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Future of maritime education in Egypt in light of maritime activities

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FUTURE OF MARITIME EDUCATION IN EGYPT IN LIGHT OF MARITIME ACTIVITIES

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A Thesis Submitted For Partial Fulfilment Of The Requirements Of The Master Of Science Degree In Maritime Engineering Education

WORLD MARITIME UNIVERSITY
MALMO - SWEDEN

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[Signature]
To Those Who

Gave Unselfishly

Sacrificed Happily

Helped Endlessly

And Await Nothing In Return.

To My Parents.
Future of Maritime Education in Egypt in Light of Growing Maritime Activities
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ABSTRACT
The main objective of this work is to suggest the most feasible proposals for developing the Egyptians maritime education system to achieve complete agreement with the regulations and requirements of the International Convention on Standards of Training Certification and Watchkeeping of Seafarers, 1978.

The work commences by illustrating the importance of Egypt's international situation, and describing the nature of Egyptian coasts. A classification of Egyptian ports, their capacities and capabilities is given, in addition to a review of the various obstacles facing the ideal utilisation of these ports. Moreover, a demonstration of the Higher Council of Ports that supervises and co-ordinates the plans of all organisations, administrations and authorities that are responsible for ports' operation and development is included.

The second chapter is concerned with the Egyptian fleet and foreign trade. A review is carried out of the reasons that lead to the fleet's lack of technological development. Analysis is held of the fleet's present situation and the availabilities for the future development. This analysis categorises the different types of the modern ships joining the Egyptian fleet according to which recommendations should be established for the regulations of maritime education in order to create suitably trained crews to suit the advanced ships' technology. A forecast of Egypt's foreign trade till year 2000 is included.
The third chapter deals with the importance attached to the problem of maritime education and training with particular reference to developing countries. It briefly demonstrates some of the education systems in 4 developed countries chosen in such a way to cover the various internationally applied education and training systems.

The forth chapter discusses the historical background of maritime education in Egypt as well as the governmental regulations for certification of seafarers. The circumstances of the Arab Maritime Transport Academy establishment are recorded. A review of its various activities and capabilities is provided. The chapter ends with proposals for achieving optimum educational objectives.

Finally, an approach is provided for the concept of conjuncting theoretical education to practical sea training, in addition to a proposal for a guided sea training programme that suits the Egyptian's maritime education system.
INTRODUCTION
The vast development achieved in maritime transport industry is a consequence of the incremental growth of trade exchange between various countries. This required continuously improving technology in ships' design, construction, operation and maintenance of equipment as well as navigation. Subsequently, the need for highly qualified seafarers had been strongly dictated.

The exponentially increasing costs of ships' building as a result of the modern sophisticated technologies associated with the dramatic increase in probabilities of ships collision due to congestion in sea traffics, has drawn the attention of individual governments to the need of assuring complete safety. This demanded various governments to create national legislation for certification of ships' officers.

Each individual country has its own legislation which agree with its historical, educational and cultural background. Thus, the maritime manpower market may be considered to be formed of a heterogeneous qualification levels of officers.

This necessitated the demand for the rise of an international unified society the main objective of which is to regulate and organise the safety of life at sea.

The International Maritime Organization, being one of the United Nation's organisations, directed a great amount of its efforts towards
the establishment of the International Conventions and Laws, the most important of which are:

1- The International Convention for the Safety of Life at Sea (SOLAS 74/78)

2- The International Convention for the Prevention of Pollution from ships (MARPOL 73/78)

3- The International Convention of Load Lines-1966

4- The International Convention on Maritime Search & Rescue, 1979

5- And finally, the most important one, The International Convention on Standards of Training Certification and Watchkeeping for Seafarers, 1978

These conventions, among coming into force, reflected the need for modernisation and updating maritime education systems, in order to comply with the different conventions' recommendations.

Some countries did not suffer any difficulties as their existing maritime education system has already been found to cover the requirements of the conventions. On the other hand, the level of education of some other countries had been even exceeding the requirements of the conventions as is the case in USA (a developed country) and in Egypt (developing country). Both countries' systems of which provide an Engineering Bachelor of Science in addition to the suitable certificate of competency.

Many developing countries that suffer lack of legislation and
shortage of maritime education systems are being mostly dependent on the support and aid offered by the IMO through the WMU to supply them with highly qualified teaching staff, maritime surveyors, casualty investigators and maritime administrators.

As EGYPT is considered to be one of the leading countries in Maritime education in the Arab World as well as the African Area, three chapters of this thesis are devoted towards studying maritime education system in EGYPT.
CHAPTER 1

Development of Egyptian Ports
Introduction:

Egypt is the largest and most developed country in the Middle East both in culture and in population. It has a unique situation between Asia and Africa with the Suez Canal connecting the Mediterranean with Red seas. Egypt sea coast line on both the Mediterranean and Red seas amounts to 2,400 Km. The population of Egypt is about 46 million and is concentrated in the narrow area formed by the Nile River Delta and Valley which accounts for about 4% of the total area of just over one million square Kms.

Egypt's domestic transport system consists of about 3,500 Kms of railways, 26,400 Kms of roads, 3,300 Kms of inland waterways and four major airports.

An oil pipeline connecting Suez with the Mediterranean, has been completed in early 1977 and now is in full use transporting the Arab Countries crude oil from Suez to the Mediterranean.

Egyptian main ports on the Mediterranean are: Alexandria, Port-said and Marsa Matrouh, and those on Red sea are: Port Ibrahimia, Addabia and Safaga. A sea port forms a vital link in the chain of the transport system; as a matter of fact, a port is the place where the maritime transport is changed to other internal transport systems whether by road, railways or inland waterways or even by aviation.

Seaports can also be thought of as a system themselves in that, excess capacity in one port can be utilized to relieve congestion in another. Alexandria is the main port in Egypt. It handled over 90% of the total overseas traffic handled by all Egyptian ports in 1975.
other important ports for general cargo and dry bulk are Suez and Port-said. Ports Safaga and Qseer on the Red sea are specialized in bulk traffic of phosphate and other minerals. On the Mediterranean, Marsa Matrouh, midway between Alexandria and the Libyan border, is another small port. In addition, there are some other small ports on the Egyptian coast which handle a minimal amount of traffic, but some of which hold much promise for future development. Egypt has also specialized oil ports on both the Mediterranean and Red seas.

Recently, some traffic in foodgrains, fertilizers, timber and general cargo has been diverted from Alexandria to Port-said and Suez; it is expected that by 1986, the rehabilitation projects for these two ports will enable more of such traffic to be handled there. Port Suez may particularly be called upon to handle the large volume of cement imports expected during 1986 followed by the large cement exports expected subsequently. Some development work is in progress also in Port Safaga for providing mechanized handling facilities for alumina and phosphates.

In addition, a new port is planned to be developed at Dekhela, about 15 Km west of Alexandria, to serve a steel complex plant to be constructed there, beside general cargo containerized and bulk cargoes. Another new port is planned to be developed in Demietta, about 70 Km west of Port-said to have substantial general cargo, bulk and a trans-shipment international container terminal.
There are three port authorities in Egypt:

a- Alexandria port authority
b- Port-said port authority
c- Port authority of Suez and Red sea ports

These port authorities are semi autonomous bodies. Each port authority has a board of directors composed mainly from the representatives of the governmental bodies which have direct relation with the port. Chamber of commerce as well as that of industry both are represented by the chairmen of the two chambers in each region.

In 1981, the Egyptian government established the higher council for ports. It is headed by the deputy of the prime minister and joined by the concerned ministers. Added to this council are the governors of Alexandria, Port-said, Suez and Red sea. The main aims of this council are:

1- To supervise the ports development plans and reinforce their capacities so as to be able to accommodate as much ships as possible.
2- To develop the storage capacity of ports.
3- To supervise and to coordinate the formation of a policy for scheduling the arrival and the departure time of ships and cargoes so as to spread if possible the importation of goods along the whole year for the prevention of port congestions and transport bottleneck.
4- This council is served by a technical secretariat belonging to the minister of maritime transport which is responsible for reporting to the ports to make studies and to submit
recommendations to it

This council, on condition that its secretariat takes the full responsibility and gets the full support and highest capabilities, can be a very powerful tool for drawing a strategy for ports, and for planning and coordinating between various ministries.

Egypt is trying hard to improve its economy after long years of war, tension and unstable international relations. Since the last decade, a major scheme for the modernization of Egyptian ports has taken place. Heavy investments are directed towards the construction of new ports, new terminals, modern equipment and wide highways. Loans from the World Bank and other foreign sources were offered. However, organizational weakness may be the main obstacle to quick development.

1.2.1 Alexandria Port Authority:

The port authority, as a public corporate entity responsible to the ministry of maritime transport, is responsible for the administration and operation of the port. As a public authority it has to function within the framework of the national ports plan. The ministry of maritime transport has to approve:

1- The port's annual budget and foreign loans negotiated with banks, financial associations or foreign governments.
2- Any contracts for major development or expansion.
3- The port tariff and dues.
4- The appointment of the chairman, the director-general and the members of the board.

This is in addition to any other matters affecting national security.
1.2.2. The major functions of the port authority are:

1- To manage and operate the port in the manner which regulates and simulates the current daily work, providing quick dispatch for the vessels and the safe, rapid flow of cargo

2- To provide, maintain and utilize the port facilities (navigation berths, storage, and other auxiliary facilities)

3- Supervise, cooperate, and coordinate with other governmental public and private parties working within the port

4- Set up, regulate, and adjust the port tariffs and dues in close cooperation with the Alexandria chamber of commerce

Although, under the new form of administration, the port authority has been able to set up its own internal organisation, rules and regulations, the general features of administration are still quite similar to the governmental bureaucracy

1.2.3. The Board of Directors:

The board of directors is the supreme administration body responsible for setting out the general policy of the port. The port has stationary backing for its resolutions and the powers to impose its decisions on the user. It is formed from the chairman, the secretary-general of the maritime transport sector, the director-general of the port authority, councillor from the state council, the under secretaries of state for maritime, economy, the treasury, transport, war, health, inhabitance. The chief of Alexandria
police, the chairmen of the port authority companies (stevedoring and storage) and three members appointed by the minister of maritime transport.

The Board has the right to co-opt any person or expert working in or outside the field to attend its meetings.

Figure (1.1) shows the organisational structure of the Alexandria Port Authority.

1.3. Main ports on the Mediterranean Sea:

1.3.1. Alexandria Port:

a) Situation and Access:

The city and port of Alexandria are situated at the west of the Nile Delta, and is established on a trip of land to three km wide between the sea and the lake Mariout. It is the second city of Egypt and its population is nearly six millions. It handles more than \( \frac{3}{4} \) of the country's foreign trade. Lack of space has led to a dense urban settlement and strong settlement pressure against the port. Such multi-stored apartment houses are immediately adjacent to the port fence for much of its length, thus prohibiting enlargement of the port area.

The harbour is protected by outer reefs, two channels give access to it, the great pass and the bougaz pass, respectively 12m and 9m deep. There are no tides. A third pass, the alternate pass, is planned to be opened at a depth of 15m, which will necessitate
dredging 4 million cubic metres of sand of which 2.1 million cubic metres to reach the final depth of 15m

b) Accommodation:

The harbour is formed by two converging break waters, with entrance channel some 500m wide. Total water area is 600 ha, of which 200 form the inner harbour (mainly for general cargo traffic) and the remainder form the outer harbour (mainly for bulk and oil traffic). These harbours are separated by further breakwater. Total length quay for merchant shipping is 7300m, of which 200 are at piers. A further 2500m is used for ship repair and is distributed over the port area. This makes communication in the port difficult especially since the harbour stretches for 7 Km along side the coast.

The above would show that the port of Alexandria is impressive in size. However, earlier developments without a master plan with many small basins separated by piers make it difficult to operate. The port authority has sensible master plan projects to correct this and redesign the port. However, since modification of most piers will necessitate their temporary closure, facilities will have to be developed outside the present port to relieve congestion and to permit continued operations during the closure. The development of such facilities will emerge from the ongoing transport plan survey. Such development may take place at Dekhela, 20 Km west of Alexandria where a project exists for industrial development of a shore based steel plant.
c) General Cargo:

There are 3,400 m of quay (27 perths) for general cargo of which only about 1,500 m (11 perths) can accommodate deep sea ships exceeding 130 m in length and 8 m draft. 310 m of length of Perth has been constructed and is in service since the second half of 1982, and 140 m will be reconstructed and used by the end of 1985. In addition, the use of 4 perths and the passenger terminal are limited because these perths must be available for priority passenger and tourist vessels. Quay number 18 was reconstructed for the use of Ro-Ro ships and can accommodate two ships at a time. The turnover of this quay is very high because Ro-Ro ships need few hours to unload and load its cargo on regular trailers or the MAFI trailers using special tractors.

Transit sheds and stacking yards are too small, there are 16 square metres of transit sheds and 30 square metres of stacking yards per linear metre of Perth where the modern standards are 40 and 130 square metres respectively. Most quays have half the required width to operate equipment effectively. All these are due to the old design of the large number of narrow finger piers of inadequate and obsolete characteristics. Some of these quays are more than 60 years old and still being used.

The bulk of the general cargo trade is handled either by ship-mounted cranes or derricks or by the high tower mobile shore cranes. Of the 27 berths in the general cargo zone, only 5 or 6 can accommodate vessels of 15,000 DWT or more because of the restrictions in the length and depth of water. Under normal conditions, the average annual handling capacity of the general cargo berths is approximately
During 1983 nearly 7 million tons of general cargo were handled. This tonnage was achieved as a result of the use of Ro/Ro vessels. At present, the average berth occupancy for general cargo has nearly reached 100% due to the insufficient speed of physical handling, insufficient storage system, and complexity of customs procedures.

**d) Passenger Cargo Station:**

Tourism is a major source of Egypt's foreign exchange earnings. Since the majority of tourists come to Egypt by sea, the government decided in the late 1950s to build a modern passenger terminal in Alexandria. A deep water pier was constructed in the middle of the general cargo zone. A luxurious passenger station was built to accommodate the port authority traffic centre, offices for a number of governmental agencies (customs, security, passport and immigration); shipping agent offices and travel agents and souvenir shops.

The passenger station has 4 berths to accommodate passenger vessels of up to 30,000 GRT. To obtain full utilization of the 4 berths, the port authority allows general cargo vessels to use the quays when no passenger vessels are in the port but the latter vessels have berthing priority over cargo vessels. The berths have a total length of 639 m and a depth of 10.5 m and they have been used successfully by Ro/Ro vessels carrying passengers, cars, and trailers. The berths are well equipped with auxiliary facilities and are covered by a net-
work of rail tracks.

e) Bulk Cargo:

The bulk cargo port comprises 2,800 m of quays for coal, fertilizers, corn, wheat, flour, timber, sulphur, scrap iron etc. Half of the berths have either inadequate dimensions with narrow aprons, or inadequate length and draft (from 10 m to 7 m depth) for modern bulk carriers. Corrective measures are being taken by reconstructing the timber berth to adequate dimensions and extending the grain berths by a new berth of 300 m length and 12 m depth which is in use since 1975. The 48,000 tons grain silos has 10 m deep quay and adjacent berth is under elongation to accommodate 35,000 'TDW grain carriers to work with a new 100,000 ton silos which is under construction now to work in conjunction with similar silos in Cairo. These two silos are only transit and can both unload 15,000 tons of wheat per day and transport to Cairo by special bulk railway cars, barges and trucks.

For ores and mineral dusts, the length of the quay is 870 m. It has an average along side water depth of 9 m and can accommodate small or medium size vessels (10,000 - 15,000 DWT). Cargo is still handled manually using ships gear. Efficiency in handling bulk cargoes cannot be achieved unless modern mechanical handling equipment such as modern cranes and conveyor belts are provided. The area is, however, provided with road and rail shipment facilities.

For the coal terminal, the berths which are provided on marginal quay, have a total length of 500 m and an average depth of 8.5 m which limits the size of the vessels that can use the berths. The
The berths can accommodate 4 vessels of 4,000 DWT or two of 15,000 DWT at any one time. The quays are presently equipped with three unloading gantry cranes each having a rating of 200 ton/hour. Additional modern handling equipment is expected to be installed in the near future so that an unloading rate of 8,000 tons a day can be achieved.

Phosphate berths have a total length of 260 m but with a depth of only 2 m. Phosphate used to be loaded by two old gantry cranes rated at 60 ton/hour. The port of Safaga in the Red sea is better sited to handle this cargo since the main centre of production is located in upper Egypt. The port of Safaga is being developed to handle this trade.

The need for fertilizer is expected to increase in the near future because of the massive reclamation projects recently instituted to provide additional agricultural land. There are three berths that can accommodate three vessels of draft up to 9 m. The average daily productivity of the berths ranges from 3,000 - 4000 tons depending on the nature and type of cargo packing. Although the importation of fertilizers is likely to continue, no advanced methods for unloading and bagging are in use. The berths need modernisation (installing belt conveyors and mechanical cranes) and methods of handling should be developed to increase productivity and to reduce damage to cargo.

For the timber terminal the berths have a total length of 323 m, and a depth of 7.5 m. Timber is handled in conventional manners using ship's gear. No way cranes or other mobile mechanical handling equipment are in use for handling timber. The lack of modern mech-
nical equipment, and the slow evacuation of timber from the port have significantly slowed down the rate of unloading and created permanent congestion on the quay.

The situation in the bulk trade sector may be summarised as follows:

1- The cargo mechanical handling equipment installations are inefficient and inadequate and they do not satisfy the need to handle the increasing traffic of the port.

2- Many commodities are handled manually employing a large labour force with low productivity. Mechanical handling of those commodities would lead to far higher efficiency and productivity.

3- The undeveloped berthing facilities have placed constraints on the use of modern vessels and bulk carriers with respect to depth of water and berthing impacts. This large number of smaller vessels, required to carry the increasing traffic results in port congestion.

Immediate action is required to improve the efficiency and medium and long-term development plans are necessary if the system is to be streamlined and more productive.

f) The Liquid Bulk Terminal:

A small berth, equipped to accommodate small tankers (15,000 DWT) loading molasses, is provided with two storage tanks of 15,000 tons storage capacity. The average pumping rate is about 200 tons/hour.
On the other hand, the petroleum basin is enclosed by a small breakwater which isolates it from other cargo terminals. It contains five oil-jetties for different types of oil products (crude, fuel, refined products, lubricants, butane). The jetties can accommodate tankers with maximum draft of 36 feet. Every jetty is equipped with a number of hoses of different diameters but the present handling capacity and facilities do not match the rapid developments in the sizes of tankers. Special attention, however, should be paid to develop the petroleum facilities in light of the Egyptian's present and future demands for such a vital commodity.

Alexandria Port Rehabilitation Projects:

During the past ten years, Alexandria Port Authority (APA) has been working under conditions of extreme difficulty. The pressure put on it, following the closure of other Egyptian ports, as well as the shortage of foreign exchange which prevents the port development, the replacement of outdated equipment and buying new ones, was handled with a considerable degree of success, which reflects well on APA's ability to work under adverse conditions.

APA and its two subsidiaries (Arab Stevedoring Company and General Warehouses of Egypt) employ some 10,200 workers in all: labor supply and relations at lower levels are not problems, although need exists for training in many areas of operation. The port operates 20 hours a day, 7 days a week with additional overtime when appropriate. Target of the project is an average annual of at least 11.3 tons per hookhour.
The main elements of the project are:

1- The dredging of 1.8 million cubic meters accumulated sand in the existing entrance channels and harbor. This maintains dredging which has been differed due to the lack of dredgers.

2- Completion of the opening of a new channel by dredging 8 million cubic metres to provide additional access, which will make ship traffic flows easier and safer to accommodate and control.

3- Establishing a new general cargo storage area outside the port.

4- Building 900m (three berths) of deep sea quays.

5- Procuring floating cargo handling, communication and transport equipment for port operations.

6- Procuring maintenance equipment.

7- Consultancy studies for management, organization, accounting and training.

8- Consultancy services for final project design and engineering, including soil investigation and operation of tender documents.
1.3.2. Port-Said:

a) Situation and Access:

The city and port of Port-Said owe their existence to the Suez Canal, built during the 1860s. The port served for a long period almost exclusively as a waiting area for ships to be assembled into convoys to pass through the canal, as a bunkering and supply base for shipping as a ship repair station with excellent docking and workshop facilities and as a base for the maintenance work to be done for the canal by the Suez Canal Authority (SCA). Cargo handling activities and facilities were secondary consideration.

After nationalization, in July 1956, the SCA studied and implemented projects for providing commercial cargo handling facilities. However, the hostilities in 1967 and 1973 badly affected the working of Port-Said, but it has now partially resumed operations and it became a medium size commercial port able to berth ships of up to 9 m draft and handle 2 million tons of foodgrains, fertilizer and general cargo including bagged cement.

Seaworld access is the same as for the Suez Canal, suitable for ships up to 11.6 m draft which is more than the existing quay walls now allow. The hinterland connections consist of a road, a single track railway and an almost impossible waterway. A channel through the lake Manzala leads only to Damietta (70 Km west of Port-Said) and it is not adequately connected with the country's navigable waterways. It is used only by small ferry boats.
b) Accommodation:

The principal marine structure for the existing port is a continuous quay wall extending from the south part of Abbas Basin around Sherif Basin and into Arsenal Basin. The quay is made of steel sheet piles supported by steel tie rods anchored to continuous Larsen piles. Abbas Basin quay is 720 m long, whereas Sherif Basin quay is 525 m long, both quays depths of which vary from 6 to 9 m. Sherif Basin will accommodate five ships and after the completion of inland dredges and reconstruction operations.

c) Rehabilitation and Modernization of existing port:

This must be concerned with recognition of four principal factors:

1- Existing commitments of special port area
2- Port capacity potential related to present and future throughputs
3- Life of the facility
4- Cost of major rehabilitation

The items of rehabilitation are:

1- The existing sheet pile bulk head is sound and does not require replacement.
2- The existing water distribution system should be redesigned and repaired to provide adequate water for port
3- The existing fencing is adequate and requires local repair and painting
4- Most existing buildings are structurally sound and only require refurnishing

5- Existing quays, berths and port service should be fur­bished

6- The existing electrical system should be redesigned and upgraded accordingly

7- The installation of VHF communication system in the port must be renewed

8- Additional berths would be required to handle 1986 to 1990 projections.

9- Compatible operation methods and organisation of port responsibilities should be instituted.

10- Cargo handling equipment capable of improving productivity under existing conditions should be provided.

