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WORLD MARITIME UNIVERSITY

Malmö, Sweden

**TRAINING OF DECK CADETS IN INDIA:
STCW AND BEYOND**

By

KAUSHALENDRA GUPTA

India

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

(Nautical)

1999

DECLARATION

I certify that all the material in this dissertation that is not my own work has been identified, and that 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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far away from their homes.

Abstract

This dissertation examines the effectiveness of maritime education and training of deck cadets in India in providing competent and skilled officers in charge of a navigational watch. It further investigates whether the training of deck cadets in India is effective in developing awareness, concern and sincerity in deck officers towards their duties and responsibilities on board ships. The combination of these qualities with competence and skills is absolutely necessary in navigational watchkeeping officers for safe and efficient operation of ships.

Continuous technical developments and changes in ship-design and operations create challenges for the job of deck officers. It is therefore necessary to ascertain the effectiveness of the cadets' training and assessment programme periodically and improve it. This will provide competent and skilled deck officers, who can face the challenges in their sea career.

To accomplish the above, the existing training and assessment programme of deck cadets and its implementation has been studied. A survey was conducted by means of a questionnaire to a large number of shipmasters, ship-managers and faculty of training institutions in order to analyse post-training performance of cadets from various entry streams.

A comparative study of cadets' training programmes of some leading maritime nations has also been made. The author has taken into account the comparative study and the results of the survey mentioned above in defining a strategy for enhancing the effectiveness of maritime education and training of deck cadets in India.

Keywords:

Deck training India, technological developments, curriculum improvement, training methods, evaluation, post-training performance

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LIST OF ABBREVIATIONS

ARI	Applied Research Institute, New Delhi
ARPA	Automatic Radar Plotting Aid
B.Sc. (NS)	Bachelor of Science in Nautical Sciences
BE	Bachelor of Engineering
BITS	Birla Institute of Technology and Science, Pilani, India
COC	Certificate of Competency
CTO	Company Training Officer
DF	Direction Finder
DGS	Directorate General of Shipping (The Government of India)
DWT	Dead Weight Tonnage
ECDIS	Electronic Chart and Display System
Ed.	Education
FG	Foreign Going
FOSMA	Foreign Owners' Ship-Management Association, India
GMDSS	Global Maritime Distress and Safety System
GOC	General Operator's Certificate
GPS	Global Positioning System
GRT	Gross Registered Tonnage
Hrs	Hours
IBS	Integrated Bridge System
I.M.I.	International Maritime Institute, New Delhi
IMO	International Maritime Organisation
INDos	Indian National Database of Seafarers
INSLC	International Navigation Simulators Lecturers' Association
LBSCAMSAR	Lal Bahadur Shastri College of Advance Maritime Studies and Research, Mumbai
LORAN	Long Range Navigation
MERI	Marine Engineering and Research Institute, Calcutta

MET	Maritime Education and Training
META	Maritime Education, Training and Assessment Manual
MS	Merchant Shipping
MSC	Maritime Safety Committee (of IMO)
NCV	Near-coastal Voyage
NI	Nautical Institute, London
NIPM	National Institute of Port Management, Chennai
NW	Navigational Watch
NWKO	Navigational Watchkeeping Officer
OIC (NW)	Officer In charge of a Navigational Watch
OIC	Officer In charge
OMBO	One Man Bridge Operation
Opn.	Operational level
10 + 2 PCM	12 years of general education with Physics, Chemistry and Mathematics as main subjects
Pr.	Practicals
PSC&RB	Proficiency in Survival Craft and Rescue Boats
RT	Radio Telephone
SATNAV	Satellite Navigation
SCI	Shipping Corporation of India Ltd.
SSTP	Structured Shipboard Training Programme
STCW	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended in 1995
STO	Ship Training Officer
Th.	Theory
TRB	Training Record Book
T.S.	Training Ship
VHF	Very High Frequency
WMU	World Maritime University, Malmö, Sweden

Chapter1

Introduction

The most important element in the safe operation of any ship is the competence and experience of its master and crew. A well-trained and experienced master and crew can avoid disaster by compensating for defects in or damage to their ship. No ship has been designed or built that can save an incompetent master or unskilled crew from the consequences of their ill-considered action or inaction.

Morrison (1997, 10)

On Global Standards in Maritime Education and Training

The topic of the dissertation is the maritime education and training of deck cadets in India. Well-groomed and efficiently trained deck cadets eventually rise in their career to take up the responsibilities of shipmasters and ship-managers. The competence and skills of the shipmasters and ship-managers ensure the safety of life and protection of environment at sea through their efficient management of ship operations afloat and ashore respectively. A good background in maritime education and training by deck cadets therefore lays a strong career-foundation for the future shipmasters and ship-managers. The training prepares the young aspiring deck cadets to face the challenges of a sea career with adequate knowledge and confidence.

1.1 Background

The training of deck cadets in India has always been of an exceptional order by all national and international standards. Ever since commissioning of the first Indian

merchant marine training ship "Dufferin" in the year 1927, the standards of this proven traditional training have been maintained. Under close monitoring and control of India's maritime administration, these were upgraded from time to time to meet the requirement of safe manning on account of the rapid changes in technology and working conditions in the shipping industry. All sections of the shipping industry in India helped the administration in achieving the excellence in cadets' training. It was for this reason, that the well-trained and competent Indian deck officers not only enabled the national shipping industry to operate successfully but have also been a major source of manpower for the global shipping industry.

With the fast changing worldwide scenario due to the introduction of the latest technology and various safety conventions, the shipping industry now looks vigorously for more and more well trained and qualified seafarers. Competition in the industry for the speedy and safe transportation of cargo also underlines the need of competent and skilled deck officers. The latter are crucial for safe operation and management of ships. The training of deck cadets who are the future mates and masters/managers, has a pivotal role and bearing on the safe manning of the ships at sea. It is therefore necessary to examine its quality and effectiveness from time to time and find methods to improve the efficiency of training. It is obvious that efficiently trained cadets shall ensure safer ships and cleaner oceans. These cadets thus will earn a good name and fame to our country, which is already a potential manpower supplier to the global shipping.

The topic proposes to examine the quality of training imparted to deck cadets in India at various phases as per the exiting national training and assessment programme. The aim of the author's research on the topic is to ascertain whether the trained deck cadets are fully capable of taking responsibilities as per the job requirements of the officers in charge of a navigational watch in the global shipping industry. The study and research on the topic helps the author to draw conclusions on

effectiveness of deck cadets' training, and to make recommendations, if any, for improving the training standards.

The author is employed at the Maritime Training Institute of the Shipping Corporation of India, which is one of the largest shipping companies in the world having a DWT of over 5 million tonnes. The author has been the co-ordinator of the deck cadets' training in the Maritime Training Institute prior to his coming to the World Maritime University. The institute trains annually about 120 deck cadets for the large diversified fleet of the Shipping Corporation of India and has global recognition for its quality of training of the cadets. The dissertation is expected to benefit the author's institute, other training institutes, the maritime administration, the shipowners and all sections of the shipping industry, which are directly or indirectly involved with deck cadets' training for enhancing its quality and effectiveness.

1.2 Objectives

The research intends to achieve the following objectives:

- Review the need of deck cadets' training in India, the national cadets' training policy and training resources available, taking into account the technological changes afloat and ashore.
- Examine the curriculum and methods of training in each entry stream of deck cadets including the provisions of STCW-95.
- Examine the methods adopted to monitor the progress of deck cadets' training at various stages and also the methods of assessment and certification.
- Conclude whether or not deck cadets' training is effective in providing competent and qualified deck officers to the shipping industry.
- Make recommendation for corrective measures and modifications if any, in the existing deck cadets' training and assessment programme for improving its quality and all round effectiveness.

1.3 Methodology

The research examines the policies, guidelines and manuals of the Government of India on deck cadets' maritime education, training and assessment. The training and assessment programme on deck cadets' training has been reviewed. The curriculum, learning activities, training resources and methods of assessment followed in various training institutes in India have been inspected. These inspections helped the author to assess the implementation of the cadets' national training programme as well as the compliance to the requirements of STCW-95. Data on India's maritime trade, fleet, manpower particularly deck officers, output of training institutions, etc. has been collected from the appropriate sources.

In order to ascertain the effectiveness of maritime education and training of deck cadets, feedback on quality of training and post-training performance of deck cadets has been obtained from the shipmasters, ship-managers and the training institutions by conducting a broad based survey. The survey covered the post training performance of cadets from all the entry streams available in India. The results of the survey have assisted the author to pinpoint the areas, which need improvements for better quality and effectiveness in training and education of cadets.

Cadets' training institutions and the training programmes of some other leading maritime nations have also been studied either by the author's visit or by personal interview of the senior training officers of these institutes. The comparative study of the training programmes of these nations with India has established the advantages and disadvantages in the training programme of the author's country. On account of continuous changes in technology and working atmosphere at sea, the author has searched for the methods and criteria to achieve the excellence in training of deck cadets beyond the standards set by STCW-95.

Chapter 2

Training of deck cadets in India

2.1 Maritime trade and industry

India's geographical location, long coastline with numeral ports and maritime trade interests had given a vital importance to the training of the seafarers including the deck cadets. Set midway between the eastern and western world, she is surrounded by the Bay of Bengal, the Indian Ocean and the Arabian Sea. According to Hariharan (1998, 44), it has a coastline of about 7516 Kms. and includes two groups of islands located far from the mainland. These are the Andaman & Nicobar Islands in the Bay of Bengal and the Lakshadweep Islands in the Arabian Sea. There are a total of 150 ports at present on the coast. Eleven are major ports and the remaining ones are intermediate and minor ports. 251 million tonnes of cargo handled by these ports in 1998, which represents 80% of the country's trade. The cargo traffic is likely to grow to 415 million tonnes by 2002 and 1273 million tonnes by 2020. Besides these, a number of coastal, mainland-island passenger services, off shore services, survey services, dredging operations and specialized services etc. are operated through these ports.

(Bose, 1999, IV)

The above maritime interests and trade requirements certainly need a vast size of fleet of ships for the country. India at present (as on 1.7.98) has 480 ships comprising of overseas, coastal and offshore-specialized vessels. This has a total deadweight tonnage (cargo carrying capacity) of 11.13 million tonnes, ranking 14th

among the world maritime nations. (Indian Shipping, 1998, 8,32) This fleet is likely to grow steadily, as the present size is still not adequate to handle India's total maritime trade of diversified cargo. For example, at present only 30 % of the total overseas cargo is handled by the Indian ships. In addition to the said fleet of large vessels, India also has a number of fishing vessels, steamers and multipurpose supply vessels manned by the near coastal, home trade, inland masters and mates.

2.2 Requirement for deck officers

There has always been an acute shortage of trained deck officers to man the national fleet. It was not because the training programmes or facilities were less. In fact, from the inception of India's first training ship T.S. Dufferin in 1927, till date over 10000 deck officers have been trained through long and short-term pre-sea training. In addition another about 3000 deck officers have been trained directly on board ships. It implies that after allowing a reasonable figure of 30 % for the retired deck officers at least 9100 Indian trained deck officers are expected to be working ashore or afloat. However, for the purpose of manning 500 odd national ships at present, we do not have adequate deck personnel and the shipowners often face a great deal of hardships in manning their ships efficiently. It is not difficult to pinpoint the cause of this shortage.

According to The Sea (1999, issue 137), there is an acute shortage of trained deck officers world wide for the manning of ships especially after the regulations of the new STCW-95 Convention. It also reports, that there is a large demand of qualified and well-trained deck officers for operation and management of various shipping companies, agencies, classifications societies, ports, harbours, underwriters, insurance companies, etc. It goes on to say that express measures must be taken by all the maritime nations to increase and upgrade the maritime and education training to meet the new training standards of officers. It further warns that if same is not

done, the industry may suffer very badly and it will be too late to undo the losses later.

As Indian deck officers are well trained, properly certificated and competent, a large number of them opt for work on foreign flag vessels and companies ashore. It is because the foreign companies are paying high salaries to the qualified Indian deck officers for quality management of their ships and offices ashore. At present, over 200 foreign ship-management companies and their agencies are recruiting Indian deck officers for about 1500 foreign flag vessels. This exodus of qualified and dynamic officers creates the actual shortage of deck officers for national ships, where salaries are not so low but the national tax structure reduces the net salary considerably.

A study carried out by the Indian National Shipowners' Association in 1990 revealed that out of 14000 certificated Indian officers, only 3000 were available against a requirement of 4500 needed to man about 400 Indian ships. (Agrawal, 1997, 35)

The above facts strongly justify that in India, there is an acute need to train a large number of deck cadets, who on becoming certificated officers can overcome the shortage of deck officers currently prevailing in India and through out the world in general. It's a great pride for the country that its quality and standards of training of deck cadets are recognised by all maritime nations. In the interest of global shipping industry, The Government of India has never tried to hold back from training deck officers for the national ship-manning requirement. Instead the Government decided to augment the training facilities of the cadets in the country. These training facilities also included continuous upgrading of the quality and knowledge, to keep pace with the technological developments in the shipping industry.

2.3 Government's policy on training standards

The Government of India has always accorded great importance to the quality and standards in the training and certification of all seafarers. The Directorate General of Shipping (DGS), functioning under the ministry of surface transport, is responsible for the marine education and training of seafarers in India. The directorate is situated in Mumbai, with its branches in all the major ports in India. The DGS has a team of competent and experienced officers, who control and monitor the maritime education and training of the seafarers.

For the implementation of the STCW-95 effectively the DGS has made new Merchant Shipping (STCW) Rules, 1998, supported by a training and assessment programme. The programme provides details for various certificates of competencies, which are produced in a simplified manner in the form of META Manual (Maritime Education, Training and Assessment Manual). The training and assessment programme for the deck cadets too, is covered in the manual. The training and assessment programme lays considerable emphasis on " functional " approach in marine education and training of the cadets. The said " functional " approach in turn, demands from cadets aspiring to be officers a clear demonstration of their ability to perform various tasks related to the shipboard operation satisfactorily before a certificate of competency is issued.

The META Manual ensures that uniform standards of training and assessment are followed throughout and a highest degree of quality assurance is observed. There is hardly any matter, which is not dealt in the manual. In other words, the DGS ensures that strict compliance to the META Manual is made in respect of the selection of cadets, their training, certification, watch keeping and assessment of their competence.

The DGS itself, to set an example has accreditation from the Bureau of Indian Standards for its Quality & Assurance System. Similarly the META Manual of the DGS requires that the training institutions, methods of training, competence of faculty, assessing and examining bodies, etc., dealing with the cadets' training must have Quality Management System of proven standards.

The Government of India considers that the training of the deck cadets is the equal responsibility of all sections of the shipping industry alike, viz. Administration (DGS), training institutions and the shipowners/managers.

The pre-sea training institutions have the young trainee cadets in India from families varying in social, cultural, geographic, linguistic and economic backgrounds. The Government requires these institutes to provide a regimental disciplined training schedule, laying adequate emphasis on classroom and out door activities such as physical training, swimming, games, etc. The institute has a responsibility to ensure that each trainee cadet is fully re-oriented to be suitable for the seafaring profession with regard to cheerful obedience to the lawful orders of superiors, team spirit, leadership and other officer like qualities.

The training programme of cadets makes the shipowners and managers responsible for the effective execution of the structured shipboard training of the cadets. They are to identify the responsible ship and shore officers, who will supervise the training and submit the periodical compliance reports to the Government designated assessment centres.

The academic councils comprising eminent seafarers, shipowners, ship-managers, principals of the reputed training institutes, officers of the DGS, etc. are constituted by the Government, to monitor the quality of cadets' training on continuous basis in the approved training institutes.

The collective responsibility, as envisaged by the Government, through the training programme of cadets, ensures that the required quality and standards are maintained throughout the marine education and training of deck cadets.

2.4 Entry streams & eligibility criteria

The DGS in its META Manual has prescribed three main entry streams of the deck cadets. These streams are:

1. B.Sc. (Nautical Sciences) stream
2. Pre-sea (16weeks) stream
3. Direct Entry stream

The eligibility criteria, selection methods and the training and assessment programme for the three said streams are illustrated in table 2.1 on the next page.

Each stream has an eligibility criteria and selection method on an all India basis. However minimum education standards for eligible candidates have been kept uniform i.e. 10+2 school level with Science group subjects. This group includes Physics, Chemistry and Mathematics as individual subjects. Science and Engineering graduates are also eligible for entry through these streams subject to age restriction. A good knowledge of written & spoken English language is necessary. However, this poses no problem as English is taught in India from the school level. Although no minimum age is prescribed, it is expected that the age should be 18 or more on completion of 10+2 level. It is because the students passing 10th class of Indian Education boards attain an age of minimum 16 years. The upper age limits depend on the entry streams and are stated in table 2.1 on the next page.

Table 2.1 Training and assessment programme of deck cadets (stream-wise)

Stream	B.Sc. (NS)	Pre-sea (16 weeks)	Direct Entry
Entry Education (minimum)	10+2 (PCM group subjects)	10+2 (PCM group Subjects) (Aggregate 60 % marks)	10+2 (PCM group subjects)
Selection	All India Joint Entrance Exams.	Selection on Merit by Company	Selection on Merit by Company
Age	Up to 20 Yrs.	Up to 20 For 10 +2 Up to 22 For Science Graduates Up to 23 For Engineer Graduates	18 or above
Medical	Pre-sea standards	Pre-sea standards	Pre-sea standards
Pre-sea Education and Training	3 years B.Sc.(NS) degree course and four modular courses on basic safety training	16 weeks course and four modular courses on basic safety training	Four modular courses on basic safety training
On-Board Training	12 months structured training including 6 months bridge watchkeeping duties.	24 months structured training including 6 months bridge watchkeeping duties.	36 months normal seagoing service including 6 months bridge watchkeeping duties.
Post-sea education and Training	<ul style="list-style-type: none"> • Assessment of onboard structured training from cadet record book • Five post-sea advance courses as per IMO modules 	<ul style="list-style-type: none"> • Assessment of onboard structured training from cadet record book • Foundation course of 2 months in Nautical Physics, Chem., Maths and Electronics • 4 months 2nd Mate preparatory course • 5 post-sea advance courses as per IMO modules 	<ul style="list-style-type: none"> • Assessment of sea going service • Foundation course (same as for pre-sea) • 4 months NWKO (NCV) Course • 4 months 2nd Mate preparatory course • 5 post-sea advance courses as per IMO modules
Examination & Assessment	Orals	Written & Oral Examinations	Written & Oral Examinations
Certificate of competency: 2nd Mate of a foreign going ship (officer in charge of a navigational watch)			

"Source: META Manual (Directorate General of Shipping, India), Vol. I, 1998 page II/6 "

All aspiring young boys and girls are required to meet the standards of the medical fitness physical as well as mental as per Merchant Shipping (Medical Examination) Rules, 1986. In addition, they should have no colour blindness and must have normal vision in each eye separately (6/6).

