where ship board officer can either sail as master or as chief engineer of a ship). A French national maritime academy, Ecole National de la Marine Marchande (ENMM) in Le Havre in 1967, is widely based upon Polevant training for students of highest and unlimited certificate of competency.

A Polyvalent officer's training programme provides training to fully qualify a trainee to undertake all the functions of a deck officer, engineer officer, chief engineer and master. It is a fully integrated training scheme.

In the French system of maritime education and training, there are basically three main courses in training of the sea-going officers. These are

1. The bivalent first level certificate of competency (Unlimited),
2. The second level of certificate of competency for ships up to 7,500 GRT and 7,500 KW propulsion power,
3. The monovalent third level certificate of competency.

It takes 12 years to complete studies at sea-time for the bivalent (Polyvalent in France) first class certificate of competency. The candidate enters the system after 12 year general education. He spends a total of 4 years at school. He spends a total effective sea-time of 60 months of the sea-time, 14 months as cadets and 46 months as officer in both the deck and engine departments.

Since 1986 the monovalent training for the second class certificate of competency for master and chief engineers has been changed into a bivalent training. The candidate enters the system after completing 10 years general education. He spends a total of 3 years at ENMM. He too spends 60 effective months at sea, of which 24 months as

cadet and 36 months as officer on deck and engine departments and holds a dual-purpose second class certificate.

The third class certificate of competency will remain a monovalent. The training courses are normally taken by seafarers with extended ship board experience. This certificate is separated with deck and engine certificate for coastal ships.

The fundamental subject included Baccalaureat C (Mathematics) for entrance into ENMM. The logic behind this is attracting technical-minded persons. They are then able to commence with vocational subjects almost immediately. It is the basic strength of the "Officer polyvalent" system of MET. Beside that emphasis is given on electronic data processing, electricity, thermodynamics, automatic control, etc. Moreover the academies are well equipped with laboratories, audio-visual aids and personal computers etc

The dual-purpose officer scheme of MET for ship board personal introduced more than 20 years ago and remain unchanged. Even today the concept of French MET is one of the most advanced and future oriented system world wide, and is of considerable benefit for today's modern ship.

They are considered as institutions of higher learning in technical and engineering disciplines. At least half of graduates now work ashore in shipping companies, technical departments, as pilots and in maritime administrations. The social status of ship officer in French society is very high and even higher than in many countries.

Reference: Class Handouts, WMU, MET 303: French MET (Prof. Zade)

The structure of bivalent first class certification and training programme is shown in table 4.4 and bivalent second class in table 4.5

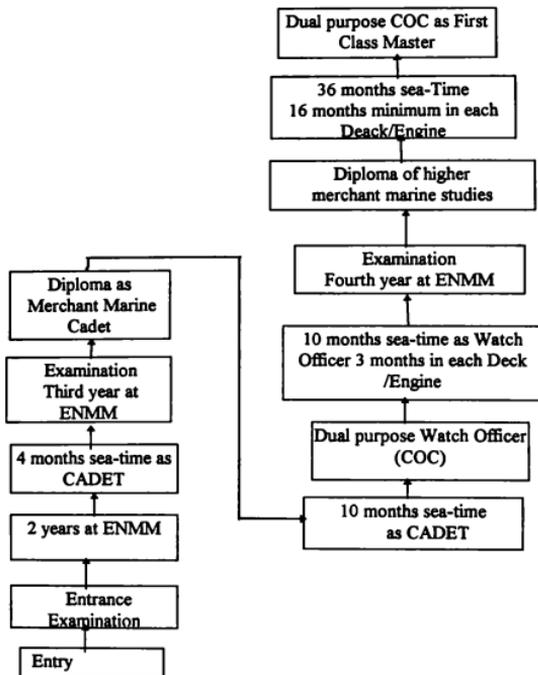


Table 4.4 The Bivalent First Class Certification Programme (France).

Source: Classroom notes, WMU, MET 303: French MET (Prof. Zade)

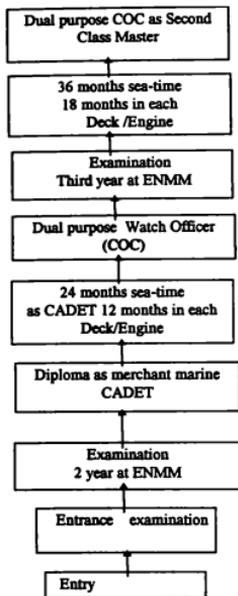


Table 4.5 The Bivalent Second Class Certification Programme (France).