As a general recommendation, the entire port area should be cleared and maintained free of all cement, grain and other depris.

It has been determined that the existing steel sheet pile bulk head is sound and stable and should be dredged to a depth of up to 10.5 m of water with the repair of concrete cap beam on top of the bulk head. The use of rubber fenders in place of damage timber fenders. The existing rails line on the west side should be repaired. A complete list and requirements schedule for cargo handling equipment in accordance with forecasted cargo types and berth requirements has been prepared to fit the approved development plan.
133. Marsa Matrouh Port:

a) Situation and Access:

The city of Matrouh is 290 Km west of Alexandria, the original old port in Marsa Matrouh consists of an old berth parallel to the coast, 80 m long and 6 m deep. In 1971 a shallow berth of 90 m long and 2.4 m deep was built for barges and dredged the entrance path, which is 3 Km long to a width of 120 m and a depth of 6 m with the exception of the rock entrance from the open sea side. This port can accommodate ships of 3,000 TDW. The capacity of this port is about 15,000 tons per year of general cargo. This port is only used for fishing coastal boats and private yachts.

The harbor consists of a specious lagoon parallel to the coast and separated from the sea by two chains of rock reefs with an opening of 100 m width and 6 m depth. The eastern part of lagoon, which is about 2 Km long and from 300 to 1,000 m wide contains the old port. The new port under construction now is located in the part of the lagoon west of the inlet, which is about 5 Km long and has average width of 1,000 m. As from the inlet, a channel about 3 Km long, 120 m wide and dredged to a depth of 6 m, leads in a broken line to the old port.

The natural hinterland conditions for this port are more or less primarily desert. Marsa Matrouh is connected to Alexandria by a major Four-lane highway and a single track railway line, which starts from Alexandria and ends at Sallum; 300 Km west of Marsa Matrouh. Development of both the town and surrounding of Marsa Matrouh, which could include further port development, is limited by lack of fresh water.
b) The Present Situation of Marsa Matrouh Port:

A quay 1000 m long and 12 m deep was completed at the end of 1978 together with the reclamation behind the sea wall. Dredging in front of this quay and in the turning basin and the entrance channel up to the rock seaward entrance has almost been conducted to depth of 9 m and a channel with 120 m. The blasting of rock entrance to some width and depth is under study now and cost estimates have been calculated but it will not start before an actual commercial use of the port is ensured.

The assignment of that quay, complying to the design task is to take over container cargo traffic. The quay wall has been dimensioned to take over the load of 6 tons per square metres. Such a load is necessary to stock containers. On the other hand, the quay has been designed to receive heavy loads like locomotives, electric transformers and similar. The quay wall is 2.3 m above the sea level, that being sufficient to allow construction of service duct with installations.

c) The Possible Use of Marsa Matrouh Port:

It may appear from the first look the difficulty to envision significant demand for this port. From my point of view, the following ideas should be studied to achieve commercial use of the port:

1- To relieve the congestion at Alexandria port by diverting some sort of ships to Marsa Matrouh Port, specially in the season starting from November and ending by June yearly. This season is the time all Egyptian agricultural exports such as cotton, oranges, rice, onions, potatoes....etc
are shipped through Alexandria.
2- As container terminal for good coming from USA and also could be used by container feeder ships to serve ports along the North African Mediterranean Coast. The idea is to use Marsa Matrouh Port to receive at the beginning container and Ro/Ro ships having a draft of about 8 m and transport these containers by special flat wagons trains to Cairo, where a dry port will be established at the end of the goods train terminal.
3- The Khattara Hydraulic project equipment and gear could be unloaded in Marsa Matrouh Port.
4- The development of the western control region if it will be sufficiently advanced, Marsa Matrooh Port could be used for smaller passenger ships and yachts.

1.4. Main Ports on the Red Sea:

1.4.1. The Port of Suez:

a) Situation and Access:

The city of Suez is located 135 Km east of Cairo. It is at the northern extreme of the Bay of Suez, and at the southern terminus of the Suez Canal. From Suez, there is a direct sea access to SAUDI ARABIA, the Arabian Gulf, East Africa and the Far East by the way of the Red Sea. Through the Suez Canal to the north, there is access to the Mediterranean Sea, Atlantic Ocean, Europe and North America. Suez is strategically located for the development of both Ocean and local shipping trade.
At present, the infrastructure of Suez area consists of two principal roads connecting Suez with other cities, the 134 Km long 7 m wide two-lane Suez-Cairo road and the two-lane Suez-Ismailia road both asphalt paved. The main road extends to both Port Ibrahim and Adabiyah. Suez is also connected to Cairo by a single line and Ismailia by double line railway.

The area south of Suez is rich in minerals principally phosphates and manganese. Exports of these minerals are through the ports of Suez and Safaga. Imports into Suez are mainly from southern trade routes, of which a large portion is wheat from Australia.

b ) Existing Port of Suez Facilities :

The existing, port of Suez, facilities consist of the following:
- General cargo and passenger terminals at Port Ibrahim
- General cargo pier at Adabiyah, about 18 Kms south west Port Ibrahim.
- Petroleum terminal between Port Ibrahim and Port Adabiyah.
- A breakwater-protected fishing port at Ataga north of Adabiyah.
- Miscellaneous facilities for mooring, building and repair of small crafts and fishing boats at several locations.
- Anchorage in the Bay of Suez for convoys forming to transit the Suez Canal.
- An offshore petroleum buoy at El-Sadat.

Port Ibrahim and Port Adabiyah are the two principal facilities
for handling general cargo. Most facilities have suffered war damage during 1967 and 1973 hostilities.

1.4.2. Port Ibrahim:

At Port Ibrahim, a general cargo and passenger terminal, the principal present port facilities include a protected harbour with four cargo berths on the north Mole. The fifth berth is not used due to the damage, and two cargo berths on the south side, the centre Mole. These two berths are also used for passenger operations. Temporary storage facilities include transit sheds, open storage area and warehouses.

During the Hadg Season the port becomes congested with passengers, and cargo berths are used to accommodate passenger ships when necessary. In an attempt to relieve passenger congestion, the centre Mole will be extended to create three new passenger ships berths. A construction contract for the extension has been signed by the Ports and Lighthouses Administration and construction is expected to commence soon. Due to the water depth and the harbour size limitation, Port Ibrahim is restricted to medium draft vessels.

1.4.3. Port Adabiyah:

At Adabiyah, the existing port facilities consist of a land filled finger pier with four berths. Adabiyah is used, mainly, for the discharge of bulk wheat, frozen meat, scrap iron and bagged commodities.

Due to the water depth limitation, Adabiyah also is limited to
medium draft vessels.

Expectations are tea and some other commodities requiring covered storage area only port Ibrahim facilities are only used.

During periods of peak passenger travel when it is necessary to use some cargo berths to accommodate extra passenger ships and to save time when a ship waiting to pass through the Suez Canal has only a small amount of cargo for discharge at Suez.

1.4.4. The Rehabilitation Program at Suez Ports:

<table>
<thead>
<tr>
<th></th>
<th>Port Ibrahim</th>
<th>Adabiyah</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quay length</td>
<td>700 m ( 5 berths )</td>
<td>300 m ( 2 berths )</td>
</tr>
<tr>
<td></td>
<td>South side of centre Mole 300 m</td>
<td>North side of pier 200 m ( 1 berth )</td>
</tr>
<tr>
<td>Water depth along side quay</td>
<td>9 m at north Mole and passenger quay</td>
<td>8-9 m at all berths</td>
</tr>
<tr>
<td></td>
<td>7 m south side of centre Mole</td>
<td></td>
</tr>
<tr>
<td>Storage area, transit sheds</td>
<td>5,400 square metre</td>
<td>None</td>
</tr>
<tr>
<td>Storage area, warehouses</td>
<td>7,400 square metre</td>
<td>None</td>
</tr>
<tr>
<td>Storage area, open</td>
<td>16,000 square metre</td>
<td>13,000 square metre</td>
</tr>
</tbody>
</table>
The new cargo handling and supporting equipment will comprise of 4 - 19 ton fork-lift trucks, 2 - 15 ton fork-lift trucks, 1 - 30 ton mobile crane, 1 - 70 ton mobile crane, 3 high-way tractors. 6 - 20 feet container trailer, 3 fire trucks, 1 service truck and 1 tank truck.

1.5 General aspects regarding Egyptian Ports:

1.5.1. Port Investments:

There is a plan under implementation for modernizing the Egyptian ports and increasing their capacity. All these projects will be finished within the coming ten years. This plan can be summarized as follows:

1- The construction of a new port of Damietta.
2- The construction of the port of Marsa Matrouh and of Aboukir
3- The construction of Dekila port as an extension to the port of Alexandria.
4- Establishment of container terminal in Alexandria port, in Dekila, in Damietta and in Port-Said.
5- Increasing the capacity of Port-Said Port.
6- Developing the facilities of ports of: Suez, Safaga and Alexandria.

It can be disputed that for a country with a scarce capital, undeveloped infrastructure and scarce experienced management teams, it would be advisable to establish several multi-purpose ports for one region or to concentrate on one or two ports. Concentration on one port means to have a well equipped organised and efficient port connected to a modern reliable infrastructure. The other alternative means to dissipate
available resources on several sub-standard ports. On the other hand, the dependence on one port has its drawbacks, a balanced view has to be taken.

1.5.2. Multi-Model Transport System:

Egypt has not entered yet, the age of multi-model transport concept. This concept has to be first understood by all persons engaged directly or indirectly in transport which will include all sectors of economic activity in the country. It is - in other words a behaviour and a way of thinking, the key element of the success of such a system is the custom house. A successful introduction of this system will influence conditions of life and will put Egypt at the steps of the twenty first century.

This system was introduced during the last decay in the Egyptian ports mostly in the form of containerized cargo. Containers need to remain unbroken for as long as possible and most important, to be carried under multi-model transport arrangements. These two requirements have far reaching implications for the physical infrastructure needs as well as for the administrative and political framework within which the operators are acting. For these reasons, it is realy that the containers move beyond the ports area. All containers entered the Egyptian ports were carried exclusively under conventional unimodel transport arrangements, with participating unimodel carriers liable only for the performance of services relative to their own specific leg of the journey.

The relatively big amount of scarcey investments spent for the reception of containers did not help in improving conditions. One of the
the reasons is that there were no good correspondence between the port technique and the infrastructure of the hinterland. Great part of the problem created by the containers in the port of Alexandria would be solved when the container terminal operates within one or two years period. Full containers ships will be able to call at that terminal. Specialized equipment will be operating, a well trained team of administrative staff and managers will supervise the efficient running of the terminal.

1.5.3. Port Labour Productivity:

Under the conventional cargo handling systems and according to the ports regulations, all labour forces are decasual permanent force. The decasual system has its advantages and disadvantages. It will ensure stability in training, it gives sense of responsibility and a feeling of security to the labour. At the same time, it leads to less productivity. The non-productive labour time if spotted, recorded and analysed would show that many practices are attributing in reducing the pure productive time of the labour force.

The main causes of low productivity of the port labour force may be summarised as follows:
1. Weak supervision of the Port Authority.
2. Bad organization of the labour force.
3. Weak communication.
4. Low standards of training.
5. Unsuitable degree of mechanisation.
CHAPTER 2

Growth of Egyptian Fleet & Foreign Trade
2.1 The Egyptian National Fleet (E.N.F)

2.1.1 Introduction:

According to the increase of Egyptian foreign trade after the second world war (1939-1942). The attention with the Egyptian National Fleet also increased until its size had reached at 1961 to 237,000 TDW, but after that as a result of the wrong policy of Egyptian Government the size of E.N.F decreased until reached to 189,000 TDW at 1970 and 216,000 TDW at 1974.

As a result of the right policy of the Government at 1978 the size of E.N.F started again increasing and reached to 500,000 TDW at 1978, but despite of that this size of fleet share with about 15% of the total General Cargo trade of Egypt and also at that year we don't find Dry Bulk ship in E.N.F which equal about 7 Million Tons/year so the total share of E.N.F to the total Egyptian foreign trade was about 5%.

For those reasons, there was a great attention to the industry of Maritime Transport from the Egyptian government which started of increment the National Capital to investment in the maritime field. From 1975 until now was established more than 15 Maritime National Companies with Egyptian flag which result to more share in the Egyptian foreign trade.

Egyptian shipping may appear to have found the answer to many of its inherent problems. However, the remedy is superficial and beneath the surface very little has changed.
In 1981 the state sector has been revamped with the establishment of two new companies:

National Navigation Co. (NNC)
and Misr Shipping Co. (MSC)

which, in theory, operate independently under the country's low 43
governing foreign investment and the free zones), but critics see these moves as being purely cosmetic, doing nothing to solve the malaise endemic throughout the Egyptian merchant marine. For instance, both companies have shareholders in common and their leading executives are drawn from the army or the civil service.

NNC is to specialise in the bulk grain trades, and since becoming operational in October 1981, has been active chartering in tonnage for the importation of North American and Australian wheat. However, the company is presently tendering for a series of bulk carriers while concurrently seeking to acquire competitively-priced secondhand vessels.

MSC has a dual function. Three Hamlet multiflex-type vessels under construction at Alexandria shipyard originally ordered for Egyptian Navigation Co. (ENC).

MSC's principal shareholder will form the nucleus of the new company's liner specialist activities. At the same time four 38,400 dwt bulkers on order at Mitsui, again earmarked for ENC, will revert to MSC.

The fate of two similar ships, also building at Alexandria shipyard, was at year end, still uncertain but it was widely predicted that they would also come under the aegis of MSC.
Meanwhile, ENC has also put out for tender for four 2500 - 3000 grt ro/ros and a car ferry.

All these moves are to restructure the state sector - owned making it more efficient by hiving off sections of the old ENC, injecting fresh capital from other state organizations and forming what are really autonomous units of the original company. Although the government has overtly encouraged the growth of the private sector, in practice, with Martrans (the government booking and chartering brokers, decreeing who gets what cargo) the essential ingredient for a flourishing free market system does not exist.

Those companies that have emerged are small and confined to short sea trades, and even here Egypt is without a cabotage policy. So unless closely connected with Martrans, a shipowner has a little or more or even no chance to participate in the comparatively lucrative deepsea trades and without the underpinning of government - sponsored freight, private sector importation is insufficient to support a liner service.
2.1.2 Misr Shipping Company:

Shareholders:
Egyption Navigation Company ................. (40%)
Martrans ........................................ (12%)
Canal Shipping Agencies ...................... (12%)
Alexandria Shipping Agencies ............... (12%)
General Supply Organization ............... (10%)
Egyption National Bank ................. (5 %)
Egyption Insurance Companies ............. (5 %)
Private Sector Interests ................. (4 %)

Capital:
70 millions $

The Fleet:

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<tr>
<th>Name</th>
<th>Type</th>
<th>Tonnage</th>
<th>Builder</th>
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<td>Bulk</td>
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<td>Mitsui (1261)</td>
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<tr>
<td>Aaton</td>
<td>&quot;</td>
<td>24,500</td>
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<td>Teba</td>
<td>&quot;</td>
<td>24,500</td>
<td>&quot; (1263)</td>
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<td>Souno</td>
<td>&quot;</td>
<td>24,500</td>
<td>&quot; (1264)</td>
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<tr>
<td>Abu Redeis</td>
<td>MP</td>
<td>9,710</td>
<td>Alex. (10024)</td>
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<td>&quot; Zenima</td>
<td>&quot;</td>
<td>9,710</td>
<td>&quot; (10025)</td>
<td>.83</td>
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<td>&quot; Eghila</td>
<td>&quot;</td>
<td>9,710</td>
<td>&quot; (10026)</td>
<td>83</td>
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</table>

136120

N. B:

MP Multipurpose
### 2.1.3 Fleet Analysis

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<th>Type</th>
<th>No.</th>
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<th>DWT</th>
<th>Dry</th>
<th>Reefer</th>
<th>Liqui:</th>
<th>Total</th>
<th>TEU</th>
<th>Pass. Crew</th>
<th>Avg. Age</th>
<th>Share %</th>
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<td>General Cargo</td>
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<td>0</td>
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<td>469,626</td>
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<td>45,113</td>
<td>683,170</td>
<td>790</td>
<td>274</td>
<td>1805</td>
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Cargo capacity
(continue)

cargo capacity

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<tr>
<th>type</th>
<th>No.</th>
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<th>DWT</th>
<th>dry</th>
<th>refeer</th>
<th>liquid</th>
<th>total</th>
<th>TEU</th>
<th>pass.</th>
<th>crew</th>
<th>avg. age years</th>
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<tr>
<td>General Cargo</td>
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<td>4,640</td>
<td>341</td>
<td>10.7</td>
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<td>Passenger/Cargo</td>
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<td>6,379</td>
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<td>total</td>
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<td>823,310</td>
<td>24,454</td>
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<td>6,653</td>
<td>3,434</td>
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2.1.4 Shipowning League:
(vessels over 1,000 GRT)

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<thead>
<tr>
<th>shipowner</th>
<th>No.</th>
<th>GRT</th>
<th>DWT</th>
<th>average age (years)</th>
<th>% ge share</th>
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<tbody>
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<td>294,054</td>
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<td>Ban-Arab shipping</td>
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<td>Pharaonic shipping</td>
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<td>Misr petroleum</td>
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<td>average age (years)</td>
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<td>------------------------</td>
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<tr>
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</table>
2.2 Development of the Egyptian National Fleet:

2.2.1 General:

Examination of the international shipping and trade movement statistics reversals and adverse and low participation of the developing countries in the maritime transport of trade generated by these countries particularly in the bulk sector. This issue has been highlighted by several international agencies and is regarded a principal step in order to implement the program of the section of the UN on the "Establishment of a new international economic order". This program states that all efforts should be made to promote an increasing and equitable participation of the developing countries in the world shipping tonnage.

The local aspects of the problem in Egypt are equally worse. The percentages of both freight and tonnage carried by the national vessels are considerably low (around 4%). In addition to this low participation, a great portion of the fleet current tonnage capacity has exceeded its economic life. Moreover, fleet composition reveals severe deficiency in the availability of specific ship types particularly in the bulk and grain carriers.

Given such conditions, it would be more logical for Egypt to direct the efforts towards increasing this percentage before taking any decision of entering cross trade operations. Therefore, it is finally believed that the issue of national fleet development should be traced within more generalized approach of minimizing the economic costs of securing transportation means for the Egyptian foreign trade whether on national or foreign ships.
2.2.2 Objectives

Within this framework a recent study based on the formulation and application of an optimization model has been conducted at INP to cope with this problem.

The objectives of this study were:

1. to draw up some sort of a master plan by which the various economic activities related to maritime transportation such as national fleet operations; the national brokering agencies; the national shipbuilding yards...etc. could be brought to a harmony that attempts to satisfy some kind of a national optimum.

2. to identify, within the framework of the above master plan, the major investment opportunities that make up the development process. This identification would direct the efforts for the development of an investment program and would constitute an integrated basis for detailed feasibility studies of the particular opportunities.

2.2.3 Main Findings

In view of the foreign trade forecasts as well as the cost analysis carried out, the model devised for this problem yielded upon application the following main findings for the next 5 years plan (1980-1985):

1. There is a general tendency towards preferring foreign means of transportation to national means. This preference pattern holds true for both general liner as well as bulk cargo. For the latter category this tendency applies to almost all bulk commodities considered. For the former category, it applies to the majority of the navigational lines namely; North America, Adriatic, India, East & West
10. Meanwhile, the allocation scheme proposed by the model output and assuming the prevailing load factors will continue to prevail by the year 1985, the out-bound vessels of the international fleet will be able to carry export cargo in the order of 229,000 tons on the North-West Europe line and 105,000 tons on the U.K line.

11. The total costs of transporting the Egyptian foreign trade by the year 1985 according to the optimum pattern proposed by this model is estimated at approximately L.E. 560 million.

12. Among the possible ships types and sizes for new addition to the national fleet, the 12,800 dwt multipurpose ship to be built locally seems highly competitive. In fact this has been the only type and size suggested by the model output. Eleven ships of this type are proposed. Their allocation in 1985 is as follows:

   6 ships on the North West Europe line and,
   5 ships on the U.K. line

13. Within the prespecified total amount of investment of L.E. 144.5 million as stated in the current 5 year plan, the only source for the above additions will be the domestic shipbuilding yards. No building orders need to be placed on foreign yards.

14. The previous indication suggests that the Ministry of Planning should reconsider the investment scheme for 1980-1985 plan. This plan incorporates 4 bulk carriers to be built at foreign yards and 3 multipurpose ships at the domestic yards. The results obtained however, call for a concentration on the multipurpose ship in the next future.

15. The preference of the multipurpose ship type as a new addition to the fleet tonnage might be attributed to the high cargo handling rate and consequently the reduced port times of such ships.
However, these ships will be engaged in general cargo trades rather than bulk trades.

16. While the maximum building capacity of domestic yards which is decided by the number of the building slip-ways is estimated at 15 ships in the next 5 years, it follows that the capacity utilization of these yards will amounts to 73%. Slack capacity could be utilized in building other units for agents other than the Egyptian commercial fleet.

17. The proposed number of the 12,800 dwt multi-purpose ships to be built domestically in the next 5 years are slightly bigger than the building capacity of Alexandria yard. This means that Port- Said yard will have to contribute in such activity by at least one or two vessels.

18. The total investments required for the proposed additions to the national fleet amount to L.E. 140 million, 78 million of which in foreign exchange.

2.2.4 Epilogue.

One of the main considerations that have been stated early in this study is to separate the managerial aspects of the national fleet from its planning aspects. The objective was to draw up the main features for the current 5-years plan assuming that operational efficiency of the national fleet will maintain its currently prevailing levels. In other words, the currently prevailing cost figures were taken as the basis for any estimated of the future transportation cost of trade on the national vessels. However, the preliminary results at hand shows an evident preference of transportation on the foreign means as compared to the national
means. This might be attributed to the operational inefficiencies of the national ships at present. This finding reduces the problem back to its managerial aspects. Real efforts should be directed towards increasing the operational efficiency of the national vessels whether within the current organizational form i.e. within ENCO or through other forms. The establishment of new shipping companies and the initiation of some sort of competition among them might be one way in this connection. At any rate, no final solutions for the problems of the maritime transportation sector are claimed to be at hand through the present study. However, it is hoped that the indicators provided by this study will stimulate discussion with the interested parties to improve our understanding of the problem as well as its solution procedures.