After the selection, the cadets of each stream undergo the maritime education and training in following three phases of varying duration:

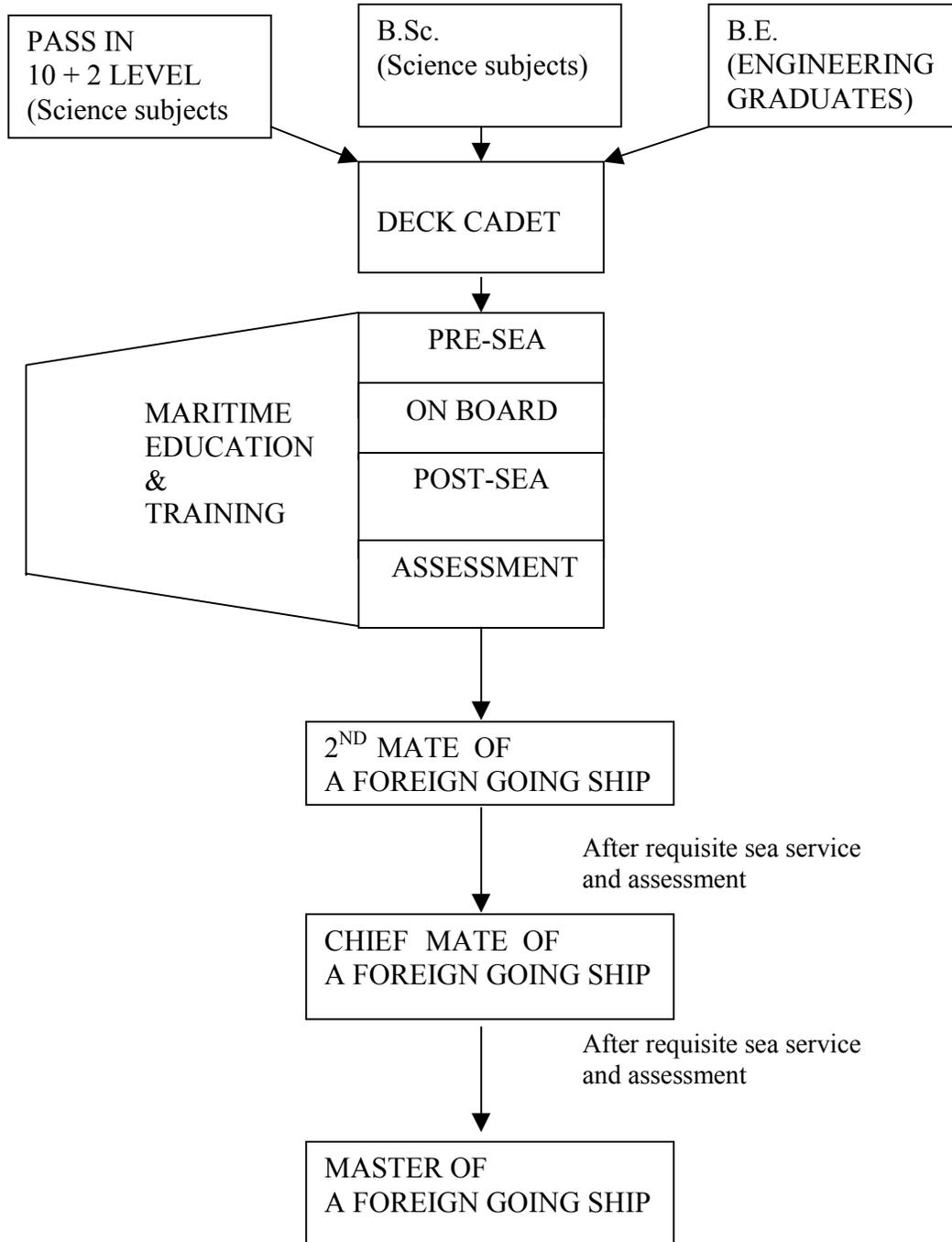
1. Pre-sea education and training
2. On board training
3. Post-sea education and training

The training in these three phases is imparted in such a manner, that at the end, the cadet irrespective of which stream he/she followed, acquires the requisite knowledge and competence to appear for assessment and examination for the certificate of competency as 2nd Mate (Foreign Going) i.e. Officer in charge of a navigational watch on ships of 500 gross tonnage or more. A career profile of the deck cadet is illustrated in the figure 2.1 on the next page.

The deck cadets, after becoming the Master, may even obtain the Extra Master's certificate of competency after the requisite sea time and assessments/examinations.

On leaving the sea as Master, various shore jobs are available for deck cadets in management positions with the Shipping Companies, Directorate of Shipping, Classification Societies, Hull and Cargo Underwriters, Agencies, Ports and Harbours, Ship-yards and Workshops, Training Institutions, Stevedores, etc.

Figure 2.1 Career Profile of a Deck Cadet



2.5 Training institutions for pre-sea training

B.Sc. (Nautical Sciences) Entry Stream

At present the maritime education and training for the deck cadets under this stream is provided at T.S. Chanakya. It is a state-owned shore based Nautical Academy situated in Mumbai with a very big campus along the sea. T.S. Chanakya is well equipped and has all training facilities in compliance to the quality and standards as required by META Manual and STCW-95 Convention.

The Government of India set up this academy in 1993 to meet the requirement of the cadets training after the decommissioning of earlier famous training ships T.S. Dufferin (1927-72) and T.S. Rajendra (1972-93). T.S. Dufferin had a unique competence based induction training of 2 to 3 years duration and same was maintained by T.S. Rajendra. Both these training ships have given together until 1993, 4916 officers to India as well as to the world shipping. It is a tribute to the excellence of training of these two training ships that their ex-cadets are serving all throughout the world and most of them are heading their organisations.

In January 1988, the University of Mumbai (Earlier known as Bombay) granted affiliation to T.S. Rajendra as its college of Nautical Sciences and a B.Sc. degree was awarded after a three-year course. This was a great recognition to the excellent training provided in T.S. Rajendra. This degree course continues as a pre-sea training for this stream of entry through T.S. Chanakya.

A total of 613 deck cadets have passed out as B.Sc. (Nautical Sciences) under this stream since 1990 from T.S. Rajendra and T.S. Chanakya. T.S. Chanakya inducts on average 90 cadets every year in the first year of B.Sc. (NS) course including cadets from overseas.

(Source: T.S. Chanakya, 1998)

Pre-sea (3 month) entry stream

This entry stream was started in India to tackle the acute shortage of trained deck officers in early eighties. At present following Government approved training institutions are imparting pre-sea training under this stream.

Table 2.2 Pre-sea (16 weeks) training institutions and their capacities

Name of Institute & Place	Approved Annual Capacity	Total Cadets passed out till Dec.'98
SCI Maritime Training Institute, Mumbai	120	894.
T.S. Chanakya, Mumbai	200	1274
T.S. Jawahar, Mumbai	100	1140
T.S. Rahaman, Mumbai	200	1000
N.I.P.M., Chennai	120	676
I.M.I., New Delhi (Approved w.e.f. 20.11.97)	72	Data not available
A.R.I., New Delhi (Approved w.e.f. 22.05.98)	144	29

(Source: Individual Training Institutes, 1998)

The selection under this stream is made by individual shipping companies through written tests, orals and interviews.

From the above data, it implies that two entry streams together i.e. B.Sc. (NS) and Pre-sea Entry Streams, have an annual capacity to train 1046 deck cadets. However this output of trained cadets only marginally makes up the national shortage of deck officers. It is because, more than 50% of these cadets are recruited and later trained through these streams by the foreign shipping companies for their ships. After allowing for exodus of deck officers to the foreign flag vessels and considering a fair

growth in the industry, an estimated 1500-2000 cadets are required to be inducted every year to meet the actual demand at present. This fact indicates clearly that the present supply position of the cadets is still far below the existing demand of the cadets in the national shipping industry.

Direct entry Stream

The entry of deck cadets through this stream has been very insignificant. This stream is mainly used by ratings, who meet the requirements and aspire to become officers. The companies, after selection of cadets through this entry stream, send the cadets to do the pre-sea training in the Government approved institutes. This brings them at par with pre-sea (16 weeks) entry stream cadets. Regarding ratings, they undergo the pre-sea ratings' training of 4/6 months at the approved training institutions before joining the ships. On completion of the requisite seagoing service, ratings may opt for this entry stream for their assessment and certification as the officer in charge of a navigational watch.

2.6 Training institutions for post-sea training

Lal Bahadur Shastri College of Advance Maritime Studies and Research (popularly known as LBS CAMSAR) provides various post-sea training courses for the deck cadets. This is a pioneer maritime college in India and situated in Mumbai. It is also a Government approved Training and Assessment Centre for assessing the competence acquired by the deck cadets.

Besides LBS CAMSAR, the following institutes provide the post-sea training to deck cadets.

1. SCI, Maritime Training Institute, Mumbai
2. National Institute of Port Management, Chennai
3. FOSMA Maritime Institute, Delhi
4. Indian Institute of Port Management, Calcutta

Chapter 3

Training and assessment programme for deck cadets

3.1 Pre-sea education and training

3.1.1. B.Sc. (Nautical Sciences) entry stream

The eligible candidates do their three years degree course in Nautical Sciences in the shore-based academy T.S. Chanakya. On successful completion of same, they are awarded degree of B.Sc. in Nautical Sciences from the University of Mumbai.

The University of Mumbai in consultation with the DGS has framed the syllabus of the degree course in Nautical Sciences. It gives broad-based maritime education with special emphasis on fundamentals of maritime subjects and practical aspects of the maritime profession. The syllabus includes all subjects and functions of operational level as per competency tables of section A-II/1 of the STCW Code. It is same as Appendix M-II/1A of META Manual. Some important theoretical subjects from management level competency table A-II/2 are also included in the syllabus. A new subject of Marine Engineering and Control Systems with practicals on the function "Maintenance and Repairs at operational level" as per table A-III/1 is also added to it. In addition, the syllabus also covers the required curriculum of the University of Mumbai for the award of a University degree. The overall educational and training programme is designed to develop a strong moral character, self-discipline and officer like qualities in the trainees. Sports and physical training is also an essential part of the curriculum.

Educational and Training Programme

The 3-year course is fully residential with good hostel facilities with all necessary amenities. Each year has two academic semesters as follows:

1st Semester : 24th August to 14th December

2nd Semester : 15th January to 31st May

There are two vacations namely winter and monsoon vacations at the end of 1st and 2nd semester respectively. In the 2nd year, during monsoon vacations, the cadets sail on Indian and foreign vessels for 2 ½ months to have a feel of the sea and get acquainted with shipboard routine.

Syllabus of the Degree Course

According to the syllabus prescribed by Mumbai University (1996-99, Year I to III), the subjects taught during the three years are arranged hereunder, in following groups and include practicals:

1. Scholastic: English and communication skills, Applied Mathematics, Physics and Electronics, Computer Science and Maritime Management.
2. Professional: Navigation, Astronomy, Practical Navigation, Voyage planning including Chart work, Magnetic and Gyro compasses, Electronic Navigational aids viz. Radar, Decca, Loran, Satellite Navigation, GPS, GMDSS and Ship Operation Technology, Naval Architecture, Cargo Work, Ship Maintenance, Collision Prevention and Maritime Communications, etc.
3. Applied Subjects: Maritime Law, Maritime Commerce, Maritime Engineering and Control Systems and Environmental Sciences (Meteorology, Geology, Oceanography, Maritime Pollution, Hydrographic Survey, etc.)
4. Maintenance and Repairs at operational level as per chapter III of STCW-95

First year of B.Sc.

Mechanical drawing: Engineering drawing, Discussions on ships plan, Isometric views, Simple Assembly drawings.

Second year of B.Sc.

(A) Basic Maritime Workshop: cutting, preparing plates and all components, welding, removal & fitting of ball bearings, overhauling of pumps/valves, dealing with dove tail joints.

(B) Basic Electrical Workshop: Drawing & laying of electrical circuits, installation of electrical fittings & appliances.

Third year of B.Sc.

Automation and Control Engineering:

(A) Auto helm and UMS operation of the ship, various sensors, transmitters and control instruments

(B) Bridge control of main engine, information, display, data-logging and alarm system.

5. Basic Safety Training Courses as per STCW-95 Code A-VI/1

During the degree course, the cadets are required to do the following 4 basic safety training model courses.

Personal Survival Techniques (3 days)

Fire prevention and Fire Fighting (3 days)

Proficiency in Elementary First Aid (2 days)

Personal Safety and Social Responsibilities (3 days)

Allocation of Lecture Hours (Subject Wise)

Subject-related lecture hours for the syllabus said above, are produced on the following page with the allocated number of hours during the degree course. A total of 1200 hrs. each year are assigned for covering all subjects. These are kept reasonably modest to enable the cadets to attend workshops, modular courses, other training activities and examinations, etc. It is pertinent to see that 20% of the total teaching hours are earmarked for practicals in each subject.

Table 3.1 Subject-related lecture hours of the degree course

SR. NO.	SUBJECTS	B.Sc. 1 st YEAR (HRS)			B.Sc. 2 nd YEAR (HRS)			B.Sc. 3 rd YEAR (HRS)		
		Th.	Pr.	TOTAL	Th.	Pr.	TOTAL	Th.	Pr.	TOTAL
	Scholastic Group									
1.	English & communication skills	75	25	100	-	-	-			
2.	Applied Mathematics	100	-	100	100	-	100			
3.	Applied Mathematics	100	-	100	100	-	100			
4.	Nautical Physics & Electronics	75	25	100	75	25	100			
5.	Nautical Physics & Electronics	75	25	100	75	25	100			
6.	Computer Science	-	-	100	75	25	100			
	Professional Group									
7.	Navigational Principles /Practicals	75	25	100	75	25	100	90	30	120
8.	Voyage Planning & Collision rules	50	50	100	50	50	100	60	60	120
9.	Ship operation technology Cargo-work, Seamanship, Maintenance, etc.	75	25	100	75	25	100	90	30	120
10.	Cargo-Work & Marine Communication	75	25	100	-	-	-	90	30	120
11.	Naval Architecture (Ship stability & construction)	100	-	100	100	-	100	120	-	120
12.	Bridge procedure & Legal knowledge				75	25	100			
13.	Ship compass and Electronic Navigational Aids							90	30	120
	Applied Group									
14.	Environmental Science	75	25	100	75	25	100	90	30	120
15.	Marine Engineering & Control systems	75	25	100	75	25	100	90	30	120
16.	Shipping Management (Marine Management & Maritime Commerce)	-	-	-	-	-	-	120	-	120
17.	Maritime Law	-	-	-	-	-	-	120	-	120
	TOTAL NO. OF HRS. IN YEAR	950	250	1200	950	250	1200	960	240	1200

"Source: Syllabus for B.Sc. (NS), University of Mumbai, India, 1996-99, Year I to III"

Examination and Award of Degree

To monitor and assess the progress of the cadets, regular tests during and on conclusion of each semester are carried out by the academy. Proficiencies and grades are assigned to the cadets in practical and professional activities.

The promotional examinations of 1st and 2nd year and final examination of third year on conclusion of the course are conducted by the University of Mumbai. On successful completion of all basic safety training courses, workshop training, swimming test and the final examinations, conducted by the University, the B.Sc.(NS) degree is awarded to the cadet.

The University has kept pass marks considerably high in each group of subjects to maintain a very high standard in their graduates. While 70% pass marks are fixed for professional group subjects, 50% and 40% pass marks are for the applied group and scholastic group subjects respectively. (University of Mumbai, 1996-99, Year I to III)

Training Facilities in Campus

The review and analysis of the training facilities are based on the author's visit to T.S. Chanakya (1999) and interview with Baveja (1999). Some details are quoted from Information Brochure on TS "Chanakya"/ "MERI" (Session 1996).

For navigation at operational level

T.S. Chanakya has a bridge control room equipped with modern navigational equipment and simulators to give realistic training as required by the curriculum.

These include following:

Navigation Simulator: Integrated navigational system, "LAN" type, with 7 monitors

Ship Control Simulator: For training in ship handling

GPS, Satnav, Decca, Loran-C, and DF

GMDSS Simulator

Radars: Two with ARPA and collision avoiding devices.

Gyro compasses

Auto pilot

Echo-sounder

Magnetic compasses

Course recorder

Life boat radio with Accessories

Communication and various other common bridge equipments

For Cargo Handling and Storage

A concrete model of a ship with all cargo gears, hatches, hatch covers, decks, mast houses, etc. is under construction. Cranes and winches are being installed. Prior to this, the training was imparted in the cargo gear workshops and on board ships during ship-visits.

For controlling the operation of ship and care of persons

T.S. Chanakya's location on the coast provides the jetty and the facility of boat launching devices installed there. The campus has lifeboats, rowing boats and other life saving appliances required for cadets' training. Equipment like EPIRB, SART, immersion suits and other life boat equipment are kept in the demonstration lab.

The campus has an approved fire fighting mock-up ship for training in fire prevention and fire fighting.

Maintenance and Repairs at operational level

Full-fledged mechanical, electrical and electronic workshops with shipboard machinery are located in the campus with competent supervisors and mechanics.

Curricular / Extra Curricular Facilities

Excellent curricular and extra curricular facilities are carried out in the training. These activities put stress on all round development of the cadets' personality and

character. They are taught boat-work, karate, physical training, parade, drills, etc. The campus provides many facilities for outdoor and indoor games, sports, hobbies, cultural activities, learning band music, debates, quiz competitions, ship visits, picnics and excursions, etc. Annual athletic and aquatic meets are held. The campus also has a very well equipped library and recreation rooms for the cadets. The latter has audio and video facilities.

Classrooms, labs and simulator rooms are quite spacious and adequate use of audio and visual aid is made to teach and train the cadets.

The faculty is comprised of very efficient, learned and experienced mariners and academicians, who are approved by the DGS in accordance to META Manual.

Campus Routine

The cadets and faculty wear appropriate uniform for the different activities and it is compulsory. The cadets strictly follow a standard daily routine, which is documented in the form of weekly orders. The cadets of all three years batches are divided in 8 groups called tops and each top has a cadet captain to lead it. One cadet captain takes over as a chief cadet captain for a week by rotation and is given responsibility to carryout all orders of the training officer. Many other cadets are also assigned special duties on up-keep and maintenance of campus facilities. The weekly orders also list all events of the week, activities, various assigned duties of the cadets, officers and instructors on duty, etc. The disciplinary actions against defaulters are also recorded in the weekly orders. A copy of a weekly order is placed at Appendix 1.

3.1.2 Pre-Sea (16 weeks) entry stream

The review and analysis of three pre-sea training institutes here, are based on the author's visit to T.S. Chanakya and T.S. Rahaman in 1999 as well as on interviews with Baveja and Varadkar, the captain superintendents of the training ships. The

author himself was co-ordinating the pre-sea training at SCI Maritime Training Institute (1999). The selected candidates for this entry stream are also trained in shore based institutions for a period of 16 weeks. During this period the applied and nautical subjects are taught, however the course content is brief and is meant only to familiarise the cadets with the sea-life, the ship's equipment and basics of Nautical Sciences. They are carefully groomed for the seafaring profession with a regimented and disciplined training schedule comprising of various activities.

The course covers part of the function-wise education and training prescribed in section A-II/1 of the STCW Code (same as Appendix M-II/1B of the META Manual). The course also covers the training on maintenance and repairs in accordance to chapter III of STCW Code. The basic safety training courses are also conducted on completion of pre-sea training and the final passing out certificate is issued thereafter. Training also covers a large number of extra curricular and sports activities to keep the cadets healthy and to develop their character with high moral values.

Since a number of institutes provide the training under this stream, the DGS has documented the standard guidelines and requirements applicable for all such institutes. These guidelines specify the requirements of selection procedures, training facilities, equipment, course intake and faculty ratio, teaching syllabus with list of text books, continuous monitoring and assessment criteria, uniform for trainees and trainers, training in general etiquette, etc. Only those institutes, which meet these requirements, are approved for training and thus trainees passing out of these institutes have a uniform standard in knowledge, competence and code of behavior.

Educational and training programme

As per the META Manual and the guidelines issued by the DGS, the pre-sea training institutes have a well-chalked out timetable for this 16 weeks training programme.

The programme includes classroom studies and practicals, workshop training, basic safety training courses and other physical and extra curricular activities.

The subjects taught are in accordance with the standards of competence for officer in charge of a navigational watch of 500 GRT and above stated in STCW-95 Code A-II/1. It is the same as Appendix M-II/1B of META Manual. The syllabus of each function is framed to give the basic and fundamental knowledge to familiarize the cadets with various shipboard activities and tasks relating to the particular function. More emphasis has been placed on the Seamanship practicals and workshop training to develop the confidence in the cadets to perform the shipboard tasks independently.

