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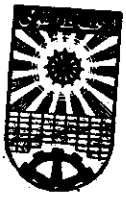
of National Planning



Planning and Development Cases
In Egypt
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A STUDY ON DEVELOPMENT OF THE EGYPTIAN NATIONAL FLEET

July 1980

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FOREWORD

The Institute of National Planning, continuing its main objective of handling scientifically and contemporary national development problems, has managed since December 1977 to publish socio-economic researchs within a series entitled "Planning and Development Cases in Egypt". Fourteen researchs of this series have been issued till now tackling a varied latitude of problems in that field. I would like to introduce here this study on the Development of the Egyptian National Commercial Fleet.

Since the late sixties, the problems of the maritime transportation sector in general, and the National Fleet in particular have been focussed on, therefore, they need considerable attention for many reasons. This sector has a direct impact on the cost of transporting the Egyptian foreign trade and consequently affects our balance of payment. In spite of the great efforts taken in the last decade to overcome the difficulties that confronted the national fleet, we find that the contribution of the national-flag ships in transporting foreign trade are still at exceedingly low levels. This indicator needs reassessment of the whole condition and its underlying factors.

Before beginning to prepare this study, it was clear that the problem to be coped with is not an easy one. The interdependencies and interrelationships among the managerial as well

as the planning aspects of the problems make it far reaching solution. Therefore, it was decided that this study should handle and limit itself to the planning aspects only. It was also decided that it should deal with the problems on a wide scope and on the national level, trying to connect all related activities such as the domestic shipbuilding capabilities, the national cargo brokering agencies, foreign trade forecasts...etc., into one entity liable for systematic analysis and treatment. To attain this objective a mathematical model is built with fundamental goal of formulating the main features at a medium range plan for the sector till 1985.

I hope that this study will stimulate discussion about the problems dealt with and the analytical framework devised for its solution, so that we can help our maritime transportation sector in paving its road towards overcoming all problems. We also hope to make use of these discussions in strengthening our planning tools.

I would like to refer to the Ministry of Planning who collaborated with the Institute in undertaking this study, specifically I mention Mr. Ismail Kamel, the undersecretary of state for transportation and communication planning, and his staff members who helped much in availing the data required for the study.

Finally I would like to thank the core team of INP who conducted this study, Dr. Ahmed Farahat, senior expert for transportation, Dr. Tharwat Mohamed Ali, expert of cost accounting and Dr. Yehia Abdel Rahman, expert of transportation.

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CHAPTER 1

Introduction

CHAPTER ONE

1.1. General

Foreign trade is one of the main items contributing to generating economic growth. Since trade depends basically on the provision of transport means at a reasonable price, it follows directly that shipping is considered an important factor in the development process.

However, examination of the international shipping and trade movement statistics reveals an adverse and low participation of the developing countries in the martime transport of trade generated by these countries particularly in the bulk sector. This fact has led the United Nations Conference on Trade and Development (UNCTAD) in its recent meeting in Manilla in May 1979 to highlight this fact and urge developing countries to expand their national merchant marines. This issue is regarded a principal step in order to implement the program of Action on the Establishment of a New International Economic Order which states that "all efforts should be made to promote an increasing and equitable participation of developing countries in the world shipping tonnage".

The local aspects of the problem in Egypt are equally worst. The percentages of both freight and tonnage carried by the national vessels are considerably low (less than 10%) and 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 the bulk and grain carriers.

There are many advantages in establishing a national merchant fleet. Beside the main advantage of reducing the economic cost of foreign trade transport and improving the balance of payment, national fleets will reduce the economic dependence of the country, promote its exports, prevent disruption if its shipping services during hostilities and enable it to influence liner conferences decisions. Shipping contributes to economic development in another way as an industry through labour employment and income generation.

Therefore, in view of the international and domestic aspects of the problem and the potential benefits of expanding the national fleet tonnages, several pressures have been placed on national agencies in charge of investment decisions to allocate adequate resources for fleet development purposes.

Due to the high capital intensive nature of such decisions and the complexities and inter-relationships among the various agencies of the maritime transportation sector involved in this problem, the need do arise on the central level for an analytical framework to rationalize such decisions.

1.2. Study Objectives

Within the framework of the main problem encountering the maritime transportation sector in Egypt as stated earlier, the objectives of this study could be outlined as follows:

1. To draw up some sort of a master plan by which the various economic activities related to maritime transportation such as; the national fleet operations, the national brokering agencies (MARTRANS); 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 will direct the efforts for investment programs and will constitute an integrated basis for detailed feasibility studies of the particular opportunities.

In course of achieving the above objectives, due consideration should be given to search for appropriate answers for the following questions:

- What are the expectations of the structure of the Egyptian foreign trade during the next decade and their geographical distribution among the various navigational lines ?
- What would be the optimum size of the national fleet against these trade forecasts ?
- What would be the optimum composition of the national vessels regarding their type and size ?
- What would be the appropriate scale of operation of the national fleet units ? Would the present lines be satisfactory

should the fleet management adopt an expansion policy for the scale of operation or vice versa ? and what would be the main features of such a policy ?

- How would be the allocation of the currently available as well as the prospective additions of the fleet tonnages on the various navigational lines ?
- What would be the excessive trade size that have to be secured by foreign vessels ? What would be the specifications of such vessels (liners, tramps, ... etc) ?
  these latter quantities could serve as plan targets for the coordinated operations of the national brokering agencies?
- How could the building capacities of the national shipyards be mobilized and coordinated such as they might contribute in an efficient way to increasing the deadweight tonnages of the national fleet ?
- What would be the numbers, types, and sizes of the new ships from nondomestic sources such as the foreign shipyards and markets ?
- What would be the size of the investments necessary to undertake the required development program and its distribution among local and foreign exchange ?
- How can the private sector contribute to the overall national objectives ?
- Eventually, what would be the capacity of the Egyptian ports to handle the expected trade sizes ?