Source: Classroom Notes, WMU, MET 303: French MET (Prof. Zade)

4.4 Maritime education and training in United States of America (USA)

The USA has many maritime academies and colleges where front-ended education programme is in use. There often exists a chance of monovalent or bivalent type of programmes. The curriculum are developed to match sophisticated computer assisted

technology, comparative position of the maritime profession with other disciplines also to change in social outlook. Qualified graduates have opportunities to join sea going profession or they can go into the industry either afloat or ashore.

At present in USA there are seven maritime academies. These are

1. The United States Merchant Marine Academy (USMMA), King's Point, New York.
2. Marine Maritime Academy.
3. California Maritime Academy.
4. Massachusetts Maritime Academy.
5. Texas Maritime College, University at Galveston.
6. Great Lakes Maritime.
7. State University of New York (SUNY).

All these academies are residential and co-educational type. The merchant marine academy situated at King's Point is run by Federal Government and rest through the state governments.

Besides the Great Lakes Maritime Academy which offers a three year programme and is meant for Great Lakes and river licenses, rest of the academies offer a four year undergraduate programme. Upon successfully passing examination he/she receives Bachelor of Science (Marine Engineering) degree, which is nationally recognised. He/she sits for Coast Guard License examination to sail as officer in American Merchant Marine Fleet as Third Assistant Engineer or Third Mate and/or a Naval Reserve Officer Commission.

He/she can then continue to pass the United States Coast Guard examinations for the next consecutive higher certificates of competency upon completing the corresponding requisite sea-time until he/she reaches the Chief Engineer (Unlimited) certificate of competency.

4.4.1 The United States Merchant Marine Academy (USMMA).

The USMMA established in the year 1943, is located at King's Point in New York. The academy offers a four year undergraduate programme which leads to a Bachelor of Science degree and a US Coast Guard license as a Third Mate or Third Assistant Engineer or both. After completing graduation from the academy, the fresh/newly licensed third mate or third assistant engineer joins a ship as a fully qualified Junior Officer, entrusted with duties as an Incharge officer on watch on the bridge or in the engineroom. These graduates have wide option either to sail or to take suitable shore-based job such as Navy Officer, Coast Guard Officer, Marine Engineers, Maritime Lawyers (Admiralty Law), Oceanographers and other related maritime sectors.

In the academy the four basic curriculum offered are (1). Marine Engineering, (2). Marine Engineering System, (3). Marine Transport and (4). Dual License Programme.

Selected students follow a substantially common curriculum in the first year. This common curriculum stresses the fundamental basis sciences, English also physical fitness. Professional and vocational systems are introduced in the second year and from the third year, cadets take specialised courses relevant to the degree provided

The cadets complete one year of sea training during his four years, two half periods at sea abroad training ships or US flag merchant ships.

The candidate must be an American citizen. His/her competitive standings are determined by completion of SAT (Mathematics and Verbal) or ACT (English,

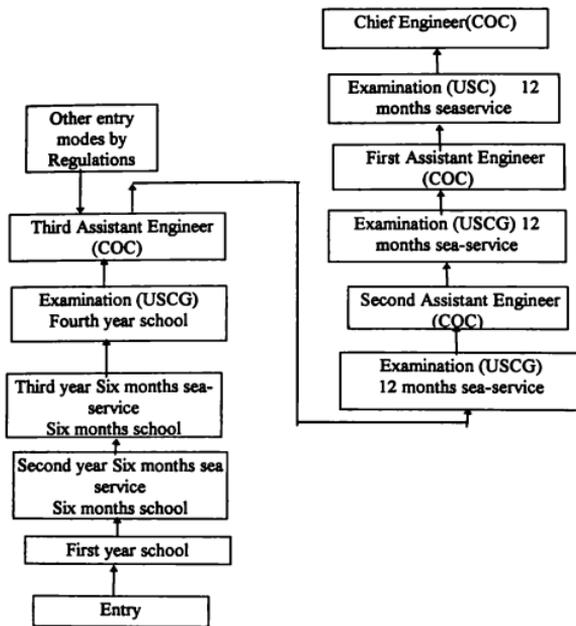


Table 4.6. USMMA Marine Engineering Programme (License System)