The training programme of 16 weeks has 6 working days per week and Sundays are given off to the cadets for shore leave, letter writing and personal jobs. The break-up of the daily hours for the training activities on working days is as follows:

Table 3.2 Break-up of daily hours in Pre-sea (16 weeks) training programme

Training activities	No. of hours per day
Lectures and Practical	8
Physical Training and Parade	1
Games and Swimming	1
Self Study	2
<u>Total Hours per day</u>	<u>12</u>

"Source: Guidelines for pre-sea course by DGS (India), 1998, Annex.7, page24"

Class Room Studies, Practical and Workshop Training

The first 13 weeks cover this part of training. The 13th week is assigned for the examination and assessment. The first 12 weeks have 576 teaching hours. The subject-wise break-up of these 576 hours is as per the table on the next page.

Table 3.3 Pre-Sea (16 weeks): break-up of 576 teaching hours

S. NO.	FUNCTIONS / SUBJECTS	LECTURES	PRACTICAL	TOTAL
1.	Introduction	6	-	6
	Function: Navigation			
	Spherical Trigonometry	18	6	24
	Meteorology	18	6	24
	Navigation	36	12	48
	Chart work	24	24	48
	Bridge Equipment and watchkeeping	24	24	48
2.	Total Navigation Function	120	72	192
	Function: Cargo Handling and Stowage			
	Cargo gear, cargo handling and stowage	12	2	14
3.	Total Cargo Handling and Stowage	12	2	14
	Function: Ship-operation, Safety and Care			
	Ship construction	12	2	14
	Ship stability	8	6	14
	Practical Seamanship	50	150	200
4.	Total Ship Opn. Safety and Care Function	70	158	228
	Function: Repairs and Maintenance			
	Workshop Practicals	-	100	100
5.	Total Repairs and Maintenance Function	-	100	100
	Function: Communication			
	Signals (Morse), GMDSS, VHF, RT, etc.	-	20	20
6.	Total Communication Function.		20	20
	Revision, internal assessment and tests			16
	GRAND TOTAL OF TEACHING HOURS	208	332	576

"Source: Guidelines for pre-sea course by DGS (India), 1998, Annex.7, page24"

Basic Safety Training and Familiarisation Courses

During the 14th, 15th and 16th weeks, the cadets undergo the 4 basic safety training courses and the familiarisation course as required by chapter V and VI of the STCW Code. These are the same as stated earlier for the B.Sc. (NS) entry stream.

General Campus Routine

The training course is fully residential. A strict campus routine is followed during the cadets' stay in the campus of the training institute. Each cadet is given an opportunity to act as a cadet captain for the day in rotation and other cadets are assigned watchkeeping duties in rotation such as gangway watches, anti-pilferage watches, campus rounds, etc. Cadets are also given responsibilities for maintaining cleanliness of living quarters, workshops and various laboratories, recreation rooms, sport-centres, gymnasium, boats, life saving appliances, fire fighting appliances, etc.

Weekly orders are made which give a full account of all activities to be undertaken by the cadets. Two to three times a day, the cadets muster for attendance and briefing by the training officers. Inspections of uniform and living quarters are made weekly to ensure that the cadets are groomed in a most seaman like manner.

A number of games' and sports' events are organised and tournaments are held to create competitions. Prizes and proficiency badges are awarded to those cadets, who excel in the various sports and games. Similarly, the cadets are encouraged to take part in group discussions and debates.

Conduct and attitude of the cadets is carefully watched by the training officers / faculty. A discipline of the highest order is maintained and any misconduct or indiscipline can cause withdrawal of the cadet from training or the withholding of the final passing out certificate.

Visits to Ships & Places of Maritime Interest

During training, a number of visits to ships, ports, harbours, workshops and also to meteorological offices, maritime museums, beaches, scrap-yards, container terminals, offices of the shipping companies, etc. are made, accompanied by training officers of the institute. The cadets are thus made to see things themselves and co-relate their classroom studies and practicals.

Structure Of Final Examinations and Issue of the Final Passing-out Certificate

As stated earlier, the cadets are examined under the functional approach in written and oral examinations during the 13th week of the training. The subjects and passing percentage of marks are as per following table:

Table 3.4 Average pass-marks in the final examination

Functions	Average Pass-marks (Percentage)
Navigation	60 %
Communications (Signals)	90 %
Cargo Handling and Stowage	50 %
Ship-operation, Safety and Care for Persons	50 %
Orals for above Functions	60 %
Maintenance and Repairs	50 %

"Source: Guidelines for pre-sea course by DGS (India), 1998, Annex.4, Page 22"

The final passing-out certificate is issued to a cadet if he/she meets the following criteria:

- Pass in each written paper and practical
- Minimum classroom attendance of 90 %
- If attendance is not to the required limit, the cadet must make it up in the subsequent batch of training.
- Demonstration of good conduct and discipline.
- No adverse remarks by any faculty or training officers.

3.1.3. Direct cadet entry stream

This entry stream is common to a certain category of cadets and general ratings, who aspire to become the officer in charge of a navigational watch. The cadets selected by the individual shipping companies, who meet the eligibility criteria as set out by the DGS in the META Manual are required to do four basic safety training courses (same as for the pre-sea training of the earlier two streams). They also do additional familiarisation courses for the type of the ship to which they are likely to be posted. After this these cadets are directly placed on board the company's ship to complete their 36 months' approved seagoing service including 6 months' bridge watchkeeping. No pre-sea training for this entry stream is prescribed in the META Manual of the DGS. However, it is observed that most of the shipping companies ensure that their cadets pass through this stream too, do the pre-sea training of 16 weeks, same as for the pre-sea (16 weeks) stream at the approved training institutions.

3.2 On board training

Earlier in section 3.1, the phase I of the cadets' training in all three streams has been analysed. On completion of their pre-sea training, deck cadets join their ships for doing their approved seagoing service. Phase II of the training is the "On board

training" of the cadets during their seagoing service. On board training is an on-the-job systematic acquisition of the competence and skills required for the certificate of competency as 2nd Mate of a foreign going ship (Officer in charge of a Navigational Watch).

Onboard training needs to be differentiated from maritime education. Maritime education is gaining of underpinning knowledge theoretically as per syllabus, for a particular job on a ship. The onboard training is imparted for assimilation of skills to perform shipboard tasks. The revised STCW-95 Convention puts stress on acquisition of competence, which is based on skills and also an ability to demonstrate it to prove that the trainee is capable of performing all shipboard tasks. The convention requires that the onboard (shipboard) training of the cadets should be systematically structured and it should be carried out under a structured shipboard training programme (SSTP). This programme must have a reasonable time frame and must be supervised, monitored and assessed throughout by competent persons in compliance with STCW-95 Reg. I/6. It is imperative that the requisite function-wise competencies are covered in the programme for the desired qualifying standard. The convention also requires that there should be documentary evidence for the above accomplishment.

In compliance with above, the DGS has fixed the period of 12 months and 24 months of SSTP for B.Sc. (NS) and pre-sea (16 weeks) entry streams respectively for the 2nd phase of the shipboard training. For the third stream of direct entry, 36 months of approved seagoing service is required with normal shipboard training for this phase. If a cadet of the first two streams fails to complete the SSTP successfully, he/she will be required to undergo 36 months of seagoing service.

During their seagoing service, the cadets of each entry stream will also have to perform bridge watchkeeping duties of not less than 6 months under supervision of any certified responsible watchkeeping officer.

3.2.1 Implementation of Structured Shipboard Training Programme (SSTP)

For effective and systematic execution of SSTP, the DGS has published a comprehensive training record book for the cadets. This book lists all the tasks/jobs to be performed by the cadet to train him/her for the functional competencies as per requirement of STCW Code A-II/1. The shipping company makes a SSTP of 12 months or 24 months for cadet of B.Sc. (NS) stream or of pre-sea (16 weeks) stream respectively for the approval of the DGS. This approved SSTP is implemented on board the ship to enable the deck cadet to complete all the tasks and acquire proficiencies listed in the record book. The effective implementation of SSTP is carried out under proper supervision, monitoring and assessment by the following designated officers/units.

- (1) Shipboard Training officer (STO)
- (2) Master of the ship
- (3) Company's Training Officer (CTO)
- (4) Assessment Centre authorised by the DGS (The Govt. of India)

The functions and duties of above are explained later in this chapter.

Contents Of Cadets' Training Record Book

The training record book has the entire record of the cadet's shipboard training with the documentary evidence of the tasks and jobs performed by him/her. This also keeps the record of all vessels on which he/she worked and various inspections, supervisions and endorsements made by the designated training officers afloat and ashore.

Besides the Introductory section, the record book has 10 sections containing the proficiencies to be gained by the cadet on different shipboard tasks. The first three sections contain the tasks on functional competencies i.e. Navigation, Cargo Work and Safety Aspects. The next five sections contain the proficiencies in the tasks

related to tanker practice, dry docking, steering, collision regulations and bridge watchkeeping. The last two sections contain the tasks for the cadet's journal, sketch book, daily work diary and record of quarterly reports sent to the CTO/Assessment centre.

In the case of cadets from the pre-sea entry stream, all tasks are completed in 24 months over four stages of six months each. The tasks on the functional competencies are covered in three stages and tanker practice/dry docking sections are completed in the 4th stage, whenever the cadet gets an opportunity for these tasks. The cadet achieves the proficiencies in the remaining sections during the entire shipboard training period.

In the case of cadets from B.Sc. (NS) stream, they too have to perform all the tasks of the record book in the same manner. The four stages in their shipboard training shall be of 3 months each.

3.2.2 Monitoring and Assessment of Structured Shipboard Training

The following designated ship and shore officers/centre monitor and assess the structured shipboard training programme of the cadet and their assignments are explained as follows:

Shipboard Training Officer (STO)

- Monitors the SSTP and endorses the cadet's TRB with suitable remarks on successful completion of an activity or task.
- Inspection of TRB, journal, sketchbook and daily workbook at least every two weeks.
- Submits the quarterly report on progress of cadet's SSTP to the Company's Training Officer (CTO) through the master.

Master

- He is a link between STO and CTO and ensures that the SSTP is implemented effectively.
- Reviews the progress of the cadet in SSTP every month and enters remarks in TRB

Company's Training Officer

- Ensures overall planning and administration of SSTP
- Monitors the progress of the cadet till completion of SSTP and seagoing service. Sends quarterly report on progress of the SSTP for each cadet and also sends final completion report of SSTP, to the assessment centre along with his comments.

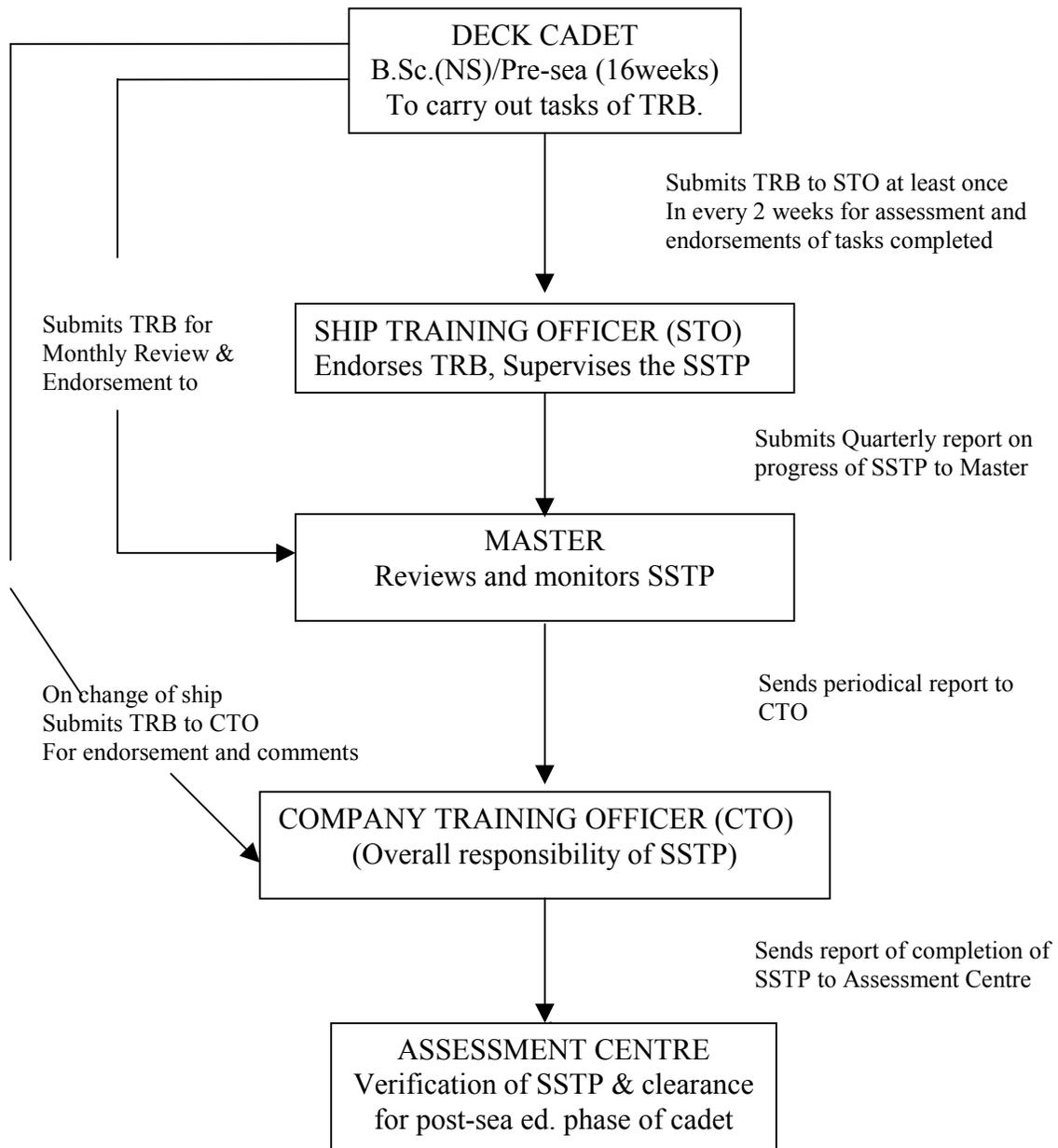
Assessment Centre

This centre is authorised by the DGS to monitor the execution of SSTP in respect of each cadet on the basis of reports received from CTO periodically.

At the end of SSTP, the centre examines all the documents such as TRB, journals, sketch book, work diary, watchkeeping certificates, steering certificate, sea time certificates, etc. of the cadet. The centre carries out on-spot evaluation and assessment of the skills and competence of the cadet in compliance with the requirements of STCW Code A-I/6 and A-I/8. For this purpose the centre has all necessary navigational equipment and simulators to test the cadet's skills and competence. If the centre is satisfied with the demonstration of required skills in the functions of operational level by the cadet, it allows the cadet for admission in to the post-sea education phase.

The stage-wise monitoring and assessment of the structured shipboard training of the deck cadets by the above-designated officers and the assessment centre is illustrated in the following figure 3.1:

Figure 3.1 Stage-wise progress of the structured shipboard training programme



TRB includes Journal, Sketch-book and the daily work-diary

3.3 Post-sea education and training

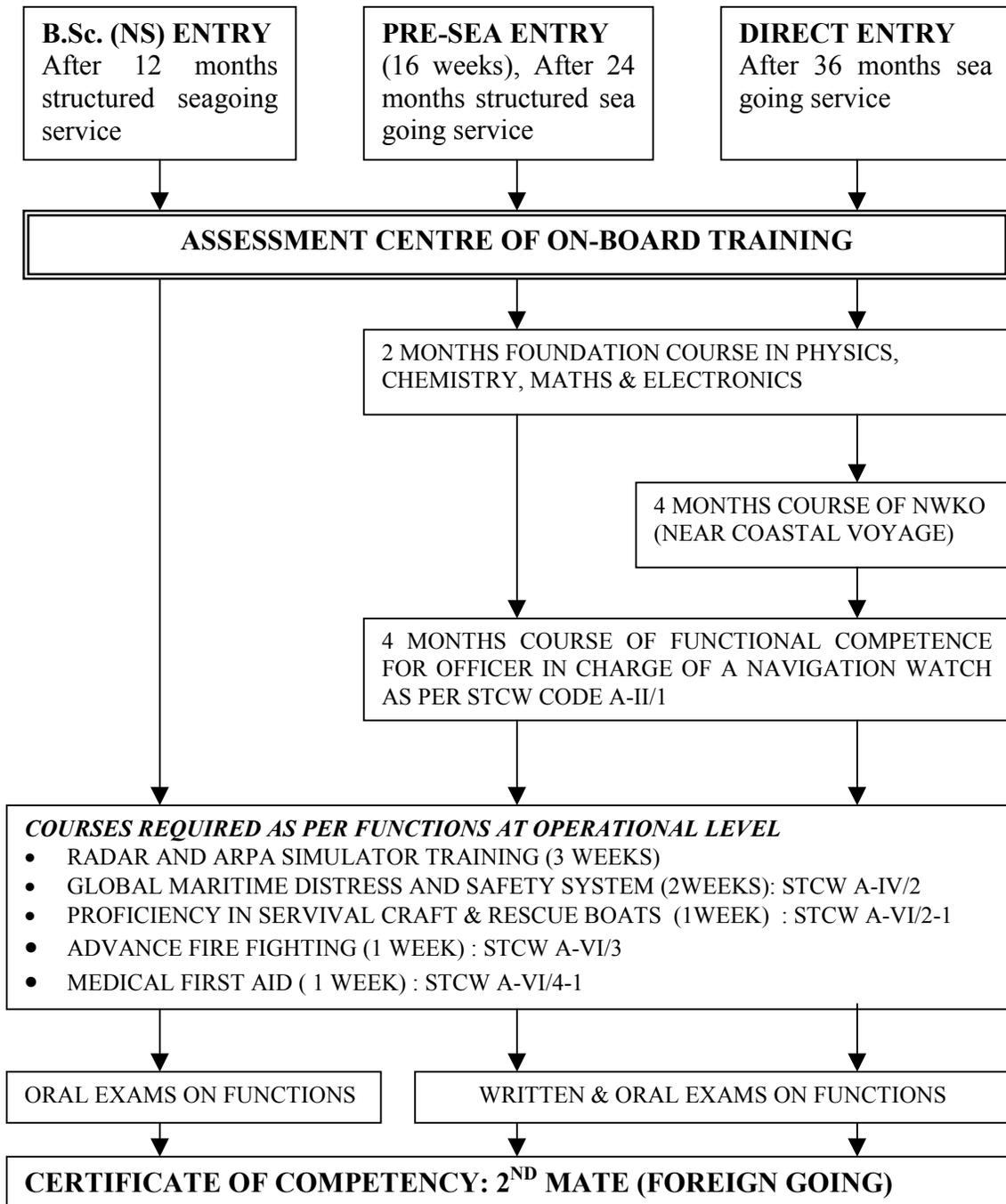
The aim of the post-sea training is to prepare the deck cadet for the evaluation of their competence by the examining and assessing authority for their certification. The post-sea education and training of deck cadets is conducted by the approved training institutions. The training and assessment programme of the cadets (META Manual) clearly outlines the courses, to be conducted in the post-sea training. The syllabus of these courses conforms to the standards of competence as required by the STCW Code A-II/1, B-II/1 and A-VIII/2 part 3-1 for the officer in charge of a navigational watch (2nd Mate Foreign Going).

Post-sea courses give the final touch to the skills and knowledge acquired by the deck cadets during their earlier seagoing service. The courses, which have been developed as per the functional competency tables of STCW Code A-II/1, help cadets to apply their practical knowledge gained at sea in understanding the in-depth theory behind all the shipboard operations and the responsibilities. Figure 3.2 on the next page illustrates the post-sea education and training applicable to the three different entry streams of the cadets. The figure also gives the procedures of their assessments for the issue of the certificate of the competency.

