

World Maritime University

The Maritime Commons: Digital Repository of the World Maritime University

World Maritime University Dissertations

Dissertations

1989

Development of a maritime education and training institute in Ethiopia : considering the priorities

Asrat Amare

World Maritime University

Follow this and additional works at: https://commons.wmu.se/all_dissertations

Recommended Citation

Amare, Asrat, "Development of a maritime education and training institute in Ethiopia : considering the priorities" (1989). *World Maritime University Dissertations*. 1312.

https://commons.wmu.se/all_dissertations/1312

This Dissertation is brought to you courtesy of Maritime Commons. Open Access items may be downloaded for non-commercial, fair use academic purposes. No items may be hosted on another server or web site without express written permission from the World Maritime University. For more information, please contact library@wmu.se.

DEVELOPMENT OF A MARITIME EDUCATION AND TRAINING
INSTITUTION IN ETHIOPIA: CONSIDERING THE PRIORITIES

by

Amare Asrat

Ethiopia

A paper submitted to the Faculty of the World Maritime University
in partial satisfaction of the requirements for the award of a

MASTER OF SCIENCE DEGREE
in
MARITIME EDUCATION AND TRAINING (NAUTICAL).

The contents of this paper reflect my personal views and are not
necessarily endorsed by the UNIVERSITY.

Signature:



Date: 24 October, 1989

Supervised and assessed by:

Hans van Walen
Lecturer
World Maritime University



Co-assessed by:

Captain Burkhard Rahn
Principal
Schleswig Hosteinische Seemansschule, FRG



DEVELOPMENT OF A MARITIME EDUCATION AND TRAINING
INSTITUTION IN ETHIOPIA, CONSIDERING THE PRIORITIES.

<u>LIST OF CONTENTS</u>	<u>PAGE-NO</u>
ACKNOWLEDGEMENTS	
ABSTRACT	1
<u>CHAPTER 1</u>	
INTRODUCTION.	3
1.1 General .	3
1.2 Importance of shipping in world trade.	4
1.3 Significance of maritime training institutions for developing countries.	5
<u>CHAPTER 2</u>	
GENERAL OVERVIEW OF ETHIOPIA AND ITS MARITIME ACTIVITIES.	7
2.1 Geo-political and socio-economic information.	7
2.2 Ancient maritime history .	10
2.3 The Ethiopian merchant fleet at present.	15
2.4 Shipboard personnel.	16
2.5 The sea ports	18
2.6 Inland water transport system.	23
<u>CHAPTER 3</u>	
ESTABLISHMENT OF AN ETHIOPIAN TRAINING INSTITUTION.	26
3.1 Reasons for establishing an institution.	26
3.2 Aims and objectives of the institution.	27
3.3 Phased programme of development	28

CHAPTER 4

FRAMEWORK OF THE INSTITUTION	31
4.1 Organization and administration	31
4.2 Staff requirements and running cost	32
4.3 Staff criteria	35
4.4 Teaching Staff	37
4.5 Financial resources	40

CHAPTER 5

FACILITY REQUIREMENTS	42
5.1 Buildings and site	42
5.2 General layout of buildings and constructions	43
5.3 Requirements of training aids	47
5.4 Library facilities	49
5.5 Equipment estimate for cadets centre	51
5.6 Equipment estimate for ratings centre	52
5.7 Equipment estimate for practical seamanship centre	53
5.8 Equipment estimate for fire-fighting centre	55
5.9 Equipment estimate for chartroom and instruments laboratory	58
5.10 Equipment estimate for electronic navigation laboratory	61
5.11 Equipment estimate for marine electronics laboratory	63

CHAPTER 6

ENTRANCE REQUIREMENTS TO THE ETHIOPIAN MARITIME TRAINING INSTITUTION	64
6.1 PRE-SEA CADET TRAINING PROGRAMME	64
1 Minimum General Education	64
2 Written Entrance Examination	
3 Physical Health and Medical Fitness Examination	65
4 Psychological and Personality Tests	66
6.2 PRE-SEA RATINGS TRAINING PROGRAMME	67

CHAPTER 7

CURRICULUM OF EDUCATION FOR 3 YEAR PRE-SEA CADET TRAINING COURSE	69
7.1 General	69
7.2 Summary of proposed curriculum	70
7.3 Syllabus distribution per semester	74
7.4 Detailed syllabus description	75

CHAPTER 8

CURRICULUM OF TRAINING FOR PRE-SEA, AND POSTSEA RATINGS TRAINING	99
8.1 General	99
8.2 Summary of proposed pre-sea curriculum	100
8.3 Breakdown of the curriculum	101
8.4 Curriculum of training for post-sea rating	105
8.5 Breakdown of the curriculum	106

CHAPTER 9

EXAMINATION AND CERTIFICATION OF SEAFARERS	114
9.1 General	114
9.2 The need for strict follow up of trainees	114
9.3 Proposed advancement scheme from junior officer to senior officer	117

CHAPTER 10

CONCLUSIONS AND RECOMMENDATIONS	118
10.1 Conclusions	118
10.2 Recommendations	119
REFERENCES	121

ACKNOWLEDGEMENT

First of all, I would like to express my deepest gratitude to the Marine Transport Authority of Ethiopia, who nominated me to have the opportunity of studying at the World Maritime University. I owe gratitude and sincere thanks to IMO and the Government of Denmark for sponsoring me and putting an implicit faith in me to complete this Course.

I am greatly indebted to my Course Professor, Gunther Zade for his advice and constructive comments. My special thanks go to lecturer Hans Van Walen, who continuously supervised my work and provided me with encouragement, support and guidance, and Captain Burkhard Rahn for co-assessing my project.

I would also like to express my thanks to Ms. Alison Howe for her contribution in revising my English and her editorial efforts, the staff and faculty of the World Maritime University, who have assisted me in one way or the other to successfully complete my studies. At this juncture, I would like to extend my appreciation to my colleagues, for their cooperation and friendly attitudes shown to me in various ways.

Finally, I thank my brothers and sisters, who have been a constant source of inspiration, and always provided me with unlimited material and moral support.

ABSTRACT

The purpose of this paper is to show the significance of establishing a maritime training institution in Ethiopia, to foster the development of the shipping industry in particular, and of the nation as a whole.

The main argument for the establishment of the maritime training institution is the need to pave the way towards the country's integration into the maritime world economy, which demands well qualified seafarers and maritime experts to run the different aspects of the maritime industry.

To clarify the present situation of the country, brief information on geo-political and socio-economic conditions has been included.

Acquaintance is also made to the ancient maritime history, to show the extent of the nation's maritime achievements, and its contributions to the making of maritime history. Furthermore, to provide a clear basis for comparison, and to further highlight the significance of the training center, the activities and operation of the merchant fleet, together with the existing shortages of trained manpower are illustrated.

In addition to that, proposals are presented regarding:

- organization and administration of the institution
- staff requirements and criteria
- construction sites and buildings
- requirements of training facilities and equipment
- curricula and syllabi for cadet and rating training, and
- examination and certification procedures.

Even though concentrated marine engineering training for engineering cadets and introductory marine engineering training for nautical cadets is proposed, the curricula mentioned above deals only with the nautical side of the training.

Finally the thesis project is concluded, with the author's conclusions and recommendations, given in reference to the future expansion of the institution.

CHAPTER 1

INTRODUCTION

1.1 GENERAL

The ocean, seen as the origin of life and an inexhaustible natural resource of our planet, has played an important role in influencing history and social behaviour of mankind since the early days of man on the globe.

However, the incessant endeavor of man to ensure his survival has led finally to converting part of the perilous might of the seas to the advantage and benefit of mankind.

Today, as a result of technological innovations more ships have been built, expanding world shipping trade and increasing the number of countries and peoples depending in one or the other way, on ships for the transportation of goods to satisfy their daily needs.

(31) Likewise, the world merchant fleet has dramatically increased to an estimate of 75,000 ships plying the high seas, most of which are specialized modern ships, carrying a large variety of cargoes over great distances.

According to statistics, some 75% of the total cargo exported is transported by sea, proving the importance of ships in world trade.

1.2 IMPORTANCE OF SHIPPING IN WORLD TRADE.

(32) "The future is trade. you can double, triple or quadruple the aid; it will not do. Trade brings 50 times more than aid."

Thus international trade is a prerequisite for economic growth and welfare of a nation, and at the same time a decisive factor in stimulating industrialization and the growth of local markets for goods and services. Trade fosters the development of advanced agricultural systems and techniques, increasing the speed of development.

Moreover, transport and communications are a vital prerequisite for any form of economic and political integration of a state, in which shipping contributes an important role.

This in its turn can only be achieved through the existence of a national fleet, and consequently, in the effective control of own shipping services.

Thus to participate in international trade a country needs a functioning transport system, of which shipping is of the utmost importance, especially in the foreign trade of a developing country.

However, due to the complexity, capital intensiveness and the highly competitive nature of the shipping business, it should be clear that acquisition of a merchant fleet alone can not foster the expected socio-economic development unless it is properly manned and operated by a well trained crew, preferably nationals of that particular country.

Hence it is imperative that developing countries properly react, to meet the challenges of modernizing their fleets, by harnessing their abundant human resources effectively to remain competitive in world trade.

Considering shipping technology, one realizes the drastic change of modern innovations of the shipping industry: the ever changing ship design and specialization, the sophistication of the bridge with electronic devices and integrated control systems, changes in the operation of power and propulsion systems, etc..

These reflect the need for the availability of adequate facilities of continuous training and updating of knowledge of the highly trained manpower for the shipping industry.

1.3 SIGNIFICANCE OF M.T.I FOR DEVELOPING COUNTRIES

Training is means of developing a person's occupational capabilities and of enabling him to use his abilities to his greatest advantage.

Likewise the developing countries should endeavor to create training means to produce their own trained seafarers to support the increasing demand of their shipping industry. Operating a fleet using hired expatriates, or training an adequate number of nationals abroad, will be difficult and quite expensive.

(* M.T.I=Maritime Training Institution.)

Therefore, to curb the threat of professional shortage, it would be more appropriate to establish a maritime training institution, to produce the required amount of national expertise for the maritime industry of the nation.

The desired institution, depending upon the projected manpower plan, socio-economic background, and degree of co-operation between neighbouring countries, may be established either as a national or a regional training centre.

The main advantages of establishing a M.T.I are...

- the possibility of training an adequate number of personnel for the whole sector of the maritime industry, according to priorities and requirements;
- the provision of training and retraining facilities commensurate with the current and projected manpower needs of the shipping industry;
- a reduction of expenses on valuable foreign currency;
- increased employment opportunities for nationals; and
- acquisition of self-sufficiency, regarding training and qualifications of the available manpower.

CHAPTER 2

GENERAL OVERVIEW ON ETHIOPIA'S MARITIME ACTIVITIES

2.1 GEO-POLITICAL AND SOCIO-ECONOMIC INFORMATIONS

Situated in the Horn of Africa, between latitudes 3 and 18 degrees North and longitudes 33 and 48 degrees East, Ethiopia covers over 1,220,000 sq. kilometres (471,000 sq. miles.) with a population of 45 million people.

Ethiopia is bounded by Sudan on the west and north-west, by the Red Sea on the north and north-east, by Kenya on the south, by Somalia on the south-east and Djibouti on the east.

The Red Sea stretches between the northern and eastern side of the country, providing a total coast line of 1200 kilometres .

It is a country of large rivers and lakes, some of which are suitable for inland navigation.

The heartland of the country consists of two rugged high-land masses divided by the Rift Valley. Much of the Western Plateau is between 1,800 mtrs. and 3,000 mtrs. with mountain peaks rising to over 4,600 mtrs.

The great Rift Valley stretches in a north-south direction across the country into the neighbouring countries of southeast Africa. The area running roughly northeast from the Kenyan border to the southern section of the Rift Valley is fairly narrow, with a maximum width of 60 kms. but houses a number of attractive volcano lakes.

Further north the floor of the valley widens into the Danakli plain, parts of which are as much as 100 mtrs. below sea level.

As a result of the variations in altitude,

Ethiopia embraces a great diversity of climatic conditions, which are traditionally divided into:

1. dega (temperate plateau)- land above 2,400 mtrs. and with an average temperature of 15 degrees centigrade;
2. woina-dega (intermediate)- land between 2,400 mtrs. and 1,700 mtrs. with an average temperature of 22 degrees centigrade; and
3. kolla (hot low-lands)- land below 1,700 mtrs. with an average temperature of 26 degrees centigrade.

The main cities of Ethiopia are Addis Abeba (the capital, with a population of 1.5 million), Asmara (the largest second city with a population of 300,000) and Diredawa (the third largest city with a population of 100,000).

The average population density per square kilometre is estimated to be 23. The population is over-whelmingly rural, and only 11% of the population is estimated to live in the urban areas.

in spite of great cultural, religious and linguistic diversity, much of present day Ethiopia has been linked by strong political and economic ties for more than 2,000 years.

The range of physical environment has resulted in different patterns of occupation in the rural areas. In the heart land of the country and around it the pattern is one of settled arable agriculture, however, in the surrounding lowlands of the Rift Valley areas, the population is pastoral and mainly nomadic.

Amharic, a Semitic language derived from the classical tongue "Geez" is the first official language. In addition to Amharic, the national radio station provides regular programmes in Tigrina, Oromo, and Somalina.

Ethiopia is primarily an agricultural country, and although relatively poor, some experts consider that it is potentially one of the richest agricultural countries in Africa. Agriculture accounts for about two-thirds of the G.D.P. and provides the livelihood of 85% of the population. The traditional subsistence sector, consisting of live-stock and cereal production, is still the largest, when compared with the modern sector, eg. coffee, which accounts for only 10% of total agricultural production.

The country's major outlet to sea is through the ports of Assab and Massawa, where it borders the Red Sea with a 1200 km. long coastline.

The industrial sector is small and mainly manufactures for local consumption. Industry contributes 16.2% to the G.D.P. and employs just over 100,000 people. The small role it plays seems largely due to the lack of local minerals and the low purchasing power of much of the rural population. Textiles, beverages and food processing account for 85% of the total industrial output.

Ethiopia has a problem of acute shortage of skilled man-power in all fields. The rapid expansion of institutions for higher education is intended to remedy these draw-backs of the country.

For nearly two decades, Ethiopia had a considerable trade deficit, but as a result of reductions of luxury imports

and an increase in exports, the balance of payment has improved. Coffee is by far the country's biggest export commodity but oil-seeds, hides and pulses now provide considerable export earnings too. The main imports are machinery, transport equipment, oil and manufactured goods.

2.2 ANCIENT MARITIME HISTORY OF ETHIOPIA

GENERAL

The following is intended to highlight the maritime aspects of the ancient Ethiopian civilization.

It is also meant to provide a firm foundation for readers, to confirm to themselves the country's leading role, and its worldwide reputation, as one of the strongest maritime empires in the past.

Ethiopia, known as the source of the great Blue Nile, with its favourable geographical location on the Red Sea, was among those countries which attained a high degree of ancient civilization.

*

According to historical proofs, the Axumite Kingdom of Ethiopia existed before the 6th century B.C with Axum as its capital. During this time the country used to mint its own coins out of gold, silver, bronze and iron.

(1) From the 6th century B.C to the beginning of the 4th century A.D Sabean was used as the official and literary language of Ethiopia, until it was replaced by the Geez language which is the predecessor of the present day Amharic language..

*Axum. ancient capital of Ethiopia

*Axumite-Kingdom. ancient kingdom of Ethiopia.

The main commercial centre and important port city of the time was Adulis, not far from the present port town of Massawa.

(2) The author of "Periplus of the Eritrean Sea" describes Adulis as a port established by law, and counts 37 important port cities of the period which traded with the mighty Roman Empire. Of these, he mentions 3 as ports established by law. They were Adulis in Ethiopia, Mouza in Arabia and Charix in Persia.

This highlights the position of Adulis, as one of the leading maritime trading centres of the time, where merchants and seafarers were protected and taken care of by the law.

(3)(14) According to the same source, the country used to have commercial relations with different nations, out of which Arabia, the Mediterranean world, Persia, Egypt, India and China were the main trading partners.

The main export items which were shipped through the port of Adulis were:

Animals and animal products :

ivory, tortoise shell, live rhinoceros, rhinoceros horn, apes, giraffes, etc.

Wood and related products :

balsam, boomerang, cinnamon wood, ebony, fragrant gums, frank incense, myrrh trees, etc.

Minerals:

antimony, electrum, gold, silver, eye cosmetics, Malachite, Lapis lazuli etc.

The main imports of the country were:

clothes, raw cotton, girdles, muslins, gold and silver plates, brass and copper wares, iron implements, plates and crystals, glass, wine, olive oil. etc.

(4) A 3rd Century A.D Christian writer of Persian origin called "Manni" writes that there were 4 great Kingdoms in the world at that time. The first one was Babylon and Persia, the second the Roman Empire, the third the Axumite Kingdom (Ethiopia), and the fourth Silus (Chinese Empire).

(5,6) During the Han Dynasty of China (220-589 A.D) maritime commerce flourished between China and Ethiopia, which the Chinese called "the King dom of Huang-Chi." According to foreign sources, the Emperor " Wang-Mang " sent messengers to the Ethiopian emperor with gifts, and he in return received live rhinoceros from the emperor.

(7) At this period, due to the decline of the Graeco-Roman commercial contact with the eastern world, the Indian Sea trade was dominated by the Ethiopians, who conducted feeder service between the East and the West. This was very significant as there was no Suez Canal at that time.

Ancient Ethiopian Naval-operations on the Red-Sea. (8)

Many literary sources, monuments, inscriptions and archaeological findings revealed the fact that Ethiopia during the Axumite Empire (specifically, from the 3rd century A.D to the 7th century A.D) was at the height of its glory. As a result the country became very strong and occupied oversea territories, expanding its domain on both sides of the Red Sea.

(9) The existence of such an oversea territory is traceable back to the 1st century A.D.

(10) For this purpose, the naval expedition undertaken by "Gadarat", Emperror of Ethiopia, to occupy Arabia in 150 A.D is clear evidence reflecting the naval might of the country at the time.

The expedition was successful and the Army occupied the territory along the coast of the Red Sea almost as far as Bab-El-Mandab. He then moved east, to Himyarites and subdued the capital Zafar. From there he proceeded to the north and occupied Nagran.