Source: Classroom notes, MET 303: USA Systems (Mark A. Swanson)

Mathematics, Social Sciences and Natural Sciences). Minimum age is 17 years and not older than 25, possess good moral character. Cadets are required to meet high standards of conduct and discipline. The regimental life is the vital part of total education. As such cadets training is organised along military lines as a Regiment. The

purpose of military programme is to develop leadership quality, officer life quality and sense of responsibility.

Reference: Course handouts, WMU, MET 303 USA Systems (Mark A. Swanson)

The chart of the United States Marine Engineering license system by way of the USMMA marine engineering programme is depicted in table 4.6.

4.5 Maritime education and training systems in Japan

The dual-oriented education is in use in Japan. There are two highest educational institutions namely Mercantile Marine Universities, are located in Tokyo and Kobe. Five Mercantile Marine Colleges, are located in five places, namely Toyama, Toba, Oshima, Hiroshima, and Yuge. Eight schools for seamen's training are located in eight places namely Otaru, Miyako, Tateyama, Shimizu, Namikata, Karatsu, Kuchinotsu, and Okinawa. Apart from this, further supplemented by educational institutions for fisheries, give instructions to many marine technical officers for training of fishing boat seamen rather than merchant officers and in addition to that there is educational institution for Electro-Communication, which is located in Tokyo, and department of communication systems, offers instruction as a ship's radio operator. Furthermore there exists an oceanography department in a private university.

All these institutions work under the Ministry of education. Opportunities for sea going jobs can and do fluctuate. At present training and education is provided for wide spectrum of occupations in the shipping industry.

The Marine Technical College, which is the sole government-run institution works under the Ministry of Transport at Ashiya near Kobe, to re-educate seamen who already have served abroad vessels has several special purposes.

- (a) To provide training facilities to seamen, already having sea-experience to obtain COC as marine officers.
- (b) To provide advanced course, a special training course, a short training course and a correspondence course.
- (c) To provide advanced course for obtaining higher certificate of competency and enhance their knowledge and skills on the ship's operation.
- (d) To provide some special type of courses to officers who have not previously received such type of education, for contributing to modernisation of the seafarer's system.
- (e) To provide training for existing officers, deck or engine ratings with knowledge and techniques necessary to enable them to obtain the dual qualification necessary for job of engine or deck ratings to modernise the seafarer's system, aim at the reduction of number of crew on vessels.

4.5.1 Mercantile Marine Universities, Mercantile Marine Colleges, School for Seamen Training

The mercantile marine universities are the highest educational institutions for ship's officers in Japan. The entry qualification is graduate of a senior high school with no age limit. Candidate should pass entrance examinations including of an achievement test and a high examination. Mercantile marine colleges take candidates be graduate of a junior high school with 15 to 18 years of age and must qualify an achievement test and health examination. Whereas in school for seamen's training the candidates are requested to be graduates of a junior high school between the age of 15 and 18 or senior high school between the age of 18 and 19, should pass written examination and physical check-up.

The two Universities have a four year academic system and a six months sea training course to obtain a license as a maritime officer. For the Mercantile marine college, the period of study is five years and six months including one year sea training. The

subjective of courses at school for seamen's training is to provide dual-oriented education to enhance technical know-how to cope-up with any changes on board vessels.

After graduation from mercantile marine universities, the qualified students are only awarded degrees and no sea-going certificate is issued, but the graduates are eligible to appear in the national examination for highest sea-going certificates. In mercantile marine universities the dual-oriented education was started in 1984, and first graduate was sent out in September, 1988. On successful completion of navigation and engineering courses they are qualified to take the examination either for the Third grade M.O.(nav) or the Third grade M.O.(eng).

The mercantile marine college has a merchant marine department consents of the navigation course and the engineering course. The dual-oriented education was started in 1983 and first graduate was sent out in 1988. After graduation, students from both departments are eligible to sit in national examination for highest sea going certificates. After graduation students from the navigation course are exempted from the written examination of the Third grade M.O. (Nav), and from the engineering course are exempted from the written examination of Third grade M.O.(engr) and are qualified for the corresponding oral examinations.