2.3 Shipping and The Relief From Inherent Bureaucracy.

2.3.1 Study and Analysis:

Considering Egypt has a massive and fast growing import liability, it is very surprising that more emphasis has not been placed on the shipping sector to encourage the country younger companies to buy new ships. The longely state controlled industry is top-heavy with bureaucracy and Egyptian vessels carry barely 10% of the country's seaborne-trade-spiralling freight costs already exceed $200 million a year and could close to 500 $ million by the end of the decade. The volume of some basic imports, particularly food stuffs, is rising by more than 15% a year - yet encouragement for new companies is limited.
The industry's malaise dates back to the huge nationalisation program early in the 1960s when the all-powerful state agency, Martrans, was established, charged with securing all tonnage for imports and exports. The rest of the shipping industry was nationalised some months later and more than 150 companies were reorganised into eight.

One decade later, then the president, Anwar Sadat, recognised the sector's ills and initiated changes to open shipping to outsiders. Foreign finance was welcomed - along certain guidelines - and overseas owners were tempted by the huge trade potential. The new open door policy, they were assured, would grant them a fair slice of the cake. Not much time was needed, however, for them to recognise that Egyptian procedures and state bureaucracy were certainly not going to change overnight. An efficient involvement in the Egyptian shipping sector would take time, patience and money.

Law 43 was established in 1974, specifically aimed at encouraging joint ventures between Egyptian interests and foreign companies. The law requires that at least 25% - but ideally 51% of capital originates in Egypt and frees companies from the shackles Egyptian legislation which it was recognised, was particularly needed in the shipping sector. Ten years later, however, we see handful of Law 43 companies battling it out with the state sector and looking fearfully backwards at all their counterports who have, over the years fallen by the wayside.

Various changes have been initiated over the last 18 months which at first sight, bode well for the industry. A close look, how-
ever, reveals purely cosmetic adjustments, an increasing rather than falling state involvement, less encouragement for newcomers and a steady spread of the endemic bureaucracy which besets the whole business.

At the centre of the stage in the Egyptian Company for Maritime Transport (Martrans), the Government's booking agent with responsibility for allocating cargoes and timechartering ships from abroad. According to general manager Nabeel Abo Hussein, the corporation's policy is absolute priority for Egyptian vessels but if non are available, the next best option. Agreements cover the whole world, which either give Egyptian vessels preference or else aim to split cargo loaded between the ports of A and B on a 50:50 basis. Most cargo shipped on Egyptian vessels passes through Martrans' hands: Government cargo is contracted 'cif' and "c&f" contracts must be submitted to Martrans for approval. Martrans does not control the whole of the country's cargo by any means - where Egyptian vessels have a service and where such vessels are suitable some 61% of cargo is carried by the national flag. At first sight a huge statistics until it is remembered the country's carriers concentrate on relatively few routes. Since May 1981, all wheat has been shipped from Australia through Egyptian companies, although not necessarily by Egyptian vessels. In 1981/82 Egyptian general and bulk cargos totalled 24 million tonnes, 6.5 million of which was booked through Martrans while the rest being 'cif', 'c&f' or private sector.

The largest shipowner has a fleet of some 40 ships and it perhaps the best example of Egyptian bureaucracy at its worst.
It is now concentrating on short-sea routes and has four ro/ro ships under construction. An attempt to hive off some of the company's activities has resulted in the new concern, Misr shipping, which began its operation in January. It is a private sector company, established under the low 43.

The company's capital is $70 million, ENC's share in that being two 12,000 dwt multi-purpose Hamlet type vessels which work between Alexandria port, port Said and Western Europe and the U.S. Gulf plus a 5% contribution to four 41,000 dwt bulkers under construction at MITSUI in Japan. One - the Abydos - was delivered in September and the others, costing $23 million each, will hoist the flag in the early part of 1984. The vessels are intended to work the grain trade-with the country's burgeoning wheat imports and both the GSO and Martans as shareholders, the future looks rosy. The company charters ships about 40 since January 1983 - usually from the US Gulf, redelivery Middle East, for the carriage of grain from the US. It also has two bulk carriers an order from Alexandria shipyard.

Also geared two work bulkers is the national Navigation company has been chartering in 1980. Since then the company has been chartering vessels on the open market but has four 45,000 dwt and two 35,000 dwt bulkers on order at Hyndia.

Other companies are anxious to acquire bulkers for grain imports and phosphate exports. Low 43 company Pyramid Navigation, private sector (private Egyptian interests 27.5%), chandries in Greece the remainder, has just about a 38,000 dwt bulker. Although the ship may not itself be used in these trades, it enables the company to participate in grain carriage since Martans
requires that companies own at least one bulker before they can work chartered vessels in the bulk trades. At this time, with freight rates so low, it is likely that Pyramid will be able to charter in bulk carriers more cheaply. The company also has a 20 years old 20,000 dwt tanker on charter to Martrans and a 1,700 dwt vessel used for Esso for bunkers.

The Pan Arab shipping co., (Pasco), is a joint venture between Egypt, Kuwait, Jordan, Syria, Sudan, Iraq and Libya although it has become largely an Egyptian concern since the country fell foul of other Arab states in the league. The two largest of the seven ship fleet trade to the Continent, three others work on Adriatic service and two more recently inaugurated a new service to Ruumania.

A joint venture - French Arab Lines - was recently set up with the French, Ro/Ro vessel Amira, flying the French flag sails between Alexandria and Marsseills every 12 days. According to managing director, Capt. Hassan Said Mahmoud, any opportunity to get involved with foreign companies is welcomed.

Arab Maritime company (Famco), is three-way concern between Egypt, Syria and Libya, each with 33%. The line operates three Polish built sisterships - 6300 dwt multipurpose vessels with container capacity between Alexandria and Continent every 20 days. According to managing director M.B. Morsi, notes on the route have plunged by 50% over the last two years and things are now difficult.

Although the lines have made several applications to join the Egypt to continental Europe Conference, it has received no reply and understanding that the conference has not held any formal meetings for the last three years. Morsi believes that until the
conference gets itself together the nature will remain a disaster, with massive relating rendering any sensible note structure irrelevant. He could like to see the conference with disciplinary powers and rights to raid members' offices and punish lines not sticking to the tariff. As it is, goods contracted "cif" enable European suppliers and shippers to make considerable profits on the ocean-freight element of the price.

2.4 The Aim of Shipping Policy in Egypt.

2.4.1 General View:

* To increase the general capacity of the Egyptian national fleet to share in transportation reasonable ratio from the foreign trade of Egypt.
* The cooperation with the developing countries.
* Planning policy for the working power at sea.
* Encouraging the policy of establishment of industrial organizations.
* Try to renew the Maritime National legislations to follow the international conventions.

I will not try to explain all the above items, mainly because this might be out of the aim of my research, but I will try to give some emphasis on:

1. Planning and policy of working power at sea, because it deals with the marine personnel which is considered the main target of my research.

2. The principal object of the international policy concerning marine personnel can summarize in two main points:
* the standard of wages and living
* the standard of training.

If we want to talk about the standard of wages which consider now as international policy and its responsibility is related to the organizations of the United Nations.

The International Labour Organization (ILO) which considers the minimum standard of wages for seaman must be about $187 (about L.E. 200), while (ITF) consider the minimum standard not less than $478 for the far east area.

With mention to Egypt and the circumstances of seaman, we will find a wide gap between the international standard of wages and the Egyption wages. From my point of view this policy of low wages was reflected on the productivity, efficiency and performance of seaman.

I have tried to make the responsible heads of the Ministry of Maritime Transport and the shipowner to think once more about the level of the Egyptian seaman wages.

With reference to the training, IMO had issued the international standard for training and certificate of officer and ratings.

In accordance with the Egyptian government with co-operation with Arab Maritime Academy had rechanged the system of Maritime education, training and certification to follow the international system of IMO.

In the other side, I think that the maritime transport companies must give great attention to the maritime training for the crews of their ships; officers, engineers and ratings.
From my point of view, this training policy has economical effect, because the economical voyage for the ship comes from the co-ordination between a well qualified and trained crew, and also a well qualified managers ashore for the shipping company.

2.5 Egyptian Seaborne Trade.

2.5.1 Scope:

The total volume of the trade passed through the Egyptian ports in 1982 reached 42.3 million tons with an average yearly rate of increase of 20% during the period from 1974 - 1982 which can be considered a very high rate of increase.

Several studies conducted in the seventies forecasting Egypt's foreign trade. The least optimistic one estimated that the rate of increase of trade will be the basis of 12-%.

Starting from 1981, new policies have been adopted so as to decrease if possible imports and to encourage exportation. A new agricultural plan has been put into implementation so as to be self-sufficient in grain products, especially in maize crops within 6 years. The grain was imported in 1982, of a volume 7 million tons. At the same time, it is expected that the volumes imported of cement each year (about 6 million tons in 1982) would be eliminated by the anticipated increase of the national cement production within the few coming years.

With the efforts of the government and in consideration of the high rates of population increase it may be realistic to consider a 10% rate of average increase till 1982. The project of trade till 1992 would give the estimation of 84.6 million tons.
The gap between export and import is so wide that transport routes consequently become imbalanced. In 1982 exports composed 9.0% of total traffic (3.8 m.t.) while imports consisted 91.0% (38.5 m.t.). This phenomenon puts great tension on the inward direction of trade and increases costs of transport units leave the port empty.

2.5.2 The imports categories of goods in 1982.

1. Liquid bulk cargo of 15.5 m tons Making a percentage of 40.0% of total imports. The main ports of discharge are Alexandria and Suez.

2. Dry bulk cargoes which represent 25% of total traffic consists of: cement, coal, fertilizers timber, ores and scraped iron. The main ports of discharge are Alexandria (78%) and Port-Said (17%).

3. Provisions of food stuff which consist of wheat, flour, maize beans, tea, .. etc.

This category which is imported by the Ministry of supplies ranks as the third category with 7.0 m tons (18.5%). Alexandria received 3.7 m tons (52.5%) in 1982. Port Said discharged 1.8 m tons (15.3%).

4. General cargo was imported in 1982 in the volume of 6.5 m tons making about 16.8% of total imports. Alexandria received 5.0 m tons with percentage of 77.2% of total general cargo imported. Port-Said discharged 0.9 m tons of about 13.8%. Suez handled 0.5 m tons of 7.3% of imported cargo.
VOLUME OF TRADE IMPORTS THROUGH THE EGYPTIAN PORTS DURING 1982.

<table>
<thead>
<tr>
<th></th>
<th>TOTAL</th>
<th>ALXANDRIA</th>
<th>PORT SAID</th>
<th>SUEZ</th>
<th>SAFAGA</th>
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<tr>
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<td>77.2%</td>
<td>17%</td>
<td>1.6%</td>
<td>2.8%</td>
</tr>
<tr>
<td>Agricultural Products</td>
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<td>0,574</td>
<td>0,007</td>
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<tr>
<td>100%</td>
<td>16.8%</td>
<td>77.2%</td>
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<td>0.1%</td>
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<tr>
<td>Liquid Bulk</td>
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<tr>
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<td>40%</td>
<td>56.7%</td>
<td>3.4%</td>
<td>40%</td>
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</table>
### VOLUME OF TRADE EXPORTS THROUGH EGYPTIAN PORTS

**DURING 1982**

<table>
<thead>
<tr>
<th></th>
<th>TOTAL</th>
<th>ALXANDRIA</th>
<th>PORT SAID</th>
<th>SUEZ</th>
<th>SAFAGA</th>
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</thead>
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<tr>
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<td>100 %</td>
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<tr>
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<td>0.003</td>
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<tr>
<td><strong>100 %</strong></td>
<td>29.3 %</td>
<td>36.8 %</td>
<td>4.5 %</td>
<td>17.7 %</td>
<td>0.3 %</td>
</tr>
<tr>
<td><strong>DRY BULK</strong></td>
<td>0.306</td>
<td>0.005</td>
<td>/</td>
<td>0.001</td>
<td>0.300</td>
</tr>
<tr>
<td><strong>100 %</strong></td>
<td>8 %</td>
<td>16 %</td>
<td>/</td>
<td>3 %</td>
<td>98 %</td>
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<tr>
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<td>/</td>
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<tr>
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<td>/</td>
<td>47 %</td>
<td>53 %</td>
<td>/</td>
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<tr>
<td><strong>LIQUID BULK</strong></td>
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<td>0.193</td>
<td>/</td>
</tr>
<tr>
<td><strong>100 %</strong></td>
<td>56.8 %</td>
<td>66.4 %</td>
<td>24.7 %</td>
<td>8.9 %</td>
<td>/</td>
</tr>
</tbody>
</table>
2.5.3. The exports categories of goods in 1982

Total exports were in 1982 of 3.8 million tons:

1. Oil and oil products, composed the greatest share making 2.1 million tons (56.7% of exports).
   - Alexandria exported 1.4 m. tons (66.4%)
   - Port Said exported 0.5 m. tons (24.6%)
   - Suez exported 0.2 m. tons (8.9%)

2. General cargo, as the second in importance was exported by 1.1 m. tons (29.2%). Exported general cargo includes cotton and cotton products. Alexandria exported 0.8 m. tons (77.8%). Suez exported 0.9 m. tons (17.6%).

3. Dry bulk cargoes, are the third in importance, 0.3 m. tons were exported in 1982. Mainly these cargoes are loaded in Safaga.

4. Fruits and vegetables, are exported by 0.2 m. tons (6.0%) from Port Said (47%) and Suez (43%).

Alexandria port handled in 1982 about 27.2 m. tons of total foreign trade (6.4%). Suez (port of Adabiah) handled 7.8 m. tons (18.0%). Port Said handled about 5.6 m. tons (13.0%) and Safaga handled 1.7 m. tons (4.0%).

2.6 The Role of Egyptian Maritime Transport in Handling Egyptian Foreign Trade

In our modern area, the maritime transport is of a very significant importance for the national economy of any country, carriage of goods by sea is very essential to promote the foreign trade and to achieve the success of mass production policy. The maritime transport activities represent a vital element in the national economic policy. due to its impact on the productive plan of the country and its reflections on the total cost of merchandies services, production programs and
price levels of the goods.

All nations, regardless of their political regimes, give particular attention to the maritime transport activities and great concern to its commercial fleets. The maritime transport policy adopted by any country reflects the political and economical trends which it pursues. Consequently, the adopted maritime policy of commercial fleet, to supervising the activities and ensuring the full utilization of the national fleet's capacity available to transport the national trade alongwith, supporting or encouraging the National shipowners to enlarge their commercial fleet, with vessels flying the national flag.

In 1959, Egypt decided to direct more of its attention to the Maritime Transport sector, with an aim of direct supervision of its activities, later on, to the country's ownership of the commercial national fleet, and all its related activities. Since the adoption of this policy, the national maritime transport sector, has fulfilled its role with efficiency and success in serving Egypt's foreign trade. The need to adopt the open-door policy was based on the fact that the said policy considered an economical initiative to strengthen the national economy of Egypt and assure the fulfillment of its social development.

Consequently, the law No. 43/1974 was issued concering the investment of Arab and Foreign Capital and Free Zones, and which permitted the establishment of the joint venture companies.

The constant increase in the volume of the Egyptian foreign trade, is the principle element which induced investors to establish joint venture shipping companies, especially that the commercial fleet capacity - which is owned by the Government is limited.
Whereas it was observed, that these joint shipping venture companies, have not realized the diversity of the Egyptian exports imports, which needs various kinds of specialized vessels to meet the needs of Egypt's foreign trade.

Both Egyptian exports and imports have reached in 1979 approximately 34 million tons divided as follows:

- General Cargoes 6 million
- Bulk Cargoes 14 "
- Liquid Cargoes 11 "

If we examine the available vessels owned by these joint venture companies, we will find out that most of these vessels are traditional / conventional vessels suitable only to load general cargoes. At the same time, the national shipping company owned by the government does not own, besides general cargoes vessels, more than two tankers, one utilized for loading oil products, the other for grain.

If we consider that the oil shipments represent around 50% from the volume of Egyptian consignments, therefore, it is of utmost importance to secure the necessary tonnage of oil tankers flying the Egyptian flag to load all the petroleum products. The same would apply to bulk cargoes, the quantum of the Egyptian exports/imports and their diversity offers lots of opportunities vis-a-vis investments in the maritime transport sector. This matter necessitates keeping pace with the modern technological developments in the specialized field of maritime vessels, and thus we will refrain from concentrating on shipping general cargoes only by traditional/conventional vessels.

The Egyptian investment market, in implementing a joint venture shipping company is available for investors to participate in
the formation of the Egyptian fleet in order to actually share in transportation of Egypt's foreign trade.

To assure the company's success in the actual participation in loading Egypt's foreign trade, this means or implies that these shipping companies should provide the specialized different kinds of vessels such as grain tankers, oil tankers, Ro/Ro and containers.

Achieving the aim, leads to attaining the desired aim or the country, which is to consolidate the national economy and promote Egypt's foreign trade by securing an Egyptian commercial fleet capable of loading the country's foreign trade with its multiple commodities.

2.7 Development of Egyptian Foreign Trade Policy.

2.7.1 Strategy for 1980 through year 2000.

Egyptian foreign trade will continue to grow well into the next century. This will esstimately come about from the combined effects of increased consumer demand, and emphatic export policy and an increased gross domestic product (GDP).

Forecasted tonnages of exports and imports, exclusive of liquid bulk are as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Export</th>
<th>Import</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>9,367</td>
<td>14,500</td>
<td>23,867</td>
</tr>
<tr>
<td>1990</td>
<td>13,439</td>
<td>24,180</td>
<td>37,619</td>
</tr>
<tr>
<td>1995</td>
<td>22,830</td>
<td>31,243</td>
<td>54,073</td>
</tr>
<tr>
<td>2000</td>
<td>40,887</td>
<td>39,609</td>
<td>80,496</td>
</tr>
</tbody>
</table>

( the units in thousands of metric tons)
### FORECASTING DISTRIBUTION OF FOREIGN TRADE
### BETWEEN THE DIFFERENT PORTS OF EGYPT
### 1975-2000

<table>
<thead>
<tr>
<th>Year</th>
<th>Type of Cargo</th>
<th>Tonnage</th>
<th>Alexandria</th>
<th>% of Total</th>
<th>Port Said and Dunia</th>
<th>Suez</th>
<th>Safaga &amp; other Ports</th>
</tr>
</thead>
<tbody>
<tr>
<td>1975</td>
<td>General Cargo</td>
<td>5200</td>
<td>4100</td>
<td>80</td>
<td>600</td>
<td>300</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>Dry Bulk</td>
<td>7100</td>
<td>5900</td>
<td>83</td>
<td>600</td>
<td>300</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>12300</td>
<td>10000</td>
<td>81</td>
<td>1200</td>
<td>600</td>
<td>500</td>
</tr>
<tr>
<td>1980</td>
<td>General Cargo</td>
<td>7500</td>
<td>6200</td>
<td>83</td>
<td>750</td>
<td>350</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Dry Bulk</td>
<td>13200</td>
<td>10500</td>
<td>81</td>
<td>800</td>
<td>400</td>
<td>1300</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>20700</td>
<td>17000</td>
<td>82</td>
<td>1550</td>
<td>750</td>
<td>1400</td>
</tr>
<tr>
<td>1985</td>
<td>General Cargo</td>
<td>10000</td>
<td>8000</td>
<td>80</td>
<td>1150</td>
<td>550</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td>Dry Bulk</td>
<td>16300</td>
<td>11600</td>
<td>72</td>
<td>1000</td>
<td>500</td>
<td>3200</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>26300</td>
<td>20600</td>
<td>79</td>
<td>1150</td>
<td>1050</td>
<td>3500</td>
</tr>
<tr>
<td>1990</td>
<td>General Cargo</td>
<td>12400</td>
<td>9700</td>
<td>78</td>
<td>1500</td>
<td>800</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>Dry Bulk</td>
<td>27200</td>
<td>20200</td>
<td>74</td>
<td>1600</td>
<td>1100</td>
<td>4300</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>39600</td>
<td>30000</td>
<td>75</td>
<td>3100</td>
<td>1900</td>
<td>4700</td>
</tr>
<tr>
<td>2000</td>
<td>General Cargo</td>
<td>17800</td>
<td>12400</td>
<td>70</td>
<td>3000</td>
<td>1600</td>
<td>800</td>
</tr>
<tr>
<td></td>
<td>Dry Bulk</td>
<td>46700</td>
<td>35000</td>
<td>78</td>
<td>2300</td>
<td>1700</td>
<td>7700</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>64400</td>
<td>47400</td>
<td>76</td>
<td>5300</td>
<td>3300</td>
<td>8500</td>
</tr>
</tbody>
</table>
2.7.2 Cargo Forecast Data and Assumption of Red Sea Ports.

Data used for developing cargo forecast through the year 2000 are as shown hereafter. The forecasts shown for ports of red sea are based on least cost allocation to all Egyptian ports for 1980 through year 2000.

Cargo categories adopted for the Red Sea ports for the purpose of facility planning are as follows:

Break bulk cargo: containerized cargo and dry bulk cargo. At present, movements of containerized cargo through the ports of Suez are negligible due to the lack of facilities to handle such cargo. However, containerized cargo will increase in importance. For this reason facilities to handle containers, including refrigerated containers, are provided, in the first phase of development. Actual volumes of containerized cargo will dictate the training of transforming more general cargo berths into containerized berths for the successive expansion in ports of Suez and Safga.

2.7.3 Cargo forecast through the year 2000.

In the rehabilitation of the port of Suez had been completed at present time, the volume handled in the short term would be expected to increase rather rapidly as a result of the "open-door" policy, the peace efforts, and the foreign aid secured by Egypt, which all tend to boost economic activities and movements of cargo in the near future.
Considering the schedule of port rehabilitation, its actual capacity during rehabilitation will be lower than its potential capacity primarily due to non-availability of one or more berths at a time due to construction activities.