(11) Similarly an eye-witness account was given by Cosmos, who visited Adulis in the 5th century A.D, about a copy of an ancient inscription he happened to obtain. Some of the contents of the inscription are the following.

"I sent a naval force and artillery against the "Arabital" and "Kinaidokolptae," who lived on the other side of the Red Sea, and when I had overthrown all their kings, I commanded them to pay tribute for their country, and to go about their business by sea and land in peace. And having established peace on all the world which has been conquered by me, I have come to Adulis to offer up sacrifices to "Zeus" and "Ares" and to "Poseidon" on behalf of the seafaring nation."

(13) In addition to that, the excavation of Emperor Caleb's inscription, which was written to commemorate the success of his naval expedition against "Dhu-Nuwas", king of Arabia, contributes a significant part to estimate the infantry and naval power of the country at that time.

(12) Caleb's order for the construction of 170 vessels in Adulis and other ports of Ethiopia as war preparation to retaliate the massacre of Dhu-Nuwas forces on "Nagran" citizens in Arabia is additional proof indicating the degree of civilization attained by the kingdom.

230 ships, from within the country and overseas were made ready, all being anchored at the port of "Gazan". Dhu-Nuwas expecting the attack when the monsoon ceased, blocked all the harbour entrances with chains and

stationed his army all along the coastline.

In addition to that, the cavalry was also deployed along the shoreline and the horse-men actually rode down into the sea to prevent the ships from landing. But finally Emperor Caleb succeeded to land on the eastern front, and defeated Dhu-Nuwas.

(15) Regarding the art of Ethiopian shipbuilding, Procopius comments that construction was conducted by a "Cording-system" without the use of metal, which took 1 year to complete a ship.

(14) When completed, the ships were so large and impressive, that they even inspired the early Arab poets, among whom "Tarafan" was a leading pre-islamic poet who composed the following:

" When the lady of Malik rides her camel at dawn, her litter appears like a large ship in the midst of the Valley of Dad, one of the ships of Adulis, or Ibn-yamin, which the mariner now turns aside and now directs strait ahead; its prow cuts through the foam of the water as a gambler divides the dust with his hands."

As can be seen from the above narration, it is imperative and proper for Ethiopia to improve on her enviable maritime reputation by establishing an Education and Training Institution.

- * Himyarites. ancient City of s/Yemen
- * Zafar. ancient City of s/Yemen
- * Nagran. ancient City north of s/Yemen
- * Arabital, Kinaidokolptae. ancient cities of n/Yemen

2.3 THE ETHIOPIAN MERCHANT FLEET AT PRESENT. (16)

Ethiopia, a developing country, realizes that acquisition of a national fleet is a prerequisite for optimum participation in world trade.

To foster the social and economic development of the nation, it organized its merchant fleet in 1972 under the name of "Ethiopian Shipping Lines." It became operational in 1974 with 3 ships and a combined tonnage of 47,385 DWT. During the peak of its operation today, it has grown to a fleet of 14 vessels of various types with a combined tonnage of 93,401 DWT.

Out of this 10 are foreign going liner ships, while the rest are operating on the Red Sea, between Massawa, Djibouti, Hodaida, Jeddah and Port Sudan.

The liner service operates mainly between Red Sea, East Africa, Mediterranean, Europe and the Far East.

Major ports of call.

In Europe: Rotterdam, Bremen, Hamburg, Antwerp, London, Hull, Le Havre, Middlesbrough and Uddevalla.

Mediterranean: Barcelona, Leghorn, Trieste, Piraeus, Marsseille .

East Africa: Dar-es-salaam, Mombasa.

Far East: Kobe, Yokohama, Singapore, Hong Kong, Penang and Busan.

Middle East: Jeddah, Hodeda, Aden, Suez.

Coastal service: Djibouti, Massawa, Assab.

2.4 SHIPBOARD PERSONNEL

The company is operated by a total number of 286 nationals who are serving shipboard duty both for foreign and home trade.

According to the manpower plan, the company's actual seafarer requirement is stated to be 455, hence showing a shortage of 171 seafarers. This is solid proof of the existing sharp imbalance between the needs of the company and actual supply of trained professionals.

Out of the total shortage, Masters contribute 14, Chief Officers 16, Second Officers 10, and Third Officers 3. From the engine room staff, Chief Engineers contribute 13, First Engineers 16, Second Engineers 7, and Third Engineers 3. The remaining 89 shortages are of ratings in different shipboard positions.

However despite the existing shortages in personnel, the company has contributed much in saving a substantial amount of foreign currency for the country .

During the period 1981 to 1988, the company transported a total of 2,344,316 tons of liquid and dry cargo, while 2,038,183 tons of liquid and dry cargo was carried by chartered vessels.

Hence from 1981 to the end of 1988 a total of 99 ships were chartered to carry import export goods.

On observing the significance of increasing the fleet, the management of Ethiopian National Lines has decided that by the end of 1993, the fleet will be expanded to 16 vessels. Though the management is striving hard to improve the situation by training eligible personnel abroad and employing expatriates, the company is still operating in shortages.

Most of the officers presently serving in the company were trained abroad, particularly in western Europe. Since its organization in 1972 a total of 161 officers (77 deck and 84 engineering) were trained abroad, while 54 trainees were lost as dropouts for various reasons.

At present 34 cadets are abroad for training in Eastern Europe and India.

The pre-sea cadet training course in India costs the company \$ 8550 to train one cadet for a period of 4 years, this figure includes salary and allowance. Upgrading courses for officers are exclusively given in Great Britain at Liverpool Polytechnic and South Meri Engineering College.

The total expense incurred to the company in upgrading one officer for a year, including his salary and allowance is: 8573 US Dollars for upgrading one third mate to second mate, and 11,213 US Dollars for upgrading a second mate to chief mate.

In addition to that whenever an officer is sent abroad for his chief mate, the company loses 2000 US Dollars in foreign currency every month in paying the salary of the substitute expatriate officer.

Hence training of an officer alone from cadet to master costs the company more than 60,000 US Dollars in foreign currency.

On the side of the ratings, no formal training has been offered be it locally or abroad ever since the company's establishment. The only training offered is in the form of on the job training on board.

2.5 THE SEA PORTS

Massawa Port

Massawa Port is situated 120 km southeast of Asmara (capital city of Eritrea province) and about 15 km west of the ancient Ethiopian port of Adulis.

The pattern of sea traffic on the 2 ports (Massawa and Assab) before 1974 was slightly more than 57% for Massawa and 43% for Assab, but with the continuing security deterioration in the area, Massawa's share changed substantially to about 10%. Hence the present trade activity through Massawa is exceedingly low and includes a high proportion of domestic traffic between Assab and Massawa.

The port comprises 6 berths which are situated on the same pier. The maximum depth alongside is 11 metres and the minimum 6 metres.

The tides are of semidiurnal character, with a maximum range of 1 meter. Predominating winds are south east and north east winds. From November to May, south east winds prevail with an average speed of 6 knots. During the rest of the year north east winds prevail with an average speed of 2 to 5 knots.

Two specialized oil berths, " Agip " and " Mobil Jetty," provide berthing facilities for tankers up to 18,000 DWT. The port flotilla comprises 3 harbour tugs, 1 pilot boat, and 2 mooring boats.

The present manpower, including dockers working in the slipway (used to repair boats and small ships up to 800 tons) is 600. To increase productivity and widen their

professional horizon, low level port personnel training is conducted within the port.

Short term improvement plan

Regarding the port facilities, most of the equipment is old fashioned and in poor condition. The sea traffic improvement seems far beyond reality as long as the prevailing unrest continues. However an urgent plan of restoration of facilities, especially for the most dilapidated berths, 5 and 6, is being prepared by the government as the quickest and most economical short term solution. In addition to that, the establishment of roll on roll off ramp at the junction of berths, 4 and 5 is projected.

Assab Port

This port is located in the northern part of Ethiopia at a distance of 870 kilometres from Addis Ababa, and 90 kilometres from the bordering port of Djibouti. The construction of the port took place at the end of 1959 in collaboration with the government of Yugoslavia. The port handles oil tankers, container vessels, roll on roll off vessels, lash vessels, etc. and accounts for 95% of the import/export traffic of the country. It is connected with the hinterland by road and air transport. It consists of 6 berths located on two U-shaped piers and is protected by a 700 metre long offshore break water, which protects the port from the prevailing north east and south east seasonal winds. The south east winds prevail from November to May with an average speed of 15 knots, while the north east winds predominate from June to October with an average speed of 6 knots.

Tides are of semidurnal nature with a maximum range of about a metre.

The piers depending on their location are named north and south jetty, respectively. The north jetty is 480 metres long and consists of 3 berths (berth 1 to 3) where ships of 150 metres length and maximum draught of 10 metres are accommodated. Vessels of deeper draught such as lashes are handled at anchorage.

The south jetty is 525 meters in length and consists of 3 berths for ships of 150 metr's length and draughts of not more than 10 metres, and 2 other berths for smaller ships. The maximum depth alongside is 11 metres while the minimum is 8 metres. Even though berth 1 and 11 are customarily occupied by bulk carriers (grain, fertilizers, etc.), all the berths are general user facilities.

For RO/RO services a special berth has already been prepared at the ends of berths 1 and 11, where the vessels are moored using both the ship's anchors and stern ropes. A bunkering facility is also provided at the same berth by means of oil bunkering lines. In addition to that, the port possesses 3 specialized oil berths which are well separated from the main commercial port.

The Crude Oil Berth:

A sea berth is provided with submarine pipelines for discharging tankers of 30 to 35,000 DWT.

The Shell Jetty:

It accommodates product tankers of up to 20,000 DWT.

Refinery Jetty:

This jetty accommodates product tankers of 10,000 DWT, and below.

Cargo storage facility

To facilitate cargo storage, 6 warehouses with a total capacity of 29,704 cubic metres, 4 shades with total capacity of 17302 cubic metres and an open storage area of 229,000 square metres is made available.

According to a statistical analysis conducted for the period between 1979 and 1986, each year an average of 531 different kinds of merchant ships with an average cargo of 2,292,737 ton (including domestic trade) are handled in the port.

The major international trade commodities which are handled in the port are:

Import:	Export
cereals	coffee
fertilizers	expellers
machinery and transport equipment	pulses hides and skins
building materials etc.	oil seeds
	live animals and salt

Manpower

The present manpower is 2800, out of which 1600 are permanent employees while the remaining 1200 are mainly dockers working on temporary contracts.

With the aim of widening the professional horizon of employees, a low level port personnel training programme is conducted.

Future Expansion and Improvement

To improve efficiency and facilitate faster turn around of ships, short term and long term development plans have been designed.

One of the objectives of the plan is to solve the prevailing shortage of port working space, which is considered to be the major cause for congestion and shipping delays.

Hence to remedy the shortages, the following short term improvements are planned.

1. construction of a new RO/RO berth,
2. provision of a container handling terminal,
3. construction of a new berth for tugs and harbour crafts, and
4. provision of a container depot.

The most significant change in the pattern of port traffic is expected to be due to containerization. The impact will be felt strongly at Assab where containerization is forecast to be about 75% of the dry cargo trade by the year 2000.

Hence as container handling requires a trained and more disciplined way of operation, it generates the need for abundant qualified personnel especially in the field of port operations and cargo handling.

2.6 INLAND WATER TRANSPORTATION IN ETHIOPIA The existing water transport services function in 3 distinct and un-related areas of Ethiopia (see attached map 1) they are:

1. Lake Tana in Northern Ethiopia (between Gojam and Begemidir Provinces),
2. Lake Abaya and Lake Chamo, in the southern part of the Rift Valley. (between Gomugofa and Sidamo Provinces), and
3. Red sea coastal transport between islands and towns situated around Red Sea area.

1. The Lake Tana Service

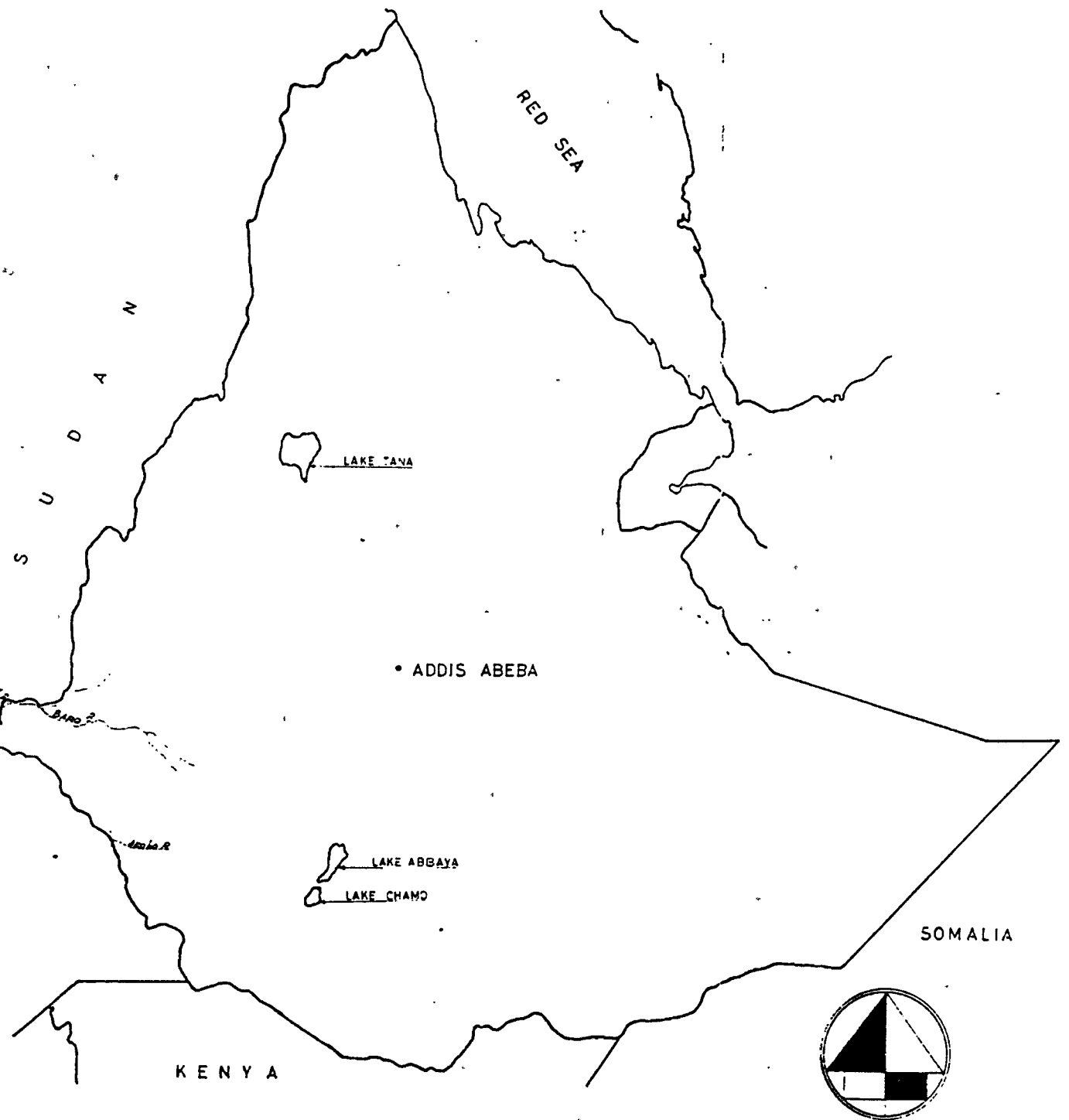
Lake Tana is the largest lake in Ethiopia. It is 85 kilometres long at its widest point, and covers an area of 3,600 square kilometres. It lies in the north western highlands at an altitude of 1860 metres. The lake area with more than 30 islands in it is considered to be one of the remains of the past Ethiopian civilisation.

The lake transport service has existed since 1948, and was initially conducted by private company. Soon after the 1974 revolution the task was handed over to the Marine Transport Authority, which is still offering valuable transportation service for the rural areas around the lake. The lake service is equipped with 8 passenger/ cargo boats of different sizes, the largest boat having a capacity of 250 passengers and 100 tons of cargo.

In Gorgora Town a workshop and slip-way have been constructed to facilitate repair and maintenance of boats.

2. Lake Abaya and Lake Chamo Services.

The two lakes are situated in the Great Rift Valley, and separated from each other by a narrow strip of land.



MAP 1
GENERAL LOCATION OF INLAND WATERWAY
TRANSPORTATION IN ETHIOPIA.

SCALE 1: 6,000,000

(map 2) Lake Abaya is the larger one, having a maximum length of 70 kilometres and a width of 30 kilometres, while Lake Chamo has a maximum length of 35 kilometres and width of 25 kilometres.

The town of Arbaminch with a population of approximately 15,000 is located on the narrow strip of land separating the two lakes.

The population in the town and in the rural areas around the lakes was dependent on the lake transport service, which was operating on a weekly round trip schedule with only one boat.

The boat providing this service had a capacity of 100 passengers and a cargo of 40 tons.

It had a 200-horse power diesel engine and a drive-on facility for 5 cars.