The dual-oriented education in Japan is generally classified into training of new members and re-education of experienced seamen. The individual may be trained basically as a marine engineer and also be trained to developed the essential skills and knowledge of a deck officer to enable him conduct the duties of a integrated watchkeeping officer. Similarly an individual may be trained basically as a deck officer and also be trained to developed the additional essential skills and knowledge of a marine engineer to enable him conduct the duties of a integrated watchkeeping officer. There is a clear trend towards narrowing the gap between the qualification of officers and crew on Japanese vessels.

Reference: Classroom handouts, WMU, MET 303: Japanese MET Systems (Prof. K. Ishida)

Although the system in most of the countries do not entirely match with each other. There are some aspects of MET which are common amongst them. Many of the institutions are still evolving new courses to better cater to the needs of the industry in their respective countries.

The purpose of mentioning maritime education and training systems of maritime academies of a few selected countries is to highlight how these countries have adopted MET to changing circumstances, economic necessities, technological development and safety requirements.

After reviewing the system being followed in France, USA, and Japan, it can be said that its applicability in the context of the PMA is limited. It is not possible to transplant an entire foreign system from a developed country to an alien context of developing nation. The priorities of developing countries differ greatly from that of any developed country. In addition there is a problem of severe resource constraints which might magnifies the problem of successful implementation of a MET system from a developed country to a developing country.

In view of foregoing, the solution which can be adopted by the PMA is that they can select aspects of the system from each of these countries which is best suited to the needs of the Pakistan Shipping Industry.

However, the proposed front-ended programme in chapter 2 is definitely the most suitable for the PMA as this system is very easy to administer, for the MET institution as they need only be involved at one point in the seafarer's career without any need for follow up. Examinations may then be conducted by the national maritime administration.

The reason for the author to suggest the suitability of the front-ended system for the PMA is that, it will avoid the need to co-ordinate academic programmes with sea-service periods as required in the sand-wich type programme. This co-ordination will entail the perfect harmony between the Ministry of Communication and Ministry of Education, who will later issue the Certificate of Competency (COC) and Academic Award respectively. This harmony may be extremely difficult to achieve, leading to failure of any programme pursuing a sand- wich type system.

Chapter 5

Human resource management in the MET

5.1. TRAINING AND EDUCATION.

All organisations need not only the suitable human and material resources to accomplish the set objectives but they must also have a strategy to utilise these resources in the most productive and economical manner. The employees of the organisation therefore, need to know the proper application and effective utilisation of the resources. This can be achieved only through proper education and training on management of resources.

The question arises here what is needed in education and training for marine personnel and how this education and training can be provided. If the training for marine personnel is really a growing necessity, if so by what means and to what extent. As no organisation can achieve its results other than through people, it is best to have people who are properly trained to perform their task with better utilisation of

resources. This maxim is supported by the International Labour Organisation's observation that "man is the pivot of economic and social progress" but cannot contribute to national development if he is badly utilised. For the effective utilisation of the available resources education and training is necessary to develop and boost creativity among the employees. However, such education and training needs to be well planned to produce necessary end results.

Consequently it is in the best national interest to keep the PMA management fully abreast with latest techniques and methods of management. This can be suitably accomplished through proper education and training programmes.

5.2 INTEGRATED MANAGEMENT TECHNIQUES.

The recent developed methods of management through participation create and demand a teamwork spirit. Although all the management must ensure the effective use of resources through the people however, getting things done through people never is an easy task, you have to come across a lot of uncertainties in the working environments, such as human behaviour, communication problems, and on the top, personal motivation, which requires more and more attention.

As technology is changing rapidly, some ships have become more and more complex technically. The most sophisticated equipment now available is utilised. Also great progress has been made in terms of safety of ships, protection of environments, response to competitive market forces, government regulations, and the IMO Conventions. Human resource planning plays a vital role in enabling organisations to cope with all of these changes, but especially to changes in technology which is really a growing necessity for marine personnel.

It is therefore important to upkeep the human resource management programme activities such as management and economics training in skills, demands and attitudes, continually emphasising the most efficient utilisation of human efforts and by facilitating resources and their impact on society.