Details of Post-sea Courses

The courses in each entry stream are provided with the objective of developing the uniform knowledge and competence in cadets of all streams. It is because they all have to be assessed and examined in the same manner and standards as set by the DGS in compliance to the STCW Convention for the issue of the certificate of competency. During each course, the cadets are assessed continuously by appropriate methods. All courses are approved by the DGS and some of them are based on IMO model courses. A review of these post-sea courses is made in the following sections.

Figure 3.2 Post-sea education & training of deck cadets



"Source: META Manual (DGS, India), Vol. I, 1998, page II/6"

Foundation Course

This course is of 2 months' duration. The objective of this course is to revalidate the knowledge of the deck cadet from pre-sea (16 weeks) stream and direct stream in the under mentioned subjects covering those portions, which are applicable to Nautical Science.

Table 3.5 Subjects and examination structure of the foundation course

No.	SUBJECTS	MARKS	PASS	MODE	TIME
1	Nautical Mathematics	100	50	Written	2 Hrs.
2	Nautical Physics	100	50	Written	2 Hrs.
3	Nautical Chemistry	100	50	Written	2 Hrs.
4	Nautical Electricity & Nautical Electronics	100	50	Written	2 Hrs.

"Source: MS Notice (DGS, Govt. of India), 1998, Annex II, page 4"

The deck cadets from pre-sea (16 weeks) stream can do this course any time after their pre-sea training. The direct stream cadet can do this course after a minimum 6 months of approved seagoing service. Approved training institutes conduct this course.

Course on functional competence

The course is also called the 2nd Mate (FG) competency course, which is of 4 months' duration. The cadets from B.Sc. (NS) stream are exempted from this course, however they will have to do all modular courses as shown in the figure 3.2. Thereafter they appear for only oral examinations of all three functions of operational level as required by STCW A-II/1 tables for obtaining the certificate of the competency.

The cadets from the remaining two streams shall attend the full competency course, which has a stipulated number of hours for each competency divided among lectures, exercises and practicals. The schedule of this course is stated in brief in table 3.6 on the next page.

Table 3.6 Schedule of 2nd Mate Competency Course

No.	Competence	Lectures (Hours)	Exercise (Hours)	Practical (Hours)	Type of Assessment
NAVIGATION AT OPERATION LEVEL					
1.	Plan/conduct a passage and determine position	120	33	35	Cont. Assessment & written Exams.
2	Maintain a safe navigation watch	21	-	-	
3	Use a Radar and ARPA for safety of navigation	50	10	13	Based on IMO model course. Written & practical/oral exams.
4	Respond to emergencies	14	-	-	
5	Respond to a distress signal at sea	10	-	-	Oral and Visual Examination
6	Transmit & Receive by visual signaling and other means	28	-	77	Cont. Assessment & written Exams.
7	Manoeuvre the ship	07	-	-	
CARGO HANDLING & STOWAGE AT OPERATIONAL LEVEL					
1	Monitor the loading, stowage securing and unloading of cargoes and their care during the voyage	30	10	-	Continuous Assessment, written & oral Examination
CONTROLLING THE OPERATION OF SHIP & CARE OF PERSONS ON BOARD					
1.	Pollution prevention	10	-	-	Cont. Assessment & written, oral Exams.
2	Maintaining sea worthiness of the ship	40	24	-	” ” ”
3	Prevent, control and fight fires on board	20	08	08	As per IMO model course 2.03
4	Operate life saving appliances	10	10	10	As per IMO model course 1.23
5	Apply medical first aid on board ship	15	-	10	As per IMO model course 1.14
6	Monitor compliance with legislative requirements	10	-	-	Cont. Assessment & written, oral Exams.
7	Ship safety (Additional competence)	20	-	-	” ” ”
TOTAL TRAINING HOURS FOR COURSE		405	95	153	

"Source: META Manual (DGS, India), 1998, Appendix M-II/1C"

These competencies shall be from each function at operational level as required by STCW Code A-II/1. During the course, the cadets shall also complete all the post-sea modular courses, which are part of the three functions at operational level namely Navigation, Cargo work and Safety and Care at Sea. The schedule of the course also gives the method of assessment for each competence of the prescribed 3 functions.

Radar Observer and ARPA Simulator Training

The simulator training is given as part of navigation function in the competency course as listed at serial number 3 in table 3.6 on the previous page. It is additional simulator based training on the use of Radar and ARPA for the safety of navigation. The break up of training hours is shown in the table 3.7.

Table 3.7 Schedule of Radar Observer and ARPA Simulator Training

No.	Simulator Course	Lectures	Demos.	Exercises	Simulator	Total
1	Radar Observer	27	6.5	12	-	45.5
2	ARPA	07	-	-	26	33.0
	Total	34	6.5	12	26	78.5

"Source: META Manual (DGS, India), 1998, Appendix M-II/1C"

GMDSS Operator's Course (GOC)

This two-week IMO model course is given to the cadets as a part of the navigation function in the competency course. It is aimed to train the cadets in the operation of Global Maritime Distress and Safety System for the radio communication. On completion of the course, they shall have the necessary skill to operate the system especially for distress alerting and all emergency satellite communication.

3.4 Assessment and Certification

The final assessment of the competence of the cadets for the certification is done by the written and oral examinations. The summary of the examinations is stated in the following table.

Table 3.8 Officer in charge of a navigational watch: examination structure

No	Function: Navigation at the operation level	Marks	Pass	Mode	Time
1	Coastal & Terrestrial Navigation	200	140	Written	3 Hrs.
2	Celestial Navigation (Principal & Practicals)	200	140	Written	3 Hrs.
3	Meteorology	100	50	Written	2 Hrs
4	Bridge watchkeeping and Emergencies	200	100	Written	3 Hrs
5	Communication	100	90	Visual	1 Hr.
6	Radar Observer Simulator Course			Modular	2 weeks
7	ARPA Simulator Course			Modular	1 week
8	Orals for Navigation Function only after completing 1 to 7 above			Oral	

	Function: Cargo Handling & Stowage (Opn.)	Marks	Pass	Mode	Time
1	Cargo Handling & Stowage	200	120	Written	3 Hrs.
2	Orals for Cargo Handling & Stowage Function only after completing 1 above			Oral	

	Function: Ship operation & care of personnel at the operational level	Marks	Pass	Mode	Time
1	Ship construction, Stability, Ship safety and Environmental Protection	200	120	Written	3 Hrs.
2	PSC & RB			Modular	1 week
3	Advanced Fire fighting			Modular	1 week
4	Medical First Aid			Modular	1 week
5	Orals for Function after completing 1 to 4 above			Oral	

	Function: Radio Communication	Marks	Pass	Mode	Time
1	GMDSS-GOC			Modular	2 weeks

"Source: MS Notice (DGS, Govt. of India), 1998, Annex II, page 5"

The assessment and the evaluation referred to earlier comprise of the written and oral examinations in each of the three functions of the competency. The cadets are eligible for the Final Assessment Stage only after successful completion of the post-sea training and all required operational level courses. The cadets from B.Sc. (NS) entry stream are exempted from the written examinations and are required to pass the oral examination of each function. The cadets from the other two entry streams are required to pass the written examinations prior to appearing for oral examinations of any function.

The certificate of the competency as Officer In charge of a Navigational Watch (Above 500 GRT) i.e. 2nd Mate (Foreign Going) is issued to a cadet, only if he/she passes the written and oral examinations of all three functions of the competency.

Chapter 4

Survey on post-training performance of cadets as officers

4.1 Scope of the survey

In the foregoing chapters, the training and assessment programme of the deck cadets of all three entry stream has been reviewed. Each entry stream has three phases of training of various duration, depending upon their level of education and training. The training programme complies with the national training policy, the needs of the industry and the standards of the STCW-95 Convention. On completion of their final assessment and evaluation, the successful cadets are issued a certificate of competency as 2nd Mate (Foreign Going). The cadets after being certified, irrespective of their entry stream, are expected to have uniform level of competence and proficiency in performing their functions at operational level on board their ships. The training is also expected to develop a high degree of motivation and dedication in these officers towards their new duties and responsibilities.

The new technological developments in ship-operations and the changes in the working environment of the ships, have put a lot of responsibilities on the newly certificated officers of the watch. For example, the new concept of "one man bridge watchkeeping (OMBO)" on IBS ships and even normal watchkeeping with new integrated navigation systems demand a lot of competence and confidence in the watchkeeping officer. Equally important is the sincerity and concern of the watchkeeping officer towards his duties for the safe and efficient operation of the ship. These two basic qualities of competence and concern for duty are developed in the cadets by a good training and assessment programme. To achieve these major

training objectives, it is necessary to ascertain the effectiveness of the training programme from time to time. This process of evaluation of training will ensure that the aim of the training is achieved by improving the standards, to keep pace with the rapid technological developments at sea.

The necessity of regular periodical assessment of the effectiveness of the seafarers' training is also strongly supported by the IMO. The IMO has already appreciated this need by adopting Resolution 8 in the STCW Conference, 1995, which states:

THE CONFERENCE,

Having adopted the 1995 amendments to the International Convention of Standards, Training, Certification and Watchkeeping for seafarers, 1978, with a view to strengthening the implementation of the convention and thereby improving the

" Competence of seafarers,

Appreciating that the overall effectiveness of selection, training and certification process can only be evaluated through the skills, abilities and competence exhibited by the seafarers during the course of their service on board ship.

Recommends.....".

The overall effectiveness of the training and assessment programme can be ascertained by evaluating and scrutinising the actual post certification job performance of these cadets in their new role of watchkeeping officer. Their performance therefore at the operational level in the designated three functions is to be assessed. In addition their conduct, behaviour and sincerity towards their duties are also to be assessed at the same time.

In order to ascertain the overall effectiveness of the training programme, the author conducted a survey by sending a special questionnaire to about 200 concerned

officers of the shipping industry. These senior officers were from sea and shore, and are directly responsible for employment and training of the cadets. The questionnaire is placed in Appendix 2. The questionnaire sought opinions of the respondents on the job performance of newly certificated officers, who passed out from four different entry streams of the cadets' training. These streams included erstwhile training ships Dufferin and Rajendra for a good comparative study of the quality of training among the various streams. The entry streams under survey were:

1. B. Sc. (Nautical Sciences) entry stream
2. Pre-sea (16 weeks) entry stream
3. Direct cadet entry stream
4. T.S. Dufferin / Rajendra entry stream

The questionnaire sought opinions of the respondents on the following aspects of the job performance of the newly certificated officers of the navigational watch:

1. Competence and skills of officers in all three functions at operational level
2. General conduct, behaviour and sense of discipline in the officers
3. Any shortcomings and suggestions for the improvement in the training

The respondents included masters, mates and ship-managers of various shipping companies, and faculties from the maritime training institutes in India.

In all 122 replies were received from the masters and ship managers of 37 major foreign and Indian shipping companies and from faculties of 8 well known maritime training institutions. A list of these companies and the institutions is placed in Appendix 3. These shipping companies mostly employ trained cadets from India, passed out from the different entry streams. A good response to the questionnaire from all corners of the shipping industry in the survey provided an evidence of the deep concern of the senior seafarers towards the cadets' training. Replies in respect of

each entry stream depended upon the experience of the respondents with the cadets of that stream. Since T.S. Dufferin/Rajendra entry stream has been closed since 1993, there were less number of replies for this entry stream.

4.2 Feedback on competence and skills

The results of the survey are tabulated and graphically shown hereunder.

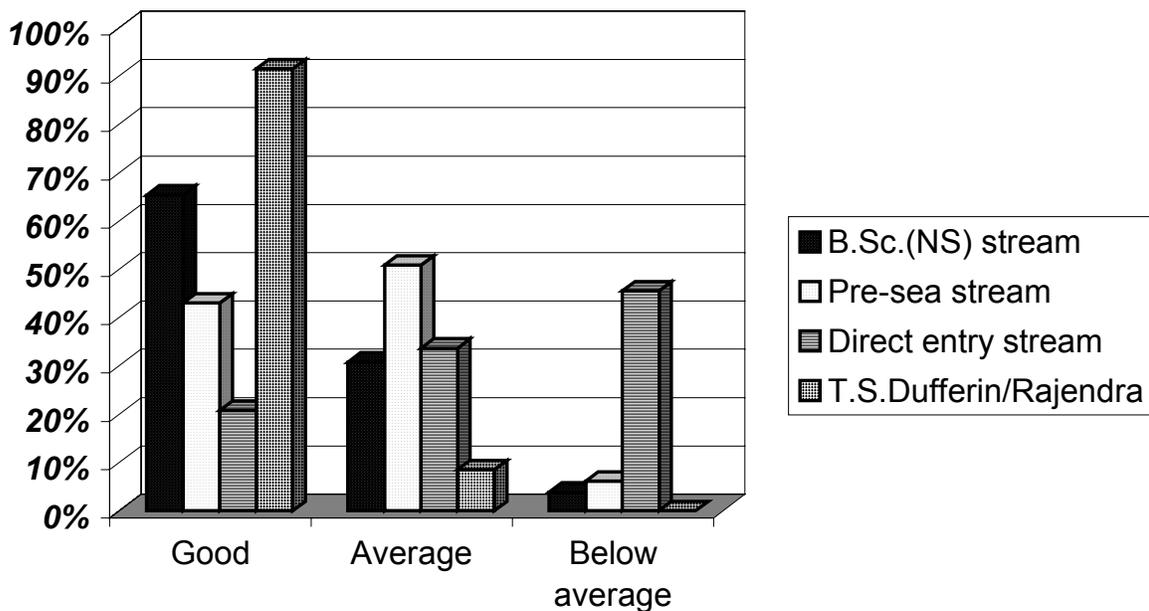
Table 4.1

Response to question "A": Feedback on competence and skills in all functions

Entry stream	Replies received	% Good	% Average	% Below average
B.Sc. (Nautical Sciences)	104	65 %	31 %	4 %
Pre-sea (16 weeks)	114	43 %	51 %	6 %
Direct Entry	101	21 %	34 %	45 %
T.S. Dufferin / Rajendra	59	92 %	8 %	Zero %

Figure 4.1

Graphical display of feedback on competence and skills of the officers in all three functions passed out from 4 different entry streams



4.3 Feedback on general conduct, behaviour and sense of discipline

The results of the survey are tabulated and graphically shown hereunder.

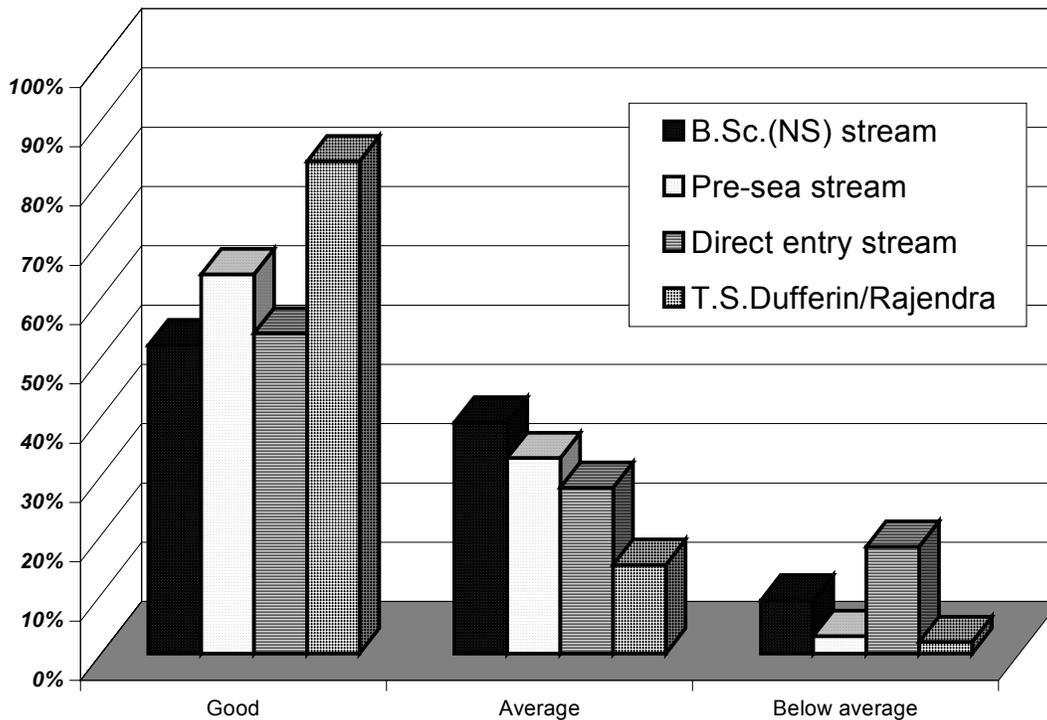
Table 4.2

Response to Question "B": Feedback on conduct, behaviour and discipline

Entry stream	Replies received	% Good	% Average	% Below average
B.Sc. (Nautical Sciences)	104	52 %	39 %	9 %
Pre-sea (16 weeks)	114	64 %	33 %	3 %
Direct Entry	101	54 %	28 %	18 %
T.S. Dufferin and Rajendra	59	83 %	15 %	2 %

Figure 4.2

Graphical display of feedback on general conduct, behaviour and sense of discipline of the officers passed out from 4 different entry streams



From the feedback received on the competence and conduct of the officers passed out from four different entry streams as shown in tables and graphs of section 4.1 and 4.2, the effectiveness of the training in each entry stream can be placed in the following descending order. It is important to note that only *excellent performance* in the "competence" and the "conduct" sections has been accounted for each entry stream.

Table 4.3 Entry streams in order of the effectiveness of their training

Merit	Effectiveness in competence and skills	Effectiveness in conduct, behaviour and discipline
First	T.S. Dufferin/Rajendra with 92 %	T.S. Dufferin/Rajendra with 83 %
Second	B.Sc.(Nautical Sciences) with 65 %	Pre-sea (16 weeks) with 64 %
Third	Pre-sea (16 weeks) with 43 %	Direct Entry with 54 %
Fourth	Direct Entry with 21 %	B.Sc.(Nautical Sciences) with 52 %

4.4 Feedback on improving the standards of training

The response of this section of the survey was very good. Very useful and constructive suggestions were received from the officers from the sea and shore on the subject. The majority of the respondents were generally satisfied with the training and assessment programme. This was clearly indicated in their appraisal of competence and conduct of the newly certificated officers. According to their appraisal, on average 57.5 % of total officers passed out from the two main entry streams of the cadets, i.e. B. Sc. (NS) stream and Pre-sea (16 weeks) stream were found to be excellent in their job performance. In addition another 36.4 % of the officers were found to be average in their job performance from the same two-entry streams. The other two entry streams are irrelevant as T.S. Dufferin / Rajendra stream is no more and the direct entry stream mostly has ratings.

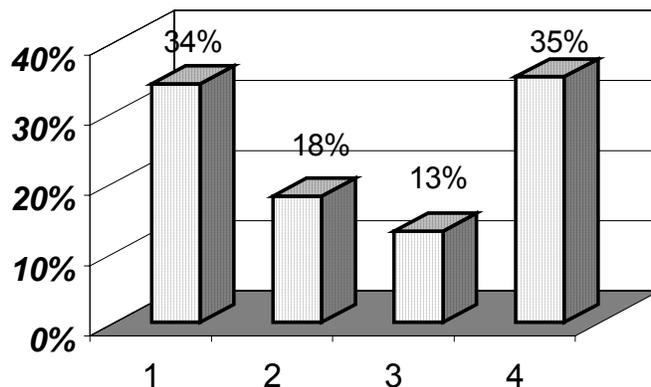
The survey therefore, established that 6 % officers were found to be below average in the performance of their jobs, as officers in charge of a navigational watch. This data was related to the two applicable entry streams of the cadets' training, i.e. B. Sc. (NS) and Pre-sea (16 weeks) entry stream. However with the objective of achieving more and more excellence, the respondents of the questionnaire gave very good suggestions for improving the training and assessment programme of the cadets.