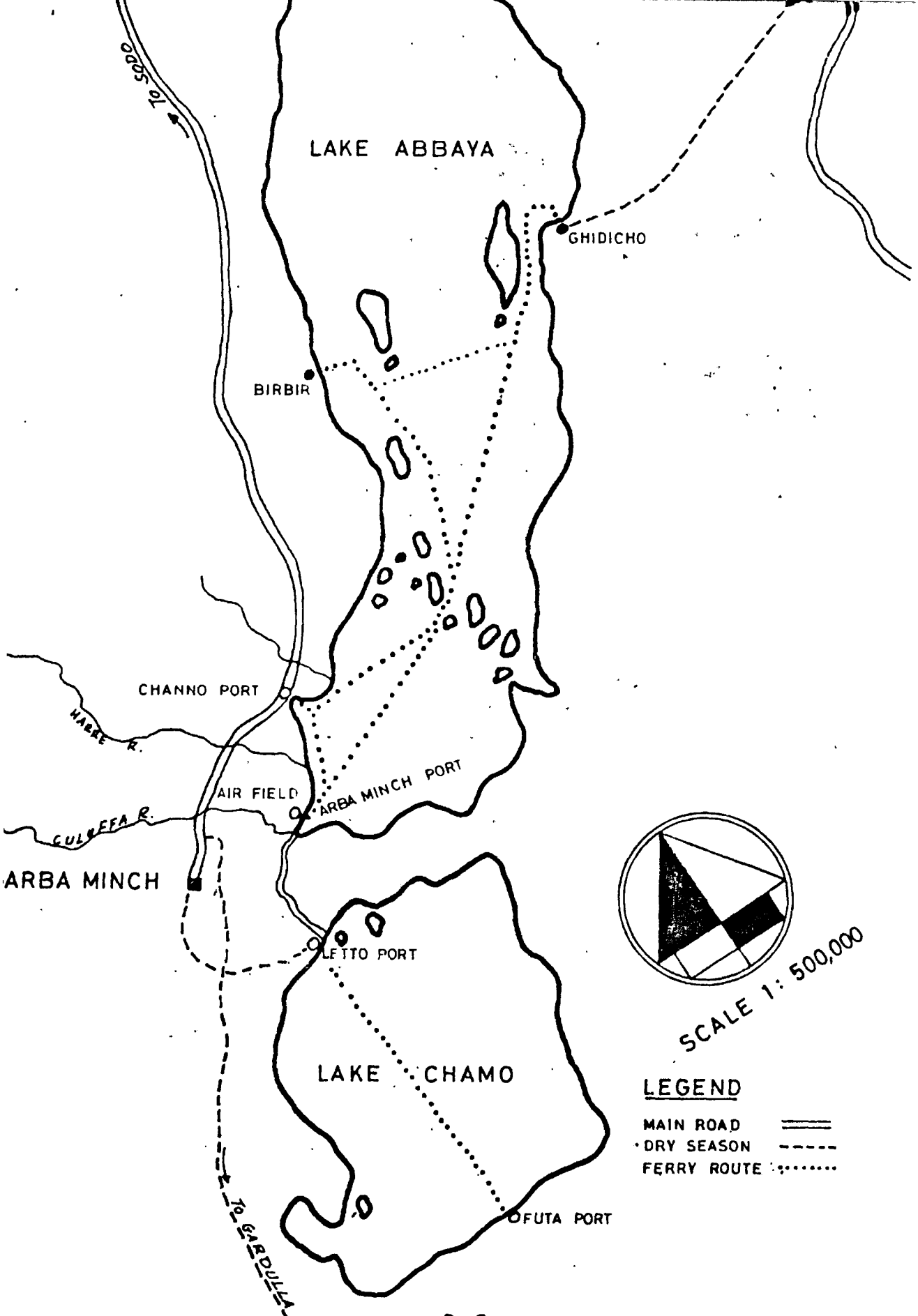
However, with the construction of new roads and air fields the transportation scene changed drastically. Thus due to the superiority of the service character and low operating cost of buses, trucks and airplanes, the lake transport lost its competitiveness and ceased its service on both lakes.

3: The Red Sea Coastal Service

Along the Ethiopian Red sea coast of 1000 kilometres, there are many towns and islands whose inhabitants are very much dependent on the resources and products available on the mainland.

Due to a lack of modern means of sea transport, communication between islands, coastal towns and even the main port cities is conducted by primitive sailing boats called " DHOW ", which are neither safe nor suitable for passenger transport.

Besides, due to lack of coastal transport, people living in remote areas are not benefited from the privileges and



MAP 2

LAKE ABBAYA & CHAMO AND RELATED WATER AND ROAD TRANSPORT FACILITIES.

social services (hospitals, schools, markets, etc.), which usually are available mostly in cities.

This problem is seriously felt, especially at times when immediate assistance is required (in case of serious sickness or injuries, etc.).

Analysing the situation, the shipping line allocated a cargo ship of 6700 DWT to serve the home trade between Massawa and Assab. But due to its size and the inavailability of proper berthing arrangements the service remained limited to the two port cities, leaving the towns and the islands curtailed from the benefits of modern sea service. In the same manner due to the operation of the vessel on a weekly round trip schedule and the prevailing high cargo traffic between the two ports, very few passengers are accepted each trip as deck passengers. The remaining passengers who come from different towns and cities are obliged to wait for weeks until transport is available. The Marine Transport Authority in an effort to alleviate the problem, assigned one ocean tug to offer free transportation between the two port cities and a small coastal town "Thio" on unscheduled operation. eventhough the construction feature of the boat has not permitted full abolition of the deck passenger system, the problem has been reduced to a considerable extent.

At present another cargo ship has been assigned additionally by the Marine Transport Authority to serve the same coastal areas.

The combined operation of these vessels is expected to minimize the shortage until the long awaited boat yard starts the production of suitable boats to replace the old ones.

CHAPTER 3

ESTABLISHMENT OF AN ETHIOPIAN TRAINING INSTITUTION

3.1 REASONS FOR ESTABLISHING AN INSTITUTION

Since Ethiopia lacks the rudimentary maritime training facilities to produce trained maritime personnel, establishment of an institution became of paramount importance to meet the following objectives:

1. to satisfy the growing demand of the industry for trained maritime personnel, to run and operate the different sectors the Shipping Line, ship building and repair yards, and the expected development in exploitation of national sea and water resources such as fishing and mining,
2. to rehabilitate and revive the lost maritime tradition of the country,
3. to curtail the huge amount of training expense encountered by the national shipping company in training seafarers abroad,
4. to expand the educational horizon of the people, create employment opportunities and to prepare the youth to serve in conjunction with the Ethiopian Navy in time of emergency,
5. to inspire and enhance an integrated system of academic, technical and vocational education in the maritime sphere, which is compatible with the training schemes of existing higher education centres in the country, in order to ensure a continued and firm foundation for the development of the maritime sector,
6. to develop and conduct maritime research activities.

3.2 AIMS AND OBJECTIVES OF THE INSTITUTION

1. To train adequate and skilled manpower for safe and efficient operation of ships in the fields of:
 - _ nautical science,
 - _ marine engineering, and
 - _ electronics and other shipboard training programmes .

2. To produce maritime experts in different fields, who eventually are capable of preparing viable national maritime policies, which would give impetus to the development of the shipping industry.

3. To provide training courses and instructional facilities in Port management and operations, Equipment operations and maintenance, and other maritime support activities.

4. To comply with international maritime and related standards established by the United Nations, the United Nations Conference on Trade and Development, the International Maritime Organization and others, calling for training in:
 - safety at sea and in ports,
 - prevention and control of accidents such as pollution, collision etc.,
 - maritime laws and legislations, and
 - other bilateral, regional and international laws, rules and regulations, agreements and conventions.

5. To award Diplomas and certificates according to the academic requirements of the institution.

3.3 PHASED PROGRAMME OF DEVELOPMENT.

Rapid changes in maritime technology have put greater emphasis on the need for a higher level of education and training than in the past.

Possession of thorough technical training through acquisition of modern training equipment has become today's only option to meet the challenge of sophistication and complexity of modern ships.

However, this has required a large amount of financial investments to afford advanced maritime training aids and equipment such as simulators, computers, laboratories, library and research facilities, and expert teaching staff.

These investments, besides improving the training output, have also tremendously increased the training cost of many maritime training institutions over the years.

Furthermore, the consequence of a chronic shortage of skilled personnel and the impact of the skyrocketing cost of modern training equipment has affected many of the less developed maritime nations, which are unable to acquire this sophisticated, but highly expensive equipment.

Therefore to establish the maritime training institution, the aim should not be the achievement of the ultimate goal in one step. In another words, to accomplish early and useful results, simple practical programme as mentioned below should be taken.

The underlying concept of the programme is the development of a maritime training institution starting with specific pre-sea cadet and rating training, together with small scale port personnel training courses.

As mentioned in Chapter 2.3, the present shortage of 43 deck, 39 engineering watch keeping officers and 89 ratings in the coming 4 years due to expansion and personnel dropouts may increase by a considerable amount. To curb this tendency, a training programme based on the country's means will be the only option. Hence considering the present low development and limited capabilities of the country to manage and operate a complex institution, the introduction of a phased programme of development is strongly suggested.

According to this programme, it is proposed that an annual intake of 20 deck and 20 engineering (totalling 40) officer cadets per year within the first phase recruited. In addition to that, a maximum of 15 engineering and 15 deck ratings and a maximum of 20 junior shore-based employees (port section) is suggested.

Assuming the total duration of the cadet training to be 4 years (including 1 year sea training) and that each cadet group stays for 2 years in the institution before sea training, a maximum population of 80 officer cadets plus 50 other course participants are accommodated (ratings and junior port employees) .

The proposed gradual expansion scheme consists of the following 3 phases of development.

Phase 1:

- ratings training for deck and engine room service;
- junior port personnel training; and
- pre-sea cadet training.

Phase 2:

Following phase 1

- refresher and up-dating courses for ratings, and
- refresher and up-dating courses for third and second mates, and the corresponding engine room ranks.

Phase 3:

Subsequent to phase 2

- refresher and up-dating course for chief mates, chiefengineers, masters and pilots;
- refresher and up-dating courses for staffs of senior management levels, and
- other maritime related research activities.

Once the lower phases are in progress, it will finally be easier to include the remaining advanced courses such as refresher, updating, and upgrading programmes for higher ranks.

As the activity of maritime training is new for present day Ethiopia, such a gradual but firm scheme of development will provide valuable time and experience to manage the different aspects of the institution such as administrative, financial, academic etc..

Moreover, the programme obviates the burden of financial expenses for the purchase of sophisticated equipment atleast for the initial stage of development.

CHAPTER 4

FRAMEWORK OF THE INSTITUTION

4.1 ORGANIZATION AND ADMINISTRATION

The institution will be established within the Ministry of Transport and Communication and under the supervision of the Ethiopian Marine Transport Authority (see the proposed structure on the next page) .

To provide advice and guidance regarding training and education, a Maritime Education and Training Advisory Board will be organized.

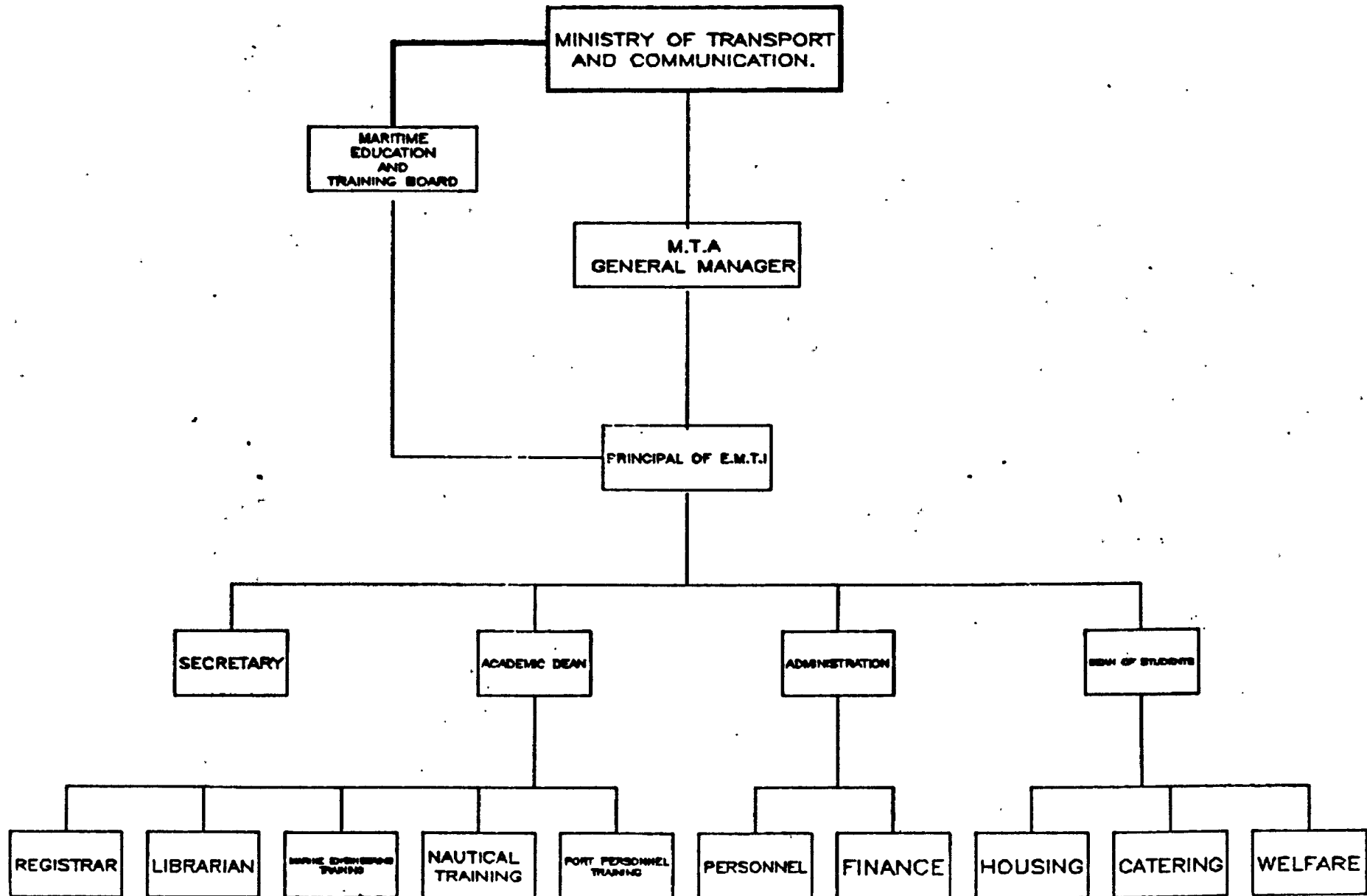
The board hence organized will consist of:

- the permanent secretary of the ministry who shall serve as the chairman of the board;
- a representative from the Marine Transport Authority;
- a representative from the Ethiopian shipping line;
- a representative from the Ministry of Education;
- a representative from the Ministry of Defence;
- a representative from the National Commission For Higher Education, and
- the principal of the institution.

The function of the Maritime Education and Training Board is the provision of guidance for the Marine Authority, pertaining to all interests connected with maritime education and training of seafarers such as:

- supervision of the training and education imparted in the Institution;
- revision of syllabus;
- maintenance of operational links with maritime training institutions abroad;

ORGANIZATIONAL PLAN OF THE ETHIOPIAN
MARITIME TRAINING INSTITUTION



- considerations and recommendation regarding the introduction of new courses and starting point of development phases;
- decisions on the number of trainees to be recruited, and
- appointment of teaching staff.

In the initial phase of development, the institution should have 3 departments in the following order:

- the department of Nautical Training;
- the department of Marine Engineering, and
- the department of Port Training.

4.2 STAFF REQUIREMENTS AND RUNNING COSTS

According to the suggested phased programme development, the number of students enrolled in the Institution within the first phase will not be more than 130 (80 cadets and 50 other trainees from the ports and merchant navy).

Due to the few number of trainees in the rating and port training programmes, which is estimated to be 50, it will not be feasible to provide the scheme with independent staff.

To be more functional and to save manpower and material, it is desirable to incorporate the staff within the cadet training programme.

On the basis of this suggestion, the following staff requirement and running cost estimate is prepared for a combined student body of 130 .

(18) The academic teaching staff requirement based on a staff/student ratio of 1:20, and for practical teaching a staff/student ratio of 1:10 , provides a total requirement of 19 lecturers for both groups. Out of this, 10 will be lecturers in the cadet training centre, while the remaining are assigned in the rating centre.

Teaching staff:

1 principal
1 academic dean
3 heads of department
1 dean of students
19 lecturers

Non-teaching staff:

1 administrator
1 librarian
5 technicians
4 clerical assistant and typists
4 caretakers and cleaners
2 watchmen

Running costs per annum

1. Salaries of teaching staff

	BIRR	US
1 principal	14350*1= 14350	7000*1= 7000
1 academic dean	13325*1= 13325	6500*1= 6500
3 heads of dept.	12300*3= 36900	6000*3= 18000
1 dean of student	12300*1= 12300	6000*1= 6000
19 lecturers	9840*19=186960	4800*19= 91200

2. Salaries of non-teaching staff

1 registrar, librarian	9225*2= 18450	4500*2= 9000
5 technician	8200*5= 41000	4000*5= 20000
10 other staff	8200*10=82000	4000*10=40000
Total salary of staff	405285	197000

(* The 19 lecturers mentioned above include other professionals such as lawyers, nurses etc.)

3.Premises charges (for both groups)		
Light,power,water etc.	60393	29460
4.Supplies and survices (for both groups)		
Equipment,stationery, supplies	36235.8	17676
5.Debt charges (for both groups)	54357.7	26514
6.Miscellaneous costs (for both groups)	6449.3	3146
Grand Total (Eth.Birr)	<u>562,716.8</u>	<u>\$ 274,496</u>

4.3 STAFF CRITERIA

Since availability of qualified staff is one of the most significant factors that determine the effectiveness of the institution, it will be very desirable to select efficient managers, instructors and reliable support staff. Therefore the following proposal is made to recruit individuals possessing relevant certificates and work experience.

Principal:

(17) Being the man at the top management level of E.M.T.I. and responsible for the development of external relations, he is required to possess academic degrees and adequate work experience in maritime activities in comparable positions to enable him to direct the E.M.T.I efficiently in carrying out its mission and objectives.

Educational requirements include possession of academic degrees in maritime studies and educational administration with a minimum requirement of a Master's Degree in these fields. Work experience could be service in the merchant navy, an officer of outstanding quality in the Ethiopian Navy, or a manager of advanced training programmes.

Academic dean:

Considering the few number of trainees accepted in the early phase, the staff requirement suggested on the previous page does not include a vice principal. This is done to avoid excessive staff which can be incompatible with the number of trainees.

* E.M.T.I= Ethiopian Maritime Training Institution

Therefore, I suggest that the duties and responsibilities of the vice principal be covered by the academic dean . As a person responsible for the general academic policy of E.M.T.I. i.e. control and supervision of the academic curriculum and performance standards of lecturers and students within the department divisions, he should have strong academic background and considerable experience in a field associated with management of training programme. It would be appreciated if his other degrees are in maritime / port related studies or educational administration.