Necessary efforts can be carried out in the field of training for the benefit of individual and the PMA for maritime personnel. It is not out of place to mention here that there always exists in Pakistan a close co-operation between academics and the shipping organisations. No doubt the shipping organisation needs to have well-trained personnel, both to adapt to sudden change, and to avail itself to new opportunities for the efficient utilisation of human efforts.

The necessity and importance of teamwork for the successful operation of any organisation is undebatable. However the basic human factors are to be given due considerations while developing a teamwork spirit.

It is not out of place to mention here that people have varying abilities and skills depending upon their education, training, experience and their intellectual capacity to learn from their earlier institutions.

Definitions, explanations and interpretations of terms used in management such as job analysis information, orientation programme, employee training, planning, strategic planning, tactical planning, human resource planning, need theories, motivations etc. are not uniform.

The author has encountered different interpretations of these terms in various sources such as "Handbook of Organisation Behaviour Management" (Frederiksen, Lee W.), "Managing Human Resources" (Wayne F. Casio), "Personal Management and Human Resources" (William B. Werther, Jr. Keith Davis), "A Recommendation on Education and Training on Port Management and Staff engaged in Ports and Shipping Industries" (Syed Masood -ul-Hasnain). The logic behind this is to provide a suitable

system for the effective utilisation of the human resources which can be applied to the maritime education in the PMA, that might to overcome the challenge of obtaining and maintaining an effective work force.

It is therefore considered appropriate to explain some important terms here, in order to clarify the context in which they are utilised in this study.

5.3. Job analysis information

The information obtained in this area can be utilised to define the capabilities required to perform current and new job in the PMA. This information is useful for variety of organisational purpose ranging from human-resource planning to career counselling.

Job analysis is the foundation for forecasting the need for human resources as well as for planning for such activities as training, transfer, or promotion. Consequently the data will be essential to the development of a human-resource programme. It is therefore necessary to implement this step in accordance with the result obtained when planning. There are two basic things to keep in mind while thinking about job analysis.

First, every thing changes as time-goes on and so do jobs. To produce efficient output, the job must be appropriate to the worker who performs it. Furthermore the very nature of jobs change with environment such as technological changes. For example, the introduction of modern sophisticated computer assisted ships has drastically changed the nature of the mariners job.

Secondly, job specification and people requirements with minimum acceptable qualifications for job holder are necessary. Without meeting these qualifications, an individual absolutely would be unable to do the job.

The job of collection of job analysis information is to modify and update the outline of a job description to provide systematic procedure for human resource management which can be applied to maritime education system in the PMA. This is the best time to address major aspects of job analysis such as the knowledge, skills and ability ,etc. required to do the work in order to overcome the challenge of obtaining and maintaining an effective work force to meet higher standards. There are number of methods used to collect information. No one of them is sufficient. Some combination of methods can also be used to adjust the content of job. In this particular case of Pakistan Marine Academy the decision of adopting and implementing one method or combination of methods will rely on choice of a technical committee constituted by the PMA.

5.4. Future needs

Two kinds of need can be considered while looking at future demand for the organisation.

(1). Short-range needs:

These needs may be found when doing the inventory (resignations, retirements, and promotions).

(2). Long-range needs:

These needs may be caused by organised demands. (Strategic plans, retirements, growth) or by external demands (economical and technological)

Furthermore the process of estimating future demands in the organisation includes, formulation of future organisational charts, determination of job descriptions/job specifications for new posts, estimation of future vacancies, grouping and classification of future needs.

The results obtained from these methods are approximations which can be useful to the PMA when implementing human resource programme.

5.5. Orientation programmes

Job orientation is a comprehensive programme and it is concerned with social behaviour, standards and policies and technical and cultural aspects of the job.

Moreover it helps the new employees to be assimilated more quickly into organisation and comprehend what will be important to their job success. Consequently it is during this period that an employee is most receptive and this can speed up the specialisation process and acceptance into the work group.

The new employee in his/her initial period is more receptive to cues from the organisational environments, as whether he is or is not acceptable to the other group members. It is important to consider how does the new environment help or hinder the new employee. There are other numerous problems facing the new employee.