2.7.4 The Role of Demieta Port in Development Trade Policy

<table>
<thead>
<tr>
<th>Cargo classification</th>
<th>1985</th>
<th>1990</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Cargo</td>
<td>0.907</td>
<td>1.366</td>
<td>1.688</td>
</tr>
<tr>
<td>Bagged Bulk</td>
<td>1.101</td>
<td>1.653</td>
<td>2.046</td>
</tr>
<tr>
<td>Special Cargo</td>
<td>0.699</td>
<td>1.076</td>
<td>1.330</td>
</tr>
<tr>
<td>Dry Bulk</td>
<td>0.650</td>
<td>0.700</td>
<td>0.750</td>
</tr>
<tr>
<td>Container</td>
<td>1.155</td>
<td>2.750</td>
<td>3.900</td>
</tr>
</tbody>
</table>

**total** 4,512 7,545 9,714

(units in thousands metric tons)
### Cargo Forecast of Red Sea Ports

<table>
<thead>
<tr>
<th></th>
<th>year 1985</th>
<th>year 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Suez</td>
<td>Safaga</td>
</tr>
<tr>
<td>Exports</td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Containerizable</td>
<td>77,400</td>
<td>174,090</td>
</tr>
<tr>
<td>** Break Bulk</td>
<td>71,090</td>
<td>191,200</td>
</tr>
<tr>
<td>*** Special Cargo</td>
<td>4,600</td>
<td>0</td>
</tr>
<tr>
<td>**** Dry Bulk</td>
<td>23,000</td>
<td>6,049,000</td>
</tr>
<tr>
<td>total</td>
<td>168,090</td>
<td>0,414,290</td>
</tr>
<tr>
<td>Imports</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Containerizable</td>
<td>87,180</td>
<td>325,300</td>
</tr>
<tr>
<td>Break Bulk</td>
<td>126,250</td>
<td>148,300</td>
</tr>
<tr>
<td>Special Cargo</td>
<td>163,790</td>
<td>54,100</td>
</tr>
<tr>
<td>Dry Bulk</td>
<td>968,900</td>
<td>432,300</td>
</tr>
<tr>
<td>total</td>
<td>1,346,120</td>
<td>1,060,000</td>
</tr>
<tr>
<td>Total Transport</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Containerizable</td>
<td>164,580</td>
<td>499,390</td>
</tr>
<tr>
<td>Break Bulk</td>
<td>197,340</td>
<td>339,500</td>
</tr>
<tr>
<td>Special Cargo</td>
<td>168,390</td>
<td>54,100</td>
</tr>
<tr>
<td>Dry Bulk</td>
<td>1,001,900</td>
<td>6,581,300</td>
</tr>
<tr>
<td>total</td>
<td>1,532,210</td>
<td>7,474,290</td>
</tr>
</tbody>
</table>

* Containerizable: such as onions, vegetables, fruits, cotton textile
** Break Bulk: rice, sugar, raw cotton, cement, paper and flour
*** Special Cargo: iron, steel, lumber, heavy machinery and vehicles
**** Dry Bulk Cargo: phosphate, fertilizer, corn, cement and coal
CHAPTER 3

An Approach to International Maritime Education
3.1. The Analysis of Ships Accident Data & The Application of Crew Training:

The purpose of this analysis is to demonstrate the close links between education and training in the maritime field. Training is essential to carry out technological and managerial tasks, and education is often essential to define the skills necessary for these tasks. When we look at any work being done we ask... is it successful... are the objectives being fulfilled? If the answer is no or not adequately, then we ask why? Has the man the necessary skills to carry out the work? If the answer is yes, there is not a training problem, there is some other kind of problem—lack of motivation, lack of proper work environment or the man is in the wrong job. If it is identified that the person has not sufficient skill to carry out the tasks, then a training problem may exist.

Let us take an example where, on large scale, there appears to be a lack of the right type of training to carry out the tasks. The main tasks of ship's officer is to bring his vessel safely from one port to another. Despite enormous investments in training in many ports of the world, and the applications of highly expensive and increasingly sophisticated equipment. This task is frequently not being carried out well enough. Ships are at risk, lives are at risk, the environment is at risk, insurance premiums are high and shipping for some potential entrepreneurs is made less attractive—although for some other less scrupulous (business man) made more attractive through maritime field, using the insurance markets. Let us look first at some of the evidence for ship casualties and then at the causes as revealed by basic records.
3.1.1. Sources of Casualties Records & Information:

There are three primary sources of casualty information available to research workers in most countries. First is the information from international organizations, and particularly the Loyds Register of Shipping (London). Loyds collects details of the position of casualty, types of ships involved and primary causes. This information is stored in Loyds computers and it includes total losses as well as ships which have been seriously damaged. Information relating to total losses are published each quarter in Loyds casuality Returns. Information on ships which are damaged but not lost can be obtained from Loyds in the form of computer print-out on payment of a fee. The type of information contained in these records are as follows: Ship's name and year built, gross tonnage, flag, type of ship, origin and destination, cargo carried and circumstances and place. The second source of information is the International Chamber of Shipping "Navigation Casuality Report Scheme". This is provided primarily for ship owners and government use. Not every casualty is detailed in the reports but what is provided is extremely useful and takes the form of an analysis, accompanied by short extraction of the incidents and the navigational errors. The third source is that of the Official Government Records of the flag state. These are normally confidential as they represent the surveyor's report to government following an inquiry into the casualty. These reports are quite comprehensive and provide information on the type of accident, the environment of the area of occurrence and details of the ship and the cross examination of the master and the officers during the inquiry.
The numbers and tonnage of ships totally lost over recent years are recorded at Lloyds as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Ships</th>
<th>Million GRT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1976</td>
<td>345</td>
<td>1.10</td>
</tr>
<tr>
<td>1977</td>
<td>336</td>
<td>1.00</td>
</tr>
<tr>
<td>1978</td>
<td>423</td>
<td>1.70</td>
</tr>
<tr>
<td>1979</td>
<td>465</td>
<td>0.20</td>
</tr>
<tr>
<td>1980</td>
<td>387</td>
<td>1.80</td>
</tr>
<tr>
<td>1981</td>
<td>359</td>
<td>1.24</td>
</tr>
<tr>
<td>1982</td>
<td>330</td>
<td>1.34</td>
</tr>
</tbody>
</table>

The above represents ships lost if we take ships seriously damaged as well as the losses, then for two sample years 1978 and 1979 the total is 2394. If we look at the distribution of these which we have plotted accurately by computer mapping (The block spots) where navigators experience most risks are shown the distribution pattern shows a direct relationship between high shipping densities and accidents, compounded by reduced visuability, strong tidal currents, narrow channels and depth restrictions.

3.1.2. The 'Analysis:

What we have found from the analysis of the records and interviews is that the factor of "human error" predominates. The problem is, however, that inquiries seldom penetrate the precise nature of the human error, thus they are seldom, on their own, a sufficient basis for
critically examining the skills of the mariner to deal with an immeregency. It is these skills that we have to be certain the navigator has. He cannot adequately learn immeregency skills by experiences. His first immeregency can therefore be a disaster. He can only learn them by training. His subsequent success then gives him additional experience.

3.1.3. Crew Training:

Training is required which will allow the mariners to determine when they are entering into an immeregency situation and when their options are closing so that they can escape before the onset of the immeregency. However, if they do find themselves so close as to constitute an immeregency then they have to be trained on extracting themselves from this.

There is a close and obvious connection between the promotion of maritime and environmental safety and the education and training of the seafarers themselves. It was therefore, very rightly hoped that, by laying down internationally accepted minimum training and certification requirements for seafarers, accidents would be significantly reduced and efficiency of navigation improved. To adopt adequate and cost effective maritime training close cooperation is required between:

- Administrations: which have the prime responsibility for providing training facilities and programs and the specialized or refresher courses required.
- Management: which must clearly identify the immediate and projected manpower training needs, taking account of fleet growth, develop safety and pollution prevention awareness at all levels of management and provide in-house training program
maintaining and improving the skills and teamwork of all personnel.

- Mariners: who must develop greater professionalism.

3.2. Shipping Policy & Maritime Training:

3.2.1. General:

The economic development of a country and the betterment of the quality of life of its people depend on the efficiency and the effectiveness of the transportation infrastructure which allows the movement of raw materials and manufactured goods from their point of extraction or production to their point of consumption. It is little wonder then why one of the prime areas for concentration of effort by the governments of all countries of the world, developed and developing alike, lies in the transportation field. Participation in international trade inevitably involves a sea link and, in the more basic economic, the tonnage of material moved is high in relation to its value.

Any investigation of the existing national capabilities, trends and needs in the field of maritime transport should also include an associated investigation of existing facilities, trends, and needs in maritime training. No recommendation on shipping policy should be considered complete unless it includes or has associated with it policy recommendation on maritime training.

Maritime training is not only a key factor in the development of every country's national maritime capabilities, but is also essential for

* The safety of life at sea.
* The prevention of marine pollution.
* The efficiency of navigation.
The importance of these technical objectives, all of which lies within the view of international maritime organization (IMO), is high-lighted by the following:

1- Almost 80% of economic activity depends on transportation.
2- Nearly 80% of the world trade is carried by sea.
3- Shipping activities play a major role in many countries' balance of payments and have a great impact in their marine environment, fisheries and tourism.
4- Between 1970 and 1982 the world merchant fleet increased more than 40% by ships and more than 85% by tonnage.
5- Prior to the current world recession, sea transport of cargo had increased tenfold in forty years.
6- Oil transport by sea had increased 700% in little more than 25 years.
7- 50% of all goods transported through the world today are dangerous goods, oil and petrochemicals.
8- Ships are becoming increasingly specialised and sophisticated so as to serve the needs of the world trade as economically and effectively as possible.
9- Increasing manpower costs and technological progress are giving rise to inverted automation.

The heterogeneous composition of the world fleet, ranging from the traditional to the highly sophisticated ships and the growing volume of cargo of hazardous nature have greatly increased the problem of maritime and environmental safety.

The efficient manning of modern ships presupposes the proper training of all seafarers as well as those in charge of port and offshore terminal activities.
3.2.2. The Assessment of Maritime Training Needs:

Shipping requires a variety of knowledge skills and experience if ships are to be safely and economically run. The acquisition of the correct type of ships for the trades concerned is of paramount importance to the success of an operation but the establishment of an efficient and effective management team and the necessary manpower resource of properly trained, certificated, skilled and experienced seafarers is even more critical and requires much greater planning and effort. Because of the length of time it takes to educate, train and qualify seagoing personnel—up to ten or more years for masters and chief engineer maritime training policies have to be very forward looking and take into account the needs of the national merchant fleet over at least a ten year period.

Reliance on expatriate experts may be necessary in the initial stages of the development of developing country's maritime transport capability and may be utilized to make up for temporary manpower deficiencies caused either by rapid fleet expansion or by acquisition of ships involving new technology. However, fleet growth and manpower growth must be matched if the interests of fleet safety and efficiency are to be adequately served and the country is to be self sufficient.

While ("in-house") training is provided by numerous shipping companies and by seafarers organizations, the vast bulk of maritime training is carried out in training or educational institutions operated by or supported by governments. Education and training for any profession is costly and maritime training is no exception.
particularly if training is to be provided for masters, officers and crews of the more sophisticated ships and if recommended standards as well as mandatory minimum global standards are to be met in the case of masters, officers and crews of the less sophisticated ships. The capital and operating costs of providing adequate maritime training facilities should therefore be taken into account in assessing the costs and benefits for any government-sponsored or government-encouraged merchant fleet expansion.

Without support at the highest government levels and it is clear establishment as a national priority, any maritime training program is liable to suffer from underfunding with possible results in terms of lowered safety standards and higher fleet operating costs because of lowered efficiency.

Where resources are limited, priority should be given to attracting and retaining adequately qualified teaching staff. Accommodation, equipment and teaching aid efficiencies can be set by efficient teaching staff. It is better to have good teachers and poor physical facilities rather than good physical facilities and inadequate or ineffective teaching staff.

In order to justify investment in maritime training it is advisable that a survey of manpower needs be conducted. Since it takes about ten years for seafarer to become fully qualified and gain sufficient experience to become a master mariner or chief engineer and somewhat lesser periods for other qualifications, the orderly supply of qualified personnel can only be assured if realistic forward planning is carried out. To carry out forward planning, it is necessary that each shipping company which is to be supplied
with trained seafarers takes stock of its existing fleet and sea-going personnel and attempts to forecast future trends over at least the next ten year period.

Forecast of fleet growth or reduction, fleet replacement and modernization is exceedingly difficult but it is generally possible to produce a maximum and minimum forecast assuming favourable and unfavourable trends. The size of crew each ship in the fleet will require depends upon its type, size, main and auxiliary machinery, cargo gear, degree of automation utilized and the nature of the trade its employed in. In determining the minimum crew required for each ship in its fleet, the company should take account of applicable international requirements and recommendations and the associated national provisions which give effect to them. Account also has to be taken of any applicable provisions of labour laws or codes and industrial agreements. The specific qualifications required of the seafarers must also be identified.

Having estimated the minimum crew required for each of its ships over the next ten years an estimate has to be made of the number of qualified seafarers which the shipping company will have to employ in order to keep each ship fully manned while in operation. This stage of the needs forecast must take account of current and anticipated provisions of national labour laws and codes and industrial agreements affecting the amount of leave to be granted to seafarers. Thus more than one complete crew will be required to man each ship on a continuing basis.

Having estimated the crewing demands for each ship in each
of the next ten years in each of the qualifications concerned, the company's required supply of such personnel must be estimated.

The company's manpower supply needed to meet the crewing demands must be analyzed qualification by qualification. The attrition caused by retirements, resignations, deaths and disablement must be estimated for each year taking continual account of the age distribution of the employees. The average period during which young seafarers recruited to the company's service may be expected to stay at sea will depend greatly on alternative employment opportunities, including shore posts within the company itself. In these matters each company has to be guided by its past experience. Any shortage between the company's crewing demands and its manpower supply must be made up for by recruitment or improvement in the qualifications of its sea-going personnel.

Each company's manpower inventory and training needs over the forecast period can thus be indicated by maximum figures to provide a national forecast of the training "output" needed each year.

In the assessing the new entry intake needed each year, the authority responsible for co-ordinating the training of seafarers will also have to take account of the attrition which may be expected to take place during the training period. The rate of drop out will depend upon the selection process and entry requirements. Sea life does not suit all who are attracted to the profession. It is both wise and economical to screen out those who will not make a long term career at sea as early as possible
by suitable aptitude and motivation tests and including some ex-
posure to service at sea in merchant vessels at any early stage.
Given the high level of discipline and academic atmosphere which
generally prevails on board training ships, service in such
ships does not generally expose the trainee to the full spectrum
of service conditions some of which he might find unattractive
in the long run. Academic failure during training can be avoided
by setting high entry requirements. However, the country's
needs in the scientific, medical, legal, teaching, business and
other professions have to be born in mind and in some cases
may indicate a need to restrain rapid growth in maritime indus-
try or in the supply of crews to foreign flag ships.

Note should be taken during the manpower needs forecast
of the upgrading training required as each trainee progresses
through the certification structure and the expected demands for
special courses such as particular courses in fire-fighting, tanker
familiarization courses, and refresher and updating training.

The national training needs for new entrants and upgrading
and maintenance of knowledge of seagoing personnel having been
established by the manpower needs forecast, annual courses load-
ing over the forecast period for each type of course required can
be determined. Practical constraints on course loading, such as
the need for actual handling or operation of equipment by the
train, must be taken account of. Allowance must also be made for
preventative maintenance to be carried out on training aids,
"down time", which can be significant in the case of sophisti-
cated and complex simulators.
3.3. The STCW 1978 IMO Convention:

The international convention on standards of training, certification and watchkeeping for seafarers (STCW) had entered into force on 28 April 1984. Acceptance by 25 countries whose merchant fleets represent at least 50% of the world gross tonnage. The convention was adapted under the auspices of IMO in 1973.

During the last 20 years shipping has undergone the technological revolution. Container ships, Ro/Ro ships, gas and chemical carriers, very large crude oil tankers and product tankers have been developed during these two decades, as there has been an increasing interest in the sea for it is to the world means of communication, a source of food and a source of minerals. Most of these ships are provided with very advanced and sophisticated equipment and automation. All this contributes to increase the problems involved in sea transport, coupled with the expected increase in the volume of marine traffic. The likely consequences if no action is taken in the light of these trends are not difficult to imagine. The resultant loss of life of marine casualties, the environmental damage and property losses are problems of growing importance.

During the sixties and the beginning of the seventies much importance was attached to the safe construction and equipment of ships without paying enough attention to those who are operating the ships i.e. the officers and the ratings, and the difficulties of the rising number of the poorly qualified mariners and substandards ships navigating the high seas have become more pressing within each country.
In 1971, the IMO council decided that further action was necessary to strengthen and improve standards of training and qualification and requested the Maritime Safety Committee to give urgent consideration to the preparation of international standards of training, certification and watchkeeping for seafarers. It was also in 1971 that the IMO assembly decided to convene a conference of training and certification of seafarers. The preparatory work for the conference was carried out by the sub-committee on standards of training which prepared a draft convention, its annex containing technical provision and a number of draft recommendations which together formed the basic documentation for the conference.

The STCW convention is regarded now as the first attempt to establish global minimum professional standards for seafarers. The convention prescribes minimum standards which countries are obliged to meet or exceed. However, in some countries standards are often higher than those stipulated in the convention, in some others, standards are not so high and by ratifying or accepting the convention governments undertake to implement and enforce its requirements. The effect of the convention's entry into force will therefore be to raise standards in the world as a whole.

The convention articles contain the legal provisions of the convention while the technical content is incorporated in the annex. The articles deal with entry into force provisions, amendment procedures, denunciation and various other matters.

One specially important feature of the convention is that it
will apply to ships of non party states when visiting ports of states which are parties to the convention. Article X requires parties to apply the control measures to ships of all flags to the extent necessary to ensure that no more favourable treatment is given to ships entitled to fly the flag of state which is not party than is given to ships entitled to fly the flag of state that is a party. As this could lead to difficulties for ships of states which are not parties to the convention it is expected that the members of parties to the convention will increase considerably in the near future.

Certificates, each authorizing the holder to serve in stated capacity- are the basic control provision of the convention and article VI requires that they be issued only to those who meet the requirements of the convention.

Deficiencies are required to be reported to the master and to the authorities of the flag state. If the deficiencies are such that they are judged to pose a danger to personnel property or the environment, the party carrying out the control shall take steps to ensure that the ships will not sail unless and until the convention requirements are met to the extent that the danger has been removed.

Although one aim of the convention is that in future all certificates shall ultimately be issued in accordance with its requirements the need for the transitional provisions is recognized in article VII. In states that certificates issued before entry into force of the convention for a party shall remain valid, no matter what the standards may have been. After the entry into
force of the convention for a party, its administration may con-
tinue to issue certificates with its previous practices for a peri-
od not exceeding five years. This provision will enable the requ-
irements of certificates to be updated in line with technical and
other changes.

The technical provisions of the convention are contained in
an annex of six chapters.

Chapter I deals with general provisions and includes a list
of terms as well as control procedures.

Chapter II (master-deck department) establishes basic
principles to be observed in keeping a navigational watch, including
watch arrangements, fitness for responsibility navigation and nav-
igational equipment, navigational duties and responsibilities, the
duties of the look-out, navigation with a pilot on board and prote-
cction of the marine environment.

Chapter III deals with the engine department. It follows
a similar format to chapter II, including an opening regulation
outlining basic principles to be observed in keeping an engineering
watch.

Chapter IV is concerned with the radio department, while
the importance of tankers in modern shipping is recognised.

Chapter V contains special requirements for officers and
crews serving on tankers, chemical tankers and liquified gas ca-
rriers.

Chapter VI deals with proficiency in survival craft.
Resolutions adapted by the conference are 23 resolutions, because in some regulations of the convention the language is fairly general with much detail being incorporated in resolutions adapted by the conference.
3.4. THE WORLD MARITIME UNIVERSITY:

Developed countries, with their vast resources of technical knowledge can be expected to keep a breast of technological developments and adjust their maritime training to meet the changing needs. On the other hand, many developing countries lack the resources and experts in the field of shipping. The lack of trained personnel and even basic training institutions in certain developing countries remain the main impediment to their progress in the maritime sector.

Considerable efforts have been made by the developing countries during the recent years to overcome this impediment. With the generous financial support of mainly the United Nations Development Program (UNDP) and some donor countries and agencies, IMO has managed an extensive program of technical assistance, to the benefit of these countries.

Among efforts aimed at assisting developing countries to establish and enhance their maritime training institutions, the following are significant:

1- The establishment of two maritime transport academies for the Arab World, one in Alexandria, Egypt and the other in Shargah, UAE.

2- The up-grading of the maritime training institutions in Indonesia, i.e. those responsible for the training of seafaring personnel for ships playing one international voyages and ships on enter-island voyages.

3- The establishment of ratings training school in Singapore.
4- The up-grading of regional maritime training facilities in the pacific.
5- The establishment of a training centre for deck and engineer officers in Rio Do Janeiro, Brazil.
6- The establishment of regional academy of sciences and techniques of the sea (for the French speaking countries of Africa) in Abidjan, Ivory Coast.
7- The establishment of another regional maritime academy (for the English speaking countries of Africa) in Accra, Ghana.

Several of the projects mentioned above have been successfully completed during the last few years while others are in progress or planned. However, the results of these efforts only meet the needs of the three first levels of maritime training (which are included in the STCW) and don't adequately provide for the training of future lecturers and examiners, ship surveyors and inspectors and maritime administrators. The existing facilities of the developing world cannot cope with the sophisticated needs of the fourth level on maritime training.

Against this background, a global seminar on maritime training convened in Malmo, Sweden in November 1980, proposed the establishment of an "International University Of Maritime Sciences And Technology" in Sweden. This proposal was unanimously supported by IMO Technical Bodies and, in November 1981, the twelfth IMO Assembly, emphasizing that the proposed high level training institution was intended to be complementary to existing and planned national and regional academies in developing countries, requested the Secretary-General of IMO to take all further necessary
action for the establishment of a world maritime university (WMU) and requested to the Administrator of the UNDP to give the highest priority to the considerations of this extremely important project with a view to providing the necessary financial support.

In October 1982, an agreement was signed with the Swedish government and the provincial government of Malmo to establish the IMO-WMU at Malmö, Sweden.

The aim of the university is to provide specialized training for maritime administrators, surveyors and inspectors, accident investigators, maritime lecturers and others holding key positions in the administrations of developing countries.

The initial intake of a number of 75 students forming the first group of post-graduate studies has been calibrated to join the university on July 1983.
3.5. Maritime Education & Training In some developed Countries :

3.5.1. System of Certification & Training in U.S.A. :

There are four certificates for deck officers and four for engineering officers, they are :

1- Third mate.  Third Assistant Engineer
2- Second mate.  Second Assistant Engineer
3- Chief mate.  First Assistant Engineer
4- Master.  Chief Engineer

For entry to first year a candidate must be at least 19 years of age and have had three years service at sea, he must be graduated from a merchant marine academy. Satisfactory completion of course at a United States Government Operated Training School earns four months of sea service. For second (2) a candidate must be at least 21 years of age and have served as third mate or third assistant engineer for at least a year. After a year's service as second mate or second assistant engineer, the chief mate or first assistant engineer's license is awarded. Finally at 23 years of age with a year's experience as chief mate or first assistant engineer, a master's or chief engineer's license may be obtained.