His work experience should include experience in a faculty of a similar institution, experience in a port or as a mariner with a position requiring management skills.

Dean of students :

Since he is entrusted with a variety of managerial responsibilities, calling for a wide range of experience and educational background, desirable work experience could include advanced officer standing from the Navy or the merchant marine with management responsibilities.

The student affairs department is headed by the dean of students, who is responsible to look after the welfare and privilege of the students such as accommodation, food, discipline, recreation and social privileges.

Head of department:

Each department head is required to have a B.Sc. in his academic field of responsibility. Teaching experience in the academic field coupled with management experience would be preferable.

In the field of maritime studies the department head should hold a valid top licence in the field of his speciality (Nautical Science, Marine Engineering).

Administrator:

The post requires an individual who is competent enough to run and manage the department. He has to bear the responsibility to manage the overall operational affairs of the institution, such as finance, personnel, public relations, buildings and grounds.

Therefore the criteria for acceptance should be possession of a general management background in personnel and financial management, with an academic requirement of a B.Sc. degree and Master's degree in business administration or management.

Besides, ample work experience in the fields is required.

4.4 TEACHING STAFF.

For an institution to comply with its objectives, the availability of adequate number of qualified teachers is decisive. The required number of teachers is dependent on the number of trainees and the variety of programmes offered.

Due to the highly specialized and technical nature of the profession, many training institutions, specially those of the developing nations like Ethiopia, often encounter a shortage of maritime teachers, the degree of which is dependent on the different situation prevailing in each country.

To satisfy the highly specialized and rapid change of maritime technology, the teaching staff should be qualified technically as well as academically to ensure better results in the transfer of technology .

As far as professional competence and experience is concerned, it is more desirable to employ ex-mariners with practical experience at sea who are competent in the art of teaching.

Teachers at officers training centres in different countries teaching professional subjects are usually ex-ship officers, holding certificates of competency as master or chief engineer of foreign-going vessels, competent ex-naval officers or other qualified technical cadres having either university level and pedagogic training.

On the other hand, to minimize the effect of shortage in professional teachers, the following two options should be considered:

1. teaching of certain natural science subjects and general educational subjects which do not require sea experience could be taught by non-seafarers who possess degrees from universities or colleges (Addis Ababa University, Asmara University, or other technical colleges) in their particular specialty;

2. practical subjects which concern maritime professions, may be covered by supervisory personnel in the shipping industry, experienced teachers in practical training and also competent veteran ship ratings.

Besides, to improve and broaden the outlook of teaching staff in modern maritime related activities, the institution when fully functional should have the responsibility of providing the relevant training programmes. The training may be conducted as refresher, updating or in the form of extended courses.

To achieve good results, selection of instructors for the available training courses should be conducted on the basis of the individual's possession of an academic degree and a minimum of job experience.

Some of the education and training criteria should be:

- to have taken the course he is to teach;
- to have participated in an instructor training programme;
- to possess advanced language skills;
- preferably to hold both a Bachelor's and Master's degrees in the field he is teaching, and
- to have worked at least at a level above that which he is going to teach.

Furthermore, the institution should encourage its teaching staff to take the initiative to update their knowledge and skills using the available resources, and when the situation permits, by arranging the following :

- encourage lecturers to undertake research activities;
- encourage teaching staff to participate in international conferences, workshops, and seminars;
- arrange study tours to other maritime institutions abroad; and
- arrange periodical sea service time for teachers, and send them to sea, to keep abreast of new trends and developments in shipping.

4.5 FINANCIAL RESOURCES

Availability of adequate funds to meet the different sources of expenditure is one of the decisive factors for the successful establishment of a maritime training institution.

The amount of financial resources required for this task is directly proportional to the objectives and functions which are expected of the institution.

Hence to match hope with reality, it would be realistic first to consider the priorities in the immediate objectives of the institution, and then deliberate on the question of funding.

The requirements regarding future objectives should be dealt with after the accomplishment of the former.

The immediate objectives, as stated in Chapter 4.2 are as listed below.

1. training of ratings, i.e. general pre-sea course for new entrants and a short refresher programme for senior ratings.

2. training of junior port employees in cargo handling, stevedoring, transit cargo operations, tallying, first aid and other safety aspects of port operation.

3. training of pre-sea cadets both for the engineering and deck division.

Thus with this order of priorities, funding of the institution can proceed on a step-by-step basis.

Once the task is so simplified, the initial run to achieve the immediate objectives will not be so difficult as compared to that of the funding requirements for a comprehensive training complex with facilities for all programmes.

Therefore, inspite of the exisiting difficulties, it is desirable that the Ethiopian government itself funds the annual running cost of the institution, an estimated Eth. Birr 603716 (\$ 294496), and the construction costs of the aforesaid institution so as to lay the basis for seeking financial aid and material assistance from other international organisations. Regarding the remaining capital fund, to purchase equipment and materials abroad, I suggest that Ethiopia acquire them through diplomatic channels using the technical assistance programme of the International Maritime Organisation (IMO).

The appeal for assistance may be directed to the following United Nations organisations, development agencies, and donor countries:

1. United Nations Development Programme (UNDP)
2. Economic Commission For Africa (ECA)
3. United Nation Education, Scientific and Cultural Organisation (UNESCO)
4. United States Agency for International Development (USAID)
5. International Centre for Ocean Development (ICOD)
6. African Development Bank (ADB)
7. Swedish International Development Agency (SIDA)
8. Canadian International Development Agency (CIDA)
9. Norwegian Aid for Development (NORAD)
10. International Bank for Reconstruction and Development. (IBRD)

CHAPTER 5

FACILITY REQUIREMENTS

5.1 BUILDINGS AND SITE.

The construction of suitable purpose built buildings is the most important part in the process of establishing the maritime training institution, as buildings are essential to house the different training facilities and equipment which are the fundamental requirements for the establishment of the institution.

Some of the facilities are:

- 1 nautical, engineering and science laboratories;
- 2 auditorium and lecture theatres;
- 3 library;
- 4 offices for administrative and teaching staff;
- 5 classrooms;
- 6 dormitories and dining rooms;
- 7 recreational and health facilities; and
- 8 other in-house equipment and facilities.

To achieve optimum results maximum care should be taken in selecting a suitable site for the institution.

It is advisable that educational and architectural staff consultants work harmoniously to choose the best possible layout for the intended building designs.

Some of the important criteria which should be considered when choosing the construction site are:

1. availability of enough land space for the construction of the intended facilities (libraries, offices, workshops, laboratories, messes, parking lots, staff quarters, recreational facilities, etc.) and for future expansion;

2. presence of adequate water front area to provide facilities for training ships, boats and for hands-on training in seamanship and other shipboard activities;
3. physical proximity of the site to a port facility (maritime industry) to form a mutual working cooperation in order to allow the institute to take advantage of the existing port and other marine installations, specially the equipment in actual operation,
4. provision of electric power supply for teaching aids and other daily services; and
5. earth-quake zone and areas suspected of erosion should be avoided to prevent loss of life and property.

Considering the above criteria, "Haleb Island" near the port of Assab appears to be the best site for the establishment of the institution.

5.2 GENERAL LAYOUT OF BUILDINGS AND CONSTRUCTIONS

The lay out of suitable buildings in training facilities is found to have a bearing on the overall efficiency of the education process; it is, therefore advisable that the structural engineering be undertaken by qualified and competent people. All buildings should generally be of low cost type, and good looking which blend into the general scenery of the background.

(19) According to F.G Knirk's "Designing Productive Learning Environment" there are seven types of building layouts for a training facility, namely: corridor, finger, court yard, loft, circular, cluster, and campus types.

For better results the selectors of buildings specially for the Red Sea area need to consider the following points.

1. Climatic conditions

- The buildings should suit the Red Sea climatic conditions; to allow optimum use of cooling systems. (natural or artificial)
- The construction should be completed in such a way that seasonal winds (the south east and north east winds) could be exploited with suitable arrangements of windows to reduce the effect of heat.

2. Economic limitations

3. Availability of space

4. Curriculum to be followed,

To prevent acoustic disturbances and other activities distracting mental concentration, workshops, kitchen, laboratories, etc. should be suitably spaced.

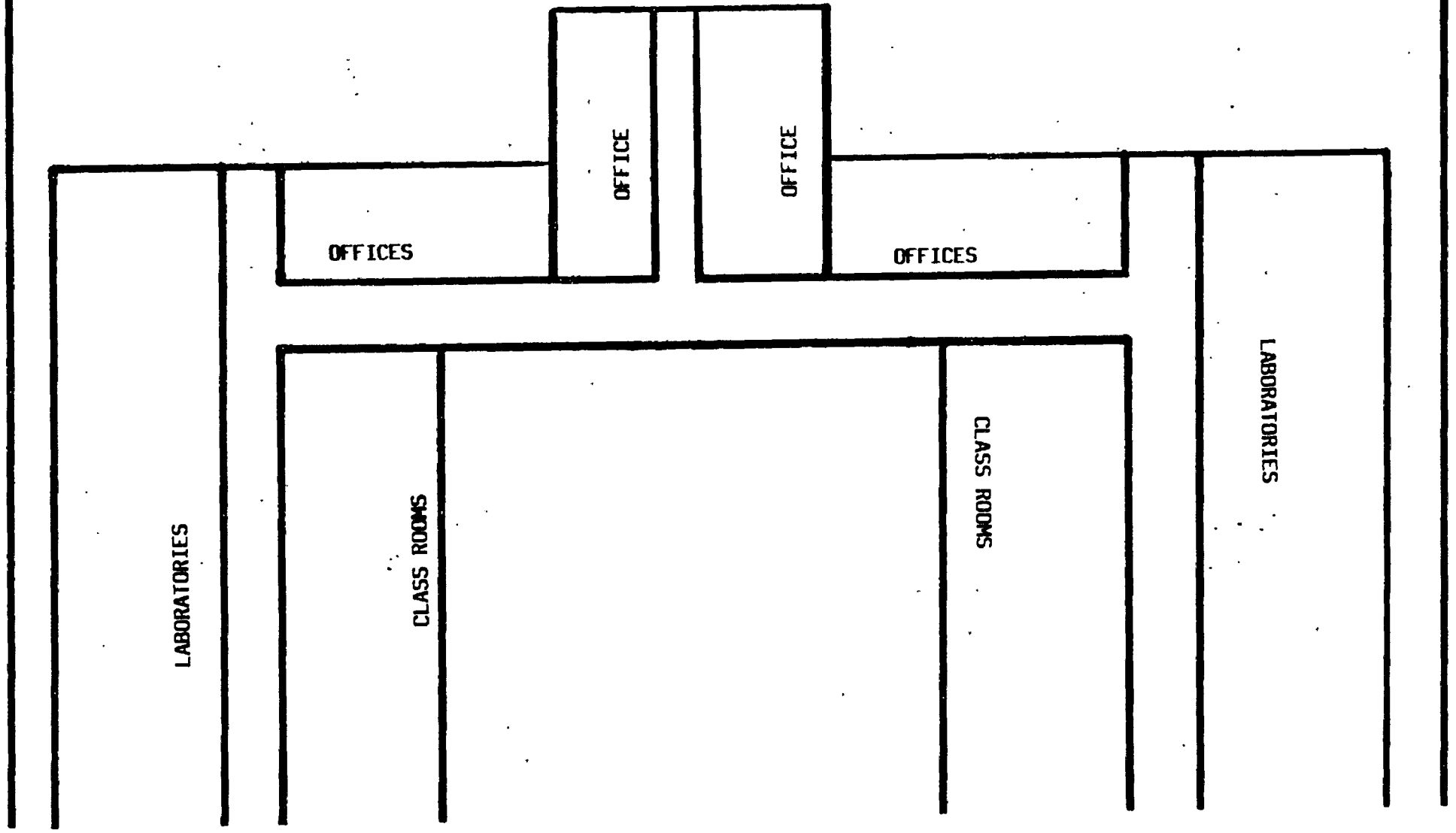
5. Sizes and special features of constructions should suit the prevailing climatic condition of the region, therefore for equatorial regions and hot areas such as Massawa and Assab it would be more appropriate to apply the corridor, or finger designs shown on the next page.

(20) During the construction process flexibility should be used to provide buildings with the basic requirements, such as:

- adequate working space (atleast 1.5 sq.metre/trainee);
- proper ventilation (artificial and natural);
- adequate lighting (artificial and natural); and
- suitable emergency exits.

Furthermore, as maritime technology is changing very fast, with the tendency of making educational facilities quickly

PROPOSED BUILDING PLAN FOR ETHIOPIAN MARITIME TRAINING CENTRE



obsolete and incapable of meeting demands, it is more advantageous to erect buildings with all loads borne by the external walls. This leaves the internal partitions to be non-load bearing, making future internal re-arrangements easy. Such adjustability of roomsize enables the training facility to modify rooms to the required size at a very minimal cost.

To allow interchangeability of instruction media and rooms with the change of technology, wiring in buildings should be flexible. Excess of required conduit piping should be laid to allow for future additions and alterations, without incurring expensive structural modifications. For example, instruction rooms or an office may be changed to a computer laboratory.

All different buildings (administration, sick bay, library, classrooms, workshops and laboratories, etc.) depending on the similarity of their functions may be grouped into clusters. Thereby, the cluster consisting of workshops, the main power station, laboratories, etc. characterized by loud noise and distracting smell are to be located at suitable areas for tranquility.

The fire fighting cluster should be constructed with fire resistant materials. In addition to that, provision should be made for smoke diving rooms, storage areas with machinery space, a briefing/ de-briefing room and an office for the instructor. The lifeboat station should be near the seaside to suit the training facility. It should be arranged in such a way that it is beneficial for sailing, boat launching, survival craft and other seamanship training activities.

Classrooms

The classroom environment should be conducive to learning, and the number of students should be appropriate to the size of the rooms. (approx. 1.5 sq. meter per student). It should be well illuminated and properly ventilated.

Library

It should possess enough space for readers, and its location should assure tranquility.

Furthermore, provision of adequate light and proper ventilation is very important.

Student accomodation

Student accommodation needs to be constructed of strong durable material and should provide planned entrance and exit to ensure free movement.

In addition to that, illumination and ventilation should adequately be provided, with stairways and emergency fire exits conveniently marked and located.

Dining and Galley rooms

- Rooms need to be spacious enough to accommodate the whole student body at the sitting;
- They need to be of the type that can be easily kept clean;
- They should be re-arrangeable to be used for general assembly and other social functions, or as a T.V room;
- They should be provided with fire proof materials; and
- They need to be covered with wall and floor material that could be washed frequently.

Recreation and sport

- They should possess enough ground for different games (football, basketball, ground tennis, etc.) ;
- They should be provided with indoor game facilities, and
- They should possess a swimming facility for recreation and training purposes.

5.3 REQUIREMENT OF TRAINING AIDS

In every knowledge imparting and acquiring process, availability of training aids is an essential part in the evolution of a training activity. Appropriate training aids when employed as supporting means for theoretical instructions provide motivating forces leading to professional improvements.

(21) Easier understanding and retention of the subject matter is achieved by the trainee in a relatively short teaching time, saving valuable time and energy for all parties. They usually take various forms, from simple chalk and blackboard through audio visual aids and cinemas, to full-size vessels, all of may be widely used to:

- form an integral part of the main exposition by providing sign-posters, guidance for note-taking and illustrative materials ;
- provide supplementary material (background reading, remedial or extension and enrichment material, etc.);
- increase student motivation by introducing visually attractive, interesting or simply different material into an otherwise routine lesson;

- provide illustrative application, relations, integration of one topic with another, and bring understanding where at times any spoken words can not help the learner's comprehension.

Hence E.M.T.I, which is going to be the nation's maritime learning resource centre, depending on its financial capabilities, should possess these modern teaching aids, some of which are summarized as follows.

Visual and audio-visual aids

- Magnetic boards: used to demonstrate rules of the road, the cycle of mechanism, flow diagrams, stowage principles and arrangements, flag signals, etc;
- Flash cards: for learning the international code of signals, semaphores and morse code;
- Photographs: for demonstration of shipboard equipment, and other useful materials;
- Exhibitions and displays including models, samples, charts, components of ship-board equipment etc., to simplify and improve the transfer of information between educators and trainees.
- Overhead projectors, slide projectors, different sizes of educational films, micro films, closed circuit television, tape recorders, copying machines, and calculating machines, are very essential tools to facilitate the education and training process of an institution

(22) Furthermore, depending upon the financial capabilities and demands of the training task, it is advisable that the institution possess at least a simple simulator (radar simulator, satellite navigation simulator, radio direction finder simulator, etc.) to improve the transfer of information and skills.

*E.M.T.I= Ethiopian Maritime Training Institution

The advantages that the E.M.T.I would get through possession of simulator(s) is enumerated as follows:

- a simulator enhances enthusiastic student participation in the learning process;
- it provides a risk free environment for experimentation;
- it allows effective exercise irrespective of the weather;
- provision of possibilities for Pre selection of system failures on different situations;
- possibility of recording and replaying of training exercises to improve the training efficiency; and
- possibility of using Marine simulators for research and analysis of navigation casualties.

5.4 LIBRARY FACILITIES

Libraries are an indispensable part of the learning process which serves the needs of the institution, trainees and teachers by offering reference information compatible to the curriculum of the training programme. They also provide advisory service to students and staff alike in order to enhance optimum exploitation of the existing material collection.

So it is desirable for the Ethiopian Maritime Institution to have a good library system that will serve the needs of the students and the staff alike.

The forms of references available in well established maritime libraries are, microfiche, hardcover books, video tapes, periodicals, journals, magazines and others. The proposed library at the E.M.T.I should have a wide range of services such as:

- maintaining a good system of catalogue, indexes and bibliographies to provide easy references;
- satisfying the demands of the users;
- achieving an upto date information system by keeping abreast of current and future developments;
- subscribing to a wide range of journals, periodicals and magazines, and
- providing users with open access to the facility.

(23) To keep abreast of current developments, the library must be able to facilitate access to published literature available elsewhere, and purchase bibliographies, and current awareness journals etc. Hence, I suggest that the library generously be provided with the means to purchase books of interest for the institution to satisfy the demands of its users.