The relationship between new employee and organisation plays a vital role in maximising the impact of orientation. Consequently an orientation follow-up is necessary for proper quality and continual improvement of the work place.

5.6. Employee training

New technology exerts a continual need for employee training and retraining. Where the orientation programme ends, the training programme begins.

Good training improves employee's knowledge, skills, attitudes and social behaviour, that will contribute to organisation's goals. In this regard it is stated that office

technology is progressing rapidly. The introduction of computers, office automation and continuous evolution of electronic office equipment may necessitate the need to retrain the employees during their career as and when required.

5.7. Establishment of human resources management programme

The objective of establishment of human resource management programme in the PMA with in the context of the organisational system of maritime education in Pakistan is to propose a systematic procedure on human resource planning which helps organisation to do a better job of coping with change and which is based on similar procedures found in the literature available concerning management by objectives, strategic planning and typical tactical/operational planning.

Strategic educational development planning for the PMA needs to be focused as a complete system taking in consideration political, technological, environmental, economical and social realities and implications.

As an upgradation project in the PMA is underway, the use of this strategic planning model is timely and can help to improve the understanding and quality of strategic thinking at higher levels than the system currently in use does.

5.7.1 Development of planning

Planning helps reduce the uncertainty of the future and thereby leads to success. One of the benefit of planning is to focus on resource toward those products or services that are most consistent with their objects. Human resource objectives must be consistent with the planned future direction of the organisation. Fundamentally human resource management programme consistent with two types of planning.

- (1). Strategic planning.
- (2). Tactical or operational planning.

5.7.2 Development of strategic planning

Planning is the process of setting organisational objectives and deciding the action programme to achieve them. Strategic planning includes long-range-objectives, medium-range functional programmes and short-range tactical or operational plans. It involves fundamental decisions about organisation. As it is long-range planning describing aims/objectives and policies of the organisation, identifying factors that may enhance or inhibit any future courses of action. All aimed to develop some strategic and detailed plans to achieve objectives to fulfilment of the organisation's mission. Consequently strategic planning may involve substantial commitments of resource.

5.7.3 Tactical or operational planning

Tactical or operational planning deals with the normal ongoing growth of current operations as well as any specific problems that temporarily disrupt the pace of normal growth. Once the PMA has developed overall objectives, strategies and policies, there then is need to develop tactical or operational strategies, that are those moves made within the frame work provided by strategies. Subsequently strategic planning flows naturally into tactical planning.

To overview, the obvious difference between the strategic planning and tactical or operational planning is the time period. The former involves fundamental decisions about the very nature of the job, where as the later may result in new job acquisitions. The other difference between the two is the degree of change resulting from the planning, as time frame shortens, planning details become increasingly specific. Strategic planning always involves, data collection, analysis, repeated review and revaluation, when the tactical or operational planning is carried out on a recurring basis.

5.8 Human resource planning

Once a human resource information system for PMA is implemented, the same can be used to develop a human resource planning programme. Broadly speaking, human resource planning is an effort to anticipate future problems and environmental demands on PMA and to meet the personnel requirements dictated by those conditions. In order to establish an integrated human resource planning system in the PMA two kinds of information are required.

- (1). A personnel inventory.
- (2). Human resource forecasts.

5.8.1 A personnel inventory

A personnel inventory is carried out for the purpose of information about employees. It is an assessment of knowledge, skills, abilities and potential in order to analyse how they are currently being used. It is essential at PMA to evaluate each employee's abilities, experience and career aspiration of the present workforce so that proper appraisal can be conducted.

The basic step for developing an inventory of human resources are selection, promotion, transfer, training, reporting, retirement, compensation planning and motivations. All these information are very useful for contemplating the particular potential of employee and he will make fuller use of his abilities and skills. Consequently the human resource planning means that better people achieve better results, so that helps the PMA to meet its requirements.

5.8.2 Human resource forecasts

Forecasting the future human resource requirements is anticipating manpower problems based on human resource supply and demands. These are related to the

current and future supply of staff at PMA that might have overcome problems when forecasts and action plans are actually implemented.

In this regard, it is stated that human resource forecast for PMA should be based on planning and managing future personnel requirements such as type and number of employees, their skills and their experience.