Deck and engineer officers may attend upgrading courses at private or union schools to sitting the various examinations, but this is not compulsory. These courses tend to be of about two months duration.
The license examinations are held in 23 centres in various parts of the United States, once every month. The results appear after from ten to fifteen days. All answer papers are forwarded to a central examination centre for grading. Failure in up to two sections incurs referral, but in more than two sections it results in complete re-examination.

Qualifications as a deck or engineer officers in the United States merchant marine may be obtained in three ways:

1- By joining one of the merchant marine academies after completion of high school.

2- By the completion of three years sea service as a deck or engine-room rating and then sitting the third mate or third assistant engineer license examination held by the United States Coastguard.

3- By the completion of a short course at one of the institutes run by the unions or private institutes after the completion of the required sea service and then sitting the license examination.

The purpose of the merchant marine academies is to give the students the professional training and academic background necessary for licenses in the U.S. merchant marine & bachelor of science degrees and commissions in the United States Naval Reserve. The academies aim at providing a program of sufficient level to prepare graduates to become leaders in the Maritime industry both at sea and ashore. This involves a certain amount of character training as well as academic study. Academies require that the candidate should be graduated from
a high school and at age between 17 and 27.

The United States merchant marine academy at Kings-Point is run very much along military lines and all students follow a course of study that leads not only to a coast guard license but also to reserve commission in either the United States navy or the coast guard. It is present character has grown out of its link both with the state system of higher education, and with the United States military.

The course at the academy for both deck and engine cadets is four years in duration. The cadet spends from five to six months at sea during the second and third year. During these periods he should take part in all shipboard work including labour relations and ship's business.

* Dual License Curriculum :

There is a special curriculum in the United States merchant marine academy for dual license officers (deck and engine). The cadets in this case study both nautical and engineering sciences and sit for the license examinations in both specialists. Few cadets, however, choose this option as the specialist curricula are already fairly intensive.

* Examinations for License :

Besides the academic examinations held in the various maritime academies the students must sit for the examination held by the Coast Guard for the third mate or the third assistant
engineer certificates. The academies don't award a degree to a student until he succeeds in the licensing certificate besides the Bachelor of Science examinations. By the same token, the Coast Guard will not allow any student with unsatisfactory results at the academy to sit for the licensing examination as remission of sea service is earned on the grounds of the successful academic training at college. Cadets who fail in their academy examinations but who wish to continue their careers at sea, go on board ships as ordinary seamen until they acquire three years sea service and then sit for their Coast Guard License.
SYSTEM OF MARITIME EDUCATION IN U.S.A.
3.5.2. U.K. Training of Engineering Officers:

The training of engineering officers in the United Kingdom can be divided into three categories:

a- Traditional training
b- Cadet training
c- Further training

Since 1863 the U.K.'s Administration has had held examinations leading to the certificates of second and chief engineers. As a prerequisite to entry into any of these examinations, candidates have been required to prove that they have served suitable apprenticeship relevant to marine engineering in shore establishments and that they had a considerable amount of sea going experience as an engineer officer.

Examination candidates have served five years engineering apprenticeships in shipyard or in marine engine maker's works. They had been accepted by ship owners for employment as uncertificated engineer officers.

After 18 months of sea service, they attend private or public marine colleges for approximately six months in order to prepare themselves for the U.K. Administration's (second class examinations).

After another 18 months at sea, holding their second class certificates, for entry into the U.K. Administration's "first class examination", they usually attend six months in
private or public marine college before examination.

With regard to cadet training it was introduced in 1952 as a result of growing dissatisfaction with the traditional training that had been in use since 1863. This was a result of the increasing diversity and sophistication of ships and the need to truly educate young men in the theoretical aspects of his profession.

There are three courses of training. all involved almost the same degree of practical training but they differ from each other in theoretical content and standard. The entry requirements for these courses also differ, all having approximately the same duration (four years) and containing approximately the same amount of practical training.

These courses also differ in other respects but, in general, the cadets on leaving school and going to be employed at shipping companies as trainees, spend two years at a marine college, then one year at sea, finally one year at marine college.

During the first two years at college, the cadets receive instructions in the theoretical subjects and also in the practical subjects. This is supplemented by basic practical training and experience in the use of tools including lathes, shipping machines, welding equipment,.....etc.

During the next phase of training the cadets serve at sea on board the ships owned by their employers, thus gaining familiarity with seagoing practice, watchkeeping routines.....etc.
During the final phase, which is at the marine colleges the students continue their theoretical studies and also receive more practical training which is oriented towards the operation and maintenance of ship's machinery. All of the colleges concerned are equipped with generators, heat exchange equipment ....etc.

On completion of the cadet training, cadets become qualified for entry of U.K. Administration's examination for Certification as an engineer officer in charge of watch. Although these cadets are required to sit the U.K. Administration's examinations, they are exempted from the requirement to be examined in the theoretical subjects of the second engineer examination. Those who have taken (type B and type C) courses are also exempted from the theoretical subjects of chief engineer examinations.

With reference to further training of engineering officers: At this division, the engineer officers receive further specialized training which is more specifically relevant to the types of ships. There are, however, certain courses which have been specially created for the purpose of meeting the U.K. Administration's legal requirements for further training. Such courses include fire fighting, first aid and courses for officers on board of tankers, chemical carriers and liquified gas carriers. All of these legally required courses are in accordance with the STCW convention and some of them were actually created in anticipation of convention requirements.
* U.K. Training of Engine Room Ratings:

Every rating forming part of an engine room watch on a U.K. registered ship will be required to meet the requirements of both the regulation 31/6 and the recommendations of resolution 9. The U.K. requirements will thus be somewhat in excess of the STCW requirements.

The training course will have very little theoretical contents and will, therefore, be almost entirely practical in nature. Men attending will have basic training in the use of engineering tools and will also receive familiarization with many types of engine room machinery.

Engine room ratings of U.K. ships have usually gone to sea from school or shore employment and have become watchkeeping ratings after they have gained the necessary knowledge from practical experience.

Any U.K. engine room rating may become an engineer officer by attendance of a course that has existed for many years in one of the U.K. colleges and by successful examination at the end of that course.
<table>
<thead>
<tr>
<th>RATINGS ENTRY</th>
<th>TRADITIONAL ENTRY</th>
<th>CADET ENTRY</th>
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<tbody>
<tr>
<td>3 YEARS AS ENGINE ROOM RATING</td>
<td>2 YEARS WORKSHOP SERVICE PLUS B.Sc. DEGREE OR HND</td>
<td>ENTRY AT 16 WITH FULL-TIME TECHNICAL EDUCATION</td>
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<td>OR</td>
<td>ENTRY AT 16 WITH 4 GCE 'O' LEVELS</td>
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<tr>
<td>SELECTION COMMITTEE</td>
<td>4 YEARS CADETSHIP</td>
<td>3½ YEARS CADETSHIP</td>
</tr>
<tr>
<td>2 YEARS CONVERSION COURSE</td>
<td>4 YEARS SPECIFIED WORKSHOP SERVICE PRE-SEA COURSE (2 WEEKS)</td>
<td>CITY AND GUILDS TECHNICIAN CERTIFICATE OND PLUS ENDORSEMENTS</td>
</tr>
<tr>
<td>PART A SECOND CLASS</td>
<td></td>
<td>HND</td>
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</tbody>
</table>

SEA-SERVICE AS JUNIOR ENGINEER OFFICER
3.5.3. System of Maritime Education in Denmark:

Maritime training, including study for nautical examinations, in Denmark is under the management and control of the Directorate of Maritime Training which is an institution under the Ministry of Commerce. The Directorate is responsible for the operation of all nautical schools and training ships including the economic aspects of the institutions. The Directorate appoints teachers to the schools, allocates economic resources to the schools, issues standard timetables for school teaching, prescribes the syllabus for individual subjects, issues the textbooks and other books used by the school.

The teaching is thus centrally controlled. However, teachers and students are consulted when decisions are made. All teachers come together once a year for a three day congress where the contents and arrangements of the courses of study, the importance of individual subjects and many other matters are discussed. The instructions and decisions of the Directorate are prepared in the light of such discussions.

The organization of maritime education and training is summarized in the accompanying diagram.

* Deck Officers:

Usually recruits leave secondary school and spend five months at a pre-sea residential training school of which there are five in Denmark. Recruits are normally aged between 16
and 20. The pre-sea course consists of basic safety training and some academic work.

On leaving pre-sea training the aspirant deck officer can complete his seagoing training by serving sea time in the sail training vessel " Denmark " and as a cadet in merchant ships or by serving at sea as an ordinary seaman. If trained as a cadet only 21 months sea time is required. If trained as an ordinary seaman 36 months sea time is required. On completion of his sea training the student is admitted to one of the four navigation schools in Denmark. The period of study is 3 years during which time both Mate and Master examinations are taken. Remission of up to 12 months is allowed to students who prior to enrolling at the Navigation School undertake a correspondence course and satisfactorily pass an entrance examination.

During the two to three years students are enrolled at Navigation School, they spend time at sea on electronically aided vessels and also undertake a fire fighting course.

A student who has completed the whole course of study at a Navigation School and has passed the Mate's and Master's examinations will be capable of obtaining a certificate of competency as Mate 1st Class which entitles the holder to serve as chief mate in ships of any size in world-wide trading. After serving 24 months sea service (including 12 months as Chief Mate) a certificate of competency as Master 1st Class is issued. Generally, however, Danish companies require longer service as mate before appointment as Chief Mate or Master and
this is not different to the situation which exists in most mar-
time nations other than the more recent developing fleets.

The Directorate of Maritime Education has established at
Navigation Schools a number of updating or refresher courses
in such areas as Radar Navigation, Radar Maintenance, Electr-
onic aids to navigation, weather routeing, tanker safety, chemi-
cal cargoes and ship handling.

* Engineer Officers :

A new act dealing with the training of mechanics and
marine engineers came into force on the 1st August 1972. The
new regulations require a comprehensive progressive training
scheme for aspirant marine engineers. The regulations require :

- 6 months training for the mechanics certificate.

- 1 year and 6 months training for the Marine Engineer's
  Certificate.

- 1 year further training for the Advanced Marine Eng-
  ineer's Certificate.

Holders of the mechanic's certificate may either take up
employment in fields requiring this type of training or they may
continue their training for the Marine Engineer's Certificate, th-
therefore, constitutes the first part of the combined training for
the Marine Engineer's Certificate. In order to be accepted for
training for the mechanic's certificate, the candidates are requ-
ired to have passed the preparatory technical examination including
English as a foreign language, and have completed or are undergoing practical training in some branch of engineering. The holder of a mechanic's certificate is entitled to obtain a License as a marine mechanic under the Danish Control of Trade by Sea Order.

Marine mechanics often serve in subordinate positions as marine engineer assistants in large ships, and therefore instruction is given in engineering and electronic machinery in large ships. Instruction is also given in fire fighting.

In order to enrol for a course leading to the marine engineer's certificate, the applicant is required to have passed the examination for the mechanic's certificate and completed the necessary practical training. The holder of a marine engineer's certificate is entitled to be issued with a License as 1st, 2nd, or 3rd Marine Engineer or as a Chief Engineer.

Having obtained a marine engineer's certificate, the engineer may apply to study for the examination leading to the Advanced Marine Engineer's Certificate.

The objective of this certificate is to supply highly qualified engineers capable of filling senior positions in the shipping industry, in power station and in other fields of industry. In this respect, it is similar to the British Extra 1st Class Marine Engineer's Certificate.
EDUCATION AND TRAINING

DEEP-SEA MASTER

NAVIGATION SCHOOL

MASTER'S CLASS
12 MONTHS

MATE'S CLASS
12 MONTHS

MATE'S CLASS 1B
6 MONTHS

MATE'S CLASS 1A
6 MONTHS

--- > MASTER'S EXAMINATION

--- > MATE'S EXAMINATION

--- > ENTRANCE EXAMINATION 2

--- > ENTRANCE EXAMINATION 1

APRENTICE MERCHANT SHIPS
16 MONTHS
TRAINING SHIP 'DANMARK'
5 MONTHS

APRENTICE MERCHANT SHIPS
21 MONTHS

SERVICE IN MERCHANT SHIPS AS
DECK HAND
21 MONTHS

SPECIAL COURSE
ASHORE-10 WEEKS

PRE-SEA SCHOOL
(BOARDING SCHOOL ASHORE)
5 MONTHS

DIRECTORATE OF MARITIME EDUCATION IN

DENMARK
3.5.4. Maritime Education in Australia:

The major aim for establishment of the Australian Maritime College (AMC) is to provide services for shipping, fishing, off-shore and board industries.

* Introductory background: Tertiary education (post-secondary education) in Australia is provided three sectors:

  - The university sector
  - The advanced education sector
  - Technical and further education sector

The latter sector comprises technical colleges which provide technical education and training. Almost all technical colleges are established and operated by state governments. Secondary school graduates transfer into technical colleges after school year 10 i.e. two years before completion of full secondary education.

Prior to the establishment of the Australian Maritime College, some maritime training was provided in a few state technical colleges. Cadet ships were provided for deck officers trainees by the large shipping companies and some limited pre-sea and mid-cadet release from formal training was being introduced by one of the technical colleges. One of the companies had also introduced a cadet-ship scheme for engineer officer trainees - which involved 2 to 3 years formal training with about one year at sea in commercial ships. The main way for marine engineers, however, was a trade apprenticeship in heavy engineering - the associated part time teaching
courses in the technical colleges qualified for some exemptions from the statutory examinations for the certificates of competency, which was administered by Federal Department Of Transport (DOT).

There was a scarcity of highly qualified staff, who generally had to be recruited from overseas because there were no courses in Australia leading to the highest marine qualifications.

In the technical colleges the technician programs lead to a certificate and the developing technologist course lead to a diploma. This latter provision generally comprised a sandwich course with 3 years full time formal education and one year of industrial experience.

The education specification sets out the organizational structure—academic and administrative—the programs to be offered by the schools of study, the projected student enrolments and staff establishment to 1984, and the requirements for buildings and major items of equipment.

At the time (1978) it was envisaged that the college would reach its full operating level by 1984. In fact the capital works program will be completed by 1985 at a cost increase of $30,000,000.

For 1985, student enrolments will amount to some 650 to 700. The teaching staff currently numbers 45 and the operating budget is $5,500,000. By 1987 it is envisaged that the student enrolments will have increased to 1000 to 1100
and the teaching staff will have increased to about 65.

In the following tables, the organizational structure of the college, the academic and short courses programs and the major items of equipment are outlined.

* Major items of equipment:

- Navigation & seamanship training vessel " WYUNA "
- Fisheries training vessel " BLUEFIN "
- Ship-handling simulator
- Diesel engine simulator
- Radar simulator
- Fisheries flume tank
- Towing tank
OUTLINE OF ACADEMIC PROGRAMMES AT AUSTRALIAN MARITIME COLLEGES
OUTLINE OF PROPOSED TRAINING COURSES IN AUSTRALIA
3.5.5. Analysis of Various Education Systems:

* U.K. System:

Developments in nautical education and training in the U.K. have come about as a result of the attempts to bring nautical education within the higher education system.

Teaching and examining in the U.K. are still under separate authorities and government departments: Examining coming under the Department of Trade, teaching coming under the Department of Education and Science. Although this system appears to provide situation which will maintain the required standards, it does not necessarily imply inevitable corruption should teaching and examining be carried out by the same body.

In many cases the examiners for the certificates of competency have never worked as educators, thus they are not qualified to draw up syllabuses or set examination papers.

* Australian System:

Following the decision to break away from the British System which had been adopted until 1978 Australia has made a major step forward. It has decided to establish a single federal College of Maritime Studies in Tasmania, avoiding the problem of the setting up of Polytechnics and the division in education between students who are under 18 years of age and those over this limit.

The Maritime College has the status of College of Advanced
Education but nevertheless, is inpowered to provide all courses from Cadet through to Master and Chief Engineer and beyond.

The lesson which can draw from the Australian situation is that the appointment and development of suitable academic staff is crucial to the future reputation of the academies and the esteeming which their graduates are held internationally, the development of comprehensive academies catering for Deck, Engine and Radio Officers should be pursued.

* Danish System :

The Danish system is government controlled throughout and is efficient as far as it goes. An Advisory Board is used to keep the Government in touch to the industry's needs. The recruitment and training systems are wide ranging catering for recruits between the ages of 16 and 20. The system is designed, essentially, to train seafarers and not to accept the inevitability of second careers for seafarers. Where the wastage rate is high, it is perhaps better to prepare officers for roles ashore in the industry rather than to lose them altogether.

* U.S.A. System :

The American system has largely integrated the Deck and Engine students but not the Radio Officers. In some colleges, students study for a degree simultaneously with their preparation for
license examinations which are controlled by the United States Coastguard. Unfortunately, students have to pass both examinations, failure in either the license or the degree automatically disqualifies the student from the success in the other. As these examinations are set by different authorities an unnecessary strain is placed on the student. The educational courses tend to be designed along the credit hour system. The weakness of this system is that although, in theory, the student selects the areas of study he is interested in, the precise nature of the training required to become a sea going officer presents a wide ranging choice of courses.

* Comment:

It is essential that anyone who leaves the sea is channeled into posts in the industry ashore which shows the need for a wider ranging education and training programme which includes the study of economics and management and also provides for the awardness of degrees and diplomas as well as professional qualifications.
3.6. Problems Encountered in Establishing a Maritime Academy in a Developing Country:

In fact it is almost impossible to cover all the common problems facing the nautical colleges in developing countries but I will restrict myself to discuss only three of the most important....namely:

1- Organization and legislation
2- The teaching staff
3- Facing the ever-developing technology

3.6.1. Organization and legislation:

One cannot look to the problems relating to maritime education, training, examination, certification, administration and legislation separately. This global approach needs sound organization. In fact the dangers of the lack of organization leading to ineffective flag state control have many drawbacks.

A developing country should start its maritime education activities by focusing on organization. The process of organization should include the formulation of a training policy confirming to the maritime legislation of the country, which in turn, should confirm to international conventions, and be controlled by a well organized maritime administration. In these areas, the area of organization, legislation and the implementation of convention lies the first problem. It is not seldom that a country ratifies a certain convention but the new regulations adopted never reach the men operating at sea.
The question arises: How does that affect maritime training? The answer is clear. Maritime training cannot be effective if the programs of training don't confirm to the latest standards and if they are not fixed in a national law.

It is almost certain that a number of new institutes in various developing countries start operating without any legal base. The first problem facing the establishment of a new maritime academy in developing countries is "getting organized" the solution comprises:

* The adoption of international conventions
* The establishment of a well organized maritime administrator
* The legislation of national maritime codes
* The formulation of the regulations governing training and the issuance of the certificates of competency
* Designing training programs confirming to national regulations and international standards

3.6.2. The teaching staff:

The teaching staff in a higher institute of maritime studies should be considered the most important element in the education process. Its members are not only responsible for delivering their lectures and carrying out the practical lessons. They are responsible as well for updating the programs of training, encouraging the students to undertake research and personal study, producing the necessary teaching aids, evaluating
the students and bringing them up to high standards of discipline, integrity and personal character to be able to safeguard the interest of their country in the maritime field.

To perform its duties at the required level effectively, the majority of the members of the teaching staff must be of national origin. This allows them to understand better the local conditions and limitations and to share with their students the same aspirations.

In general, there is a shortage of properly qualified teachers in most maritime colleges. In fact, in any developing country there is almost a complete absence of such teachers. Consequently, some of these institutes depend totally on expatriates.

One of the important factors aggravating the problem is the long period needed to train the teacher. To prepare a person to become a properly qualified nautical teacher takes at least 10 to 15 years of maritime training, sea service and academic and pedagogic formation.

Unfortunately very little attention is given to this vital area, reasons may be:

* Unawareness of the importance of the problem
* Absence of incentives to attract potential national teachers
* Limited resources allocated in bilateral and international technical assistance projects to training item
The developing countries are responsible for the first two upper reasons. Meanwhile, the national and international technical cooperation agencies are concerned with the third one.

The program of preparing the qualified teachers should be carried out by sending the potential teachers to advanced maritime institutes abroad or to local universities and higher institutes of engineering and technology.

To attract the proper candidates, good conditions of employment should be adopted. It is well known that seafaring officers find it difficult to accept teaching jobs because of their inferior salaries compared to the salaries at sea. Some balance must be considered.

3.6.3. Facing the ever-developing technology:

Facing the ever-developing technology is more difficult in the developing countries than in industrialised countries for many reasons:

* Most of the developing countries dont build for themselves the vessels needed for their fleets but they depend on foreign shipyards for providing them with their needs. It is thus natural that these countries procure the most modern ships built according to the latest developments without participating in the elaborate research work which preceeds any development
Most of the developing countries don't have the proper professional and scientific institutions which can follow up the progress in the maritime science and technology and keep its members abreast of all the developments.

Moreover, when designing a training program for a maritime institute at a certain time, it must be borne in mind that the trainees will not be responsible watchkeeping officers before the elapse of about 3 to 4 years. The same students will not be senior deck or engineer officers before ten or twelve years. The programs should be therefore designed accordingly, in the same manner followed by the advanced maritime institutes. To do so, strong cultural and professional relations should be established with the relevant institutions in the developed countries. Specialists should not miss participating in the various seminars and conferences organised by the international organisations and associations. They should subscribe to the publications of these establishments and keep abreast of their latest research. Research and education should be geared one to the other. Visits should be exchanged between researchers and teachers in developed and developing countries. The transfer of no-how should be a major objective of technical assistance. Research should not be the monopoly of already advanced countries. This monopoly would only lead to widening the gap already existing between the developed and developing countries.
CHAPTER 4

A Future of Maritime Education in Egypt
4.1 Education in Egypt

4.1.1 Introduction:

The main target of this chapter is to highlight the condition of education in Egypt and to focus on maritime education, which is the backbone of my research.

From my point of view, the development of the maritime education sector in my country depends on the level of maritime education in that country. The best operation and maintenance of the national fleet depends upon the qualification of ship's officers. The best management of shipping companies depends also upon the retired masters and chief engineers who lead these companies. If they had a high level of education at the beginning completed this with broad experience they will be good managers and superintendents for shipping companies.