The value of information derived from a well established and equipped library can not be underestimated here, although an effectively operated library involves a considerable amount of funds. The vital importance of it to educational advancement is worthy of consideration.

5.5 EQUIPMENT ESTIMATE FOR CADET TRAINING CENTRE

(18) Estimate to furnish 7 classrooms
to accommodate 20 students each

<u>S/N</u>	<u>Item</u>	<u>Quantity</u>
1.	Desks and chairs	20 * 7 = 140
2.	Lecturer's desk and chair	1 * 7 = 7
3.	Equipment locker	1 * 7 = 7
4.	Filing cabinet	1 * 7 = 7
5.	Overhead projector	1 * 7 = 7
6.	Blackboard	1 * 7 = 7
7.	Whiteboard	1 * 7 = 7
8.	Magneticboard	1 * 7 = 7

Classroom for drawing
Required room = 1

<u>S/N</u>	<u>Item</u>	<u>Quantity</u>
1.	Drawing desks and chairs	20
2.	Lecturers desk and chair	1
3.	Equipment locker	2
4.	Overhead projector	1
5.	Blackboard	1

5.6 (18) EQUIPMENT ESTIMATE FOR RATINGS TRAINING CENTRE

Estimate to furnish 6 classrooms

to accommodate 20 students each

<u>S/N</u>	<u>Item</u>	<u>Quantity</u>
1.	Desks and chairs	20*6 = 120
2.	Lecturers desk and chair	1*6 = 6
3.	Equipment locker	1*6 = 6
4.	Blackboard	1*6 = 6
5.	Whiteboard	1*6 = 6
6.	Magnetic board	1*6 = 6

Equipment estimate for Demonstration Rooms

to accommodate 20 students each

1.	Desks and chairs	20*2 = 40
2.	Tables and stools	4*2 = 8
3.	Equipment locker	1*2 = 2
4.	Blackboard	1*2 = 2

A Refectory and Student's common room

5.7 (24) EQUIPMENT ESTIMATE FOR PRACTICAL SEAMANSHIP CENTRE

<u>S/N</u>	<u>Item</u>	<u>Quantity</u>
1.	Work benches fitted with 10 vices for wire splicing, with lockers under for equipment storage	2
2.	Derrick model for illustration	1
3.	Crane model	1
4.	Windlass model	1
5.	Hatchcover model	1
6.	100-ton trolley-mounted splicing press	1
7.	Sets of protective clothing, lifejackets and sea boots	20
8.	Pairs of safety spectacles	20
9.	Safety helmets	20
10.	20-man liferaft, inflated for dry demonstrations, (complete)	1
11.	Pilot ladder	1
12.	0.5 chain block	1
<u>S/N</u>	<u>Item</u>	
13.	Portable lifeboat radio	1
14.	Set of rule of road ship models, buoyage models, ships lights etc.	
15.	Selection of lifebuoys and markers	
16.	selection of boatswain's chairs and stages	
17.	supply of ropes and wires, various types and sizes	
18.	Derricks, cranes, and windlass models	

- 19 Hatchcover models
- 20 Anchors and chains models
- 21 Stability demonstration loadicator
- 22 Ships construction demonstration model

Equipment to furnish boat and survival facilities

<u>S/N</u>	<u>Item</u>	<u>Quantity</u>
1.	Wooden lifeboat, clinker built, 24ft length, fitted with small diesel engine, mast, sails and full set of oars	1
2.	Set of gravity davits to house lifeboat and allow for boat-drill instruction	1
3.	Clinker built shetland type sailing boats, 19ft length, bermuda rig, wth oars and small outboard motors	2
4.	Wooden rowing gig, clinker built, 24ft length, with full set of oars and small outboard motor	1

<u>S/n</u>	<u>Item</u>	<u>Quantity</u>
5.	20-man inflatable liferafts for survival wet drills	2
6.	Complete lifeboat outfit for instruction	1
7.	Complete liferaft outfit for instruction	1
8.	4 HP electric portable hoist unit for gravity davits and slewing davit	1
9.	0.5-ton electric winch for boat maintenance area	1
10.	GRP dinghy, 10ft length	1

5.8 (18) EQUIPMENT ESTIMATE FOR FIRE- FIGHTING CENTRE

The fire-fighting centre should be provided with its own lecture room and a practical area. It is advisable to choose the site such that there is no restriction on the emission of smoke. At the same time the lecture room would need to be equipped with the usual demonstration table, cine projector, slide projector, overhead projector, etc.

Fire building complex

The fire building should be constructed of mild steel, two stories, measuring 10 metres long, 4.6 metres wide and 5.2 metres high, constructed as shown in the attached illustration.

The building needs to be fitted with the following:

- 1 Moveable obstructions within complex i.e.
 - metal cooking ranges (simulated galley)
 - metal winch (simulated engine room)
 - metal beds (simulated accommodation) etc.

- 2 Fire Cribs (Braziers) 2 large approx. 1.5m*0.5m*0.5m
2 small " 0.5m*0.5m*0.5m.
all fitted with heat deflector plates at the head and counter-balanced at the heel (safety feature to prevent overbalance)

- 3 Assorted dummies for search and rescue procedures
 - 6 adult dummies approx. 50kg.
 - 2 child dummies.
- 4 Large supply of carbonaceous fuels (timer, etc. for inside use)
 - Large supply of used lub. oils for outside fire tray use
 - Large supply of smoke bombs/generators.
5. Two *three sided brick fire bays fitted outside, completed with mild steel fire trays approx. 1m*1m*p-0.3m.
6. A fire hydrant outlet or open water supply and fire pump would be required to supply all water for fire-fighting purposes.

Practical fire-fighting equipment

1. Sets of breathing apparatus complete with spare cylinders, spare parts and maintenance tools	30
2. Air compressor unit	1
3. Distress signal units	30
4. Fire hoses 45mm diameter	10
5. Fire hoses 70mm diameter	10
6. Fire branches, 2 standard, 2 diffuser, 2 jet/spray	6
7. Mechanical foam branches	2
8. High expansion foam generator	1
9. Foam compound	1

10. Standpipes, keys and bars to operate hydrant supply	2
11. 9 litre water extinguishers	6
12. 9 litre foam "	6
13. 5 kgs carbon dioxide extinguishers	6
14. 10 kgs dry powder	3
15. 36 metres safety lines and snaphooks	4
16. Smoke helmet and bellows	1
17. Stretchers	2
18. First aid kits	2
19. Resuscitation sets	2
20. Sets of protective clothing including tunics, fire boots, gloves, overalls, helmets	30

Theoretical fire fighting equipment

- Assortment of hand fire extinguishers, cut away for demonstration and illustration, assorted fire hoses, cut away for clarity, an international ship to shore fire hose connection and respiration and resuscitation demonstration aids.

- Different kinds of fire-fighting demonstration films.

5.9 (18) EQUIPMENT ESTIMATE FOR CHARTROOM
AND INSTRUMENTS LABORATORY

The best possible location for the teaching of chartwork should be alongside harbour, such that students have a clear view of a waterway through windows situated on at least two sides of the chartroom.

In addition to that any navigational marks in view provide invaluable opportunities for practical observations of bearings and transits, and the measurement of vertical and horizontal sextant angles.

Moreover, the facility for students to witness the effects of wind and tide on the movement of ships and other craft in the waterway will be more beneficial.

To accommodate 20 students under instruction at one time with two lecturers in attendance a room of approximately 7m*10m is considered desirable.

Equipment requirements for chart and instrument room

<u>S/N</u>	<u>Qty.</u>	<u>Item</u>
1.	5	Chart tables 8' * 2'6" * 3'0"
2.	1	Chart bench unit 2'6" wide, 3'0" high, with single drawers under.
3.	20	Chart stools 1'3" * 1'0" * 2'2"
4.	1	Lecturer's desk incorporating chart storage similar to a ship's chart locker

<u>S/N</u>	<u>QTY.</u>	<u>Item</u>
5.	2	Equipment lockers for storage sextants, and instruments not permanently displayed
6.	1	Filing cabinet, steel, 2 drawers, with suspension folders
7.	1	Bookcase for storage of sailing eirections, light lists, lists of radio signals and other publications
8.	1	Set of blinds for room blackout when signalling in progress
9.	25	Parallel rules 24", perspex, graduated
10.	20	Chart dividers 7"
11.	3	Transparent station pointers, 6" protractor
12.	1	Chart magnifier
13.	5	Sextants
14.	1	Magnetic compass and binnacle, with azimuth mirror
15.	1	Pelorus
16.	1	Starglobe
17.	6	Thermometers
18.	6	Whirling psychrometers
19.	1	Anemograph
19.	1	Pyroheliometer
20.	1	Mercurial barometer
21.	1	Aneroid barometer
22.	1	Precision aneroid barometer
23.	1	Barograph
24.	1	Thermometer screen
25.	1	Sea temperature bucket
26.	1	Facsimile weather chart receiver

- 27. 1 Rain gauge
- 28. 1 Chronometer

- 29. 1 Radiotelephone transmitter/receiver for practice
in R/T procedure
- 30. 1 Set of international equipment comprising
morse key, signalling lamp, cassette recorder,
light emitting diode
- 31. 1 Set of international code model flags and stand
- 32. 100 Navigational charts, 20 each of 5 different
charts, showing variety of navigational features,
eg. N and S hemispheres

- 33. 500 Instructional charts (not for navigation)
- 34. 21 Tide tables for tide question calculations
- 35. 20 International code of signals
- 36. 21 Meteorology ship's code and decode
- 37. 1 Meteorology Fax broadcasts (wmo)

In addition to that a selection of various publications for reference - sailing directions, light lists, lists of radio signals, etc. should be available.

5.10 (18) EQUIPMENT ESTIMATE FOR ELECTRONIC NAVIGATIONAL AID LABORATORY

The radar room should ideally be in a building so that the room overlooks a harbour and marine traffic can be observed simultaneously on a radar screen and visually.

Equipment requirements for Electronic Navigational Aids Laboratory

S/N	Qty.	Item
1.	4	Chart tables 2.45m * 0.75m * 0.92m
2.	1	Chart bench unit 0.75m wide, 0.92m high with single drawers and cupboards under it
3.	10	Chart stools 0.38m * 0.3m * 0.65
4.	1	Lecturer's desk
5.	1	Filing cabinet, steel, 4-drawer, with suspension folders
6.	1	Bookcase
7.	2	Set of blinds for room blackout when radar observing in progress
8.(24)	1	Radar Navigation Simulator, up to 4 own ships with ARPA's and Radars, live with target injector or video
9.	1	Electronic Navigation Aids, receivers and simulators for: <ul style="list-style-type: none">- Loran c display;- Omega display;- Radio direction-finder;- Echo sounder;- satellite navigator;

<u>S/N</u>	<u>Qty.</u>	<u>Item</u>
10.	1	Rules of the road and navigation light simulator
11.	1	Gyro compass wth bearing repeater and azimuth mirror
12.	1	Gyro pilot unit
13.	1	Magnetic compass and binnacle with azimuth mirror
14.	24	Parallel rules 24", perspex, graduated
15.	25	Chart dividers 7"
16.	1	Pelorus
17.		Charts and publications maintenance equipment.
18.	2	Celestial/Terrestrial Globe
19.	12	World Timezone Chart
20.	(sets)	Star charts
21.	1	Instructional model of Jyroscope
22.	2	Mercator's projection (approx.180cm*140cm) map of the world, showing shipping routes, distances, air ports and bunkering ports etc.
23.	(sets)	Classroom wallcharts showing pattern of international sea borne commerce

5.11 (18) EQUIPMENT ESTIMATE FOR MARINE ELECTRONICS
LABORATORY

Marine communications package comprising:

S/N	Qty.	Item
1.	1	Main transmitter
2.	1	Reserve transmitter
3.	1	Main receiver
4.	1	Automatic alarm
5.	1	Autokey
6.	1	Portable survival craft equipment
7.	1	VHF transmitter/receiver
8.(set)		Batteries and battery charger
9.		Instruments multirange testmeters, ORO, etc.
10.		Instrument and tool cupboard, emergency battery locker and wall facia
11.		Locker for general storage
12.		Lecturer's desk
13.	10	Student desks
14.	10	Chairs

CHAPTER 6

ENTRANCE REQUIREMENT TO ETHIOPIAN MARITIME TRAINING INSTITUTION

6.1 PRE-SEA CADET TRAINING PROGRAMME

The entrance requirement should be strict and embrace minimum general education, entrance examination, physical health and medical fitness tests, and finally psychological and personality examinations to achieve maximum results in selecting the best candidates.

Minimum General Education:

- The applicant should have completed secondary school (12 years of general education)
- He must have attempted the Ethiopian school leaving certificate examination, and have scored "B" or better grade in mathematics, physics, and "C" in English language and other science subjects.

Written examination:

- Applicants who meet the general education requirements and are found eligible in all aspects, would then be allowed to appear for the institution's written examination.

The written examination should consist of, mathematics, physics, English language, and an aptitude test to check the candidate's scope of general knowledge.

Physical health and medical fitness examinations:

Applicants who successfully pass the other examinations, are accepted for physical and medical examination, where their fitness is checked for entry to the institution. During the process of the examination, special observation should be given to:

- (17) Eye sight; un-corrected vision for both eyes, of not less than 20/100 in both eyes, correctable to 20/20 in one eye and 20/40 in the other is required.
- (27) Badly impaired hearing;
- Experience of epilepsy;
- Insanity;
- Speech impediment;
- (17) Presence of severe skeletal rupture;
- (27) Limbs, hands, and feet deformations;
- (17) Heart failure and enlarged heart
- Systolic blood pressure above 150mm HG or below 100mm HG
- Diastolic blood pressure above 90mm HG or below 70mm HG
- Heart rate above 90/minute or below 60/minute
- Chronic Gastritis gastrectomy
- Piles or Anal Fistula
- Acute chronic Nephritis
- Renal Tumor
- TB Kidney
- Glycosuria detected by Fehling or Benedict
- Nervous and Psychoneurotic diseases
- Traces of acute and chronic or any communicable disease
- Experience of relapsing diseases such as " Lumbago" and " Arthritis" etc. and any other disability which prevents the individual's training or will be obstacle for his future career as a sea officer.

Psychological and personality tests:

Candidates found eligible in all respects appear for final interview. Some of the important features which should be observed by the interviewing committee, to reach a genuine evaluation of candidates are:

- personality test, good character, smartness in appearance; (27)
- oral expression, ability to express himself logically;
- extra-curricular activity, proficiency in games, rowing, sailing, etc. and
- Age limit, a candidate must not be more than 21 years.

6.2 PRE-SEA RATINGS TRAINING PROGRAMME.

Entrance criteria for pre-sea rating

Students applying for the rating programme should be at least 18 years of age and be of good character. Furthermore students should be required to meet the following criteria.

1.1 Requirement for ratings

- minimum general education
- entrance examination and
- medical fitness test.

1.2 Minimum general education

- The applicant should have completed secondary school education (12 years of general education)
- He must have attempted the National School Leaving Certificate examination.

1.3 Written examination

Applicants who meet the general education requirement, should be tested for their knowledge of English and basic mathematics.

1.4 Medical fitness examination

Those found eligible should then be checked for their physical fitness to work at sea. To be medically fit for admission to the academy, a candidate must be in good mental and physical health. He should be free from defects likely to interfere with the training or be an obstacle for his career at sea.

Furthermore the checkup should lay special attention on the following tests:

- Impaired hearing -Severe skeletal rapture (27)
- No speech impediment
- Teeth in good condition (well filled teeth considered sound)
- Heart failure
- Enlarged Heart
- Systolic blood pressure above 150mm HG or below 100mm Hg
- Diastolic blood pressure above 90mm Hg or below 70mm Hg.
- Heart rate above 90/minute or below 60/minute.
- Eye sight, uncorrected vision of not less than 20/100 in both eyes, correctable to 20/20 in one eye and 20/40 in the other. Should pass the "snellen" test.
- Chronic Gastritis gastrectomy
- Piles or anal fistula
- Acute or chronic nephristis
- Renal tumor
- TB Kidney
- Glycosuria detected by Fehling or Benidict
- Nervous and Psychoneurotic diseases
- Involuntary movements of the limbs
- Experience of Epilepsy
- No traces of acute and chronic disease or any communicable disease.

In the case of finding a defect, it should be noted and the medical expert in charge should give his opinion, whether or not it is likely to interfere with the training and future performance of the candidate at sea.

Applicants should not be less than 18 and not more than 21 years of age.

CHAPTER 7

CURRICULUM OF EDUCATION FOR 3 YEARS PRE-SEA CADET TRAINING COURSE

7.1 GENERAL

As an organized set of formal educational and training intentions, the curriculum of the Ethiopian Maritime Training Institution (EMTI) has been carefully designed to achieve its aims and objectives.

Time and again logical analysis and empirical experiments have proved that if the education process is to be effective all aspects of the curricula must be designed with care and imagination.

On the other hand, due to unpredictable changes and uncertainties, in world trade, technological developments, and competitive pressure in shipping services, the curriculum has been designed to allow constant restructuring and review for further development. Furthermore attention has been paid to provide correlation between the theoretical, and practical training, by designing the contents, depth and timing of the courses. Hence, depending on these considerations, the following curriculum is planned and prepared for the proposed pre sea cadet training course.

The course is intended to fulfil the requirements of "front ended training system", to provide theoretical training up to the ranks of chief engineer and master. The total training duration (excluding sea training), is 3years, totalling 6 semesters of 18 weeks each. One week is 5 days of 6 lecture hours each, whereas one lecture hour (period) is of 60 minutes duration.