The areas mainly, where improvement in training is strongly suggested, have been located on the basis of the keywords. These areas and the percentage of the total respondents, who suggested upgradation of training in each of them, are shown on the in table 4.4 and figure 4.3.

Table 4.4 Suggestions for improvement in the cadets' training

Suggestions for Training Programme	Percentage of Respondents
1. Needed more practical pre-sea training	34 %
2. Pre-sea training to develop more motivation, dedication and sense of discipline in the cadets towards their duties	18 %
3. Needed improvement in " On board training"	13 %
4. No suggestions, feel training is excellent	35 %

Figure 4.3 Suggestions with percentage of respondents



4.5 Suggested improvements in cadets' training

1. *For more practical pre-sea training*

- a) Training to include less theory classes and more exposure to seamanship, workshop activities, maintenance of life saving and fire fighting appliances, maintenance and handling of cargo gear, wires, ropes and paints, etc.
- b) Training to provide more practice in operation of the latest navigational aids and a good familiarisation with modern bridge lay outs.
- c) Long pre-sea training, as in the case of B.Sc. (NS) entry stream, must be well balanced between the "shore based" and "on board" training periods and it should alternate between these two phases.
- d) Period of pre-sea training in Pre-sea (16 weeks) entry stream must be increased to minimum 6 months.
- e) More field trips to the ships, workshops, ports, harbours, dry docks, shipyards, etc. to be arranged under the guidance of the trainers.
- f) Trainers in the training institutes must be encouraged to sail on and off for short periods to keep them abreast with the new technological developments in the shipping industry. They should familiarise themselves with the prevailing activities on board ship in respect of safety and pollution prevention. If this is not feasible, some recently sailed masters and mates should be engaged as trainers to form a part of the faculty as and when possible.
- g) Some suggested to revive the pre-sea training of "training ship style" to give the correct working environment to the trainee cadet. They felt that the shore atmosphere prevailing in the training institution detracts the trainees from the objectives of the training. In the support of their recommendations, they sighted the excellent performance of ex-cadets of the erstwhile training ships T.S. Dufferin and Rajendra as a fine example. One can see this fact in the findings of the survey, wherein the officers from the training ships' entry stream, were found the best in the job performance with 100 % effectiveness in competence and skills.

2. For training of motivation and dedication to duties

a) Selection criteria at induction level should also be based on the following qualities of the candidates besides their educational standards.

- Sea aptitude
- Family background
- Past familiarisation with a sea career
- Attitudinal reflections
- Sportsman spirit

Interviews should be conducted after showing a video film on the sea career, highlighting the pros and cons of sea life and the real working conditions on board ships. This will give a fair chance of decision to the young career-seeking candidates about the career of their choice.

b) The curriculum should include more group activities, sports and other training activities to be conducted by dedicated and committed trainers for the purpose. The objectives of these activities should be to develop slowly and firmly the following qualities in the young trainee cadets:

- Sincerity, motivation and dedication to duties
- High sense of discipline
- Dignity of manual labour
- A good moral character
- Patriotism
- Officer like qualities

3. For improvement in "on board training"

a) Period of "on board training" should be equal to or more than the "on shore training".

- b) Adequate time should be given to the cadets on board for studies and where possible weekly classes may be taken by ship training officers and other senior officers.
- c) The ship-managers and the company-training officers must rotate the posting of the cadets on all type of ships available in the company. No cadet should be retained on one type of vessel for more than 6 months in ordinary circumstances. This arrangement shall enhance the competence and skills in all operational functions uniformly.
- d) Cadets should not be considered as replacements for ratings. However they may work with them to learn various shipboard operations under proper supervision of the senior officers.

4.6 Evaluation of the survey

On competence and conduct

The quality and period of training influence the effectiveness of the post-training performance of cadets. For this reason, the results of the survey on "job performance" of cadets as officer in charge of a navigational watch are tabled here with the total training period in each entry stream and its break up in phases. For the effectiveness in job performance, only excellent results are accounted and average results are not considered.

Table 4.5 Evaluation of competence and conduct of officers from different entry streams and their training period

Entry stream	% effectiveness		Break up of total training period in months			
	Competence	Conduct	Pre-sea	On-board	Post-sea	Total
T.S. Dufferin / Rajendra	92	83	24	24	2	50
B.Sc.(NS)	65	52	36	12	2	50
Pre-sea (16 weeks)	43	64	4	24	8	36
Direct entry	21	54	4	36	12	52

As stated earlier, the evaluation data of officers from T.S. Dufferin / Rajendra stream and Direct entry stream is used only for comparative study and for drawing conclusions from the data on all four entry streams.

The scrutiny of the results of the survey in two entry streams of the cadets, presently in use in India, namely B. Sc. (NS) and Pre-sea (16 weeks) establishes the following observations:

1. Effectiveness towards overall job performance in both streams is far below the effectiveness of the training ship stream. This fact points out that the training ship atmosphere was more successful than the shore based atmosphere in effective training. It appeared that training on board a training ship gave more motivation and sense of discipline than in a shore based institution.
2. "Structured on board training" in B.Sc. (NS) and Pre-sea (16 weeks) entry streams gave much more effectiveness, when compared with the Direct entry stream which does not have the same.
3. Both streams, i.e. B.Sc. (NS) and Pre-sea (16 weeks), needed further improvement in education and training to increase the quality of their job performance.
4. Conduct and behaviour of the officers from the Pre-sea entry stream and Direct entry stream were observed to be better than the officers from B.Sc. (NS) stream. This fact was attributed to the adequate sea environment, which Pre-sea and Direct entry streams had with longer periods of "on board training". This fact strongly suggests the need for a good balance in shore and ship based training periods in the B.Sc. (NS) entry stream.

On improvement of the standards of training

The suggestions for improvement in marine education and training broadly supported the results of the survey on competence and the conduct of the officers from the two main entry streams, i.e. B.Sc. (NS) and Pre-sea (16 weeks).

Summary of evaluation

Overall job performance of the newly certified officers from both entry streams was found to be considerably good. A majority of the respondents were of the opinion that the training and assessment programme was good and meets the national and international standards of the STCW-95 Convention. The author has a similar opinion after the review of the same in chapter 2 and 3. However, to achieve excellence in competence and skills and to improve further the effectiveness in training, valuable suggestions were made by the learned respondents. Considering the findings of the survey and the suggestions therein, the author feels that the following actions are necessary to implement the programme efficiently:

1. Examine eligibility criteria and selection procedures
2. Include more practical training in sea-like working atmosphere
3. Provide a good balance between the shore based and ship based training
4. Place more stress on human skills, behaviour and sense of discipline in the training
5. Actively involve the shipping companies in effective implementation of the training and assessment programme
6. Ensure that the training institutions see that the objectives of the training and assessment programme are achieved. They should provide adequate training resources including trainers having most up to date knowledge in all shipboard operations.

Chapter 5

Strategy for enhancing the effectiveness of training

5.1 Base and background of strategy

Earlier, chapter 4 has carried the results of the survey, which was conducted to ascertain the quality of the post training job performance of the cadets as certificated officers. The results were summarised and an evaluation of the broad-based feedback from the shipping industry on the job performance of the cadets, as certificated officers was made.

The feedback on the job performance of the newly certificated officers not only evaluated their competence and skills but also their conduct and dedication towards their shipboard duties. An ideal job performance is necessarily the combination of competence as well as one's concern and sincerity towards one's duties and responsibilities. Both these qualities in a good officer govern the quality and effectiveness of his/her job performance. The feedback therefore from on-the-job performance of the cadets as certificated officers of the watch has also taken in to account the following two important points:

- 1) Officer's ability to deal efficiently with the new technology on board ships.
- 2) Officer's ability to cope with the man-machine interface and changed environment of the working places on board

The survey has also discovered certain areas, where in the opinion of the learned respondents, the training of cadets needs improvement. Good suggestions have been received from the respondents to improve the training standards to keep pace with the new technological developments in ship-design and operations.

As stated in chapter 2, the training and certification of all seafarers in India was always carried out under a standard training and assessment programme for many decades. The Government of India ensured that these training programmes and procedures therein gave the best competence to seafarers of all ranks, meeting all national and international standards and regulations. There has always been good co-operation among all sections of the shipping industry and training institutions for achieving these standards of competence for Indian seafarers.

Prior to the adoption of STCW-95, the training and assessment programme of the deck cadets in India complied with the regulations of the DGS (The Government of India) based on the national needs and international standards as per the STCW-78 convention. On the adoption of STCW-95, the Government of India needed no change in the curriculum of the cadets' education and training. The curriculum had provisions for more professional knowledge and competence than what the new convention prescribed in Code A. Similarly the monitoring and control procedures in the training and assessment programme of seafarers including cadets were already well established and there too, was no need to apply the provisions of the convention. However the Government rearranged the curriculum and assessment system in functions as envisaged in the convention. The quality control system, which was functioning well, was made more documented and systematic.

The quality of a training and assessment programme can not always guarantee its effectiveness in producing competent and skilled officers. It is because both are two different aspects of the training. A training programme is based on certain objectives to achieve defined standards of training. The effectiveness of the programme

establishes whether these standards of training are able to provide safe and efficient operation of ships in the latest level of technology and the existing working atmosphere at sea.

The results of the survey as stated in chapter 4 and its evaluation paints a good picture of effectiveness of the training and assessment programme of cadets. It is interesting to note that suggestions are made mostly for a better and more effective implementation of the existing programme, in order to face the challenges now emerging due to rapid development in technology. For example, practical training is given priority over shore based classroom studies. Similarly the feedback on conduct and behaviour requires serious changes in the style of training to provide good motivation and high sense of discipline to the cadets for safety at sea.

Hereafter, the author analyses the evaluation of the survey results and examines their validity. While doing so, the author goes beyond the standards of the competence as required by the STCW-95 Convention. It is because, the respondents in the survey have weighed the competence and skills of the newly certified officers against the best performance expected of them in the current level of technology and the stress due to reduced manning. Stress on the officers is also due to the stiff competition in the shipping industry, which requires them to give the best services. Secondly the survey-data on only excellent performance of the officers is accounted for determining the effectiveness of the training. Data on average performance of officers, which also meets the standards of STCW-95 has been ignored.

The strategy for increasing the effectiveness in training is planned here for the two applicable entry streams of the deck cadets in India. These are B.Sc.(Nautical Sciences) entry stream and Pre-sea (16 weeks) entry stream.

While proposing a strategy for increasing the effectiveness of the national training and assessment programme in the concerned areas, it was necessary for the author to

look into and study the similar cadets' training programmes of some other maritime nations. The procedures and methods adopted by other nations in their training programme and their impact on their seafarers was also necessary for planning a useful strategy.

For the said purpose, the author studied and examined the maritime education and training of cadets of some of the important maritime nations from different regions. The information and data on the subject was collected by means of the author's personal interviews with the senior training officers of the premier training institutes providing training to cadets in these nations. The author also had opportunity to visit some of these training institutes and saw the methods and resources of training available there. The training programmes of the following countries are examined:

Germany (Kaps, 1999)

The Netherlands (Arbeider, 1999)

United Kingdom (Pourzanjani, 1999)

Sweden (Persson, 1999)

China (Shen, 1999)

Australia (AMC, 1999)

Denmark (Jacobsen, 1999) and (Nicolaisen, 1994, 46-52)

5.2 Eligibility criteria and selection procedures

There are no two opinions on the necessity of proper selection of suitable candidates for any job or career. The eligibility criteria of the educational qualifications, age, physical standards and suitability of the candidates for a particular job are set by the employers for the new recruits, keeping in mind their future career profile and job requirements. Right selection of suitable candidates for any job lays a successful foundation, not only for the career of the newly recruited candidate but also makes the recruiting organisation very strong. Conversely an incorrect selection of an unfit

candidate not only ruins the career of the candidate, but also adversely effects the progress of an organisation.

In selection of the cadets for their career at sea, great care is required by the organisations, which are assigned this difficult task. Parsons (1997) in his article "Preparing a company training strategy and assessing its effectiveness" stated that a successful cadet training relies upon very close supervision of selection and the monitoring of progress both ashore and on board.

The tough atmosphere and working conditions at sea, which are quite different from land based jobs require recruits with the right sea-aptitude. Moreover the selection of teenaged candidates, especially when many of them are not aware of their future plans fully, must be made with utmost care and precaution for the benefits of all concerned. In the case of cadets, an average training time is over 4 years and so the training investment in an individual is very high. If the aptitude is properly determined prior to selecting an individual, there can be huge savings in both training and time. (Larsson, 1996, 107)

The findings of the survey on-the-job performance of the cadets indicated a growing lack of motivation, dedication and sense of discipline in some cadets towards their duties. There was a lack of concern and awareness in these cadets towards their shipboard responsibilities.

The author agrees with the suggestions received in the survey that a "proper selection" of the cadets at induction level can be one of the methods to overcome this problem. Here "proper selection" means a selection strictly based on cadet's family background, his/her interest in games and sports, his/her aptitude for sea and his/her general attitude and perception of things around. The other method definitely is proper training ashore and on board to develop these qualities of motivation and

awareness in cadets towards their duties and this topic will be dealt later in this chapter.

STCW-95 Convention does not specify the qualifying level of academic education for the selection of deck cadets. Cadets in most of the maritime nations are inducted after either 10 or 12 years of school education. In India as stated in chapter 2, the minimum qualifying level for selection of cadets is 12 years of school education in Science subjects. The teaching medium in most of the schools is English and English is taught from the primary level. Indian cadets therefore have a clear edge over many cadets of other maritime nations. Not only have they academic qualifications as high as graduation in Science and Engineering, but also they have very high grades. They are selected through a national level entrance test followed by a tough interview. This ensures that academically the best boys and girls enter this career. Unlike other maritime nations especially in Europe, this career in India is still regarded as very promising and popular among the youth. The scenario is totally different in many countries in Europe and Australia, where a number of maritime academies have been closed permanently due to decline in numbers.

In India, any nation-wide entrance test for the selection of cadets brings a large number of academically bright students for a career at sea. Many of these promising young boys and girls are totally ignorant about this career due to geographical reasons. Some of them even may not like the environment at sea. At the same time, there may be many others, who are very keen to take this career and are familiar with it. What the author wants to point out is that the selection under these circumstances plays a very crucial role and the authorities responsible for it must exercise utmost caution in selecting the right and suitable candidates.

Candidates good in sports and games are found to be most suitable for the sea career. Not only are they disciplined, calm and more adoptive to sea life but also have a high degree of team spirit at work. Larsson (1996) in his paper, "Assessing ship/ boat

handling aptitude as a function of spatial ability and sports involvement" presented at the INSLC conference in Vancouver, stated that a shipping company, which did a number of surveys and interviews with their captains discovered that a majority of good captains had been involved in some sort of high school sport. He stated further that spatial ability plays some role in visual search strategies and decision making in sport. The same spatial ability of a sportsman or sportswoman makes him/her a good captain. Larsen's scientific reasoning for this fact is very interesting and convincing. The author reproduces it here under:

From a common sense standpoint, most sports require eye hand co-ordination and spatial ability in order to understand the time, speed and distance problem found in relative motion. This spatial ability is put to use when catching a fly ball in base ball, throwing a pass in football or basket ball, kicking a lead pass in soccer, passing a puck in hockey. These skills may be useful when handling a ship.

(INSLC, 9th, Vancouver, August, 1996)

The author feels that if the candidates, prior their interview are briefed well about life at sea and are shown a short video film on a sea career, many of them will be able to make up their mind at this stage. Their negative or positive response or their reactions will help the interview board in making "proper selection".

The author has been a member of interview boards conducting the selection of fresh candidates as cadets in his own shipping company, the Shipping Corporation of India Limited. Having been a co-ordinator of cadets' training in SCI Maritime Training Institute, the author had many occasions to interact with cadets of many Indian and Foreign shipping companies. It was discovered by him that most of the shipping companies and also the interview board of T.S. Chanakya do consider the sea aptitude and the suitability of the candidates, while recruiting them for Pre-sea (16 weeks) and B.Sc. (Nautical Sciences) entry streams respectively. Some of the

shipping companies even engage the services of a competent psychologist for this purpose. This kind of scrutiny and filtering in selection of cadets is possible in India because this career is in demand.

A fine blend of high academic qualifications with the right aptitude for sea, sportsman spirit and a good family background in a future cadet can be the best, one can expect at sea. This will certainly ensure that the cadets selected on these criteria shall have a high degree of motivation, awareness and sense of discipline towards their duties with a right kind of training afloat and ashore.

5.3 Training and assessment programme

In chapter 2 and 3, the training and assessment programme of deck cadets in India and their certification as officers in charge of a navigational watch (same as 2nd Mate Foreign Going Certificate of Competency) has been reviewed and analysed in detail. Application of the programme in all three phases of training in B.Sc. (Nautical Sciences) and Pre-sea (16 weeks) has been examined thoroughly. During the last phase, the procedures of evaluation and assessment of the competence of the cadets leading to their certification have also been carefully scrutinised. For a good review and close scrutiny, the author weighed the standards of national training programme against the prescribed standards of STCW-95 Convention at all stages. It was observed that the training and assessment programme fully complied with the requirements of the convention. Findings of the survey also collaborated with the author's observation.

However the objective of the author's work is not only to see compliance with the convention in the existing training programme. The objective in real sense is to examine the effectiveness of the training programme in producing competent and motivated officers, which are most suitable for the efficient operation and management of ships in the current environment of the industry at sea and ashore.

Keeping this sole objective in mind, the author hereafter examines the training programme and its curriculum and compares same with the programmes in other countries. The suggestions emerged from the evolution of the survey in respect of the training programme shall be examined. Any addition in the curriculum for improving the performance of cadets shall also be proposed.

5.3.1 Training and assessment programme of other maritime nations

As stated earlier the author studied the cadets' training programme and curriculum of Germany, the Netherlands, Sweden, Denmark, United Kingdom, Australia and China. The maritime administrations or the authorities designated by them monitor and control the cadets' training programme in these countries. Primarily two types of entry streams for cadets are there in these countries. The education standard for entry into training is school leaving certificate with Science and English subjects and so entry age group is between 17 and 19 years. Except in the Netherlands, all other countries train the cadets for the certification as officers in charge of a navigational watch. In the case of the Netherlands, the cadets are trained for the dual certificate of competency i.e. in nautical and engine both. The requisite seagoing service for the award of certificates of competency as chief mate and master in all maritime nations is in accordance to the provisions of STCW-95.

B. Sc. (Nautical Sciences) / Advance Diploma entry stream

This entry stream is available in Germany, the Netherlands, Sweden, Australia and China. United Kingdom is likely to start this stream some time in the last quarter of 1999. The average duration of the training is 4 years, which includes 12 to 18 months of structured shipboard training. The curriculum of shore based training of 30 to 36 months includes the operational and management level knowledge as prescribed in STCW Code A-II tables of competency. The curriculum of the programme of the Netherlands also includes the engineering knowledge as required by STCW Code A-

III tables of competency. The structured shipboard training is documented in the cadet's training record book. The shipboard training period is sandwiched in most cases in 2 or 3 spells of 6 months each, between the shore based training.

In the case of Germany, the Netherlands, and Sweden, the training institutes conduct assessment and examinations of the trainees. The successful cadets are awarded a degree or higher diploma in Nautical Sciences by the training institutes. At the same time, they are also issued certificates of competency as officer in charge of a navigational watch (Dual in the case of the Netherlands) by the concerned maritime administrations. These officers later on completion of the requisite sea service are issued the management level certificates of competency without any further assessment or examinations by the maritime administrations.