Apart from forecasting supply and demand for skilled mariners, PMA is beset with changes in technology, national and international economics and government regulations. Such changes in normal industry often generate changes in job context, skill demands, number and type of personnel. Forecasting human resource planning enables the PMA to cope with changes in technology, competitive forces in shipping markets.

To overview, an inventory of present personnel is not useful unless until it can be analysed in terms of future human requirements. This step is very useful for the PMA as it determines both the organisation's present needs (inventory) and future needs for human resource due to expansion (future demand for skilled graduates), as future change effects forecasts of human resource need programme.

It may be noted that the adoption of the human resource programme may be difficult decision to make because of time and money required to carry them out. Nevertheless, there is a genuine need of a planning to get the employees committed thus, employees continue to strive to better their accomplishment.

5.9 THE ROLE OF AN ORGANISATION

In any organisation, managing up is just as important as managing down. In order to emphasise the role of the PMA in completing the human resource programmes as well

as to facilitate the appreciation of the process, the motivation system and the compensation programme should be adopted.

5.9.1 NEED THEORIES.

It is the fact of life that no one works for any one except to satisfy ones own needs. The motivation in human behaviour is dictated by the needs and desires of self-actualisation to know and to understand. The most popular Need theory is “Maslow’s Heirarchy of Needs”, in which it can be assumed that the individual works to fulfil a series of needs. Therefore the most important consideration to get the employees motivated is to take into account the essential and basic needs of the people who are employed. Maslow considers a heirarchy of needs as follows:

- Physiological
- Safety
- Social
- Esteem
- Self-actualisation

Physiological is the basic need for food, clothing and shelter.

Safety needs require safety and protection from physical and economical danger

Social needs refer to the desire to belong to get recognition

Esteem needs are the desire of achievement, knowledge and freedom

Self- actualisation needs are the self-satisfaction and self development.

These basic goals are related one to another being arranged for most people in a heirarchy of prepotency. When a need is fairly satisfied , the next prepotent need emerges. Each need must be satisfied before the next. Failure to satisfy a need makes it impossible to move the next. The PMA should strive to promote working conditions which are pleasant to work with. Subsequently, the employees contribute their best through their creative imaginations in a free and relaxed working conditions.

Therefore, the PMA should focus on basic conditions to satisfy the needs of their employees. This does not only create a team spirit but helps in getting the job accomplished successfully with full participation.

5.9.2 MOTIVATION

Motivation is that set of processes that energise a person's behaviour and direct it toward obtaining some goals. Motivation is based on choices that people make. Actually the management has to stimulate a reaction in employees and see how best can they be motivated. According to Abraham Maslow's views, the individual motivation is predetermined by the order of his needs and their priorities. Motivating employees is the difficult task to meet as these needs vary in type and priorities from person to person.

Nevertheless, there are many ways to motivate people to perform better. The following approaches help to stimulate the individual motivation.

It is assumed that the more the worker is rewarded, the more he will be motivated. The reward must be given periodically to make the people comfortable, happy and secure.

5.9.3 COMPENSATION PROGRAMME.

This approach is what employees receive in exchange for their work. It is assumed that when proper compensation is made, employees are more likely to be satisfied towards organisational objectives. In order to implement a compensation programme in the PMA, it is necessary to evaluate individual skills, so that the employee can be differentiated from the others because of his abilities and loyalty.

Human beings are also a most complex working resource, as their productivity varies drastically with changes and fluctuations of their feeling and desires which are unpredictable. Consequently, it is essential for the PMA to keep a continuous and close watch on working conditions and environment to maximise the creativity and innovation of the employees as implementation of any system require dedication and willingness among all member of the staff.

Chapter 6

Conclusions and recommendations

The study has been directed toward the development of staff and upgrading of the engineering faculty in the PMA. The results and findings are shown in this chapter that summarizes the finding of the study and makes recommendations as to further development of personnel to be used within the context of maritime education in the PMA.

The study revealed the drastic changes that had taken place in the shipping. The modern ships are fitted with sophisticated machinery and equipment. New advanced technologies are introduced, new training systems came into existence. The international trend of automation and reduced manning has brought radical changes in shipboard manning. The operation of said machinery and equipment, handling of ships of large size and special design need specialized knowledge and skills.