I will describe quickly the system of general and high education in Egypt to give the reader a good idea about the level of education for the student who attends the maritime Academy. I will explain the position of the graduate students within the educational pyramid in Egypt to emphasise the great effort made in the Alexandria Maritime Academy (AMTA) to teach and qualify their students with the best and most modern system of education and sea training.

I do not say this only because I am a member of the teaching staff but also because I have been graduated from the
Alexandria University which can be considered one of the oldest universities in the East.

Finally, I hope to give the reader an idea about the construction and system of maritime education in Egypt, and I will still say that "criticism is the best way to development".

4.1.2 General Education.

1. Grade school:

This stage of education is compulsory and also free of charge. It begins when the child is 6 years old and continues for 6 years. During that period, the child passes two examinations only, one at the 4th year and the final examination at the 6th year. Within this 6-year period, the child gets the principal of reading and writing in addition to the following subjects:

- Islamic religion or Christianity.
- Arabic language.
- Arithmetic.
- Science.
- History and Geography.

After the successful passes the final examination, the pupil attends the second stage of education which is:

2. Preparatory school:

The period of that stage is 3 years with examination after every year and a final examination after the 3rd year, according to
the result of the examination, the student gets a certificate of preparatory stage.

During this period the pupils study the following subjects:

- Islamic religion or christianity.
- Arabic langue and foreign langue (E, F, G).
- Mathematics.
- Science.
- History and Geography.

After successfully passing the final examination the pupils get a certificate and according to their marks they can attend one of the following:

- General secondary education.
- Technical secondary education.
- Commercial secondary education.
- Military and technical training center.

Hereby, I will stress the general education system because it is considered the entrance qualification for the maritime education and also to the higher education in Egypt.

3 General secondary school:

The period of this stage is 3 years with an examination after every year, but with a final examination at the end of the 3rd year. This final examination is common for all schools in Egypt and is considered the most importance, because according to its marks the wishes of the students is decided the future of every one of them, in the higher education like faculties and colleges. The faculty of medicine and engineering require the highest marks in that examination.
At this stage the first year is considered common for all students but from the second year the students are divided into three branches: scientific, mathematics and literature. More than 80% of the students attend the scientific and mathematics branches. During this stage the students study the following subjects:

- Islamic religion or christianity.
- Arabic language.
- Two foreign languages: English, French and Germany.
- Physics.
- Chemistry.
- Biology.
- Mathematics.

These are the subjects for the mathematics branch. I have neglected the other branches because it is not allowed for them to attend the maritime education.

After passing the final examination of the general secondary school the students get their certificate (G.C.E.). The Ministry of higher education, according to the marks and wishes of the students, distribute them to different faculties and institutes.

I must stop at this point and give the reader a wider scope about the different things which control the decision of the students.
4.2 Higher Education

4.2.1 Egyptian universities:

There are 11 universities in Egypt, and every university consists of different faculties and institutes. The number depends upon its size and the population which serves, namely:

1. University of Cairo.
5. " Tanta.

As I said before, every university consists of different Faculties and Institutes, hereby. I will take Alexandria university as an example and I will list the different faculties which belong to it:

1. Faculty of Medicine.
2. " Dental surgery.
4. " Veterinary Medicine.
5. " Engineering.
7. Faculty of Science.
11. " Education.
13. " Tourist and Hotels
14. Special institutes

4.2.2 Military Colleges :

1. Naval Colleges (3 years).
2. Army " (3 years).
3. Air Force Colleges (3 years).
4. Technical Military Colleges (its Period is 5 years).

4.2.3 Alexandria Maritime transport Academy (AMTA) :

I forgot to state that, all the school stages are free of charge. The universities and Military colleges are also free of charge. The AMTA is considered a special sector and most students are charged. Twenty students per year are chosen by the Ministry of Maritime transport of Egypt without charge but they must work in the Egyptian shipping company (Governmental sector) at least for 6 years.

I will try to summarize the system of education in Egypt in the attached chart to give a complete picture of that system.
SYSTEM OF EDUCATION IN EGYPT
4.3 Faculty of Engineering:

The aim of this sub-heading is to explain the relation between the faculties of engineering and the maritime field, and also show the position of AMTA and its level of education within the university system of Egypt.

The period of study of faculties of engineering is 5 years and offers a degree of B. Sc. of engineering in different branches; for instance; Medical, Electrical, Marine and Naval Arch., Civil, Chemistry,...etc.

Of course, I will focus on Marine engineering and Naval Arch: because of the close relation between it and the Maritime sector and maritime education.

This department has been started in Alexandria university in 1960. Before that time it was a branch of the mechanical department.

The first year is common for all departments. The specialization starts from the second year. At the common year the students study the following:

- Mechanics.
- Mathematics.
- Physics.
- Chemistry.
- Descriptive engineering.
- Production
- Engineering drawing.
Concerning the Marine engineering and Naval Arch. department, I will list the different subjects which have been studied by students during the remaining 4 years as follows:

**Second year**
- Mathematics.
- Mechanics.
- Machine drawing.
- Production engineering.
- Metallurgy.
- Physics.
- Testing of material.
- Theory of structure.
- Civil Engineering.

**Third year**
- Thermodynamics.
- Fluid mechanics.
- Electricity.
- Stress analysis.
- Mathematics.
- Theory of machine.
- Machine design.
- Ship construction.
- Production Engineering.
fourth year
- Mathematics and computer.
- Fluid mechanics.
- Steam boilers.
- Internal combustion engines.
- Ship construction.
- Naval Arch.
- Theory of machine.
- Hydraulics.
- Heat transfer.

fifth year
- Ship design.
- Shipyard technology.
- Naval arch.
- Refrigeration and air conditioning.
- Automatic control.
- Industrial organization.
- Internal combustion engines.
- Maritime law.
- special project.
- project.

After the final examination the student gets the degree of B. Sc. of Marine Engineering and Naval Arch. This is an academic degree not a certificate. So the marine engineer from that faculty is considered as an un-qualified for sea. He must
de 6 months sea training or sea service to get a third engineer certificate or 18 months to get a second engineer certificate and after that 36 months to get a chief engineer certificate. There is an examination for every certificate.

In my point of view, I consider these kinds of marine engineers are the most suitable to work on board modern ships.

4.4 Maritime Education in Egypt

4.4.1 Historical background:

At the beginning of maritime education was some limited education provided by private schools. Cadets ships were provided for deck and engineer officers by training program of Egyptian shipping companies.

The system for examinations and certification was a copy of the English system and arranged by ports and light houses administration. A short refresher course leading to the examination for certificates of competency were given by private persons who were normally retired captains and engineers from the navy.

There was a growing awareness that our maritime industry was lagging well behind that of many other countries. Therefore, in 1950 the ministry of transport decided to take serious steps to develop the maritime sector in Egypt and comply with international standards. To fulfill the immediate needs of the shipping industry, an maritime section started in the naval academy to provide well educated and trained deck and engineering officers. The first group joined the Naval Academy in September 1959.
At the same time, a special maritime section was arranged to start refresher courses leading to the examination for certificate of competency under the auspices of the Naval Academy. The faculty of engineering started in 1960, as already stated before, a special section for education leading to B.Sc. in marine engineering and naval architecture.

The ministry of transport kept studying the situation looking forward to future requirements and conditions of the country taking into consideration the vast development in maritime education and training and the obligations of international agreements.

As a result of all these conditions, the ministry found that it is better to establish a separate maritime education and training centre to fulfill intermediate and future needs. Two main problems needed to be solved; the required funds and the qualified staff with enough experience. The latter could be temporarily solved by selecting officers who had considerable teaching and training experience in the Egyptian Naval Academy supplemented by the selection of officers with highest background and experience in the merchant fleet. Most of the members especially in the engineering department held academic qualification and maritime background.

To solve the problem of funds, Egypt found that other Arabic countries were also in a serious need of such maritime centre to be able to develop their maritime industry. By consultation with those countries, it was found that a regional maritime centre was the best way to satisfy all requirements.
4.4.2 Establishment of AMTA:

In March, 1970, the Arabic League approved recommendation No. 9 of the permanent committee for transportation and communications during its fifty third meeting and in accordance with decision No. 2631/1970. The purpose of the recommendation was the establishment of a regional centre located in Alexandria for the training of personnel to work in the field of marine transportation.

The Arab Republic of Egypt was delegated to contact the international maritime organization (IMO - a United Nations Agency) for the technical and financial aid necessary for the establishment of such training centre. The various Arabic countries were asked to inform the United Nations of their approval and support for such project.

A committee made up of representatives from few United Nations specialized agencies such as IMO, UNCTAD (United Nations Conference on Trade and Development) and UNDP (United Nations Development Programme) visited Egypt, Libya and Sudan. The committee recommended the establishment of the proposed centre for Nautical Studies which was later named the "Arab Maritime Transport Academy". The committee also recommended the necessary technical and financial support, provided a sufficient number of Arabic countries were willing to participate in this project.

In January, 1972, the officers of UNDP approved the establishment of the project and the allocation of 2.3 million $ in aid, provided the arab countries bear the cost of running the
project, Captain Mohammed Zakaullah was appointed project
manager by IMO as of March 1, 1972.

In May, 1972, the Board of Directors of the Arab
Maritime Transport Academy held its first meeting and
Dr. Gamal El-Din Moukhtar was appointed the Director General
of the Academy.

4.4.3 The Mission of the Academy :

The Arab Maritime Transport Academy is a specialized
educational organization functioning within the context of the Arab
League. The educational & training activities of the Academy are
directed to varied fields, as is clear from the following general
aims.

- The Academy receives fresh holders of G.C.E., who are
  admitted to Basic studies, with the purpose of:
  "educating, training and qualifying these students through
  providing them with knowledge of Maritime Sciences and
  Techniques as well as with mental, physical and social
  ability and skills, required for obtaining certificates of
  competency according to international standards, which qualify
  them to work at sea as Deck, Engineering or radio officers,
  which help them effect rapid adaptation to life at sea, and
  inculcate in them a sense of belonging as well as a sense of
  pride, in their own profession."

- The academy makes use of its "open-channels" system of
  education by offering the opportunity to brilliant students to
  pursue their studies, with the purpose of:
"educating, training and qualifying brilliant students of basic studies, through instructing them in advanced academic sciences, as well as in varied maritime sciences and techniques which qualify them to obtain a Bachelor Degree in Maritime Transport Marine Engineering Technology, or Marine Electronics Technology, according to their respective fields of study.".

- The academy also extends its activities to cover graduated deck officers, Marine engineers, and Radio officers, preparing themselves to sit for higher competency examinations, with the purpose of:

"educating, training and qualifying learners from amongst deck officers, marine engineers, who satisfy sea service conditions as stated by regulations, through providing them with integrated theoretical knowledge, and practical experiences, with a view to enabling them to sit for higher competency examinations, which qualify them to hold different specialized positions in the maritime field, on board ships, or ashore, and be promoted to highest grades in this field".

"educating, training and qualifying radio officers to obtain a Diploma in maintenance of Radar & electronic navigational aids, or to obtain higher certificates of competency".

- Moreover, the academy accepts learners working in shore establishments specialized in maritime affairs with the purpose of:

"educating, training, and qualifying personnel practising in shipping companies and other organizations in the field of maritime transport, of all administrative levels, through providing them with specialized knowledge and academic research skills in management and economics of maritime transport, marine insurance, marine law, or foreign trade and maritime transport, with a view
to improving their performance both in planning and in executive
tasks".

- To achieve integration in the training of personne-practising in
the field of maritime transport, the academy receives holders of
intermediate technical qualifications, according to certain
regulations pretraining to their respective specializations, with
the purpose of:

"educating, training and qualifying students with a view to
providing them with special technical knowledge, skills and
values which qualify them to work as seaman, mechanics,
electricians, stewards or stevedoring technicians."

- In compliance with the demands of sponsoring countries, or
organizations, the academy designs and offers varied educational
programmes within the maritime context with the purpose of:

"helping learners working in the maritime fields, to achieve
higher performance levels".

- The academy also, offers consultation and research services in
the field of maritime education and training as well as the other
related activities, this being in consonance with its mission of
offering its experience to all organizations and institutes to
benefit from".
Since 1978, a number of cadets from African countries have joined the academy according to special agreements.

This year some cadets from Liberia, Nigeria and Ghana have enrolled as full-time students sponsored either by their governments, or by other organizations, or through the Arab Fund for technical assistance to the African countries.

The total enrollment of students, in the various departments and institutes of the academy during the year 1972, was 733 students. The number accelerated steadily until it reached 2186 students in the academic year 1981/1982 as shown in the attached table.

As for the participants in the Arab League, their number has quadrupled in the last four years. Most Arab countries were members of the academy with the exclusion of Morocco. Due to certain political developments and uncertainties, the Arab countries decided to transfer the academy to another place in one of the Arab Gulf countries.

However, the Egyptian government refused to accept that decision, and the academy was in complete harmony with that decision. The academy's reaction was built on the fact that the Egyptian government had provided the buildings, land, the native Egyptian staff members and most of the equipment and personnel.

Also, financial and moral assistance was initiated by the Egyptian government.
<table>
<thead>
<tr>
<th>Academic year</th>
<th>72–73</th>
<th>73–74</th>
<th>74–75</th>
<th>75–76</th>
<th>76–77</th>
<th>77–78</th>
<th>78–79</th>
<th>79–80</th>
<th>80–81</th>
<th>81–82</th>
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<tbody>
<tr>
<td>Basic Studies</td>
<td>144</td>
<td>222</td>
<td>352</td>
<td>636</td>
<td>801</td>
<td>958</td>
<td>997</td>
<td>923</td>
<td>878</td>
<td>965</td>
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<tr>
<td>Upgrading Studies</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deck Officers</td>
<td>136</td>
<td>158</td>
<td>204</td>
<td>360</td>
<td>379</td>
<td>374</td>
<td>411</td>
<td>325</td>
<td>218</td>
<td>211</td>
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<tr>
<td>Upgrading Studies</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineer Officers</td>
<td>–</td>
<td>31</td>
<td>113</td>
<td>219</td>
<td>239</td>
<td>313</td>
<td>408</td>
<td>389</td>
<td>277</td>
<td>268</td>
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<tr>
<td>and Management</td>
<td>385</td>
<td>318</td>
<td>291</td>
<td>236</td>
<td>192</td>
<td>194</td>
<td>83</td>
<td>150</td>
<td>234</td>
<td>194</td>
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<tr>
<td>Maritime Economics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specialized Seamen</td>
<td>68</td>
<td>114</td>
<td>67</td>
<td>121</td>
<td>142</td>
<td>126</td>
<td>98</td>
<td>116</td>
<td>176</td>
<td>182</td>
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<tr>
<td>Other Courses</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>107</td>
<td>102</td>
<td>282</td>
<td>366</td>
</tr>
<tr>
<td>Total</td>
<td>733</td>
<td>843</td>
<td>1027</td>
<td>1572</td>
<td>1753</td>
<td>1965</td>
<td>2104</td>
<td>2005</td>
<td>2065</td>
<td>2186</td>
</tr>
</tbody>
</table>

THE INCREASE IN NUMBER OF STUDENTS JOINING THE ACADEMY THROUGH YEARS 1972 TO 1982
The academy - with its premises in Alexandria - is still functioning with a view to maintaining the welfare of its students. Efforts are being exerted to develop curricula and syllabi, and provide all possible resources necessary for the attainment of these ends. The continuous support of the government of the Arab Republic of Egypt has greatly helped the academy maintain its prestige as a specialized Arab organization.

4.4.5 Department of the Academy.

Introduction:

The academy offers opportunity to students and learners from different countries for education and training in the various domains of the maritime field. These domains include Nautical science, Marine engineering, Radio and electronics, and Maritime economics & Management.

A highly qualified selected group of teaching staff is in charge of the execution of the various programmes of study in the academy. The educational and training activities are conducted through the following departments:

1. Department of Nautical studies.
2. Department of Marine engineering studies.
3. Department of Radio and electronics studies.
4. Department of Academic studies.
5. Department of Maritime studies.

Each of the above-mentioned departments deals with the teaching activities of all subjects included in the domain of speciality. Their activities cover the programmes of Basic studies that lead to the first level certificates of competency plus
the certificate of completion of basic studies, the programmes leads
to the degree of Bachelor plus the first level certificate of
competency, and the programmes of Upgrading studies leading to
higher certificates of competency.

Each department supervises the cadets in the period of
their studying according to a programmes offered by the
department; the department of Academic studies supervises the
the cadets during the first common semester of their Basic
studies.

6. The Sea Training DEpartment :

Supervises the cadets during their practical sea training
whether on board the training ship of the academy or on board
merchant marine vessels. This phase of training is an integral
part of the educational programmes leading to the first certificate
of competency of both deck and marine engineering officers.

7. The Seaman's Training Centre :

Deals with the education and training of individuals to
prepare them to work on board ships as seaman's, mechanics
electricians or catering men. The centre also plans to upgrade
instructors needed for technical training centres of the Arab
countries.
1. Department of Academic Studies:

The main objective of the academic studies department is to develop the students' abilities acquired during their secondary school phase of education, and to orient and enrich those abilities with the necessary behavioural abilities in the scientific, linguistics and effective domains that will form the basic necessary for the specialized studies in the maritime field dealt with in the other departments of the academy.

The department of academic studies organizes the conducting of the first semester of studies (the common semester) for both deck and marine engineering cadets during the first phase of their basic studies, where courses in English, Physics, Chemistry, Mathematics are offered to them. Besides, the department offers other advanced studies in the computer science and marine pollution prevention to students of upgrading studies, B.Sc and Diploma programmes.

The department also conducts preparatory courses in Mathematics, Physics, Chemistry and English language to help the newly enrolled students attain the required standards of admission.

The department is well equipped with modern laboratories and training aids for the study of physics, chemistry, languages and pollution prevention. Efforts are constantly exerted to develop and modernise these laboratories.

Intensive courses in English language are offered by the department at the request of the parties concerned in maritime field.
2. Department of Nautical Studies:

The department deals with the education, training and upgrading of students and learners through the development of their knowledge, attitudes, and skills, so as to enable them to work as marine deck officers complying with the international standards and to hold different positions of this speciality in the maritime field.

The courses offered by the department cover different areas of study such as seamanship, nautical science, coastal and celestial navigation, meteorology, oceanography, electronic navigational instruments, and cargo handling. The nautical curriculum is also supported by other basic courses such as mathematics, physics, English language, maritime law and engineering knowledge.

The department also offers short compulsory courses and specialized courses to cadets and seafarers, such as fire-fighting course, personal survival course, first aid course, electronic navigational system course, radio telephony course, radar simulator course, tanker operation course and pilotage course.

3. Department of Maritime Studies:

The department deals with the education, training and upgrading of the individuals working in the maritime sector by conducting studies in management, economics, maritime law, maritime insurance, and international trading and transport.
SCHEME OF CERTIFICATION OF NAUTICAL DEPT
The department also carries out research work that aims at the development and modernization of the aforementioned activities.

The programmes offered by the department are outlined in the following:

- **The diploma programmes:**
  - Diploma in maritime transport.
  - Diploma in maritime law.
  - Diploma in marine insurance.
  - Diploma in international trading and transport.

- **The B.Sc. degree programme:**
  - Leading to B.Sc. degree in maritime law.

- **Short training programmes:**
  - Administrative programmes:
    - First supervisory level programme.
    - Middle management programme.
    - Executive management programme
  - Specialized programmes:
    - Port administration, operation and planning programme
    - Tanker management and operation programme

4. **Seaman's Training Centre:**

The centre deals with the education, training and upgrading of students and learners through the development of their knowledge, attitudes and skills in the specialities of seaman's, mechanics, electrician or catering man in accordance with the international standards; with a view to enabling them to
2nd Class Diploma of Radar Proficiency Certificates

Theoretical Studies "Short-Term" Sea Training

2nd Class Electronic Radio Officer

Diploma of Radio & Radar Maintenance

Proficiency Certificate & B.Sc. Degree

Proficiency Certificates and B.Sc. Degrees
on board ships in jobs related to these specialities.

The following programmes of study are offered by the centre:

- Basic studies to prepare the students to work as seaman, mechanics or electricians on board ships. This programme is offered twice a year.

- Upgrading studies for individuals working in the maritime sector in the above mentioned specialities to raise their standard of performance.

  Compulsory courses relating to satisfy, which include
  * Fire-fighting.
  * Personal survival at sea.
  * First aid.

The afore-mentioned courses are integrated in the programme of basic studies.

- Marine hotel training studies to prepare the students to work as catering men on board ships in either of the following specialities:
  * Cooking.
  * Serving.

The plans of future development of the centre include:

* A training programme for fishermen.
* An upgrading programme for instructors working in similar establishments in the Arab countries.
ORGANIZATION OF AMTA
4.5 Credit Hour System:

The credit hour system is based on the specification of the number of courses a student must successfully pass, according to the standards set by the academy to obtain a certificate of competency of basic studies in any of the specialized departments. This system allows to progress in students' way according to his own individual pace and attitude, under the guidance of an academic advisor, within the allowable minimum and maximum number of courses he is allowed to register for in each semester. The student is thus in a position to take part in setting his own plan of study according to his own ability, in conformity with the academic regulations. According to the Credit Hour System, a student gets credits for the courses he successfully passes, and is not obliged to repeat except those courses he did not successfully pass according to the set standards.

The Credit Hour:

A credit hour comprises one hour of theoretical study (of a 50-minute duration) per week for one semester, supplemented by less than two hours of individual effort on the part of the student purpose. Alternatively, a credit hour comprises no less than two hours of practical work (each of a 50-minute duration) per week for one semester, supplemented by no less than one hour of individual effort, or three hours of practical or applied work on the part of student. The credit hour is the basis used to determine the course load a student is allowed to register for in each semester.
An Achieved Credit

It is the credit hour a student achieves in any of the courses he registered for, and is calculated in the process of accumulating the credits required for graduation.

The Academic Load

It is the total number of credits a student is allowed to register for in one semester; it is determined by the student's ability and achievement.

A Course

A course is what constitutes material to be taught through one semester, each course has a certain number of credits determined by the curriculum.

An Incomplete Course

An incomplete course refers to the case when a lecturer agrees to postpone the final examination for reasons beyond his control. In this case, the student must sit for the postponed final examination within the first week of the following semester, else, he is given grade, "F".