In the case of Australia, and the United Kingdom (proposed), the training institutions award the degree/diploma in Nautical Sciences only. The certificate of competency of operational level is given by the concerned maritime administrations, only after conducting their own oral examinations. Similar procedure is followed for the issue of management level certificates on completion of the requisite sea service. In the case of China, the administration conducts both written and oral examinations of the graduates for the issue of every certificate of competency after the requisite sea time.

Alternate entry stream (short pre-sea training)

Besides B.Sc./Higher Diploma Entry stream, Australia, UK and Sweden also have the alternate entry streams with short pre-sea training at the time of induction of the cadets. While the programme and curriculum of Australia and UK are almost identical, the programme of Sweden differs a little in duration of training.

In UK and Australia, the fresh cadets are first given a pre sea training of 3 /4 months and thereafter they are posted on board for structured training of 24 months. On

completion, the cadets do courses and training as required by STCW Convention for 9/12 months at maritime institutions in one or two spells. Thereafter they appear for the written examinations conducted by the maritime institutions and are issued a Diploma of Applied Sciences (2nd Mate). The maritime administrations subsequently conduct orals for these cadets and issue them certificates of competency as officer in charge of a navigational watch. The administration issues the subsequent management level certificates after the requisite sea time, provided these officers do the management level course in maritime academies and pass the oral examinations conducted by them.

In Sweden, the fresh cadets do pre-sea training during their high school studies in selected high schools and thereafter do 6 months seagoing service. Next they have 2 years shore based nautical studies in maritime academies as per STCW Code A-II/1 competency table and appear for written examinations conducted by the academy. The successful cadets are issued the certificates of competency as officers in charge of a navigational watch by the maritime administration after additional 18 months of sea service. The cadet has a choice to do one more year of management level course in the same maritime academy for getting the master's certificate of competency on completion of requisite sea service as a watchkeeping officer.

5.3.2 Comparative study of the training and assessment programmes

The author has made a comparative study of the training programmes of the selected maritime nations including India as shown in table 5.1. The study evolved the following advantages and disadvantages in the Indian training and assessment programme.

1. The training and assessment programmes of the maritime nations are found to be nearly identical. This is mainly due to uniform application of the new convention.

Table 5.1 Comparison of training and assessment programmes of B.Sc./Diploma entry streams of cadets from the selected maritime nations

Country	MET for award of degree/diploma by the maritime academy or university	Criteria for award of certificate of competency (COC) by the maritime administration
1. Germany	4 years including 12 months on board training i.e. 6 months each during the 1 st and 3 rd year.	Graduates are issued COC of OIC of NW without any further assessment. COC of chief mate and master are issued after requisite sea time.
2. Netherlands	4 years including 12 months on board training during 3 rd year.	COC of OIC of watch (dual) is issued after 3 years in academy. COC of master (dual) is issued on completion of 4 years full degree course. Both COCs are issued without any further assessment.
3. Sweden	4 years including 16 months on board training i.e. 4 months in each year.	COC of OIC of NW is issued on completion of the degree course. COC of master is issued after requisite sea time. Both COCs are issued without any further assessment.
4. Australia	3 years including 18 months sandwiched on board training in spells of 6/9 months.	Diploma holders to appear for oral examination for issue of COC of OIC of NW. Superior COCs are issued after oral examinations on completion of requisite sea time.
5. UK	4 years including 12 months on board training during the 3 rd year	Degree holders to appear for oral examinations for issue of COC of OIC of NW. Superior COCs are issued on completion of sea time and the management course on the basis of oral examination for each COC.
6. China	4 years including 6 months practical training on training ships of the academy	Degree holders to appear for written and oral examinations and complete further 12 months on board training for issue of COC of OIC of NW. Superior COCs are issued after requisite sea time and management course on the basis of written and oral examinations.
7. India	3 years including 3 months practical training on board the merchant ships.	Degree holders to do further 12 months of on board training and appear for oral examination for issue of COC of OIC of NW. Superior COCs are issued after written and oral examinations on completion of requisite sea time, competency, and management courses for each.

Abbreviations:
OIC of NW : Officer in charge of a navigational watch
COC : Certificate of competency
MET : Maritime education and training

2. India has both entry streams i.e. B.Sc. (Nautical Sciences) and alternate entry streams (called pre-sea entry stream) like UK and Australia. It is an advantage for a large number of aspiring young boys and girls in India to select the stream of their choice and either opt for a degree or non degree course. This also creates a healthy competition among cadets of two streams, who eventually sail together on board ships.
3. Degree in Nautical Sciences to the cadets of B.Sc. (NS) entry stream in India is awarded by the University on completion of 3 years shore based education and training to the cadets i.e. prior completion of their structured shipboard training of 12 months. In other maritime nations, the degree or diploma is awarded after completion of shipboard training.

Award of a degree is a testimony of the sound knowledge in a particular science. In the author's opinion it should not be awarded to a cadet before doing his shipboard training. The cadet must understand the application of the theoretical knowledge at his/her real work place prior his/her graduation, as his/her degree also gets him/her an exemption from the written examinations for the certificate of competency.

4. The period of structured shipboard training in other maritime nations in B.Sc. entry stream has been arranged in 2 or 3 spells of 6 months between the periods of shore based training. In India this training takes place at the end of 3 years shore based training. This is another disadvantage in achieving effectiveness of training in the Indian training programme. For a better assimilation of skills and competence in cadets, the structured shipboard training must be sandwiched between the periods of shore based training in one or two spells. This will provide an opportunity to cadets to apply their theoretical knowledge in understanding the practical shipboard operations and vice-versa.
5. In Germany, the Netherlands, Sweden and Denmark, the cadets with B.Sc./ Higher Diploma in Nautical Sciences from the maritime academies, are given the certificate of competency at operational level. The maritime administrations

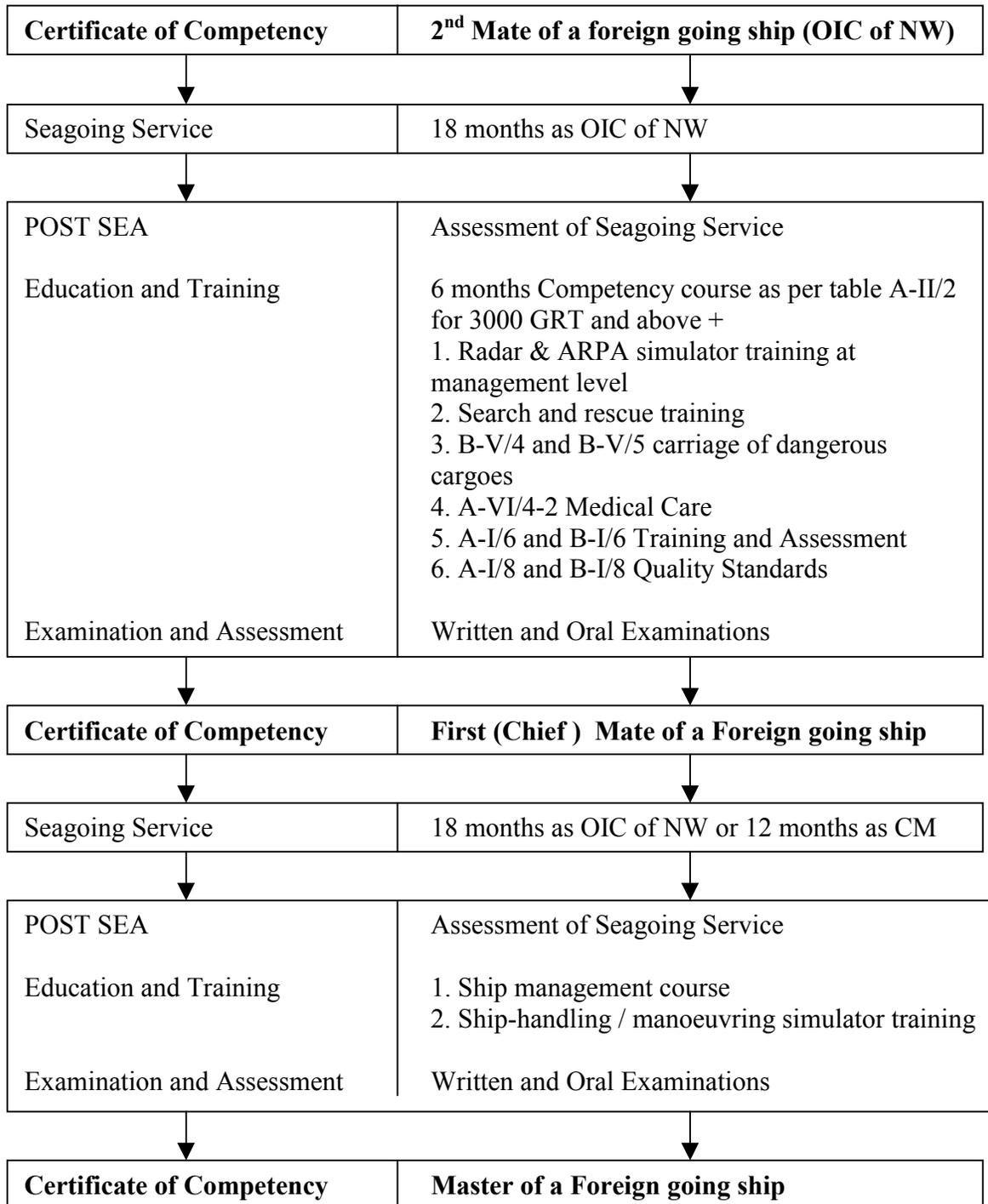
of these countries give these certificates without any further written or oral examinations. Management level certificates too, are issued in the same manner on completion of requisite sea time. These maritime administrations therefore consider that the degree or diploma course of 4 years in the maritime academy is sufficient enough for the issue of the certificates of competency. According to their system, it appears that the possession of the degree with seagoing experience is regarded, as demonstration of required skills and competence at management and operational level for the purpose of issuing the certificates.

In the case of Australia, and UK (proposed), the concerned administrations issue the certificate of competencies of all levels, only after conducting the oral examinations of the cadets, after their graduation or diploma course from the maritime academies. In China, the graduates from the academy are required to pass both, the written and oral examinations for the grant of each certificate of competency after completion of the applicable requisite sea service.

Procedures followed in India for issue of the certificates of competency give it an advantage, in doing a more effective assessment of competence and abilities for the certificate of each level. In B.Sc. entry stream, after graduation from the maritime academy and on completion of structured shipboard training, the cadets have to pass the oral examinations in all three functions for the issue of certificate of competency at operational level. These examinations are conducted by the DGS. Similarly for the certificates of competency of management level, as shown in table 5.2, these officers do 6 months competency course as per STCW Code A-II/2 and a management course for chief mate's and master's certificate respectively. These courses are done after completion of the requisite sea time. Thereafter the officers appear in written and oral examinations for the certificates of competency as chief mate and master separately. The assessment of sea service and the examinations are conducted by the DGS. This system provides the assessment of the proper demonstration of skills and competence of

Table 5.2 Training and assessment programme for the issue of Certificate of competency of Chief Mate and Master (foreign going) in India

2M (OIC of NW) → 1M (Chief Mate) → Master



"Source: META Manual (DGS, India), Vol.1, 1998, page II/4"

management level by the officer at the time of the issue of certificate of competency. Since the officers appear for each of the examinations after gaining sufficient experience at sea as 2nd Mate and Chief Mate, the examiners can judge their abilities and knowledge for the management level certificate effectively and strictly in accordance with the provisions of STCW-95 Convention.

A similar method of assessment, for the issue of all certificates of competency, is carried out in the pre-sea (16 weeks) entry stream. For operational level certificate, written examinations are followed by orals.

5.3.3 Course curriculum

The author studied the curriculum of the selected maritime nations including India and found that they are almost the same and in accordance to STCW Convention. The ratio of theory and practical classes and the number of lecture-hours in different subjects are found to be in similar ranges. It is observed that in the B.Sc. stream, where a degree is awarded by a university in Nautical Sciences, some extra academic and applied subjects are added besides the professional subjects to increase the scope of the degree.

Further the curriculum of both entry streams i.e. B.Sc. and Pre-sea (16 weeks) in India has following extra subjects and function:

1. Nautical Physics, Nautical Chemistry, Nautical Maths, Electricity, Electronics and Computer Science. These subjects are added due to the continuous development in technology on board and also the increasing application of computers.
2. A function of maintenance and repairs of engineering operational level from STCW Code A-III/1 to train the cadets in basic knowledge of the engine room operations.

5.3.4 Proposals for additions to the curriculum

The author proposes the addition of the following subjects in the existing curriculum for increasing the effectiveness of training.

Casualty case studies in Navigation function

No matter how much knowledge on the prevention of accidents, collision rules and ship handling is imparted to the future watchkeeping officers, it can never be a substitute for the real knowledge gained by them from studies and analyses of past accidents and near misses.

In his lecture "Maritime Casualty Investigation - Legal aspects" at the World Maritime University, Wiswall (1999) stated that in his legal practice of marine casualty cases, for more than 30 years, the mariners have been repeating the same mistakes again and again resulting in serious accidents. These accidents were responsible for huge loss of life and property added with severe pollution at sea. He urged and strongly pleaded with all students, that back in their countries, they must ensure that casualty investigation reports must find an important place in the curriculum of maritime education at all levels. He was very confident that it would surely help in preventing many collisions and increase the competence and skills of the mariners, in avoiding accidents at sea.

Similar were the views of Pourzanjani (WMU, 1999), which he expressed during his lectures on the subject. He too, explained to the author and his classmates, the use of casualty case studies as teaching materials, in raising the level of awareness of mariners to the dangers of accidents at sea.

The author feels that in all three phases of the cadets' training, casualty investigation reports must be taught to the cadets. However types of casualties must be carefully selected keeping in mind the professional level of the cadets in each phase. With proper discussion and analysis of these investigations, cadets will learn a lot from mistakes made by the mariners and their serious consequences.

Training in use and application of electronic charts

With adoption of the amendments in STCW-95, electronic charts have similar status to paper charts. A deck cadet is required to have knowledge of operation of the electronic chart systems of both types i.e. vector and raster, under the function "navigation at the operational level". For achieving competence in the navigation function, the cadet needs to know the capabilities and limitations of both chart systems. He should also be able to perform the task of watchkeeping officer using an electronic chart system for navigation.

While the regular curriculum may include both the electronic charts and their display and information systems (ECDIS), simulator training associated with the radar and ARPA can also be given to cadets.

Carriage of solid bulk cargoes on ships

In recent past, a number of ships carrying solid bulk cargoes were reported to be lost, sometimes without a trace, and heavy loss of life incurred. Being deeply concerned at continued loss of such ships, the Maritime Safety Committee of IMO recognised the urgent need to further improve minimum standards of competence of crews sailing on ships carrying solid bulk cargoes, to avoid recurrence of such casualties. On 9th December, 1998, by resolution MSC 78 (70), the committee adopted amendments to the tables A-II/1 and A-II/2 of STCW Code under the function of cargo handling and stowage at the operational and management level. The amendments at operational level supplemented the existing competence with further knowledge and understanding on the carriage of solid bulk cargoes on ships with particular attention to the inspection of damages / defects to the ship's structure in way of and adjacent to the cargo spaces.

The above said amendments to the competency tables of STCW Code are expected to enter into force on 1st January 2003 upon their acceptance by the parties of IMO. However considering the serious consequences of careless handling of solid bulk cargoes, the author feels that cadets must be provided with adequate knowledge and

training on this important subject with immediate effect. It is therefore necessary to include the new required competence and knowledge in the curriculum of training and assessment programme of cadets as per the amendments adopted by the Maritime Safety Committee. The increased knowledge and proficiency in handling the solid bulk cargoes at operational level shall definitely prevent accidents at sea.

5.3.5 Emphasis on practical training

A saying of Confucius

What I hear, I forget

What I see, I remember

What I do, I understand

IMO (1991), Model Course 3.05.

The results of the survey suggested the following two important actions for improving the effectiveness of training:

1. More practical training in a sea-like atmosphere
2. A good balance in shore and ship based training

Practical training relates mostly to the pre-sea training phase of the programme. The DGS (The Govt. of India) has already felt this need in early 1998 and revised the curriculum by adding more practical in each subject. About 300 hours of practical training have been added to the curriculum of both entry streams in seamanship, cargo work, navigation, chart work and workshop training. Necessary guidelines were issued to this effect and these have been in force from 1-8-98. In the light of this revision, the author feels that the present quantum of practical training in pre-sea phase of training is adequate.

The best sea like atmosphere for effective pre-sea training can be only on board training ship. Parker (1989) wrote that the shore-based training has limited value in providing seagoing experience and training in day to day shipboard routines, through

which the trainee must exercise, his craft. He stressed that in today's modern fleets, training ships are the only systematic way of providing on board training and enhanced experiences.

The results of the survey stated in the previous chapter also established that the cadets trained in training ships were the most competent. But due to the high cost of maintenance and operation of training ships, many maritime nations have shifted the training to shore based academies. To compensate for this change, a number of simulator based courses are included in the curriculum. As stated in chapter 2 and 3, the training ships in India were used for training of cadets for over 66 years. In 1993, the shore-based academy T.S. Chanakya was commissioned. To create a sea like atmosphere, for the training of cadets, the Government of India has recently installed a number of additional new simulators in T.S. Chanakya and LBS College of Advance Maritime Studies and Research. Real cranes, derricks and hatches with hatch covers are being installed with most of the cargo gear in the campus for effective training. The other training institutes providing the short pre-sea training of 16 weeks are also asked to provide the cadets with sufficient field trips to the ships and harbours. The DGS has issued guidelines to this effect to all training institutions.

Considering the high benefits of the training on board the training ships, some of the maritime academies in Australia, USA and Sweden have their own training ships for providing short sailing to cadets for practical training at sea. Some other maritime academies in China and USA have dedicated commercially operable training ships. The cadets in batches sail on these ships on overseas voyages and learn all shipboard operations and responsibilities. They even get remission of sea time for their competency examinations for their sailing period on the training ship. Since the ship carries cargo, it is not a financial burden on the academy and on the contrary, earns profits. The author suggests that the Government should study the feasibility of providing a small commercially operable training ship for T.S. Chanakya. This study must weigh the investments against the returns in form of effective and practical

training. The author is also optimistic, that some of the shipping companies may come forward to provide the technical and commercial management of the training ship, for raising the training standards of Indian cadets.

A good balance of shore and ship-based training is absolutely necessary for an effective training and assessment programme. The findings of the survey and the observations of the respondents maintained that an imbalance of these two phases was a cause of less effectiveness of the training in B.Sc. (Nautical Sciences) entry stream. The author too, agrees with this fact and feels that the ship-based training period of 12 months in this stream should be increased to 18 months. This will leave 30 months for shore based training. Further this ship-based training period can be divided into 2 spells of 9 months each or 12 and 6 months each. These 2 spells of the on board training are to be separated by periods of shore based training. This arrangement will have both phases of training alternatively in the total training period of 48 months. The degree of B.Sc. should be awarded on completion of the full training of 48 months. This arrangement has the same pattern of training as followed in other maritime nations. It will definitely improve the effectiveness of training in this stream. There is also the need of a separate training record book for the prescribed period of shipboard structured training in this stream.

For the shipboard training during the degree course, the cadets from B.Sc. stream shall require operational ships. For this, the same system can be adopted in India, which is being followed in many other maritime nations. In this system, the shipping companies either recruit cadets prior to their admission to the academy or before the commencement of the shipboard training from the campus. This ensures that cadets do their shipboard training on the ships of the company, where they will be employed later. This system also gives a job security and confidence to the cadets. Prior to making the selection of the cadets for each batch in this stream, the Government can have the total number of cadets required by the shipping companies.

This will ensure a good control on training and will also prevent wastage of training expenditure, in case any unemployment crises develop at sea.