**7.2 SUMMARY OF PROPOSED CURRICULUM FOR A 3-YEAR PRE-SEA
CADET TRAINING PROGRAM**

Subject	Lecture Hours	Laboratory Hours
1.(26) Mathematics	200	-
2.(26)Physics	200	-
3.(26) Management	75	-
4.(26) Economics	75	-
5. Ethiopian history	50	-
6.(26) Physical Training	108	-
7.(25) Navigation	428	300
8.(25) Marine Safety	79	81
9.(25) Marine Transportation	500	240
10.(25) Meteorology	100	40
11.(26) Maritime law	50	
12. Marine Eng. (Introd.)	60	25
13.(25) Nautical English	180	60
14.(26)Data Processing(introd.)	30	
15. Rules of the Road	72	
 Sub Total	 Sub Total	
	2207 hrs.	746 hrs.
 Total Hours = 2953		

COURSE OUTLINE

S/N	SUBJECT	LECTURE HRS.	LABORATORY HRS.
1. MATHEMATICS			
1.1	Algebra and Plane Trigonometry	30	-
1.2	Spherical Trigonometry	30	-
1.3	Calculus and Analytic Geometry	100	-
1.4	Statistics and Probability	40	-
2. PHYSICS			
2.1	Kinematics and Dynamics	30	
2.2	Force, Work, Energy, Elasticity	40	
2.3	Periodic Motion and Wave Motion	40	
2.4	Magnetic Forces and Fields	20	
2.5	Basic Electronics	30	
2.6	Thermodynamics and Heat Transfer	40	
3. MANAGEMENT		75 hrs.	
3.1	Ship's Business		
3.2	Modern Motivation Theory		
3.3	The Design of Organizations		
3.4	Dynamics of Leadership		
3.5	Concepts of Control		
3.6	Quantitative Decision Making Tools		
3.7	Management Science Models		
3.8	Strategic Planning and Strategic Management		
3.9	International Management		
4. SHIPPING ECONOMICS		75 hrs.	
4.1	Methods of Economics		
4.2	Supply Demand and Market Process		
4.3	Elements of Accounting		
4.4	Costs and Supply		

- 4.5 Monopoly Oligoopoly
- 4.6 Ocean Freight rates for Cargo
- 4.7 Ocean Freight Conferences
- 4.8 UNCTAD Code of Conduct for Liner Conferences

5.ETHIOPIAN HISTORY 50 hrs.

6.PHYSICAL TRAINING 108 hrs.

- 6.1 Swimming, Games and Competitive Sports
Self Defense, Boat rowing, Sailing

7.NAVIGATION

7.1 Introduction to Navigation	129	60
7.2 Coastal Navigation	60	85
7.3 Ocean and Offshore Navigation	124	
7.4 Radar Navigation	50	85
7.5 Electronic Navigation Systems	65	70

8.MARINE SAFETY

8.1 Proficiency in Survival Craft	25	40
8.2 Fire-Fighting and Fire Prevention	35	35
8.3 Maritime Security	10	
8.4 Medical First Aid	9	6

9.MARINE TRANSPORTATION

9.1 Seamanship	130	120
9.2 Watchkeeping	90	
9.3 Marine Communications	30	60
9.4 Ship Stability	70	20
9.5 Ship Construction	70	10
9.6 Cargo Handling and Stowage	110	30

10.METEOROLOGY	100	40
10.1 Instruments and Observations		
10.2 Physical Meteorology		
10.3 Synoptic Meteorology		
10.4 Sources of Weather Information		
11.INTRODUCTION TO MARITIME LAW	50	
11.1 International Law of The Sea		
11.2 Introduction to Maritime Law		
11.3 Ship's Business		
12 INTRODUCTION TO MARINE ENGINEERING		
12.1 Internal Combustion Engines		
12.2 Working Principle of Turbines and Boilers		
12.3 Scavenging, Supercharging and Turbocharging		
12.4 Refrigeration		
12.5 Pumps		
12.6 Hydraulic Machinery		
12.7 Steering Systems		
	Lecture	Lab.
13.NAUTICAL ENGLISH	180	60
13.1 Ship's Identification		
13.2 Ship's Structure		
13.3 Safety Equipment		
13.4 Navigational Operations		
13.5 Weather		
13.6 Medical and Welfare		
14. INTRODUCTION TO DATA PROCESSING	30	
15. RULES OF THE ROAD	76	

7.3 SYLLABUS DISTRIBUTION PER SEMESTER

FIRST SEMESTER

Discipline	Hours
1. Mathematics	60
2. Physics	50
3. Ethiopian History	10
4. Physical Education	18
5. Navigation	115
6. Marine Transport	140
7. Meteorology	30
8. English	<u>72</u>

495 hrs.

SECOND SEMESTER

Discipline	Hours
1. Mathematics	40
2. Physics	40
3. Physical Education	18
4. Navigation	140
5. Marine Engineering	30
6. Marine Transport	140
7. English	<u>60</u>

488 hrs.

THIRD SEMESTER

Discipline	Hours
1. Mathematics	40
2. Physics	35
3. Physical Education	18
4. Navigation	110
5. Marine Safety	40
6. Marine Transport	150
7. Meteorology	40
8. English	30
9. Marine Engineering	<u>20</u>

483 hrs.

FOURTH SEMESTER

Discipline	Hours
1. Mathematics	30
2. Physics	35
3. Physical Education	18
4. Navigation	134
5. Marine Engineering	35
6. Marine Transport	170
7. English	45
8. Rules of the Road	36

503 hrs.

FIFTH SEMESTER		SIXTH SEMESTER	
Discipline	Hours		Hours
1. Mathematics	30	1. Physics	20
2. Physics	20	2. Ethiopian History	20
3. Ethiopian History	20	3. Physical Education	18
4. Physical Education	18	4. Navigation	120
5. Navigation	109	5. Marine Safety	85
6. Marine Safety	35	6. Marine Transport	50
7. Marine Transport	90	7. Meteorology	30
8. Meteorology	40	8. Management	35
9. Management	40	9. Shipping Economics	30
10. Shipping Economics	45	10. Maritime Law	20
11. Maritime Law	30	11. Data Processing	30
12. English	13	12. Rules of the Road	36
	490 hrs.		494 hrs.

7.4 DETAILED SYLLABUS DESCRIPTION

1. MATHEMATICS

1.1 PLANE TRIGONOMETRY

- Fundamental Relations and Identities
- Trigonometric Functions
- Sum, Difference, and Product Formulas

1.2 SPHERICAL TRIGONOMETRY

- Spherical Angles and Distances
- Polar Triangles
- The Astronomical Triangle
- Area of Spherical Triangle
- Altitude of Pole

- Napier's Rules
- Isosceles Spherical Triangle
- Quadrantal Triangle
- Oblique Spherical Triangle
- Law of Sines, Half Angle Formula, Napier's Analogie and Haversine Formula

1.3 CALCULUS AND ANALYTIC GEOMETRY

- Real Line, Inequalities, Absolute values
- Distance Formula, Straight lines, Point-slope Intercept Forms,
- Functions, Domain and Range, and Composites
- Concept of Limit
- Derivative as a Limit
- Product and Quotient Rules, Chain Rule,
- Implicit Differentiation, Absolute maxima and Minima, Rolle's and Mean Value Theorems
- Increasing and Decreasing Functions
- Definite and Indefinite Integrals
- Differentiation of Logarithmic and Exponential Functions
- The Volume-Disc and Volume-Shell method
- Parabolas, Ellipses, Hyperbolas, Plane Curves
- Parametric Equations, Polar coordinates
- Taylor Polynomials, Series and convergence, Alternating series, Ratio and root test Power series, Taylor and Maclaurin series
- Double Integrals in Polar Coordinates, Triple Integrals, Volume and Mass

1.4 PROBABILITY

- Basic Probability Concepts, Sample space, Events Random Variables, Probability Functions, Probability theorems, Condition Probability

- Bayes Theorem, Combinatorial Analysis
Basic Concepts, Permutation, Combination
- Discrete and Continuous Probability Distributions
Univariate Probability Density Function,
Cumulative Distribution Function

1.5 STATISTICS

- Parametric and Non-parametric Statistics
- Sampling models, Estimation theory, Hypothesis Testing, Regression analysis, Correlation analysis, Analysis of Variance

2. PHYSICS

2.1 KINEMATICS AND DYNAMICS OF A PARTICLE

- Units, Physical Quantities and Vectors
- Motion on a Straight Line
- Equilibrium of a Particle
- Newtons Second Law

2.2 WORK, ENERGY, AND ELASTICITY

- Elastic Potential Energy, Conservative and Dissipative Forces, Internal energy, Power
- Impulse and Momentum, Conservation of momentum, Elastic collisions, Centre of mass, Torque, Couples, Center of gravity

2.3 DYNAMICAL SYSTEMS, AND PERIODIC MOTIONS

- Rotation: Angular velocity and acceleration, Moment of inertia, Rotational kinetic energy, Work in rotational motion, Parallel-axis theorem, Angular momentum
- Periodic motion: Elastic Restoring Forces, Simple

Harmonic Motion, Circle of Reference, Simple Pendulum

- Mechanical Waves: Periodic Waves, Transverse Waves, Longitudinal Waves
- Vibrating Bodies: Wave Interference, Standing Waves Interference of Longitudinal Waves, Resonance
- Acoustic Phenomena: Sound Waves, Beats, Doppler Effect
- Nature of light: Speed of light, Electromagnetic Spectrum, Reflection and Refraction, Dispersion
- Lenses : Thin Lens, Diverging Lens, Lens Systems
- Interference: Young's Experiment, Thin Films
- Diffraction: Fresnel Diffraction, Fraunhofer Diffraction, Diffraction Grating

2.4 MAGNETIC FORCES AND FIELDS

- Magnetic Field: Magnetic Flux, Field Lines
- Magnetic Forces on a Conductor: Hall Effect, Torque on a Circuit, Direct-Current Motor
- Field of a moving charge, Current element, long straight wire and circular loop
- Force between parallel conductors
- Indirect Electromotive force and indirect electric fields
- Inductance: Self-inductance, R-L-circuit, R-L-C Circuit
- Alternating Currents: R-L-C Series Circuit, RMS Values, Series Resonance
- Relativistic Mechanics: Invariance of Physical Laws, Relativity of Mass, Time and Length,
- Photons, Electrons and Atoms: Thermionic Emission, Photoelectric Effect, Energy Levels, The Laser

2.5 BASIC ELECTRONICS

- Semi conductor theory, Transistor characteristics
- Silicon controlled rectifier characteristics and ratings, Diac, Triac, Unijunction
- Transistors, Integrated circuits, Differential and Operational Amplifiers, Oscillator circuits
- Electromagnetic wave propagation, types of modulation, AM, FM, SSB Trans-recievers

2.6 THERMODYNAMICS AND HEAT TRANSFER

- Temperature and heat
- Heat Transfer
- Thermal Properties of Matter : Equations of State, PVT-surface, Phase Diagram, Triple Point and Critical Point
- First Law of Thermodynamics: Energy and Work in thermodynamics, Work and Heat in Volume Changes Internal Energy, Isochoric Process, Isothermal Process, Isobaric Process
- Second Law of Thermodynamics: Heat Engines, Carnot Cylse, Entropy
- Gravitation: Newton's law of Universal Gravitation, Motion of a Satellite, Gravitational potential Energy
- Electricity: Electric Force and Electric Field
- Potential: Electrical Potential Energy, potential difference, potential gradient
- Capacitance: Parallel-plate Capacitor, Capacitors in Series and Parallel, Effect of Dielectric
- Current and Resistance

3. MANAGEMENT

- 3.1 The business of shipping
 - Cargo documentation
 - Shipboard paperwork
- 3.2 Modern Motivation Theory
 - Maslow's Need Hierarchy,
 - Herzberg's Two Factor Theory,
 - Mc Gregor's Theories X and Y
- 3.3 Quantitative decision making tools
 - Basic cost concepts
 - Fixed and variable costs,
 - Opportunity costs
- 3.4 Management science models
 - Linear programming, Monte Carlo Technique, Probability Theory, Decision Trees
- 3.5 Concepts of Control
 - Controllable Business Variables
 - Consequences of no Control, Economic Lot Size
 - Financial Ratios, Break Even Analysis, Gantt Charts,
 - Network Analysis, Plant Layout
- 3.6 Strategy Planning and Strategic Management
 - Steps in the planning process, Market, production and Financial Planning, Who Does the Planning?
- 3.7 The Design of Organizations
 - Line and Staff, The Functional, Product, Territorial and Customer Organization, Nature of Authority

- 3.8 The Dynamics of Leadership
 - Continuum of Leadership Behavior Model, The Managerial Grid
 - Path-Goal Theory, Contingency Theory of Leadership
- 3.9 International Management
 - Overseas Manager, Customs and Culture
 - Multinational Corporation

4. SHIPPING ECONOMICS

- 4.1 Methods of Economics
 - Opportunity Cost, Production Possibilities curve
- 4.2 Supply, Demand and Market Process
- 4.3 Demand and Consumer Choice
- 4.4 Elements of Accounting
 - The Balance Sheet
 - The Income Statement
- 4.5 Costs and Supply
- 4.6 Monopoly and Oligopoly
- 4.7 Macro-Economic Problems
- 4.8 Money and Banking
- 4.9 Ocean Freight Rates for Cargoes
 - Structure of Rates
 - Types of Rates
 - Surcharges
- 4.10 Ocean Freight Conferences
 - History of Conference Development
 - Types of Conferences
 - Conference Membership
- 4.11 The UNCTAD Code of Conduct for Liner Conferences

5. ETHIOPIAN HISTORY

6. PHYSICAL EDUCATION

- 6.1 Swimming
 - Endurance swim, Back stroke, Breast Stroke,
 - Life Saving techniques, Artificial Respiration
- 6.2 Games and competitive sports
- 6.3 Self defense
 - Defense against knife attack, Gun attack, Punches being picked up from behind, choked
- 6.4 Sailing

7. NAVIGATION

- 7.1 Introduction to navigation
 - The Earth, Equator, Great Circles, Meridians,
 - Position circles
 - Constellations and motion of stars about Polaris
 - Published navigational information, Light Lists,
 - Mercator chart and Mercator sailing formula
 - General Astronomy
 - Celestial Sphere and Equinoctial system
 - Horizon system
- 7.2 Coastal navigation
 - Chart informations
 - Compass corrections
 - Tides
 - General information
 - Elementary knowledge of passage planning
 - Clearing marks, horizontal and vertical
 - danger angles and Chart corrections

7.4 OCEAN AND OFFSHORE NAVIGATION

- Calculating Courses and distances
- parallel sailing formula, plane sailing formula and Mercator sailing formula
- Use of Nautical Almanac
- Reading and correcting a sextant
- Taking vertical and horizontal angles
- Astro position line: Co-latitude, polar and zenith distances, solving the PZX triangle
- Types of position lines

7.5 RADAR NAVIGATION

- Factors affecting performance and accuracy of Radar
- Echo principle and radar pulses
- Path of radar pulse from transmitter to target and vice versa, Function of the C.R.T
- Safety precautions against radiation hazards
- Use and operation of a Radar Set
- Problems associated with unwanted and spurious responses
- Sources of error in the accuracy of radar ranges
- Effects of pulse length, beam width, shadowing and radar horizon on radar pictures
- Deriving course, speed, time and closest position of approach from a true or relative plot
- Misleading information due to sensor errors

7.6 ELECTRONIC NAVIGATION SYSTEMS

- Basic principles of hyperbolic navigation systems
- Use of phase difference to ascertain position lines
- Use of time difference to ascertain position lines

7.7 DECCA NAVIGATOR SYSTEM

- Basic Principle of decca navigator system
- Lane identification and Lane slip
- Use of data sheets to find error corrections
- Sources of warnings due to system malfunctions
- General operation and correct use of the system

7.8 LORAN SYSTEM

- Basic principle of Loran System and its operation
- Warnings indicating system malfunction

7.9 OMEGA SYSTEM

- Basic principle of Omega system and its operation
- Transmission paths, diurnal and seasonal variations
- Propagation anomalies, signal to noise ratio effect and accuracy of Omega signals
- Use and operation of a Line of Position Recorder
- Lane Slip detection and correction
- Differential Omega system
- Automatic position indicating devices based on Omega system
- Sources of information on system malfunction

7.10 SATELLITE NAVIGATION SYSTEMS

- Satellite Orbits
- Principle and operation of Satellite Navigator
- Operation of the "Transit" satellite system
- Basic idea on satellite orbits
- The role of tracking and injection stations
- Principle of defining position surface using doppler count and two satellite positions

- Method of combining two or more position surfaces to fix an observer's position
- Potential sources of error, such as single frequency reception, ship motion, aerial height, and angle of elevation, etc.
- Use and operation of a typical "Transit" satellite navigation equipment.

Overall operation of "Navstar" satellite system

- The satellite orbits and constellations
- The role of monitoring and upload stations
- Correlation method of determining pseudo-range
- Potential sources of error such as refraction, multipath interference, user clock error etc.
- Use and operation of "Navstar" receiver

7.11 RADIO DIRECTION FINDERS

- Basic principle of radio direction finder.
- Components of radio direction finders
- Practical operation of Radio Direction Finders
- Possible sources of errors reducing accuracy
- Setting and checking heading information supplied by the gyro compass
- Obtaining bearing using manual and automatic mode
- Application of corrections for half-convergency

7.12 ECHO SOUNDERS

- Basic principles of marine echo sounding equipment
- Components of an Echo Sounder
- Possibilities and limitations
- Factors affecting velocity of sound in sea water
- Operation and maintenance of echo sounder
- Causes of inaccuracies due to instrument or scale
- Errors due to trim, heel and transducer separation

7.13 COMPASS

- Basic principle of magnetic compass operation
- Checking for compass errors using bearing
- Magnetic variations and sources of information
- Corrections for secular changes in variation
- Deviation due to Ship's ferro-magnetism and its change due to change of heading and position

7.14 GYRO COMPASS

- Characteristics of gyro compass
- Gyro error and correction application
- Transfer of heading informations from repeaters to other instruments, Off course alarms

7.15 AUTOMATIC PILOT

- Basic principle of Auto-Pilot operation
- Practical operation of Automatic Pilot
- Function of each component in the system
- Method of sensing deviation from a given course
- Limitations of an automatic pilot system to maintain a course in severe weather conditions
- Change-over procedure from automatic to manual and vice versa
- Significance of testing a steering gear

8. MARINE SAFETY

8.1 PROFICIENCY IN SURVIVAL CRAFT

- Use of lifeboats and liferafts
- Survival drill on dry and wet liferaft
- Operation of inflatable liferafts
- Initial (secondary) actions in cold and hot climates
- Effect of sea sickness, morale, individual (group) behaviour and misbeliefs, on sea survival
- Helicopter rescue techniques.