It also refers to the first half of a course which may be taught over two semesters. If a student does not get pass grade in the first half, the course is considered incomplete till the student gets pass grade in the final examination of the course at the end of the following semester, in the case of which the final examination covers the two parts of the course.
A Prerequisite

It is a course which a student must successfully pass before registering for another course. In this case, the former is considered a prerequisite to the latter.

The Academic Year

The academic year comprises two, or more, semesters. The duration of each of which is 15 to 16 weeks followed by the end-of-semester examinations. The summer session, however, extends for 5 to 6 weeks.

A phase

A phase is a specific period of time of the total duration of study at the academy. It comprises one period or more during which a student is either studying in the academy or getting training on board ships according to the study plan.

Course Points

Course points refer to the assessment of a student's level in any given course. Course points are calculated by multiplying the numerical value of the grade (A/B/C/D) a student gets in a given course by the credits assigned to this course.

Semester Grade Point Average

It is the average of the points a student gets at the end of a given semester. It is calculated by adding all points a student got in the courses studied in one semester (as indicated in the
previous item), then dividing the resultant by the total number of credits registered for in this semester.

Cumulative Grade Point Average

This type of average is worked out by the addition of all the points a student got in all the courses he had taken at the time of computation, then dividing the resultant by the total number of the credits registered for. It is computed at the end of each semester with a view to working out the C.G.P.A. at the end of a given phase, and at the end of study, and for the purpose of academic probation, and disenrollment from the academy.

Academic Standing

It is a student's level of achievement as indicated by his cumulative grade point average.

The Academic Advisor

Academic advisors are chosen from among Faculty members. Each academic advisor is responsible for a certain number of students, whom he helps to take sound decisions to overcome whatever may impede their academic progress.

The Academic Board

It comprises those in charge of education at the academy. Its task is to pass decisions as to whatever pertain to educational aspects.
Certificates and Graduation Requirements

The Arab Maritime Transport Academy grants the following certificates:

- Certificate of completion of Nautical basic studies.
- Certificate of completion of Marine engineering basic studies.
- Certificate of completion of Radio and electronics basic studies.
- Diploma in the maintenance of radar and electronic navigation aids.
- B.Sc. in Maritime studies.
- B.Eng. in marine engineering technology.
- B.Eng. in Marine electronics technology.
4.6 Department of Marine Engineering Studies

The department deals with the education, training and upgrading of student and learners through the development of their knowledge, attitudes and skills so as to enable them to work as marine engineers complying with the international standards, and hold different positions of this speciality in the maritime field. The studies in the department are held in accordance with the following programmes:

4.6.1 Basic Studies, Programme No.1;

Offered to the cadets who have completed their Secondary school studies (Science/Maths), and leads to the certificate of marine engineering studies; as well as the third marine engineer certificate of competency after passing the competency examinations and attending the compulsory short courses dealing with security.

The educational aims of this programme are "to induce and cultivate scientific, professional, psychomotor and affective abilities on the learners personality and to prepare him in the proper way that will enable him to fulfill the duties and bear responsibility of his job as third engineer".

This programme of study comprises the following instructional and training phases:
(A) Phase One:

A phase of study at the academy on internal residence basis for five semesters with a minimum duration of two years and a half and a maximum limit of five years.

The following is the curriculum of this phase of study:

a - First year - First semester:

<table>
<thead>
<tr>
<th>Course Title</th>
<th>LC</th>
<th>LB</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Language (1)</td>
<td>4</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Mathematics (1)</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Physics (1)</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Introduction to engineering</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Graphics</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Seamanship (1)</td>
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<td>2</td>
<td>2</td>
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<tr>
<td>Introduction to Maritime transport</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Physical education (1)</td>
<td>0</td>
<td>1</td>
<td>½</td>
</tr>
<tr>
<td>Leadership (1)</td>
<td>0</td>
<td>1</td>
<td>½</td>
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</tbody>
</table>

\[ \begin{array}{ccc} 
13 & 16 & 21 
\end{array} \]

b - First year - Second semester

<table>
<thead>
<tr>
<th>Course Title</th>
<th>LC</th>
<th>LB</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Language (2)</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics (2)</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Chemistry (1)</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Workshop technology (1)</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Engineering drawing</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Thermodynamics</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Electrical engineering</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Physical education (2)</td>
<td>0</td>
<td>1</td>
<td>½</td>
</tr>
<tr>
<td>Leadership (2)</td>
<td>0</td>
<td>1</td>
<td>½</td>
</tr>
</tbody>
</table>

\[ \begin{array}{ccc} 
0 & 1 & ½ 
\end{array} \]
The compulsory short courses are to be attended during this semester:

1. Fire-fighting 30 hours
2. Survival at sea 30 hours.

The cadets also participate in short training cruise on board the academy's training ship for a period of two weeks, for the successful completion of which the cadets get two credits.

c - Second year - third semester:

<table>
<thead>
<tr>
<th>Course Title</th>
<th>LC</th>
<th>LB</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics (2)</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Machine drawing</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Workshop technology (2)</td>
<td>1</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Steam generators (1)</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Internal combustion engines (1)</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Electrotechnology (1)</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Marine instrumentation</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Strength of materials (1)</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Physical education (3)</td>
<td>0</td>
<td>1</td>
<td>½</td>
</tr>
</tbody>
</table>

13 17 21
### Second year - Fourth semester:

<table>
<thead>
<tr>
<th>Course Title</th>
<th>LC</th>
<th>LB</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steam power plants</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Internal combustion engines (2 units)</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Naval architecture (1 E)</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Design &amp; Theory of machines (1)</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Marine engineering practice (1)</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Marine automation (1)</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Hydraulic machinery</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Physical education (4)</td>
<td>0</td>
<td>1</td>
<td>½</td>
</tr>
<tr>
<td>Leasership (4)</td>
<td>0</td>
<td>1</td>
<td>½</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>13</td>
<td>16</td>
<td>21</td>
</tr>
</tbody>
</table>

### Third year - Fifth semester:

<table>
<thead>
<tr>
<th>Course Title</th>
<th>LC</th>
<th>LB</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marine engineering practice (2)</td>
<td>2</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Metals and their properties</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Marine automation (2)</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Electrotechnology (2)</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>8</td>
<td>11</td>
<td>13</td>
</tr>
</tbody>
</table>

A compulsory short course is to be attended during this semester:

First aid 16 hours
(B) Phase Two:

A guided sea training period on board the training ship of the academy, for a duration of four months equivalent to a six-months period of practical sea training. The guided training comprises a total of 710 hours of training divided as follows:

- 50 hours training in fire-fighting and survival at sea operation.
- 300 hours training in performing the duties and activities of watchkeeping engineer in the engine room.
- 60 hours study of ship's systems and machinery.
- 200 hours training in the detection, maintenance and repair of mechanical equipment.
- 100 hours training in the detection, maintenance and repair of electrical equipment.

The guided sea training is carried out under the full supervision, guidance and evaluation of the Engineering department in coordination with the sea-training department.

At the end of this phase the cadet sits for the examination of third engineer certificate of competency.

4.6.2 Basic Studies, Programme No.2:

It is the principal programme in the department and is also offered to cadets who have their secondary school studies (science/maths), and leads to the certificate of engineering studies, as well as the second marine engineer certificate of competency after passing the competency examination and attending the compulsory short courses dealing with security.
The educational aims of this programme are "to induce and cultivate scientific, professional, psychomotor and affective abilities in the learner's personality and to prepare him in the proper way that will enable him to fulfil the duties and take the responsibilities of the job of second marine engineer".

The programme of study comprises the following instructional and training phases:

(A) Phase One:

A phase of study at the academy, identical in period and curriculum with phase one of programme No. 1 given in detail in item (A) above.

(B) Phase Two:

A sea-training period of a minimum duration of 18 months; it is subdivided into two periods:

First period

A guided sea-training period on board the training ship of the academy; it is identical with phase two of programme No. 1 given in detail in item (B) above.

Second period

An actual sea-service period on board sea-going ships of a duration of twelve months. During this period the cadet performs certain defined assignments as mentioned in the assignment book of long-sea-training and submits periodic reports for the assessment of his training by the department in coordination with the sea-training department.
(C) Phase Three:

A phase of study at the academy on external residence basis for one semester, it comprises the completion and amalgamation of the previous practical and applied studies; as well as the preparation for sitting for the examinations of second marine engineer certificate of competency.

The following table lists the courses studied during this phase which cover the subjects of only part B examination of this certificate of competency. The academy graduates are exempted from examinations in subjects of part A of this certificate.

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Total No. of Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eletrotechnology &amp; electronics</td>
<td>126</td>
</tr>
<tr>
<td>Naval Architecture</td>
<td>108</td>
</tr>
<tr>
<td>General engineering knowledge</td>
<td>108</td>
</tr>
<tr>
<td>Steam engines</td>
<td>108</td>
</tr>
<tr>
<td>English language</td>
<td>72</td>
</tr>
<tr>
<td>Marine instrumentation &amp; automation</td>
<td>36</td>
</tr>
</tbody>
</table>

4.6.3 B.Eng. Studies, Programme No. 3:

This programme leads to the Bachelor of engineering degree in marine engineering technology, and is offered to the academy graduates who have successfully completed one of the two programmes of basic studies described above who satisfy the following scholastic requirements:

- Having obtained the certificate of engineering studies according to programme 1 or 2.
- Having successfully completed the study of certain preparatory courses (of 10 credits duration).
Having obtained a minimum cumulative grade point average of 2.8. The educational aims of this programme are "to broaden the scientific base and cultivate the professional skills in the learner's personality which will enable him to acquire the technological level of a marine engineer capable of dealing with the technical problems and taking sound decisions in the areas of his job in the field of maritime transport; whether this job is at sea or ashore.

The preparatory courses of the B. Eng. studies are:

<table>
<thead>
<tr>
<th>Course Title</th>
<th>LC</th>
<th>LB</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering mathematics (3)</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Applied Physics</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Applied mechanics</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>6</td>
<td>10</td>
</tr>
</tbody>
</table>

Note:

The department offers the above three courses as optional courses for study during the fifth term of both programmes No.1 and No.2. This gives the cadets willing to pursue their studies up to the B. Eng. level the opportunity to be registered for these courses; taking into consideration their averages.

The B. Eng. programme comprises four complementary semesters of study a minimum duration of two years, and a maximum limit of four years.

The following is the curriculum of studies:
### a - Fourth year - Six semester:

<table>
<thead>
<tr>
<th>Course Title</th>
<th>LC</th>
<th>LB</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering mathematics (4)</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Applied chemistry (2)</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Ship construction &amp; shipyard tech.</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Thermodynamics (2)</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Strength of materials (2)</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Design and theory of machines (2)</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Engineering economics</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>14</td>
<td>21</td>
</tr>
</tbody>
</table>

### b - Fourth year - Seventh semester:

<table>
<thead>
<tr>
<th>Course Title</th>
<th>LC</th>
<th>LB</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering mathematics (5)</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Naval architecture (2)</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Fluid mechanics</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Electronics</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Heat transfer</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Marine systems</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Industrial organization &amp; management</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>12</td>
<td>21</td>
</tr>
</tbody>
</table>

**Note:**

The course of computer programming is offered in summer as well as during the first semester of every academic year. The cadets interested in attending can be registered for this course as convenient to them; taking into consideration that this course is a prerequisite for the course computer methods for engineers offered in the ninth term as an elective.
### c - Fifth year - eighth semester:

<table>
<thead>
<tr>
<th>Course Title</th>
<th>LC</th>
<th>LB</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marine refrigeration and air conditioning</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Turbo machinery</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Protection &amp; distribution of electric circuits</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Internal combustion engines (3)</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Automatic control systems (1)</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Naval architecture and damage control</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Humanities (elective)</td>
<td>2</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course title</th>
<th>LC</th>
<th>LB</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic elective course</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Steam generators (2)</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Automatic control systems (2)</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Marine installations</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Project</td>
<td>2</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Humanities (elective)</td>
<td>2</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Note:</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic elective course :</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical vibrations OR computer methods for engineers.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Certificate of Completion of Marine Engineering Basic Studies:

The academy grants Certificate of Completion of Marine Engineering Basic Studies for those who successfully pass the following phases with a cumulative Grade Point Average of not less than 2.00 in each phase. Students are to follow one of two systems:

(a) System I

Phase 1:

Students must study at the academy for no less than five semesters, during which they must complete 99 credit hours. This phase is on a boarding basis.

Phase 2:

Guided sea training for 4 months on board the academy's training ship. This period is considered equivalent to six months of the set sea-service period, and is assigned 10 credit hours. At the end of this phase, students sit for the third marine engineer certificate of competency.

(b) System II

Phase 1:

Same as Phase I (System 1) as regards duration and courses.

Phase 2:

This phase is divided into two periods:
Period 1:

Guided sea training for 4 months on board the academy's training ship. This period is considered equivalent to 6 months of the set sea service period, and is assigned 10 credit hours.

Period 2:

Sea service on board foreign going vessels for a period of 12 months

Phase 3:

This phase comprises one semester on external residence basis, during which students are prepared to sit for the examination of second marine engineer certificate of competency, with exception of examinations of Part A of this certificate.
SCHEME OF CERTIFICATION OF ENGINEERING DEPT.
4.6.4. Upgrading Studies:

4.6.4.1. Examination Unit:

The academy has been intrusted with the task of conducting examinations for the issuance of certificates of competency to deck and engineer officers, by the Egyptian Government. The certificates issued by Egypt are recognized by all the Arab Countries and some of the African Countries as well. Many candidates from other Arab Countries take their examinations in Egypt.

An independent "EXAMINATION UNIT" has been established for that purpose, the staff of which are independent of the teaching department of the academy, in so far as competency examinations are concerned.

IMO is providing technical assistance to this unit for the purpose of revising the regulations and syllabuses relating to the examination of deck and engineer officers and in introducing the grades and standards of certificates needed to comply with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping of Seafarers, 1978 (STCW - 1978).

The introduction of the new grades and standards of certificates is intended to be a step towards the development of certificates of competency for sea-going officers which will have international validity, and conformity with the general objectives of IMO.

The academy offers competency examinations 4 times in a year as well as 4 make-up examinations. It is anticipated to offer 6 examinations as well as 6 make-up examinations in the near future.
thus helping seafarers to plan their examinations more easily. The accompanying table shows the number of marine officers and engineers who sat for the examination since 1972.

4.6.4.2. Certificates of Competency:

AMTA offers the following certificates of competency according to STCW - 78 for Nautical, Engineering and Radio Officers after the necessary legislation had been issued by the Egyptian Government in June 1983:

* Nautical Department:

- Third mate certificate of competency.
- Second mate certificate of competency.
- First mate certificate of competency.
- Master certificate of competency.

* Engineering Department:

- Third marine engineer certificate of competency

a) Holders of intermediate certificates:

1. Candidate must be more than 20 years old.
2. Candidate must be holder of general certificate of technical education or G.C.E. or an equivalent certificate.
3. Candidate must have served at sea for:
. 36 months as a member of the engine room watch on foreign going vessels, or . 42 months practising technical jobs in ship-yards or marine workshops.

b) Students of maritime institutes (marine engineering) and faculties of engineering:

1. The completion of engineering programme, the duration of which is no less than 3 years, in an accredited institute or in faculty of engineering, provided candidate served six months' training period on foreign going vessels.

- Second marine engineer certificate of competency:

Qualifying examinations are divided into 2 parts:

Part A:

1. Candidate must not be less than 20 years of age.
2. Candidate must be holder of third marine engineer certificate of competency.

Part B:

1. Candidate must be up to the set medical standards.
2. (a) Holders of intermediate certificate:
Candidate must have successfully passed the examinations of part A, second marine engineer certificate of competency.

(b) Students of maritime institute (marine engineering):

Candidate must be a holder of third marine engineer certificate of competency, or must have met the admission requirements for third marine engineer certificate of competency, and has actually succeeded in the oral examination for this certificate.

(c) Graduates of maritime institutes (marine engineering) and holders of B.Sc Degree:

Candidate must have met the admission requirements for third marine engineer certificate of competency.

3. Candidate must have served at sea for:

- 12 months for engineering cadets and holders of B.Sc in engineering or,

- 24 months for holders of intermediate certificates.

It should be noted that 3 months are deducted as for graduates of colleges and institutes of engineering who have satisfactorily attended the upgrading course.

4. Attending the upgrading course for those other than holders of B.Sc Degree.
Qualifying examinations are divided into two parts:

Part A:

Candidate applying for this upgrading course and the qualifying examinations must have obtained second marine engineer certificate of competency.

Part B:

Candidate applying for this course and the qualifying examinations must meet the following requirements:

1. He must be a holder of second marine engineer certificate of competency.
2. He must have successfully passed Part A examinations for chief marine engineer certificate of competency, or must have been granted exemption.
3. He must have served at sea for:
   - 30 months after obtaining second marine engineer certificate.
   or - 27 months after obtaining second marine engineer certificate of competency, for those who attend upgrading course.

NOTE: No certificate of competency shall be issued except after successfully attending the Compulsory Short Courses:
(first aid/ fire fighting/ survival at sea).
<table>
<thead>
<tr>
<th>Academic year</th>
<th>72/73</th>
<th>73/74</th>
<th>74/75</th>
<th>75/76</th>
<th>76/77</th>
<th>77/78</th>
<th>78/79</th>
<th>79/80</th>
<th>80/81</th>
<th>81/82</th>
<th>82/83</th>
<th>83/84</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marine Officers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Master</td>
<td>50</td>
<td>39</td>
<td>52</td>
<td>72</td>
<td>61</td>
<td>60</td>
<td>49</td>
<td>45</td>
<td>59</td>
<td>75</td>
<td>65</td>
<td>78</td>
<td>705</td>
</tr>
<tr>
<td>First Mate</td>
<td>74</td>
<td>62</td>
<td>62</td>
<td>59</td>
<td>76</td>
<td>85</td>
<td>66</td>
<td>124</td>
<td>126</td>
<td>123</td>
<td>111</td>
<td></td>
<td>940</td>
</tr>
<tr>
<td>Second Mate</td>
<td>12</td>
<td>57</td>
<td>90</td>
<td>226</td>
<td>249</td>
<td>238</td>
<td>277</td>
<td>214</td>
<td>296</td>
<td>207</td>
<td>163</td>
<td>188</td>
<td>2217</td>
</tr>
<tr>
<td>TOTAL</td>
<td>136</td>
<td>158</td>
<td>204</td>
<td>360</td>
<td>379</td>
<td>374</td>
<td>411</td>
<td>325</td>
<td>479</td>
<td>408</td>
<td>351</td>
<td>377</td>
<td>3959</td>
</tr>
<tr>
<td>Chief Engineer (B)</td>
<td>-</td>
<td>13</td>
<td>22</td>
<td>29</td>
<td>39</td>
<td>37</td>
<td>68</td>
<td>55</td>
<td>64</td>
<td>55</td>
<td>48</td>
<td>67</td>
<td>497</td>
</tr>
<tr>
<td>Chief Engineer (A)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>12</td>
<td>7</td>
<td>11</td>
<td>8</td>
<td>27</td>
<td>22</td>
<td>18</td>
<td>25</td>
<td>39</td>
<td>169</td>
</tr>
<tr>
<td>Engineers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Engineer (B)</td>
<td>-</td>
<td>18</td>
<td>36</td>
<td>86</td>
<td>91</td>
<td>134</td>
<td>212</td>
<td>223</td>
<td>313</td>
<td>179</td>
<td>242</td>
<td>276</td>
<td>1810</td>
</tr>
<tr>
<td>Engineer (A)</td>
<td>-</td>
<td>-</td>
<td>54</td>
<td>92</td>
<td>102</td>
<td>131</td>
<td>120</td>
<td>85</td>
<td>226</td>
<td>169</td>
<td>151</td>
<td>15</td>
<td>1645</td>
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<tr>
<td>TOTAL</td>
<td>-</td>
<td>31</td>
<td>113</td>
<td>219</td>
<td>239</td>
<td>313</td>
<td>408</td>
<td>389</td>
<td>625</td>
<td>421</td>
<td>366</td>
<td>397</td>
<td>3521</td>
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<tr>
<td>TOTAL</td>
<td>136</td>
<td>189</td>
<td>317</td>
<td>579</td>
<td>618</td>
<td>687</td>
<td>819</td>
<td>714</td>
<td>1104</td>
<td>829</td>
<td>717</td>
<td>774</td>
<td>7480</td>
</tr>
</tbody>
</table>

Number of Marine Officers and Engineers sat for examinations since year 1972
SCHEME OF STUDY OF SEAMEN TRAINING CENTRE
4.6.4.3. Courses of Certificate of Competency Examinations:

The educational aim of these courses is to conduct a general review of the different subjects dealt with in the examination papers to prepare the learners before sitting for the examinations.

- Courses for third marine engineer certificate:

  Basic Science  72 Hrs
  Marine Engineering Knowledge  108 Hrs

- Courses for second marine engineer certificate (Part A):

  Mathematics  108 Hrs
  Applied mechanics  108 Hrs
  Heat & Heat Engines  108 Hrs
  Engineering Drawing  108 Hrs
  English Language  72 Hrs
  Elements of Science and Engineering Knowledge  108 Hrs

- Courses for second marine engineer certificate (Part B):

  Electrotechnology & Electronics  126 Hrs
  Naval Architecture  108 Hrs
  General Engineering Knowledge  108 Hrs
  Internal Combustion Engines  108 Hrs
  Marine Instrumentation & Automation  36 Hrs
### Courses for Marine Chief Engineers Certificate (Part A):

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied Mechanics</td>
<td>108 Hrs</td>
</tr>
<tr>
<td>Heat &amp; Heat Engines</td>
<td>108 Hrs</td>
</tr>
<tr>
<td>English Language</td>
<td>72 Hrs</td>
</tr>
</tbody>
</table>

### Courses for Marine Chief Engineers Certificate (Part B):

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrotechnology &amp; Electronics</td>
<td>126 Hrs</td>
</tr>
<tr>
<td>Naval Architecture</td>
<td>108 Hrs</td>
</tr>
<tr>
<td>General Engineering Knowledge</td>
<td>108 Hrs</td>
</tr>
<tr>
<td>Internal Combustion Engines</td>
<td>108 Hrs</td>
</tr>
<tr>
<td>Marine Instrumentation &amp; Automation</td>
<td>36 Hrs</td>
</tr>
</tbody>
</table>

### Compulsory Short Courses for Marine Engineering Certificates of Competency:

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire Fighting</td>
<td>30 Hrs</td>
</tr>
<tr>
<td>Survival At Sea</td>
<td>30 Hrs</td>
</tr>
<tr>
<td>First Aid</td>
<td>16 Hrs</td>
</tr>
</tbody>
</table>
CHAPTER 5

A Proposal for Sea-Training Program
5.1. Introduction:

First of all, the theoretical subjects which the cadets get in a maritime academy give an incomplete job if not followed by a high level actual sea training programme.