In pre-sea (16 weeks) entry stream, the balance in various phases of training has been found to be very good. It is similar to the streams of this type in other maritime nations. However a few respondents, suggested an increase in the pre-sea training period from 16 weeks to 6 months for more effectiveness, in overall orientation of the cadets for sea life. The author feels that this point should be considered, later after seeing the impact of new guidelines issued by the DGS, which has increased the practical training in a sea-like environment.

5.4 Training in human skills, motivation and discipline

This is one of the most important aspects of training. According to Olofsson (1997, 40), there is a real need to minimise the scope for poor human decisions, which contribute, directly or indirectly, to equipment damage, a casualty or a pollution incident. Sighting that approximately 80 % of all shipping accidents are caused by human error, he reaffirms that the underlying truth in this fact is that a human being's actions or omissions play a part in virtually every accident. It is therefore absolutely necessary to develop awareness and sincerity in the officers towards their duties and responsibilities for safe operation of their ships. The results of the survey in the previous chapter clearly gave the measure of these all-important qualities in the officers from both the entry streams. It has been observed that there is a growing lack of these qualities in general. However there is a grave concern for the cadets of the B.Sc. entry stream, who possessed the least of these qualities among all the entry streams. This obviously brought down the effectiveness of their job performance in all functions.

As discussed in section 5.1 of this chapter, a careful selection of cadets with right aptitude, family background, sportsman spirit and other criteria said therein, will certainly lessen this problem considerably. Following this, very good results can be

obtained by giving the right type of regimental training. A number of activities in the entire training period afloat and ashore, can be used to inspire the cadets to understand the values of a good moral character and conduct.

The training institutions are required to chalk out a well-planned programme for the pre-sea and post-sea training periods. This programme should be implemented with the help of dedicated and committed trainers, who can cultivate these basic human qualities in the mind of young cadets. The author does not feel the need to suggest the types of programme, which the institution will have to make for the purpose. However, the author certainly would like to stress that the institutions must give priority and seriousness to develop these qualities in cadets, as much as they give to the other academic and professional curriculum. The methods to do so must be very friendly, but firm to see that these are not counter-productive. The training activities and the role of the trainers in conducting these must be carefully assessed and monitored by the heads of the training institutions.

The shipboard officers have a major role and responsibility to ensure that the human skills and the qualities inculcated in cadets during their pre-sea training, become permanent parts of their conduct. The masters and mates of the ships should continue training cadets in these aspects. They should set examples themselves and inspire the cadets to learn the value of discipline and awareness for safety at sea. They at the same time must help cadets to adopt the new environment at sea in a most caring and affectionate way. Parker (1989) agrees that these qualities are not forged in the classroom, answering examination questions. They are in fact learnt on board, by the reinforcement of approval for good practices and disapproval of bad practices. He goes on to say that it is largely through this process, senior to junior, that the trainee learns his craft and discipline is established.

5.5 Continuous on-the-job training

This includes the structured shipboard training of cadets and also the training of cadets after they are certified as officers in charge of a navigational watch. On-the-job training and learning has no parallel. This helps the mariner to use his/her knowledge in performing the challenging tasks in different situations and circumstances. This gives him/her the competence and skills by experience and develops confidence in his/her ability to perform all jobs. On-the-job training also helps the deck cadets to update their knowledge in performing the shipboard operations, each time with a better speed and better results.

STCW-95 Convention gave maximum importance to "on-the-job training" and made this very systematic and effective for cadets by introducing a cadet's training record book for the structured shipboard training. However its effectiveness shall depend on the proper and sincere implementation by the designated officers. In chapter 3, the author has already given details of the structured shipboard training programme (SSTP). Considering the results of the survey and the observations made therein, the author feels that the following provisions are necessary for the effectiveness of the SSTP:

1. The shipping company must have an approved SSTP from the DGS. If not, the company can have a DGS approved distance learning programme conducted by Birla Institute of Technology and Science (1997).
2. All senior officers and the master besides the ship-training officer must share the responsibility of training of cadets on board. They must watch the cadets' activities at all times and guide them to follow the correct procedures.
3. Where necessary due to the nature of the employment of the ship, the company must provide a dedicated training officer, who can give sufficient time for cadets on board training.

4. The company must post the cadets on all types of ships for a reasonable period for a diversified training as per the training record book.
5. Sufficient time for studies and for extra curricular activities must be provided to the cadets on board.
6. The company and the master both must ensure that the cadets are never used as replacement for ratings.

The introduction of a training record book has provided a number of benefits for on board training of cadets. It not only helps the cadets to keep a track and record of their learning, but also helps the trainers for good planning of their training objectives. In some shipping companies, the effective execution of the structured shipboard training is not possible, due to operational difficulties and lack of time with the mates and master. Recently, approved distance learning programmes have been permitted in such companies for this purpose.

Lord Perry of Walton (1994), in his keynote address on "the development and implementation of international maritime training standards", at the World Maritime University, Malmö explained the utility of the distance learning programme as follows:

It is, that the speed of technological change is now days so great that the initial training in all fields of science and technology becomes outdated. This is the reason why there has been such an explosion of continuous education provision; and why so much of it has to be done by distance education because key people can not be released from work to go back to school at regular intervals. For mariners this is the reason why on board training has become so very important.

(International Conference of WMU & NI, Malmo, 15-16 March, 1994)

In India, the DGS has approved a distance learning programme, which is conducted by Birla Institute of Technology and Science (BITS). This programme is managed and operated by the maritime professionals, who ensure that the structured shipboard training programme of cadets is executed effectively. BITS also has plans for making similar distance learning programmes for on-the-job training of watchkeeping officers and mates at sea in the near future. However the programme is totally optional for the cadets and their company.

The author has observed that the excessive interference of the senior officers in the "on-the-job training" of junior officers may be counter productive. An ideal "on-the-job training" shall be the one, where the trainees are often left to develop their own skills by self-realisation. The trainers must watch their performance and give them feedback later for improving their performance. Baillie (1998, 19) supports the author's view in the following lines:

Training involves a deliberate scheme to assist the learner. It involves the trainer guiding the learner to make more satisfactory or effective actions, helps him to attend to the appropriate feed back signals, encourages him and evaluates his progress. As skill improves the actions become smoother or quicker (or whatever the skill requires) and then the learner can focus more attention on the significant feedback. He thus takes charge of his final development with the trainer having less input.

A high level of effectiveness in "on-the-job training" of cadets can be achieved if the trainers on board motivate and encourage the cadets to perform better than what they could. The trainers should feel proud of those cadets, who excel beyond the abilities of the trainers themselves. Baillie (1998, 22) again explains this fact very nicely as follows:

At most levels, you expect teacher to be better in doing a task than the trainee. But at the highest level, the ambition of a competent teacher is that his best students will actually perform better than he or she. Coaches in sports are generally not as competent as the best performers; they offer insights, motivation and a wealth of learning from the experience of others. Like wise there are competent trainers who can help practical men to perform better than-they.

5.6 Quality assurance and records

As stated in chapter 2, the training and assessment programme of the cadets in India and all associated training activities comply with the quality assurance system, in accordance to the section A-I/8 of STCW Code. The programme also provides a centralised record system, which maintains a record of all certificates and endorsements, issued to the deck cadets and officers throughout their life. In the case of cadets, within 3 weeks of commencement of his/her pre-sea training, Principal, LBS CAMSAR (1999) allots a distinctive permanent Indian National Database of seafarer (INDos) number to him/her. This number shall be stated in all maritime certificates and documents issued in India to that cadet during his/her lifetime.

The key of the entire process of a quality assurance system is the "related standards of competence", which have to be achieved by the trainees i.e. cadets in this case, for the effectiveness of the training. These "related standards of competence" and their vital link with the training and assessment programme is explained in para (1) of section A-I/8 of STCW Code on quality standards. The author reproduces it here:

National objectives and quality standards

Each party shall ensure that the education and training objectives and *related standards of competence* to be achieved are clearly defined and identify the levels of knowledge, understanding and skills appropriate to

the examinations and assessments required under the convention. The objectives and related quality standards may be specified separately for different courses and training programmes and shall cover the administration of the certification system.

IMO (1996)

The quality assurance system sets these related standards of competence, which are included as objectives in the training and assessment programme of cadets. This implies that the administrations responsible for making these programmes must find out from time to time, the standards of the competence required by the certified officer of a navigational watch. These standards will directly relate to the level of technology and the working shipboard environment at sea. Simply making a training and assessment programme as per the competency tables of operational and management level in STCW Code shall never enhance the effectiveness of cadets' training. Moreover many standards of competence in these tables need to be supplemented due to changes in technology and procedures in the industry, which is a continuous process. It is therefore necessary for administrations, to have a good periodical feedback from on-the-job performance of the cadets and deck officers for upgrading quality standards of the training and assessment programme as and when necessary.

The training and assessment programme of deck cadets in India has certain advantages in this regard. Firstly the DGS itself carries out all written and oral examinations of the cadets and deck officers for the issue of certificates of competency. The examiner thus gets a good feedback on the effectiveness of training. He also discovers the level of competence of the officer in relation to the required levels vis-à-vis the developments at sea. Secondly, the programme also provides a number of academic councils, where the experts are drawn from the various sections of the industry. These councils as stated earlier in chapter 3, monitor the performance of trainees ashore and afloat and submit periodical feedback reports

to the DGS. Thirdly, the examiners and assessors in the programme are the nautical surveyors from the DGS, who also conduct all statutory surveys, flag-state inspections and various marine enquiries, related to ships and their personnel. This gives them an excellent feedback, which in turn is passed on to the DGS. However the author feels that the above feedback is not enough for setting quality standards of training, when we aim for the excellence in competence and skills. In his opinion, a feedback on the effectiveness of cadets' training must also be obtained in specially made report forms from the shipmasters, ship-managers and training institutions at least once in 6 months.

The quality standards of cadets' training in India have been one of the best in the world, but there is an acute need to maintain this tradition in view of many new developments. The global shortage of trained seafarers suddenly saw a sudden increase in demand for Indian seafarers, who held an excellent track record for their performance in the global industry. This in turn encouraged many individuals to quickly establish and run a number of small training institutes providing pre-sea training of cadets. Some of them provide just a few approved basic safety courses. These small institutes have to comply with the stringent requirements for approval of the DGS. However, there is always a fear that the excessive commercialisation by these new small time operators may dilute the standards of otherwise good training. The author strongly suggests that a very close monitoring of the training methods, resources, trainers, assessors and the trainees in these institutes must be made confidentially. Moreover independent assessors and experts must check the background, professional competence and the motives of the operators of such existing institutes. Similar procedures must be followed before granting permission for opening any training institute.

5.7 Involvement of industry

Every section of the shipping industry is involved either directly or indirectly with the marine education and training of the cadets. It is because, in due course of time,

the cadets rise in their career and eventually many of them take up important and key positions in the industry. These can be in shipping companies, shipyards, classification societies, port and harbour management, stevedoring companies, insurance, maritime training institutes etc. The cadets however begin their career on board the ships. It implies that an efficient and safe management of ships at sea and the industry ashore, depends a lot on the competence and skills of these cadets, when they rise in their career. It is this reason that every section of the industry, must see in its own interest that the cadets are provided with the best possible education and training.

As described in chapter 2, the Government of India very rightly treats the training of the cadets as an equal responsibility of all sections of the shipping industry. The Government involves the industry and the training institutions deeply in this all-important training programme of the cadets. The META Manual and the guidelines issued by the DGS (the Govt. of India) from time to time clearly define the role and responsibilities of the various sections of the industry.

All sections of the industry have mainly one single objective and that is the effective implementation of the training and assessment programme of the cadets. The administration, shipowners and the training institutions among them share most of the responsibilities for achieving this objective. The other sections of the industry also contribute in many ways and help them in providing an effective training for the cadets. Successful teamwork among the various organs of the industry creates a more effective cadet-training programme. Parker (1997, 38) rightly says that there is tremendous scope for teamwork in training between education providers, industry and the administration. Underpinning the success are the lecturers who prepare the youngsters for a life at sea and the sea staff who ensure that the lessons of experience are learnt and remembered.

To begin with, the shipowners have to make a proper selection of cadets with right aptitude and qualifications. They have to also ensure that a continuous "on-the-job training" of high standard is provided to the cadets prior and after their certification. The author has already outlined and clearly defined the criteria of selection and "on-the-job training" of the cadets in this chapter. The shipowners must also provide an important link among the administration, the training institutions and the trainee cadets for an effective monitoring of their training in all phases. They must post the cadets on different types of ships to give them an extensive training. And the most important duty of the shipowners is to provide the right atmosphere on the ship, which can give cadets a good motivation, awareness and great sense of discipline towards their duties and personal hygiene.

The shipowners must realise, that the competence and skills of officers manning their ships at high seas, has a direct impact on their overall business and the financial performance. For this reason, the shipping companies should carefully groom their cadets into highly talented and competent officers. The well-trained cadets are the most valuable assets of a shipping company, who provide strength and stability for it well into the future. The author is proud of giving the example of his own employers to prove his viewpoint, said above. The Shipping Corporation of India Limited is one of the largest shipping companies in the world. It is also a most efficiently managed and profit making company. The company is well known all over the world for its total commitment to the training of its fleet and shore personnel. The company has its own training institute of international fame in Mumbai. No other shipping company in the world is known to have an institute of this size and scale. The company spends unlimited funds for the regular training of all its employees on a continuous basis. It also has the best resources and establishments for the cadets' training, which is one of the most specialised training in India. The secret of the success of the Shipping Corporation of India lies in its thoughtful investment in the training of its own officers. This investment gives in turn, very rich dividends to the company in terms of all round safety and efficiency in service.

The other sections of the industry also have a major role to play in the cadets training. These organisations should provide the field trips of cadets from various training institutions to their areas of operations such as port and harbours, shipyards, workshops, dry docks, etc. The senior seafarers of these organisations should brief cadets about the working of their units and their role in achieving safety at sea. These officers should actively involve themselves in the working of the academic councils, which have been constituted by the DGS for monitoring the cadets' training. They can also provide valuable lectures to the cadets on the nautical subjects in the training institutes. It will apprise the cadets of the latest developments in the industry. Generous financial help from these sections of the industry for procuring training equipment for the training institutes would also help in improving training standards.

5.8 Training resources and their adequacy

5.8.1 Training institutions

Section 2.5 of chapter 2 has the data on annual output of the cadets from the approved training institutes, providing pre-sea training through B.Sc. and Pre-sea (16 weeks) entry streams. According to this data, maximum 1046 cadets can be inducted in the Indian shipping industry every year. However this output of the cadets is still not able to make up the national shortage of deck officers. It is because more than 50 % of these cadets are directly recruited and trained by the foreign shipping companies and their agents for their own ships. The remaining output of the cadets is not adequate for the national industry, when we consider the regular exodus of officers to foreign flag vessels and also a fair growth in the national tonnage. The author feels that considering the present global need for trained and competent Indian officers and also the need of national industry, there is a requirement of training about 2000 cadets in a year. That means either the existing training institutes will have to augment their training capacities or new approved training institutes are to be

opened. However it is never sure that in an unpredictable industry like shipping, the current demand of cadets will remain for long. This demand shall also depend on the output and acceptability of cadets from other developing nations in the global shipping industry. It is for this reason and to avoid any unemployment situation, which we saw in the middle of the nineties, it is necessary to carry out a thorough study on the subject. This study of the exact demand of the cadets in the industry shall help in planning of any strategy for opening the new training institutes.

5.8.2 Resources in the training institutions

The DGS (The Govt. of India) through its META Manual and the various guidelines issued from time to time has clearly laid down the requirements for training resources in all approved training institutes. The author has already described these requirements applicable to the two entry streams in detail in chapter 3. These rules and guidelines ensure that the training institutions are well equipped with all required resources and the facilities for the effective training.

However, the findings of the survey suggest that there is a need for optimum and proper use of the training resources by the cadets. Lack of practical training was observed especially in B.Sc. (Nautical Sciences) entry stream by many in the survey. The author during his visits to the training institutions has found sufficient equipment and facilities for the trainees there as per the rules of the DGS. Recently even more simulators and real cargo handling devices have been installed in T.S. Chanakya due to the serious concern of the DGS towards the cadets' training. The author feels that most of the approved premier training institutes having maximum training capacity are well equipped with all training equipment, infrastructure and other training resources. This means that for better effectiveness of training, it is the management of the training institutes, which has to play a more responsible role for optimum and adequate use of the training resources. Where necessary, the competent, sincere and result-oriented trainers, who are experts in operating the latest simulators, should be engaged. Muirhead (1997, 66) wrote very strongly about the role of the institutions

in ensuring proper and effective use of the training resources especially the simulators for achieving high training standards.

Institutions will have to consider the capabilities of the simulator in meeting established performance standards and course training objectives as well as considering how they intend using the simulator for assessment of performance. Who will carry this out and how will administrations check to see that all standards are complied with?

As discussed earlier in this chapter, the field trips and educational tours of cadets to various sections of the shipping industry and places of maritime interest are also a part of the training resources. Their planned and systematic use shall also enhance the effectiveness of training. Similarly the lifeboats, rowing boats, life rafts and other life saving appliances available in the campus must be regularly used.

Some of the smaller and new cadets' training institutes need to have proper facilities of indoor and outdoor games for the cadets. The author in previous sections has already explained the importance of games and sports for shaping a cadet into a good mariner. All training institutions must ensure that the cadets are given adequate time for sports and games for enhancing the effectiveness of training.

The survey results also pointed out that the cadets often lacked human skills, motivation, good behaviour and sense of discipline, which effected their performance. These problems in training and strategy to overcome these have already been formulated in earlier sections of the chapter. Here the author takes up the role of the trainer in developing these qualities in the cadets. A good trainer is the most important source of training in an institution. He is a role model for cadets and gives the first impression of a ship to most of the cadets. The trainer is the one, who makes the cadets understand the dignity of labour, hard work and good moral values of character in sea life. The pre-sea training institution is actually the first ship of the

cadets and most of them adopt the habits and methods learnt here, in most part of their career. The trainers therefore, with their good planning of training can easily motivate the cadets in developing a good moral character and a high sense of discipline.

For a good planning of training activities, the trainers must have the latest knowledge on the working conditions and the stresses, a cadet will have to pass through during his career at sea. The trainers must be able to explore the capacity and talents in each cadet and use them for the best results. It is therefore necessary that the training institutions must exercise great care, while recruiting the trainers or the faculty for the cadets' training. Only dedicated, committed and experienced trainers should be employed who have the right aptitude and inclination for educating and training the cadets.

According to Parker (1997, 38), it must be remembered that educational technology is also advancing and lecturers/trainers have to become familiar with new applications of computer based systems and simulation. The author has already expressed the same view and strongly feels that the training institutions should ensure that the trainers or the faculty of cadets alternate between ship and shore services periodically. This practice shall familiarise them with the latest level of technology and working conditions on board ships. If this is not possible, recently sailed suitable masters may be employed as faculty or trainers for the cadets for an all-round effectiveness of the training.

5.9 Summary

The strategy for enhancing the effectiveness of deck cadets' training can be summarised as follows:

- Existing training and assessment programme of deck cadets is by and large, found to be good. However there is scope for making a good balance between

theoretical and practical training, with some additions in the curriculum for new technology as well as for developing human skills and a more effective implementation. These improvements are required to enhance the effectiveness of the training.

- Selection criteria for deck cadets at induction level to give adequate weightage to family background, sea aptitude and sportsmanship of the candidates.
- Provision of small training ship, either operated by a maritime academy or by a shipping company for periodical sailing of the cadets in batches during pre-sea training. This will provide the cadets with good practical training.
- Shipping companies need to implement the training programme of cadets effectively through all three phase with special attention to structured shipboard training. Cadets should not be used as replacement for ratings but be given adequate time for studies and sports/games.
- Training institutions likewise to implement the training programme very seriously. They to provide cadets with a sea-like atmosphere, motivation towards their duties and adequate sports and extra curricular activities. The institutes to make optimum and effective use of all training resources.
- Well-trained and effective trainers with the latest knowledge are to be employed by both the training institutions and the shipping companies. Trainers to often allow cadets to develop their own skills by self-realisation.
- For maintaining quality standards in training and to upgrade the same to match with the latest technological and structural changes in shipping, a periodical feedback on post training performance of deck cadets of all entry streams must

be obtained. The feedback can be obtained from shipmasters, ship-managers and the training institutions.