- Hypothermia, cold injuries, expired air resuscitation, dehydration, sea water, rationing
- Emergency, distress signals, and their application
- Launching and handling of Survival Craft
- Emergency situation on board ship in the event of Collision, fire, foundering
- Handling and operation of Survival Radio Equipment on : 2182 k/hz, 500 K/hZ, 8364 K/hZ
- Use of automatic alarm on 2182 k/hz and 500 k/hz

8.2 MEDICAL FIRST AID PROCEDURE

- Resuscitation and Artificial respiration
- Relieving shock
- Controlling bleeding
- External Cordiac massage etc.

8.3 MARITIME SECURITY

8.4 FIRE PREVENTION AND FIRE - FIGHTING

- Basic training in Fire-Fighting
- Theory of fire, Elements of fire and explosion
- Fire triangle (fuel, source of ignition, oxygen)
- Terms such as: ignition point, lower and upper flammable limit, inerting, flash point auto-ignition point and reactivity
- Classification of fire on board ship and the appropriate extinguishing agent
- Causes of fire on board ship

8.5 FIRE PREVENTION

- Fire and smoke detection systems
- Operation of automatic fire alarms
- Method of gas freeing tank, and inert gas systems
- Types of subdivisions, (A, B, and B-100)
- Fire-fighting agents (water, foam, Carbon dioxide, halon, foam, dry chemicals and powders)

8.6 FIRE FIGHTING METHODS

- Alarm procedures
- Fire locating, isolating, Jettisoning, inhibiting, cooling, smothering and extinguishing

8.7 FIRE-FIGHTING EQUIPMENT

- Locations of fixed fire fighting installations on board (fire mains, hydrants, carbon dioxide)
- Ship board fireman's outfits and personal equipment (breathing apparatus, resuscitation)

8.8 FIRE-FIGHTING ORGANIZATION

- Fire control plans, muster stations, Composition of fire parties and duties of individuals
- Communications outlines
- Personnel safety procedures, drills and patrols
- Resuscitation methods and handling of casualties

9. MARINE TRANSPORTATION

9.1 SEAMANSHIP

- Basic personal conduct
- Personal behaviour ashore and on board
- The need for health and personal hygiene
- General safety and accident prevention
- Categories of health hazards aboard tankers
- Significance of fire and explosion prevention
- Sources of ignition leading to fire hazard
- Shipboard safety equipment and their uses
- Cargo handling equipment
- Safe loading and discharging procedure

9.2 Helmsmanship

- Reporting procedure of bearings of objects
- Identification of standard helm-orders

9.3 ROPES AND WIRES

- Properties of natural fibre ropes,
- Properties of synthetic fibre ropes
- Construction and characteristics of steel wire rope
- Characteristics of combined wire/fibre and natural/synthetic ropes
- Making knots, bends and hitches and their use
- Safety precaution when working in closed spaces
- Assembling and streaming a patent log
- Making, marking, and using of a hand lead line
- Rigging painting stages and bosun's chair
- Hatch terms: pontoon, piggy back, flush deck, rollup hatches, single pull, side ports etc.

9.4 ANCHORS, WINDLASSES AND STOWAGE OF CABLE

- Constructional features of anchors and cable
- Common method of marking anchor cable
- Reporting procedure for anchor cable veered
- Safe handling of chain cable on deck and in lockers
- Controls of windlasses and capstans
- Safety precautions when working with windlasses
- Maintenance of the windlass and its accessories

9.5 CARGO HANDLING EQUIPMENT

- Parts of a derrick and a block
- Use and purpose a preventer
- Correct way of leading a runner to a winch
- Operation of winches and dolly winches safely
- Precautions when operating a winch
- Use of single and double gearing on steam winches
- Rigging of derricks
- Terms such as: deadman, schooner guy, steam guys
- Precautions when using Electric, hydraulic, steam and self tensioning winches, capstans, windlasses

9.6 MOORING OPERATIONS

- Use of head, stern, breast and spring lines
- Maintenance of leads, rollers, winch drums, etc.

9.7 EMERGENCY PROCEDURES

- Appropriate action before and after grounding
- Correct action when floating a grounded vessel
- Appropriate action to be taken after a collision
- Safety of passenger and crew in emergency
- Rigging and use of emergency steering
- Preparations to tow or to be towed in emergency
- Role of officer in assisting a vessel in distress
- Drawing ship's roster and emergency station lists
- Operation and safe stowage of distress signals

9.8 SHIP MANOEUVRING AND HANDLING

Coming to a single anchor

Emergency use of anchors

Berthing and unberthing under various conditions

Handling in rivers, estuaries and shallow waters

- Anchoring to two anchors in limited areas
- Remedies for dragging anchors and foul anchors
- Manoeuvring characteristics of a ship
- Navigating in traffic separation schemes
- Measures when navigating in ice
- Drydocking in intact and damaged conditions

9.9 SEARCH AND RESCUE

- Merchant ship search and rescue reporting system
- Organizational procedure for on-scene co-ordination
- Action to be taken by the ship in distress

Communications

- Necessary actions on approaching the scene

- Possible search procedures on arrival at the scene
- Coordination with SAR aircraft to plan the search
- Coordination with land-based authorities

9.10 PREVENTION OF POLLUTION OF THE MARINE ENVIRONMENT

- Pollution due to liquid and noxious substances
- Procedure of reporting an incident
- Regulation for preventing pollution by oil
- Regulation for the issue of the International Oil Pollution Prevention Certificate
- Regulations for the control of oil discharge
- Reception facilities requirement for special areas
- Regulation on the use of segregated ballast tanks
- Regulation concerning size and arrangement of cargo tanks
- Regulations for the prevention of pollution by substances carried in bulk
- Regulation for prevention of pollution by harmful substances in packaged form, containers or wagons

9.11 POLLUTION BY SEWAGE AND GARBAGE

- Regulations concerning pollution by sewage and garbage from ships
- Regulations on the issue of International Sewage Pollution Prevention Certificate
- Regulations on the discharge of sewage, reception facilities and the exceptions

9.12 HELM AND ENGINE ORDERS

- Principles of good helmsmanship when underway
- Effect of Rudder with and with-out engine
- Left and right-handed propellers
- Causes and effects of cavitation
- Controllable and variable pitch propellers

9.13 DUTIES OF WATCHKEEPING OFFICER

- Producing an officer's check list
- Preparing a procedural docking plan
- Preparing procedural plan for berthing alongside
- Preparing procedural plan for securing to a buoy
- Preparing contingency plan for rough weather
- Conducting safe anchor watch

* 9.14 MARINE COMMUNICATIONS

- General regulations for maritime mobile service
- Radiotelephone- distress frequency
- Radiotelephone - working procedures
- Radiotelephone - Distress and safety calls
- Visual communications -Sound signal communications

* 9.15 SHIP STABILITY

- Principles of hydrostatics
- Form coefficients
- Tonnes per centimetre immersion (T.P.C.)
- Righting Levers at small angles
- Stability at large angles
- Effect of density on draught
- Loadlines
- Loading and discharging weights
- Shifting weights
- Inclining experiment
- Free surface effect
- Changes of trim
- Stability information carried on ships

*9.16 SHIP CONSTRUCTION

- Terminology used in merchant ship construction
 - Measurement terminology
 - Structural terminology
 - Structural components on ship's plane
 - Shell plating terminology
- Stresses in ship's structures
- Ship framing systems
- Doublebottoms - function and construction
- Pounding - structural compensation
- Panting - structural compensation
- Structure at upper deck
- Structure at stern
- Bulkhead construction
- Cross-sectional drawings
- Corrosion and associated problems
- Rudders and propulsion systems
- Pumps, Propellers and shafting

9.17 CARGO HANDLING AND STOWAGE

- Types of Merchant ships
- Hold for dry cargoes-preparation
- Hold for dry cargoes - dunnaging and separation
- Dry cargoes - calculations
- Derricks
- Hatchcovers
- Carriage of coal cargoes
- Carriage of dangerous cargoes
- Carriage of grain cargoes
- Carriage of special cargoes
- Cargo Hold inspections
- Cargo plans

- Cargo stowage organization
- Cargo handling equipment
- Heavy lifting cargo gear
- Deck machinery
- Deep tank cargoes
- Carriage of refrigerated cargoes
- Ventilation and sweat
- Cargo work safety
- Unitized cargoes
- Oil cargo - Hazards
- Oil cargo systems and operations
- Oil cargo safety

10. METEOROLOGY

* 10.1 INSTRUMENTS AND OBSERVATION

- Mercurial Barometer
- Aneroid Barometer
- Precision Aneroid Barometer
- Barograph
- Hygrometer and Psychrometer
- Sea surface temperature
- Observations of weather elements
- Meteorological codes

* 10.2 PHYSICAL METEOROLOGY

- Characteristics of Earth's Atmosphere
- Heating of Atmosphere and Temperature variations
- Changes in Atmospheric humidity
- Vertical movement of Air
- Structure of a Cloud, Cloud formation and classification
- Reductions in visibility, Fog
- Condensation and precipitation

- Atmospheric pressure
- Pressure and Wind

10.3 SYNOPTIC METEOROLOGY

- Planetary system of Wind and Pressure
- Air Mass types
- Warm and Cold Fronts
- Isobaric systems

10.4 SOURCES OF WEATHER INFORMATION

- Weather service for Shipping
- Weather Predictions
- Weather Reports
- Operation of Faximile etc.

11. MARITIME LAW

11.1 INTRODUCTION TO INTERNATIONAL LAW OF THE SEA

- Law of Nations
- Peaceful settlement of disputes
- Territorial waters
- High seas, Contiguous Zone, Continental Shelf

11.2 INTRODUCTION TO MARITIME LAW

- Ship owner and Master
- Rights of Seamen
- Charter Parties
- Contract of affreightment
- Carriage of goods by sea
- Collision and limitation of liability
- Safety of life at sea
- Load Line

- Pollution prevention and
- Collision avoidance Conventions

11.3 SHIP'S BUSINESS

- Assuming command of Vessel
 - Hand over of Documents
 - Vessel inspection
- Report of vessels Casualty or Accident
 - Responsibility to own Vessel and Crew, to other
 - Deceased Seaman
 - Stowaways
- Foreign port entry and departure requirements

12 INTRODUCTION TO MARINE ENGINEERING

- 12.1 Internal Cumbustion Engines
- 12.2 Types of Diesel Engines
- 12.3 Working principle of of Turbines and Boilers
- 12.4 Fuel injectors and injection systems
- 12.5 Scavenging, supercharging and turbocharging
- 12.6 Cooling systems
- 12.7 Refrigeration
- 12.8 Air conditioning
- 12.9 Pumps
- 12.10 Compressed air systems
- 12.11 Hydraulic machinery
- 12.12 Steering systems
- 12.13 Propulsion systems

13.NAUTICAL ENGLISH

Ships identification:

ship's name, port of registry, call-sign, date and place of build, colour of hull, age, type, speed, nationality, origin, owners, size, capacity, crew

Ships structure:

propulsion, cargo machinery, ship's lifeboat,

Safety equipment:

inflatable liferafts, ship's lifeboats, other floatation apparatus, pyrotechnic equipment, radio equipment, fire-fighting equipment,

Navigational operations :

anchoring equipment, anchoring operations, arrival equipment, arrival operation, departure operations, courses, pilotage, engine orders

Weather:

present weather, predicted weather, tropical storms

Medical and welfare:

ailments and accidents, parts of the body

Public safety:

oil pollution, gas pollution, dangerous chemicals, explosives, dangerous gases

15 RULES OF THE ROAD

9.12 WATCHKEEPING

- The 1972 Collision Regulation
- General Rules (Rules 1, 2, 3)
- Steering and Sailing Rules (Rules 4 - 19)
- Lights and Shapes (Rules 20 - 31)
- Sound and Light Signals (Rules 32 - 37)
- Sound signals when in sight of each other
- altering course to starboard
- altering course to port
- operating astern propulsion
- Vessel intending to overtake in a fairway or channel :
 - to port or to starboard of the overtaken vessel
- sound signals of vessels in restricted visibility
- International Association of Lighthouse Authorities system of Buoyage
- Distinguishing the purpose of buoys, lights, and marks, (lateral, and cardinal marks)

CHAPTER 8

CURRICULUM OF TRAINING FOR PRE-SEA, AND POST-SEA RATINGS TRAINING

8.1 GENERAL

Today, in the light of technological advancements in modern shipping, the traditional ways of learning " through the hawse-pipe scheme" (on the job) has proved itself incompetent to meet the ever increasing demand of shipping.

Modern ships, as they are heavily equipped with variety of complicated machinery which requires soft handling and skilled operation has reflected the significance of systematic training of rating-seafarers.

The scope and depth of the knowledge transfer is also found to be very extensive when compared to that acquired by merely practical experience in the same amount of time. Hence, considering the relevance of systematic ratings training, I recommend a special training course for pre-sea and post-sea ratings.

The training scheme is suggested to be conducted on the same basis of curriculum planning, proposed for the pre-sea cadet training programme, ie:

- the total training duration should be 12 weeks;
- one lecture hour (period) should be 60 minutes;
- one day should be 6 lecture hours, and
- one week should be 5 teaching days.

This provides a total of 360 lecture hours for both courses. Out of this 333 hours are planned for the pre-sea rating training, while 27 hours are reserved for class and final examinations .

For the post-sea training scheme a maximum of 345 hours is allocated, leaving a reserve of 15 hours for class and final examination work.

The curriculum is prepared in such a way to reflect the skills which the industry and the marine authority require, and the standards laid down in S.T.C.W. by the International Maritime Organization. Furthermore it is intended to provide the seaman with the basic knowledge for the intelligent application of skills and easy acquisition of new ones while training on the job with the aim of achieving competence for today and capability for the future.

8.2 SUMMARY OF PROPOSED PRE-SEA CURRICULUM FOR RATINGS

SUBJECT	LECTURE HOURS	PRACTICAL HOURS
1.(25) English	30	
2.(28)Ships nomenclature and Nautical Terminology	20	
3.(28) Seamanship	40	30
4.(28) Rules of The Road	20	
5.(28) Accident Prevention	8	
6.(28) Fire Fighting	20	30
7.(28) Basic Meteorology	10	
8.(28) Engine Orientation	15	20
9.(25) Health and Hygiene	8	
10.(28) Communication	5	5
11.(28) First Aid and Life Saving	20	30
12.(26) Physical Training		12
13.(28) Miscellaneous	10	
	Total hours	Total hours
	206	127

Grand total = 333 Hours

8.3 BREAKDOWN OF THE CURRICULUM

1. Nautical English:

- Ships Identification:
ship's name, port of registry, call-sign, date and place of build, colour of hull, age, type, speed, nationality, origin, owners, size, capacity, crew.
- Safety equipment:
inflatable liferafts, ship's lifeboats, floatation apparatus, fire-fighting equipment.
- Navigational operations :
anchoring equipment, anchoring operations, engine orders
- Weather:
present weather, predicted weather, tropical storms
- Medical and welfare:
ailments and accidents

2. Ship nomenclature and Nautical Terminology:

- Commands and Steering orders
- Internal Communication systems and Procedures
- Main directions (N,E,S,W, Port, Starboard etc.)
- General ship Knowledge (ships type, deck sub-divisions)
- Bridge Routine.

3. Seamanship:

- Bends and Hitches, Splicing
- Cargo block, Tackles and Rigs of Derricks
- Ropes and rope work, Mooring lines
- Use of Hand Lead and Patent Log
- Ship Maintenance

- Ground Tackles (Anchors and Cables, Windlass, etc.)
- Hatchwork and Cargo stowage
- Visual and Sound Signals
- Compass knowledge
- Watchkeeping duties
- Boat work.

4. Rules of the Road

- Ship's Lights and Shapes
- Uniform system of buoyage
- Vessels in restricted visibility.

5. Accident Prevention and General Shipboard Safety

- Precaution in Machinery spaces
- Precautions above and below decks
- Working in Holds and Tanks
- Handling moving ropes and wires.

6. Basic Fire fighting

- Theory of combustion
- Fire detection
- Causes of fire and preventive measures
- Fire fighting equipment
- Breathing apparatus

7. Basic Meteorology

- Ability to read and ascertain data from instruments
- General Knowledge on:
 - Types of clouds
 - Pressure systems
 - Wind movements
 - Visibility and Fog
 - Effect of sea on land

*8. Engine room orientation

- general lay-out of engine room
- staffing of engine room and duties
- safety in machinery spaces
- types of main propulsion units
- main and auxiliary engines
- theory of diesel engine
- working phases of 2 and 4 stroke engines
- fuel injectors, pumps
- electrical generators
- production of A/C and D/C current
- electrical power and its use onboard
- colour schemes for piping
- steering gears
- turbo blowers
- indicating instruments
- tools

9. Health and Hygiene

- Personal sanitation:
bathing, washing clothing, care of hands,
fingernails, feet, habits, hair style, dandruff
infectious disease sources, prevention and cure
drugs and addiction effects on health
- Area sanitation:
cleanliness of cabins, toilets, washrooms,
bathrooms, bed and bunk making

10. Basic Communication

- signalling by sound (whistle, siren, typhoon)
- flag-etiquette
- hoisting and lowering of flags
- making up flags for stowage

11. First aid and Survival at Sea

- Emergency stations and Emergency procedures
- Lifeboat and Lifeboat equipment
- Use of Liferrafts and Ancillary equipment
- Uses of Lifejackets, Lifebuoys, Line throwing apparatus
- Distress signals, Pyrotechnics, Emergency radio
- Behaviour in the water and in survival craft
- Treatment of wounds and injuries
- Resuscitation and Artificial respiration

*12. Physical training

- Swimming
endurance swim, back stroke, breast stroke,
life saving techniques, artificial respiration
- Games and competitive sports
- Self defense
defense against knife attack, gun attack, punches,
being picked up from behind, choked
- Sailing

13. Miscellaneous

- Social affairs:
life on board, shore leave, seafaring book,
behaviour on board, politeness, obedience,
alertness, attitude to officers and passengers,
signing on and off, the union, wages, payroll
- Geography and trade:
the ocean, the continents, the ports, the national
merchant fleet, the international shipping.