Personally I almost believe in the sea training on board merchant ships after graduation of the cadets from the maritime academy. Most chief and second engineers on board ships do not have the time to follow the cadets through a well-planned sea training program, and also cadets at that age are not interested enough to ask and learn by themselves. So most of the cadets enjoy the trip and the new countries they visit and consequently, they will copy the report at the end of the trip if they were asked to develop one.

Thus, in order to make the cadet get a high level of sea training, this should be undergone on board of a special training ship with a specialised teaching staff for training, i.e. guided sea training.

But the problems which are faced include:

* The capital cost of a training ship.

* The advanced training equipment.

* The best program that must be followed.

I will leave the financial problems and I will face the last problem which deals with the best problem for sea training.
The AMTA has already founded a department for sea training, I will start to focus on that department and its objectives and finally, I shall develop a sea training program for the long-term guided sea training period after completion of the theoretical subjects.

5.2. Sea Training Department:

5.2.1. Objectives:

The department deals with the sea training of the cadets on board ships with the aim of developing their skills and attitudes, so as to enable them to work as marine officers complying with the international standards.

The department is responsible for the planning and execution of sea training courses on board the training ship of the academy. The department is also responsible for the coordination and supervision of the long sea training phase on board merchant marine vessels.

5.2.2. Programmes of Sea Training:

I. Short Sea Training Phase:

Is carried out on board the Academy's training ship "Aida-3" for students in their second semester of Basic Studies and for students of the Seamen's Training centre.
The training programme is carried out during a cruise in the Red Sea of about two weeks' duration, and is offered four times a year.

The main activities of this programme lie in the domains of getting acquainted with the different parts of the ship, firefighting procedures, and safety of life at sea.

II. Guided Sea Training Phase:

Is also carried out on board the Academy’s training ship "Aida-3" for cadets in their second phase of Basic Studies (Deck & Engineering Cadets only).

The training programme extends for a period of four months and includes the fulfillment of certain training assignments under the supervision and guidance of the faculty members participating in this phase.

This programme is offered twice a year, in March and July.

III. Guided Training Programme for Engineering Cadets:

300 Hrs  Training in duties and activities of watchkeeping engineer in the engine room.

50 Hrs   Training in fire-fighting and survival at sea operations.
<table>
<thead>
<tr>
<th>Hrs</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>Study of ship's systems and machinery.</td>
</tr>
<tr>
<td>200</td>
<td>Training in the detection, maintenance, and repair of mechanical equipment.</td>
</tr>
<tr>
<td>100</td>
<td>Training in the detection, maintenance, and repair of electrical equipment.</td>
</tr>
</tbody>
</table>

710 Hrs Total

These programmes are covered during four cruises on board "Aida-3"; one of which includes visits to several ports on the Mediterranean Sea.

The period of guided sea training of four months is considered equivalent to a period of sea-service of six months; when evaluating the periods necessary for sitting for the competency examinations.

IV. Long Sea Training Phase:

Is carried out on board merchant marine vessels as a complementary part to the guided sea training for deck and engineering cadets during their second phase of Basic Studies.

The cadets during this phase, do the training assignments given in the assignment book and send regular reports to the Department about their activities.
After assessing the reports, the department sends the reports and comments back to the cadets for further readjustments of the training procedure.

5.2.3. Activities of Guided Sea Training:

The purpose of guided sea training is to train the cadets intentionally and effectively to cultivate the necessary attributes and ability to be a competent ship's engineer.

The immediate objectives would be set up as follows:

1- To cultivate such attributes of the cadets such as the adaptability, the discipline, the sense of responsibility, the determination, the endurance, the spirit of cooperation and international mindness that are indispensible elements for ship's engineer.

2- To develop the practical knowledge and proficiency of the cadets through sea-going experience which makes integration of their theoretical study and practical training, to a desired standard based on the syllabii for the sea training, which would be set up to meet the requirements for the certification of the watchkeeping engineer.
5.3. Plan for Guided Sea Training:

I will try to put down a complete syllabus for guided sea training after the graduation of the students and before they have a certificate of third engineer, and the suggestion for the time interval for that period is to lie between four to six months. I don't go to detail with the items of the syllabus but I will put down the main idea of the subject.

5.3.1. Ship's Data:

* Main data of the training ship:
  ('length, breadth, draught, displacement, dead weight, speed, type of power plant, number of propellers ... etc )

* Definition of ship's plans and the principle dimensions.

* Main engine data.
  (type of engine, power, cylinder bore/stroke, specific fuel consumption, specific lubricating oil consumption, method of charging, firing order ... etc )

* Main diesel generator data.

* Layout of engine room.

  The students try by himself to make sketches and put the name of each item.
(a) **Pipes**

<table>
<thead>
<tr>
<th>Pipe</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe indicating flow</td>
<td>→</td>
</tr>
<tr>
<td>Crossing pipes, not connected</td>
<td>+</td>
</tr>
<tr>
<td>Crossing pipes, connected</td>
<td>+</td>
</tr>
<tr>
<td>Flexible pipe</td>
<td>✐</td>
</tr>
<tr>
<td>Flanged joint</td>
<td>←</td>
</tr>
<tr>
<td>Expansion joint</td>
<td>←</td>
</tr>
</tbody>
</table>

(b) **Valves**

<table>
<thead>
<tr>
<th>General symbol</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw-down valve</td>
<td>✐</td>
</tr>
<tr>
<td>Non-return valve</td>
<td>✐</td>
</tr>
<tr>
<td>Screw-down non-return valve</td>
<td>✐</td>
</tr>
<tr>
<td>Pressure reducing valve (small triangle-high pressure)</td>
<td>✐</td>
</tr>
<tr>
<td>Safety valve</td>
<td>✐</td>
</tr>
<tr>
<td>Quick closing valve</td>
<td>✐</td>
</tr>
<tr>
<td>Regulating valve</td>
<td>✐</td>
</tr>
<tr>
<td>Butterfly valve</td>
<td>✐</td>
</tr>
<tr>
<td>Double-seated changeover valve</td>
<td>✐</td>
</tr>
<tr>
<td>Gate valve</td>
<td>✐</td>
</tr>
<tr>
<td>Cock (ports in plug marked)</td>
<td>✐</td>
</tr>
<tr>
<td>Cock (with bottom connection)</td>
<td>✐</td>
</tr>
</tbody>
</table>
### (c) Control and Regulation Parts

<table>
<thead>
<tr>
<th>Component</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand-operated</td>
<td><img src="symbol" alt="Hand-operated" /></td>
</tr>
<tr>
<td>Remote control</td>
<td><img src="symbol" alt="Remote control" /></td>
</tr>
<tr>
<td>Spring</td>
<td><img src="symbol" alt="Spring" /></td>
</tr>
<tr>
<td>Weight</td>
<td><img src="symbol" alt="Weight" /></td>
</tr>
<tr>
<td>Float</td>
<td><img src="symbol" alt="Float" /></td>
</tr>
<tr>
<td>Piston</td>
<td><img src="symbol" alt="Piston" /></td>
</tr>
<tr>
<td>Thermostat</td>
<td><img src="symbol" alt="Thermostat" /></td>
</tr>
<tr>
<td>Membrane (diaphragm)</td>
<td><img src="symbol" alt="Membrane" /></td>
</tr>
<tr>
<td>Electric motor</td>
<td><img src="symbol" alt="Electric motor" /></td>
</tr>
<tr>
<td>Electro-magnetic</td>
<td><img src="symbol" alt="Electro-magnetic" /></td>
</tr>
</tbody>
</table>

### (d) Appliances

<table>
<thead>
<tr>
<th>Component</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>General symbol</td>
<td><img src="symbol" alt="General symbol" /></td>
</tr>
<tr>
<td>Suction box</td>
<td><img src="symbol" alt="Suction box" /></td>
</tr>
<tr>
<td>Mudbox</td>
<td><img src="symbol" alt="Mudbox" /></td>
</tr>
<tr>
<td>Filter or strainer</td>
<td><img src="symbol" alt="Filter or strainer" /></td>
</tr>
<tr>
<td>Separator</td>
<td><img src="symbol" alt="Separator" /></td>
</tr>
<tr>
<td>Steam trap</td>
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</tbody>
</table>

### (e) Fittings

<table>
<thead>
<tr>
<th>Fitting</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funnel</td>
<td><img src="symbol" alt="Funnel" /></td>
</tr>
<tr>
<td>Airpipe (or swan neck ventilator)</td>
<td><img src="symbol" alt="Airpipe" /></td>
</tr>
<tr>
<td>Open scupper</td>
<td><img src="symbol" alt="Open scupper" /></td>
</tr>
<tr>
<td>Open scupper with closing device</td>
<td><img src="symbol" alt="Open scupper with closing device" /></td>
</tr>
<tr>
<td>Scupper with water seal</td>
<td><img src="symbol" alt="Scupper with water seal" /></td>
</tr>
<tr>
<td>Bell mouthed pipe end</td>
<td><img src="symbol" alt="Bell mouthed pipe end" /></td>
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</tbody>
</table>

### (f) Indicating and Measuring Instruments

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>General symbol</td>
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<tr>
<td>Slight flow indicator</td>
<td><img src="symbol" alt="Slight flow indicator" /></td>
</tr>
<tr>
<td>Observation glass</td>
<td><img src="symbol" alt="Observation glass" /></td>
</tr>
<tr>
<td>Recorder</td>
<td><img src="symbol" alt="Recorder" /></td>
</tr>
<tr>
<td>Pressure gauge</td>
<td><img src="symbol" alt="Pressure gauge" /></td>
</tr>
<tr>
<td>Thermometer</td>
<td><img src="symbol" alt="Thermometer" /></td>
</tr>
</tbody>
</table>
5.4. PORTS ASSIGNMENTS:

5.4.1. Safety of life at sea:

* Alarm signals:
  - Life boat station signal.
  - Fire alarm signal.
  - Fire alarm engine-room signal.
  - Distress signal.

* Life Safing Equipment:
  - Life boats.
  - Life rafts.
  - Life buoys.
  - Life jackets.

* Fire Fighting Equipment:
  - Fire extinguishers.
  - Fire hoses.
  - Fire hose nozzles.
  - Fire axes and mauls.
  - Breathing apparatus.
  - Immergency generator.
  - Fire detection system.
  - Stationary foam / CO₂ station.
5.4.2. Maintenance and repair of Diesel Engine Equipment:

*NOTE:*

Repair of any machinery must follow the following steps in sequence:

- removal or dismantling.
- Inspection before cleaning.
- Cleaning.
- Inspection after cleaning.
- Measuring.
- Fault detection and remedy.
- Installation or mantling.

The inspector or repairer must carefully observe and discover minute defects that may cause serious engine damage.

5.4.2.1. Cylinder head inspection:

- Visual inspection before cleaning.
  - Combustion side
  - Cooling water side
  - Valves and valve seats
- Visual inspection after cleaning.
  - Pitting
  - Cracks
- Hydraulic test.
5.4.2.2. Injector maintenance:
- Visual inspection.
- Adjusting working pressure.
- Items to be exchanged or repaired.

5.4.2.3. Valves maintenance:
- Exhaust valve.
- Inlet valve.
- Safety valve.
- Air starting valve.

5.4.2.4. Piston maintenance:
- Visual inspection.
- Piston ring inspection.
- Piston measurements.
- Piston pin measurements.

5.4.2.5. Cylinder liner maintenance:
- Visual inspection.
- Cylinder lubricators (queels) and holes.
- Measurements.
- Rubber rings and grooves.

5.4.2.6. Crank shaft maintenance:
- Crank web deflection & clearance of bearings.
5.4.3. Maintenance and repair of

Auxiliary machinery:

5.4.3.1. Pumps:

- Types:
  - Centrifugal pump.
  - Reciprocating pump.
  - Gear pump.
  - Rotary pump.
  - Helical pump.

- Requirements:
  - Description of pump.
  - Sections drawing.
  - Operation & running.
  - Routine maintenance of pump
    * Dismantling.
    * Parts inspection.
    * Clearances.
    * Assembly.
    * Testing, Sealing, Pressure....etc.
  - Troubles (causes, where to look and remedy)

5.4.3.2. Coolers:

Types:
- Fresh water cooler.
- Lubricating oil cooler.
- Air cooler.
Requirements:

. Description and drawing of cooler.
. Methods of protection against corrosion.
. Flow inside the cooler
. Maintenance:
  * Dismantling.
  * Inspection.
  * Repairing of tubes.
  * Assembly.
  * Test of cooler.

5.4.3.3. Purification, Filtration, and Clarification:

- Gravitation method:
  . Sketch settling tank.
  . Automatic control for filling.
  . Drain of settling tank.

- Filtration method:
  . Types of filters.
  . Maintenance.
    * Dismantling.
    * Cleaning parts.
    * Assembly.
    * Eject air and check sealing.
    * Check pressure before and after filter.

- Centrifugal method:
  . De-Laval and Alfa-Laval purifier.
  . Function and theory of purifier.
  . Sketch purifier showing its important parts.
5.4.3.4. Shafting, Bearing & Stern Tube:

- Bearings:
  - Line diagram for shafting from engine to propeller.
  - Types, lubrication, cooling and temperature.
  - Repair method of journal bearings.

- Stern tube:
  - Types of stern tube.
  - Method of sealing.
  - How to check clearances.
  - Cooling or lubrication of stern tube.
  - Replacement and repairing of stern tube bushes.

- Thrust block:
  - Visual inspection for:
    * Journal bearing.
    * Collars.
    * Pads:
  - Measurements:
    * Axial clearance when shaft is hard forward.
    * Axial clearance when shaft is hard aft.
    * Using bridge gauge.
5.4.4. Maintenance and repair of Deck equipment:

5.4.4.1. Anchor:

- Raising and lowering the anchors.
- Repair - troubles.

5.4.4.2. Windlass:

- Main parts, operation.
- Repair, troubles.

5.4.4.3. Capstans:

- Main parts, operation.
- Repair, troubles.

5.4.4.4. Mooring winches:

- Main parts, operation.
- Repair, troubles.

5.4.4.5. Cargo winches:

- Main parts, operation.
- Repair, troubles.
5.4.5. Electrical equipment:

- Distributer.

- Switch board.

- Generators:
  . Types.
  . Method of excitation.
  . Method of protection.
  . Routine of maintenance.
  . Parallel operation of generator.

- Motors:
  . Different kinds of motors for different pumps, air compressors, steering gear, deck equipment and ventilators.
  . Power, voltage and current for each one.

- Emergency source of electrical power.

- Storage batteries:
  . Routine maintenance.
5.4.6. Ship construction:

- Description and inspection for:
  . Bulwark
  . Hatch coaming.
  . Deck opening.
  . Mast foundation.
  . Windlass foundation.
  . Hatch covers.
  . Water tight doors.
  . Ventilation system.

5.4.7. Instrumentation & control:

- Types of measuring instruments:
  . Pressure, temperature, level, flow,
    speed, r.p.m., humidity, viscosity....etc.

- Technical specifications of controllers:
  . Input signal.
  . Output signal.
  . Set value.

- Control loop and block diagram:
  . For automated system on board ship.

- Pressure regulator:
  . Pneumatic system
. Lubricating oil system.

- Control system for auxiliary boiler:
  . Level control.
  . Combustion control.

- Main elements of remote control of main engine.

- Maintenance programme for control equipment.

- Control loop of refrigerating system.
5.5. Sea Assignment:

5.5.1. Main engine watchkeeping.

5.5.1.1. Air starting system:

- Master valve
- Pilot valve
- Distributer
- Starting valve
- Air receiver
- Sketch for starting air system

5.5.1.2. Cooling water system:

- Fresh water reading during watch.
- Sea water cooling readings.
- Air cooler water temperatures.
- Sketch for the cooling system.
- Troubles of the system.
- The location of fresh water tanks.
5.5.1.3. Air Scavenging system:

- Turbo charger theory
- Air cooler construction
- Adjusting temperature of air after cooler
- Scavenging belt fires safety equipment

5.5.1.4. Lubricating oil system:

- Draw the system showing the important parts
- Types of pumps and filters
- Lubricating oil pressure and temperature
- Function of lubricating oil purifiers
- Lubricating oil tanks and their capacities
- Troubles of the system and the suitable actions.
5.5.1.5. Fuel oil system:

- Heavy oil and diesel oil
- Sketch fuel system showing the following:
  . Bunker tank
  . Transfer pumps
  . Settling tank
  . Purifier
  . Daily service tank
  . Boster pump
  . Injection system
- Heating system of heavy oil
- Taking bunker on board ship
- Sounding table
- Pressure before and after filter
- Troubles of system

5.5.1.6. Sea water system:

The student must follow the system and make sketch to show the following:

- Sea water strainer
- Pumps of the system
- The direction of flow in each pipeline
- Readings of pressure and temperature
- Automatic control through the system

Also the student must know every thing about the troubles of the system and remedies to overcome them.

5.5.1.7. Bilge system:

- Make a belge line diagram showing the position of all valves and pumps.
- Describe the special arrangements which must be used in pumping bilges to avoid pollution of sea at ports.
- Describe the methods of location and measuring level of bilge.
- The troubles appearing during the suction of the bilge.

5.5.1.8. Lubricating oil system:

- Explanation of the function of lubrication and different kinds of lubricating oils.
- The different parts of lubricating oil system: tanks, pumps, filters, purifiers... etc.
- The routine maintenance of each part of the circuit.
- Normal pressure and temperature through the system.
- Preparation of the system before starting engine.
- The precautions that must be taken during operation.
- Data from lubricating oil test analysis.
- Troubles of the system during operation.

5.5.1.9. Ballast system:

- Sketch the ballast line circuit diagram.
- Study the ship's arrangement of tanks.
- Precautions that must be taken when entering the tanks.
- Different pumps which may be connected to the system.

5.5.1.10. Miselience items:

- Exhaust gas system.
- Reversing system.
- Engine preparation for:
  - * Starting
  - * Stopping
- Gear box
- Power calculation
5.5.2. Stearing gear :

- The function of stearing gear.

- Different types of stearing gears.

- Hydraulic stearing gear :
  
  . General arrangements
  . Telemotor system
  . Hydraulic receiver
  . Charging system
  . Air in telemotor system

- Emergency operation in the event of total failure of telemotor or power units.

- Power units :
  
  . The function of power unit
  . Hydraulic power unit
  . Operation

- The hele-show pump and its function

- Electro-hydraulic rotary van stearing gear

- Types of tests for stearing gear

- Different troubles of the system
5.5.3. Refrigerating system:

- Explanation of thermodynamic cycle of refrigeration.
- Description with the aid of line diagram of the refrigerating system indicating the main components.
- The properties of different kinds of refrigerants.
- The main function of:
  . Condenser, compressor, evaporator, expansion valve, drier, oil separator and solenoid.
- Detection of the leakage in the system and how to charge it.
- The function of low pressure cut out and high pressure cut out.
- Routine maintenance of the system.
- Troubles, causes, remedy of the system.
5.5.4. Troubles of Main Engine:

If trouble does occur in service, despite conscientious maintenance of the engine, it is important to trace the cause without delay and to rectify the faulty condition. Troubles of more severe nature should be left to our experts to put right.

The following troubles must be discussed showing the possible cause and the remedy:

- Engine fails to start.
- Inefficient combustion
- Engine knocking
- Smoky exhaust
- Supercharging air pressure too low
- Supercharging air temperature too high
- Engine tends to race
- Oil pressure drops
- Water in lubricating oil
- Cooling water in closed-circuit system overheats
- Steam in exhaust valve.

5.5.5. Evaluation of the students.
CONCLUSIONS
CONCLUSIONS

This study has illustrated the close relationships between three factors of maritime activities: education, fleet and ports. On the other hand, it highlighted the various branches of maritime activities in Egypt and reviewed the efforts directed towards the achievement of the optimum performance level.

The following conclusions have been drawn:

1- One of the main targets of the maritime sector in Egypt is to develop its activities by adopting international technology to comply with the worldwide scientific achievements in this field, enabling it to fulfil its role in the promotion and growth of the foreign trade.

2- The growing demand for developed maritime education in Egypt arises as a consequence of the expected growth of the Egyptian fleet as well as the enlargement and extension of existing ports and establishment of new ones:

* The capacity of public sector of the Egyptian fleet will be increased by 128,000 tons approaching 438,000 tons by the end of 1990.

* The capacity of the private sector of the Egyptian fleet in addition to the setting of new shipping companies is expected to approach 742,000 tons by the end of 1990.

* Consequently, the Egyptian's fleet capacity which was
565,000 tons in 1981 is expected to approach 1,180,000 tons by the end of 1990, which means an increase of almost 100%.

* Capacities of existing ports are being planned to increase by:
  - Alexandria: 2,000,000 tons
  - Port Said: 1,200,000 tons
  - Adabeya: 1,500,000 tons
  - Safaga: 1,000,000 tons

* Establishment of new ports:
  - Dekhilla with a capacity of 45,000,000 tons
  - Dammietta with 12 quays
  - Marsa-Matrouh

3- The education system in Egypt is complying with the recommendations of the international convention (STCW 73) and is suiting the requirements of the national fleet.

4- The present policy that permits gaining both the BS.c. Degree at a time with the Certificate of Competency secures a high level of qualified engineers in addition to assuring an administrative future in shipping companies after retirement.

5- Holding conferences and seminars by corporation of AMTA, shipping companies and specialists in maritime field enable continuous modification of the education system to comply with the requirements of the national fleet.
6- The establishment of the port labour's training centre serves offering a suitably trained manpower to comply with the continuous development of loading and unloading.

7- The establishment of the maritime research and consultation centre provides concrete scientific basis for planning, management and problems facing in the maritime sector.

8- The most important problems encountered in establishing a maritime academy can be summarised as follows:

* Organisation and legislation.

* The teaching staff.

* Facing the everdeveloping technology.

9- Teaching and examining separated systems in Egypt which comply with those in UK and USA are under separate authorities and government departments. This system enables maintaining the recommended standards.

10- Guided sea training, under control of the education institute on board of a special training ship is proved to befar better than formal sea training on board merchant ships. Nevertheless, guided sea training faces three major problems:

* Investment required for preparation of training ship owned by the education institute.

* Lack of professional teaching staff.

* Lack of suitable subjects.
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