- All sections of the industry other than shipping companies, administration and training institutions also need to play a more constructive role by their active involvement in the cadets' training. They to provide training resources and financial assistance to the training institutes.
- A thorough study for determining the annual requirement of deck cadets in the country needs to be carried out. It will assist the administration in proper monitoring and controlling the number of training institutes and their output and also to avoid any unemployment of cadets in future.

Chapter 6

Conclusions and Recommendations

Technical and structural changes in shipping render much initial training obsolete in a relatively short time, so there is a constant need for updating. However, this need is not limited to seagoing staff but to every person involved in decisions concerning navigation and safety at sea in the whole of the shipping community. The human factor is also present in the owner's technical and financial departments, the naval architect's design office, the instrument manufacturers, training establishments, etc. A better overall knowledge would not only improve safety, but also reduce cost through fewer accidents, more efficient ships and reduced manpower requirements. Seamanship is sometimes said to be the art of overcoming the bad design, which is far too often true. We would all benefit if ship handling could be seen to be not so much an art but the skilful application of forces based on the scientific facts.

(Gylden, 1989, 200)

The safety of ships and protection of the environment at sea directly depend on the competence and skills of men, who man the ships. An old saying, "a ship is as good as the men who man her" fully collaborates this fact. The growth of the shipping industry, its various needs and the competitive atmosphere will keep changing the ship design and the working atmosphere at sea for more and more productivity. In this change, the latest technology and science will innovate newer and newer operational methods, which actually pose a great challenge to the competence and

skills of the shipboard officers. It is therefore necessary to upgrade the training standards of the cadets and periodically improve the all round effectiveness of the training. This enhanced effectiveness of training will provide the competent and skilled officers with a high degree of motivation and awareness towards their duties. These well-trained and qualified officers then can meet the challenges in the shipping industry and provide a safe and efficient management at sea for years to come.

The author's study therefore has been centred mainly on the quality and effectiveness of the maritime education and training of deck cadets in India. The findings of the survey on post training performance of deck cadets provided the author with identification of the areas of training, which lacked quality and effectiveness. This led the author's research to explore and conclude on all possible methods for improvement in the training programme of cadets.

6.1 Conclusions

The conclusions of the author's research for enhancing the effectiveness of the deck cadets' training programme are:

- The overall cadets' training and assessment programme in general has been found to be well framed, balanced and in compliance with national and international training standards. However there is a need to effect some minor adjustments and changes in programme, curriculum and in its implementation to achieve further excellence and effectiveness in training as described in the following paragraphs.
- Due to continuous changes in the technology, structure and work-procedures in the shipping industry, it is necessary to constantly update the curriculum to include latest required knowledge and skills. It is also necessary to obtain feedback on the post training performance of the cadets at least once in 6 months. These will assist the administration to upgrade the training programme as and when necessary for maintaining high quality in the job performance of deck cadets.

- Lack of motivation, initiative, discipline and awareness in cadets to their duties on board has been found at various levels. A careful selection of cadets at entry level can overcome this deficiency considerably. It is well understood that a career at sea requires a deck officer to have a good capacity to accommodate with the tough and disciplined life at sea as well as an in-built instinct to adopt to quick changing operational and environmental circumstances. Often an individual officer of the watch has to take important decisions instantly in his own capacity for the safety of his ship. It has been established well in chapter 5 that the candidates with the right sea-aptitude, high sense of discipline, clear initiative and sportsman spirit adopt a sea career with much ease and perform excellently. The atmosphere in which a candidate has been brought up and educated prior his induction as cadet deeply influences his conduct and behaviour later at sea.
- Lack of practical knowledge has been observed in the performance of officers, particularly in B.Sc. (NS) stream. The revised training programme of the pre-sea entry stream will take care of this aspect. However in B.Sc. (NS) stream, there is a strong need to provide a good balance in shore and shipboard training. The theoretical knowledge gained by cadets has to be soon followed by its practical application at the actual work places, especially in ship handling and other navigational and operational skills. Frequent exposure to sea and shipboard atmosphere during long pre-sea training such as in B.Sc. stream not only provide the practical skills but also a good confidence and motivation in cadets. The period of shipboard training in this stream therefore needs to be increased from 12 months to 18 months. This period must be sandwiched in 2 or 3 spells in between the shore based training period of 30 months.
- Award of B.Sc. degree to cadets in B.Sc. (NS) entry stream prior completion of their shipboard structured training totally ignores the importance of developing the right kind of competence and skills required in a sea career. This gives a false sense of perfection to cadets towards their future assignments at sea. This also creates lack of motivation and concern in cadets towards their shipboard duties.

The B.Sc. degree in Nautical Sciences therefore is to be awarded to cadets only after their successful completion of a full 48 months of training including shipboard training.

- Considering the role of the training ship in giving realistic and practical training in shore based academies, there is a need to study the feasibility of providing a small training ship to the maritime academy for the cadets of B.Sc. (NS) stream. The training ship can be operated either by the maritime academy or by an interested shipping company.
- Study and analysis of carefully selected cases of past accidents and near misses at sea supplement the theoretical knowledge gained by cadets in classrooms on the subject. Cadets learn a lot from the mistakes made by mariners and their serious consequences during discussions on the casualty investigation reports. Likewise training in the use of electronic charts and their display systems for navigation is needed today for cadets. Considering severe loss of ships carrying solid bulk cargoes, there is an urgent need to train the cadets for safe carriage of this cargo. Cadets are required to understand the adverse effects of solid bulk cargoes on the ship's structure and how to detect these for the safety of the ship. Inclusion of these three subjects in the curriculum will improve the competence and skills of future deck officers in navigation and cargo handling.
- The training and assessment programme is required to provide more specific and clear procedures for training the cadets in human skills, motivation, discipline and awareness towards their duties. Accordingly, the training institutions and the shipowners have an important role in developing these qualities in cadets, which are necessary to supplement their competence for an excellent job performance. Trained and committed training officers ashore and on board can easily inculcate these basic human qualities in the young cadets. Adequate provisions for sports and other extra curricular activities for the cadets in campus and on board ships also develop these qualities.
- Posting of cadets on different types of ships during their shipboard training provides cadets with a good knowledge and familiarisation with all kind of

operations and technology at sea. This also helps cadets in achieving all proficiencies listed in the training record book.

- Use of cadets as replacement for ratings adversely affects the structured shipboard training. Cadets fail to acquire the leadership and organising qualities.
- It has been found that excessive interference of training officers in the training of the cadets becomes counter productive. For more effectiveness of training, the trainees should be often left to develop their own skills by self-realisation. Training officers can provide the feedback on their performance for this self-realisation.
- A thorough study needs to be carried out to determine an estimated number of cadets to be trained annually in India. This will assist the administration in deciding the actual need of training institutions and also in avoiding any unemployment of cadets in future.
- Lastly for more effective implementation of the cadets' training programme through various phases, all sections of the shipping industry have to work together and have an equal responsibility. This includes:
 1. The administration needs to monitor more closely all training activities of cadets ashore and afloat. This will ensure the use of correct methods in training and also the optimum and effective use of training resources. For maintaining high quality standards of training, the members of the academic councils and other authorities designated by the administration should frequently assess and evaluate the performance of the training institutions and the shipping companies.
 2. Cadets in the pre-sea entry stream are directly recruited by the shipowners. As stated earlier, cadets have been found lacking in human skills and have failed to show due concern to their duties. The shipowners therefore need to make proper recruitment of cadets having the right sea-aptitude, initiative and a good sportsman spirit. This develops good human skills and motivation in cadets later at sea. They need to monitor and review the cadets' training ashore and afloat. They also need to provide a good feedback on progress of the cadets' training and

- also on any shortcomings witnessed in training, to the administration for corrective actions.
3. The training institutions need to employ dedicated and trained trainers with the latest knowledge in shipboard technology and working conditions on board ships. The trainers need to alternate between the sea and shore service for this purpose. Another method can be to employ recently sailed officers as trainers. This is necessary to ensure the optimum and effective use of the training resources by the cadets. The training activities and the performance of trainers are to be assessed and monitored by the training institutions to avoid any dilution of training standards set by the administration.
 4. All other sections of the industry such as the classification societies, port management, manufacturers of shipboard equipment, shipyards, workshops, etc. must be encouraged by the administration to be associated with the cadets' training. It is because the well-trained and competent deck officers provide an efficient and safe management of ships at sea and the industry ashore. In other words a good training to cadets at foundation level has a direct impact on the performance in all sections of the industry. They should therefore in their own interest provide field trips for cadets to their organisation, lectures in the training institutions and also financial assistance to the training institutes for procuring the latest training equipment.

6.2 Recommendations

It is strongly recommended that:

- All sections of the shipping industry viz. the maritime administration, the ship owners and the training institutions work together to implement the cadets' training and assessment programme effectively. For this purpose, the effectiveness of the programme must be determined periodically to upgrade the

programme to keep pace with technological and structural developments in the industry.

- The selection criterion of cadets lays strong emphasis on family background, sea-aptitude, familiarisation with the career at sea and sportsmanship of the candidates.
- B.Sc. (Nautical Sciences) entry stream provides a minimum of 18 months of structured shipboard training sandwiched between 30 months of shore based training in two or three spells.
- The recruitment of cadets in B.Sc. (Nautical Sciences) entry stream is done as per their requirement in various shipping companies.
- Cadets in B.Sc. (Nautical Sciences) entry stream do their structured shipboard training on the ships of their employers for the award of the B.Sc. degree by the university.
- The administration provides or approves a separate training record book for the period of 18 months of structured shipboard training in B.Sc. (Nautical Sciences) entry stream.
- The shipowners post cadets for their shipboard training on different types of ships for a reasonable period.
- The shipowners ensure that cadets are not used as replacements for the ratings on ships.
- The university awards the degree of B.Sc. (Nautical Sciences) only on successful completion of the entire 48 months' training period including 18 months of shipboard training.
- The administration provides a suitable training ship to give more realistic and practical training to the cadets of B.Sc. (Nautical Sciences) entry stream. If necessary, the training ship may be operated by any interested shipping company.
- The curriculum includes three important subjects namely "Collision case studies" and "Electronic charts" in the Navigation function and "Carriage of solid bulk cargoes" in the Cargo handling function.

- The training and assessment programme provides more specific and clear procedures for training the cadets in human skills, motivation, and sense of discipline and awareness towards their duties.
- The training programme makes compulsory provisions for sports and extra curricular activities ashore and afloat for the cadets during training.
- The training institutions and the shipowners ensure that the cadets are encouraged to develop their own skills by self-realisation during their training ashore and afloat. Trainers should observe cadets' performance and provide them with the feedback later for their self-realisation.
- The administration more closely monitors the compliance of the training programme of cadets by the training institutes and the shipowners.
- The members of the academic councils and other officers authorised by the DGS make unscheduled inspections and assessments of the quality of training being provided in the training institutions and on board ships.
- Shipowners make proper selection of cadets, monitor and review cadets' training ashore and afloat, and provide a good periodical feedback on progress of training to the administration for corrective measures, if any.
- The training institutions make optimum and effective use of training resources to train the cadets.
- The training institutions employ dedicated and result-oriented trainers with knowledge of the latest technology and working conditions on board ships.
- Trainers in the training institutions be given improved salaries and incentives.
- The administration encourages the other sections of the industry viz. the classification societies, insurance companies, port management, shipyards, major workshops, manufacturers of ship-equipment and machinery, etc. to provide the training resources and financial assistance to the needy institutions for procuring the latest training equipment and simulators.
- The administration conducts a study to determine the annual need of deck cadets to be trained.

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APPENDIX 1

T.S. CHANAKYA WEEKLY ORDER NO. 14

C.C.C.: RAI S.

Date: 21-11-1998

I. ORGANISATION

DAY	DATE	OOD	LOD	IOD	HOSTEL	DUTY TOP	GAMES TOP
S	21	PCR	---	NLC	SJP	PST	SZT/SST
S	22	VNK	---	KSD	JSP	SST	PFT/SFT
M	23	SYL	SMP	DK	SJP	PFT	PMT/SMT
T	24	MVP	NK	LBP	JSP	SFT	PZT/SZT
W	25	AKP	NW	NLC	SJP	PMT	PST/SST
T	26	KKG	SMP	KSD	JSP	SMT	PFT/SFT
F	27	SKK	NK	LBP	SJP	PZT	PMT/SMT
S	28	KRS	---	DK	JSP	SZT	PZT/PST

II. COURT OF HONOUR: President : Sawlani M.
Members : Tuli R., Joshi S.
MESS DUTY: (5723) Kumar Shalendra, (5724) Kumar V.

III. DISCIPLINE LEAVE ETC.: Amendment to back time 5623-22 days, 5711- 15 days and 5709- 4 days instead of 6 days

VI. EVENTS: Result of debate competition held on Friday 13th Nov. 1998
1st (SST-2), 2nd (PZT-2), 3rd (SMT-2)
Best speaker Santosh Chatterjee (5785)

Day	Date	Time	Events
Sat.	21 st	0930 0930-2045	Swimming party departs TSC consisting of 30 1 st year cadets Shore leave for 1st and 2 nd year cadets except duty top (PST) Landing Rig : Civilian Landing Rig
SUN	22 nd	0930 0930-2045	Swimming test for 3 rd year cadets Shore leave for 3 rd year cadets except duty top (SST) Landing Rig : Civilian Landing Rig
Mon.	23 rd	0600 1600	Swimming party departs TSC consisting of 30 3 rd year cadets Swimming party departs TSC consisting of 30 1 st & 2 nd yr. cadets
Wed.	25 th	0600	Swimming party departs TSC consisting of 2 female cadets
Sat.	28 th	0930 0930-2045	Swimming party departs TSC consisting of 30 1st year cadets Shore leave for 1 st 6 2 nd year cadets except duty top (SZT) Landing Rig : Civilian Landing Rig

NOTE

1. Those cadets who do not possess passports should get them made during the vacations.
2. All cadets who have not passed their swimming test must learn and practise swimming during their vacations as it is compulsory for all cadets to pass their swimming test before passing out from TSC.
3. All rank holders who have not passed their swimming test will be reverted to ordinary cadets if they do not pass their swimming test after returning from the vacations. No non-swimmer will be promoted from the 3rd year or 2nd year without passing the swimming test.

APPENDIX 2

Questionnaire sent to Masters, Ship-managers and the Trainers

SCI MARITIME TRAINING INSTITUTE
52-C, Adishankaracharya Marg, Powai, Mumbai-400072

Dear Sir,

Date: 21-12-98

Sub: Survey on "Training of deck cadets in India: STCW and beyond"

For my Post-Graduation in Nautical Sciences at W.M.U. Malmö (Sweden), I am writing a dissertation on the subject topic. I shall be very grateful if you kindly spare some time and give your valuable opinion and comments on the performance of the officers afloat and ashore, passed out from different entry streams of cadets' training in India. Kindly do comment on any specific points, which will help to improve training standards of the cadets' Pre-sea, On-board and Post-sea education and training. You may also opine, if some parts of the training and education given to cadets during their said three phases of training is not necessary or should be reduced / increased.

You may kindly fill in the grading in the following questionnaire. Please use "GOOD", "AVERAGE" or "BELOW AVERAGE". You may give name, rank and company's name for my personal record only. Completed questionnaire may kindly be mailed / faxed (91-22-5700338) to me at the address given above at your earliest. This information will not be used for any other purposes and treated as strictly confidential.

Thanking you,

Capt. K. Gupta
Co-ordinator (Cadets' Training)

Questionnaire

A. Competence and skills in all functions:

- | | |
|--|--|
| 1. B.Sc. (Nautical Sciences) Entry (T.S. Chanakya) | |
| 2. Pre-sea (16 weeks) Entry | |
| 3. Direct Entry | |
| 4. T.S. Dufferin/Rajendra (Prior B.Sc., Old Pattern) | |

B. General conduct, behaviour and discipline:

- | | |
|--|--|
| 1. B.Sc. (Nautical Sciences) Entry (T.S. Chanakya) | |
| 2. Pre-sea (16 weeks) Entry | |
| 3. Direct Entry | |
| 4. T.S. Dufferin/Rajendra (Prior B.Sc., Old Pattern) | |

C. Your suggestions for improving the training:

Signature:

Name, Rank and Company:

Note: Copies may please be circulated for opinion of other senior officers also. Thanks.

APPENDIX 3

COVERAGE OF SURVEY

List of shipping companies, ship-management companies and training institutions, whose masters, ship-managers and faculty took part in the survey

<u>No.</u>	<u>Name of shipping company / training institution</u>	<u>No. of respondents</u>
1	The Shipping Corporation of India Ltd. Mumbai	50
2	Essar SISCO, Mumbai,	3
3.	Century Shipping, Mumbai	1
4.	Chowgale Steamship Ltd., Mumbai	1
5.	Varun Shipping Co. Ltd., Mumbai	1
6.	Reliance Shipping Company Ltd., Mumbai	1
7.	Peerless Shipping Company & off-shore services Ltd, India	1
8.	Teekay Shipping Company, Mumbai	2
9.	Sealandia Marine Services Ltd., Mumbai	1
10.	Lalkar Marine Pvt. Ltd., Mumbai	1
11.	Anglo Eastern Ship-management Co. Ltd., Hongkong	2
12.	Univan Ship-management Co. Ltd., Hongkong	4
13.	Tanker Pacific Singapore Ltd., Mumbai	2
14.	Barber Ship-management Pvt. Ltd., Mumbai	2
15.	V. Ships Inc., UK	2
16.	Eurasia Ship-management Co., Hongkong	3
17.	Wallem Ship-management Pvt. Ltd., Mumbai	2
18.	Dockendale Shipping Co. Ltd., Nasau, Bahamas	3
19.	Dynacom Tankers Management Ltd., Mumbai	2
20.	SEAARLAND Shipping Management, Austria	2
21.	Transworld Shipping Services Pvt. Ltd., Mumbai	1
22.	Star Group of Companies, Mumbai	1
23.	Ravencroft Shipping Company, Mumbai	1

<u>No.</u>	<u>Name of shipping company / training institution</u>	<u>No. of respondents</u>
24.	Herald Maritime Services Ltd., Mumbai	1
25.	Bergesen D.Y. ASA, Mumbai	1
26.	Egon Aldendorff Shipping Company, Mumbai	1
27.	Gear Bulk, Mumbai	1
28.	Zephyr Shipping Marine Training Division, Mumbai	1
29.	Sea Tech Marine, Mumbai	1
30.	Fleet Personnel Pvt. Ltd., Mumbai	1
31.	N.I.T.C., Iran	1
32.	K.C.M.A., Hongkong	1
33.	Fleet Management, Hongkong	1
34.	United Arab Shipping Company Ltd., U.A.E.	1
35.	Mitsui O.S.K. Lines, Tokyo	1
36.	Polaris Shipping Company Ltd., Mumbai	1
37.	Marine Management Services Ltd., Mumbai	1
38.	SCI Maritime Training Institute, Mumbai	6
39.	LBS College of Advance Maritime Studies & Research, Mumbai	7
40.	Indian Maritime Training Centre, Mumbai	1
41.	Marine Faculty: Capt. H. P. Singh	1
42.	MBPT-FOSMA Training Centre, Mumbai	1
43.	Tolani Marine Education Foundation, Mumbai	1
44.	Sunsea Maritime Academy, Calcutta	1
45.	NUSI Maritime Academy, Goa	1