After taking account of recent technological advancements in shipping, it is revealed that the PMA's existing two years degree programme does not fulfil adequately the quantum of knowledge required to meet the modern technological impact on the present day merchant ships.

A four year degree programme should be more suitable in the light of technological response and additionally for social and economic reasons.

It is concluded that the PMA shall revise its present training schemes of engineers and raise the level to an Engineering Bachelor Degree.

The study highlighted some of the major developments that have taken place recently in the field of maritime education and training under heading of selected maritime institutions (Chapter four). In the United States a new examination system which involves setting of multi-choice written questions, and holding examinations on regular basis throughout the country, has been introduced. The research into the use of ship simulators for Mariner's Training and Certification has been in progress. In Japan an individual may be trained basically as a deck officer and may be trained to develop the additional essential skills and knowledge of a marine engineer to enable him (her) conduct the duties of an integrated watchkeeping officer. A new fully integrated training for mariners upto Master's level has been developed in France. Polyvalent officer's training programme provides training to fully qualify a trainee to undertake all the functions of a deck officer, engine officer, Chief engineer and Master.

The leading maritime countries have increasingly adopted a "Fronted-ended" type of maritime education within the general stream of national education programme (It was pointed out in chapter four). This system is very easy to administer for the MET

institutions as they need only be involved at specific point in the seafarer's career without any need for follow up.

It is concluded that there is a need to provide highly qualified and trained staff of international standard compatible with the job profiles of the American, European and Japanese ships enabling to operate increasingly sophisticated ships and equipments within the established efficiency and safety parameters.

Education is an unending process. A "Development of Staff" was proposed in (Chapter three), in order to enhance individual's knowledge and skills through teaching and training, that may seem compatible with the technological and conceptual changes which are very vital and play a significant role in the upgrading and development of the engineering faculty of the PMA. It is concluded that efforts shall be made to achieve a team of highly qualified and trained people at the PMA.

6.1 Recommendations

The recommendations made in the following paragraph are based on the findings of the study.

- (1). It is recommended that the policies of recruitment and academic upgrading and development programme should be reviewed and established on a better footing as implementation of any system requires qualified, dedicated and willing workers.
- (2). It is further recommended that a Board of Maritime Education and Training (BME and T) should be formulated at earliest so that the process of review of the MET can be started.
- (3). Adequate training facilities are needed for development and upgrading of the engineering faculty in order to provide them with the knowledge and skills required in

dealing with new technology that is being introduced on board ships. Thus it is recommended that priority be given to the procurement of essential equipments for the PMA.

(4). Teachers / lecturers play a significant role in achieving the objectives of education and training for the PMA. Thus they should be provided with opportunities for upgrading their qualification in their professional fields.

(5). PMA engineering department lecturers should be sent to WMU every year to upgrade their qualifications. This university should be used to play upgrading role in the initial stage.

(6). PMA teaching staff should be encouraged to participate in the national and international seminars, workshops and conferences.

(7). At least two members of teaching staff of the PMA should be exchanged on yearly basis with two members of floating staff employed by national shipping concerns to upgrade their knowledge on a continuous basis.

(8). Pre-sea and post-sea training should be grouped together in the PMA. Furthermore, the formation of a marine college at the PMA should be accelerated to upgrade post-graduate education.

(9). A teacher training programme should be included in the regular activities of the PMA.

(10). Upgrading facilities available in the country must be thoroughly explored through co-operation with existing national institutions.

(11). It is recommended to establish a regional Maritime Institution at PMA which will serve as a forum for exchanging ideas and views on the latest development in shipping and on maritime education and training systems.

(12). It is further recommended that a manpower planning system should be established through a Human Resource Management programme at PMA.

(13). To enhance employee's motivation to work. A reward system in the form of incentives should be adopted at PMA.

(14). It is suggested that the PMA should provide more courses for maritime professionals to enable them to improve their mobility and consider the option of a job ashore in the shipping industry. Thus making the Pakistani seafaring profession attractive and not a "dead-end profession".

(15). Facilities for the post graduate and research should be designed to stimulate and allow for continuous education concept.

(16). It is strongly recommended that a four year Engineering Bachelor Degree programme in the Pakistan Marine Academy should be implemented as soon as possible.

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