Ship procedure:

- shipyard, taking a pilot, loading and discharging
operation, manoeuvres, ship in port, bunker
Terms such as tdw, gross, net, displacement

8.4 CURRICULUM OF TRAINING FOR POST-SEA RATINGS

SUMMARY OF PROPOSED CURRICULUM FOR 3 MONTHS TRAINING

SUBJECT	LECTURE HOURS	PRACTICAL HOURS
1. (25)English	30	
2. (28)Ships nomenclature and Nautical Terminology	10	
3. (25)Marine operation		
3.1(25) Seamanship	35	35
3.2 Cargo handling	30	40
3.3 Accident Prevention	8	
3.4 First Aid and survival at sea	10	25
3.5 Basic Fire-Fighting and Fire prevention	10	35
3.6 Life boat handling	2	10
3.7 Damage control	5	10
4. (25) Basic Meteorology	10	
5. (25) Basic Communication	5	5
6. Health and Hygiene	8	
7. (26) Physical Training		12
8. (29) Miscellaneous	10	
	Total hours	Total hours
	173	172
	Grand total = 345 Hours	

8.5 BREAKDOWN OF THE CURRICULUM

1. Nautical English:

- Ships Identification:
ship's name, port of registry, call-sign, date and place of build, colour of hull, age, type, speed, nationality, origin, owners, size, capacity, crew,
- Ships structure:
propulsion, cargo machinery, ship's lifeboat,
- Safety equipment:
inflatable liferafts, ship's lifeboats, other floatation apparatus, pyrotechnic equipment, radio equipment, fire-fighting equipment,
- Navigational operations :
anchoring equipment, anchoring operations, arrival equipment, arrival operation, departure operations, courses, pilotage, engine orders
- Weather:
present weather, predicted weather, tropical storms
- Medical and welfare:
ailments and accidents, parts of the body
- Public safety:
oil pollution, gas pollution, dangerous chemicals and explosives.

2. Ship nomenclature and Nautical Terminology:

- Commands and Steering orders, and steering the ship
- Internal Communication systems and Procedures
- Log, rudder indicator, telegraph,
- Main directions (N,E,S,W, Port, Starboard etc.)
- General ship Knowledge
- Bridge Routine.

3. Marine operation

3.1 Seamanship:

Ropes and Wires:

- Bends and Hitches, Splicing
- Cargo block, Tackles and Rigs of Derricks
- Ropes and rope work, Mooring lines
- Properties of natural and synthetic fibre ropes
- Characteristics of combined wire/fibre and natural/synthetic ropes
- Correct way of leading wires and ropes, kinking, chafing and sharp bights
- Safety precaution when working in closed spaces

Anchors Windlasses and stowage of cable :

- Constructional features of Anchors and Cables
- Common method of marking anchor cable
- Controls of windlasses and capstans
- Maintenance of windlass and its accessories

Paints and other preservation materials

- Composition of paints
- Pigments, binder, thinner, driers
- Patent composition paints
- Funnel paints , bituminous paints, boot-topping
- Primers for iron and steel
- Fouling
- Grease, oil, varnish.

Painting tools

- Round brush, tar brush, dog's leg, sash tool brush, lining brush, fitch

Correct painting procedure

Watchkeeping duties

- Visual and Sound Signals
- Use of Hand Lead and Patent Log
- Ship Maintenance
- Compass knowledge

- Rules of the Road

Seamarkers

- Uniform system of buoyage
- Lateral and Cardinal marks
- Isolated danger marks
- Safe water marks
- Special marks

3.2 Cargohandling

- Inspection, testing and maintenance of lifting machines
- Tests before taken into operation
- Periodic inspection
- Rope and wire specification
- Blocks and shackles specifications
- Markings, SWL, etc.
- Stress on cargo gear

Use and application of cargo handling gear:

- Slings, chains, shackles, special purpose slings, spreaders, hooks, grabs, clamps, pallet gear

Classification of cargoes:

- General cargo, break bulk cargo, unit loads, solid bulk, liquid bulk, ship types for specialised trades general loading and discharging techniques

Cargo characteristics :

- Stowage factor, broken stowage, deadweight cargo, measurement cargo, viscosity of cargo, density of cargo, marking, separation and packing of cargoes

Cargo gear and cargo handling equipment

- Rigging and operation of:
 - Swinging derricks
 - Union purchase derricks
 - Twin derricks
 - Heavy lift derricks
 - Stuelcken derricks

- Deck cranes

Securing and lashing methods :

- Dunnaging
- Lashing method of general cargo
- Lashing and securing materials
- Lashing heavy lifts

Securing and lashing systems:

- Permanent and removable container locating equipment
- Container stocking and tier fittings
- Lashing terminals
- Container lashings
- Securing systems for trailers

Treatment of cargo during voyage :

- Ventilation and sweat
- Prevention of temperatures
- Evolution of gases
- Sweat and sweat types
- Condensation factor
- Temperature and dew point
- Rules of hold ventilation

Basic principles of loading and discharging

- Stowage principles
- Handling of break-bulk, unitised, and bulk cargos
- Safe working procedures

Hatches and hatchcover systems

- Single pull, rolling, tweendeckj flush sliding, Mc Gregor types,

3.3 Accident Prevention and General Shipboard Safety

- Precaution in Machinery spaces

- Precautions above and below decks
- Working in Holds and Tanks
- Handling moving ropes and wires.

Possible dangers and characteristics of oil cargoes:

- Vapour pressure and its influence on boiling temperature
- Flammability limit
- Explosive limit
- Flash point and auto-ignition point
- Static electricity

Hazards

- Explosion and flammability hazards
- Health hazards
- Environmental hazard
- Corrosive hazards

Hazard control method

- Inerting, monitoring techniques, anti-static
- Ventilation, segregation, compatibility of material

Personnel safety and protection equipment

- Gas measuring equipment, specialized fire extinguishing appliances
- Breathing apparatuses and protective clothing

3.4 First aid and Survival at Sea

- Emergency stations and Emergency procedures
- Lifeboat and Lifeboat equipment
- Man over board procedure
- Use of Liferafts and Ancillary equipment
- Uses of Lifejackets, Lifebuoys, Line throwing apparatus
- Distress signals, Pyrotechnics, Emergency radio

transmitters and EPIRBS

- Preparation before abandoning
- Behaviour in the water and in survival craft
- Treatment of wounds and injuries
- Moving casualties
- general principles (aims, scope, and first aid rules)
- structure and function of the human body (muscles, circulating system, respiratory system, function of the human brain)

- first aid treatment (Resuscitation and Artificial respiration, relieving shock, artificial respiration, controlling bleeding, external cardiac massage etc.)

3.5 Basic Fire fighting

- Theory of combustion
- Fire detection
- Causes of fire and preventive measures
- Fire fighting equipment
- Breathing apparatus
- Fire-fighting on oil tankers
- Fire Prevention

International Maritime Dangerous Goods Code

- Precaution and fire-fighting measures during loading and discharging of dangerous goods
- Precaution and fire-fighting during voyage carrying
- Deck stowage and separation of dangerous goods

3.6 Life Boat handling

- Equipment of life boats
- Theoretical handling of life boats
- Various types of davits

- Launching of life boat

3.7 Damage control

Method of Leakage control:

- flooding risk for ship and crew
- flooding incidents
- measures to be taken in case of flooding

Damage contro materials in case of damage

- damage control and repair equipment
- material and emergency construction against flooding
- possibilities of plugging a leak

4. Basic Meteorology

Use and understanding of Meteorological instruments

- Ability to read and ascertain data from instruments
- General Knowledge on:
 - Types of clouds
 - Pressure systems
 - Wind movements
 - Visibility, Fog, and Front systems

5. Basic Communication

- signalling by sound (whistle, siren, typhoon)
- flag-etiquette
- hoisting and lowering of flags
- making up flags for stowage
- signal letters
- gale warning signals
- pilot signals

6. Health and Hygiene

- Personal sanitation:
 - bathing, washing clothing, care of hands, fingernails, feet, habits, hair style, dandruff
 - infectious disease sources, prevention and cure

drugs and addiction effects on health

7. Physical training

- Swimming
endurance swim, back stroke, breast stroke,
life saving techniques, artificial respiration
- Games and competitive sports
- Self defense
defense against knife attack, gun attack, punches,
being picked up from behind, choked
- Sailing
- Boat rowing

8. Miscellaneous

- Social affairs:
life on board, shore leave, seafaring book, behaviour
on board, politeness, obedience, alertness, attitude
to officers and passengers, signing on and off, the
union, wages, payroll
- Geography and trade:
the ocean, the continents, the ports, the national
merchant fleet, the international shipping.

Ship procedure:

- shipyard, taking a pilot, loading and discharging
operation, manoeuvres, ship in port, bunker
Shipping terms such as tdw, gross, net, displacement

CHAPTER 9

EXAMINATION AND CERTIFICATION OF SEA-FARERS

9.1 GENERAL

The 3-year intensive diploma programme of the Ethiopian Maritime Institution, is more of a "front-ended" system which demands higher levels of education and training. The sole alternative, to fulfil this requirement would be the establishment of an Academic Board to continuously evaluate and assess the academic standing and learning activity of students.

9.2 THE NEED FOR STRICT CONTROL OF TRAINEES

Since the philosophy of " examination and certification" is to assure quality and better results through careful evaluation of trainees, the following aspects must be carefully controlled:

- the scope of acquired theoretical skills and fundamental knowledge;
- psychological and physical fitness (readiness) of the individual for the intended job; and
- the correct application of the acquired theoretical skills and knowledge.

Vetting of prospective trainees should start from the early stages of recruitment in order to adequately evaluate scholastic achievement, character, physical and psychological suitability .

(30) Grades should be reported as A,B,C,D, and F to indicate the following students achievement.

A Excellent

B Good

C Average

D Below average, but passing

F Failure

The quality point values for each of the grades should be:

A = 4 Points

B = 3 Points

C = 2 Points

D = 1 Point

F = 0 Points

To remain in sound academic standing and assure class progression in all programs, students should maintain a minimum quality point average (QPA) and attain a minimum number of successfully completed credit hours by the end of each term or academic year.

Hence to review the academic standing of all students, and take action as it deems appropriate, an Academic Board should be established, composed of the chairmen of the different faculties, and chaired by the Academic Dean. Students whose academic performance does not meet the minimum graduation standards, may be issued a "letter of academic warning", or be placed on academic probation through written notification.

However, absence of evidence of satisfactory progress to meet academic standard, or getting two consecutive terms of probation, should result in an academic disenrollment.

To be eligible for the award of a diploma in Nautical Science, the candidate should complete all sea training and all mandatory course requirements of the institution with a Quality Point Average of not less than 2.0.

For those completing with successful results, the EMTI awards a diploma conforming the completion of Education and Training Programme to the Watchkeeping officer level, in conformity to IMO STCW requirement indicated on Reg. 2/1, 2/4 and Resolution 1 and its annexes.

Finally on completion of the professional sea training of 1 year on board the Ethiopian shipping line, the Ethiopian Marine Transport Authority, who is the sole maritime certifying agency of the nation, has the responsibility to examine and award the Certificates of Competency as Unrestricted Navigational Watchkeeping Officer .

The examination and certification of rating seafarers should also be given due regard in evaluating and assessing the knowledge and competence of individuals acquired from practical and systematic training courses according to the prescribed requirement of STCW for navigational watchkeeping ratings.

**9.3 PROPOSED ADVANCEMENT SCHEME FROM JUNIOR OFFICER TO
SENIOR OFFICER'S POSITION**

Progress from junior officer through to senior officer may be accomplished using the following pattern of development.

(see attached flow chart)

1. (1 Year) Junior Watchkeeping Officer
12 months sea training period, including
6 months supervised bridge watchkeeping duties.

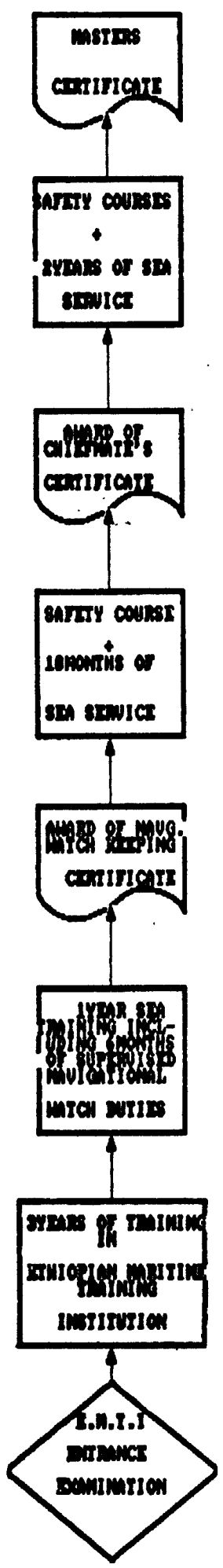
"Award of Navigational Watchkeeping Officers Certificate"

2. (1 1/2 Year) Watchkeeping Officer
Approved safety course and
18 months watchkeeping officer

"Award of Chief Mate Certificate"

3. (2 Years) Chief Mate
24 months as watchkeeping officer including
12 months of sea service as chief mate

" Award of Master's Certificate"



CHAPTER 10

CONCLUSIONS AND RECOMMENDATIONS

10.1 CONCLUSION

The following are the highlights of this Thesis regarding the development of a maritime education and training institution for Ethiopia, considering the priorities:

1. to foster the development of the shipping industry in particular and of the Nation as a whole;
2. to satisfy the demand for few, but highly trained and educated crew in view of the increased automation and mechanisation of modern ships;
3. the need and avenues of obtaining financial, technical and material assistance from donor nations, IMO and other international organizations, to reduce the effect of increased costs of modern training equipment;
4. the development of a phased programme of education and training to counter the shorta of maritime expertise in the developing countries.
5. the significance of qualified and adequate teaching staff for the success of the institution in accomplishing its training objectives.
6. the recognition of Maritime Institution's responsibility to organize extended courses, seminars and meetings for its teaching staff, to update their knowledge regarding new developments in the shipping world;

7. consideration of the choice of site, design construction and equipment of buildings, make up of curricula, etc.;

8. the importance of strict entrance criteria regarding academic standards, motivation, physical and psychological fitness all of which contribute enormously to the success of the education and training process.

10.2 RECOMMENDATIONS

1. To comply with the requirements of STCW, and new developments in the maritime world, the education and training standard of the institution should be constantly checked and revised.

2. Due to the sweeping changes of the rationalisation programmes in the maritime world, the depth and variety of maritime training curriculum has increased by a considerable amount.

Hence to cope with these sweeping changes, it is necessary to select competent trainees of high academic standards, and to reduce the length of education and training.

3. Consideration should be given to apply the concept of " sea training prior to studies " (for ratings and cadets alike), to improve efficiency of the training process, as it provides the means :

- to evaluate personal character, motivation and devotion towards the seafaring profession,
- to provide theoretical and hands-on training, and

- to prevent waste of time and resources due to personnel drop-outs.

4. To minimize the shortage of professional teachers, the institution when fully functional should have the responsibility of providing the relevant training programmes.

The training may be conducted as refresher, updating or in the form of extended courses.

Furthermore, institutional encouragement for the teaching staff to undertake research activities, participate in international conferences, workshops, and seminars is very significant to update and refresh skills of teaching staff.

4. An integral component in the process of education and training is availability of training aids and equipment to supplement the classroom instructions and lectures.

Therefore it is suggested that the EMTI, at all costs possess:

- teaching aids work-shop, where modules, boards, photographs, posters, etc. can be easily produced;
- visual and audio-visual aids including televisions and computers; and
- at least the simplest one piece equipment simulator (radar simulator, satellite navigator simulator, radio direction finder simulator)

BIBLIOGRAPHY

1. E.LITTMAN (Deutsche Axum Expedition 1913, Athiopische in-schriften 1950)
2. PERIPLUS OF THE ERYTHREAN SEA.
3. DOES RUFINUS (4th century christian writer)
4. THE BOOK OF MANI (Of the 4 great kingdoms of the world)
5. A.HERMANN (See verkher zwischen Abynien und China.)
6. A.MORDINI, KIMBLE, KOBISHENOV (The voyages of the ancient Ethiopians in the Indian Ocean.)
7. P.L SHINNIE (Campaign of Ezana on Meroe)
F.HINTZE (Studien zu Meroitischen chronologie und zu den opfertafeln ous den Pyramiden von Meroe)
8. RABI-BEN-ARIBA (Arabian visitor in 1st century A.D)
9. J.RYCKMANN (Chronologie des rois de sabat et du rayda)
- 10.EXCAVATED GEEZ INSCRIPTIONS
- 11.COSMOS (Christian topography 525 A.D)
- 12.F.M.E PEREIRA (Martyres de Nagran.Lisabon 1899)
J.RYCKMANN(la persecution des chretiens hymiarites...)
- 13.A.A VASILIEV (Justin and Abyssinia.)
ACTA ARETAS (Letters of Justin to Caleb.) 14.PROCOPIUS
(History of the wars.)
15. TARAFAN (Arabian poetry.)
16. Information from Ethiopian Shipping Lines
17. Brochure of Ghana Regional Maritime Academy
18. Report of UNDP Regional Advisory Service (E. MOT, AND G.R. HUDGE)
19. Designing productive Learning Environment, 1979, by FREDRICK G. KNIRK
20. Measurement and Interpretation of School Building Utilization, 1927, EDGAR L MORPHET

21. ILO Maritime Training Aids and Teaching Materials for the instruction of seafarers, D.34/1930
22. Fifth International Conference on Maritime Education and Training, Sydney, Canada. Sept.1988 by JEANS FROESE, head of "SUSAN", Department of Maritime studies, Hamburg Polytechnic F.R.G
23. Report on library of WMU, Malmo, Sweden by JK. ROBERT
24. IMO Strategy for Maritime Training, May 1983
25. IMO Model Course 1983
26. Course curricula summary of US Merchant Marine Academy Kings Point, New York
27. Report on entrance criteria of Bangladesh Maritime Training Centre
28. Model pre-sea Training Course for Seafarer ratings, Geneva, International Labour Office 1970
29. Report of kapitain K.THOMAS director of Schleswig-Holsteinische Seemanns Schule, Trave Munde
30. Report of Ethiopian Marine Transport Authority.
31. An introduction to shipping economics.
by IGNACY CHRZANOWSKI
32. EDWARD SAOMA, Secretary general of FAO