1.3 The Approach Adopted

In several occasions the problem of national fleet development is tackled from a narrow perspective that isolates the national fleet from its related objectives. The end goal is usually not just new tonnage additions to the national vessels but an increased fulfilment of the objectives towards which fleet operations are directed.

These operations might be oriented towards the international cross trade business between the respective foreign countries or it might be solely oriented towards securing transportation means for the domestic foreign trade. For a developing country like Egypt it is hard to conceive that its national fleet will be directed to cross trade operations among the foreign countries. Rather it will be engaged in domestic trade operations serving the Egyptian foreign trade, both imports and exports in the first place.

There are certain quantitative differences between cross trade operations and domestic trade operations. The former is performed in a free market and thus usually is highly competitive and made on a vayage charter basis. The latter is normally performed as a liner service Charter rates fluctuate widely. Liner rates are more stable, while their load factors vary widely. Therefore, the decision of entering a cross trade or a national liner trade will depend on the respective calculations of the country concerned.

Egypt is not a martime country in the first place, nor is this one of its goals in the foreseeable future. With just 4% current level of its fleet contribution to its foreign trade, it would be more logic to direct the efforts towards increasing this percentage before taking any decision of entering cross trade operations.

Therefore, it is firmly believed that the issue of national fleet development should be treated within a more generalized approach of minimizing the economic costs of securing transportation means for the Egyptian foreign trade whether on national or foreign ships.

1.4 Stages and Phasing of the study

The study has been designed to include the following stages:

Stage 1: System Analysis

Stage 2: Formulations and Model Building

Stage 3: Computer Analyses

Stage 4: Discussion of Results

Stage 1 constituted the basic foundation of the study. In order to obtain as much as possible reliable results, due consideration was given to have this stage as sound as possible. This stage was conducted in 4 major lines of parallel phasing:

Line 1:

This is oriented towards foreign trade analysis and contained the following steps:

(a) An analysis for the structural pattern of the Egyptian foreign trade, both imports and exports in order to find out the commodity items that constitute the bulk of these trades, their relative importance, and their geographical distribution in the world.

(b) Deciding upon an appropriate commodity classification in certain groupings compatible with the cargo handling methodologies in the maritime industry.

(c) Forecasts of the future trades, both imports and exports, on the commodity and for the commodity grouping levels at the agreed upon time horizons.

(d) Distribution and breakdown of the future trade on the currently available as well as the proposed navigational routes of possible operation of the national fleet.

Line 2:

Is a survey as well as a critical evaluation of the current status of the maritime commercial fleet together with the problems encountering its operations. This includes the following steps:

(a) An analysis of the currently available navigation companies of the public as well as the private sector that included; fleet size and composition, operational routes, proposed new routes, contractual additions to the fleet tonnages and their specifications, available or prospected sources of finance, delay analysis of the existing fleet units.

(b) An analysis of each navigational route (or line) showing its conference, average sea, ports, & voyage days, name of ports along this line, the interport distances in nautical miles, the countries that are connected with Egypt either directly or indirectly, (for instance land-blocked countries) via these ports, average port delays, fees, and stevedoring costs per ton.

(c) An analysis of each vessel showing its type, DWT, fuel type and consumption, average & maximum speed, route of operation, fixed and variable cost elements.

Line 3:

Is an investigation of the possible sources of new additions to the national fleet tonnages. This includes domestic shipyards foreign yards and the foreign market. Analysis of the domestic shipyards included the type & sizes of vessels that could be built in such yards, their building time, setting time, building costs in both local and foreign exchange in addition to the maximum building capacity of the yard, its contractual obligations in the near future ... etc. Analysis of the foreign markets and yards was limited to the time and cost aspects.

Line 4:

Is an analysis of the cost and freight rate structures the starting point was financial analyses of the ships revenues and expenditures on the different routes in both local and foreign exchange. Consequently economic costs have been derived through shadow pricing and adjustments of some cost components. Likewise, tariff rates were analysed for each commodity route combination. The end result was to produce a two-dimensional matrix. The first dimension represents the navigational routes while the second represented transportation means. These latter means might be national or foreign vessels with their possible variations. The matrix elements are the average economic costs of transporting one ton of the commodity concerned on the respective route by the respective mean of transport.

Stage 2 was a formulation of a mathematical optimization model that was attempted to provide a valid representation of the model under investigation and its practical implication. Several variants of the model were tried-out.

Stage 3 was the stage of data preparation from stage 1 according to the format of the computer package used, model running, and obtaining of the main results.

Stage 4 was a stage of discussion of results, derivation of conclusions, recommendations and report editing.

Figure (1.1) is a schematic representation of the layout of the research stages and phasing.

1.5 Sources and plan of Data Aquisition

Two main sources of data have been relied upon in this study namely;

(a) Data forms that are particularly designed for the purpose of this study which are sent in an official channel to the respective agencies through the transport & communication department of the Ministry of Planning, a partner in conducting this study with INP in its capacity as a governmental central planning agency.

(b) Several related consultants reports such as Fredric Harris, Black & Veatch and Egypt National Transport study (ENTS), Phase I which was concluded in 1977 by a foreign consultant* and

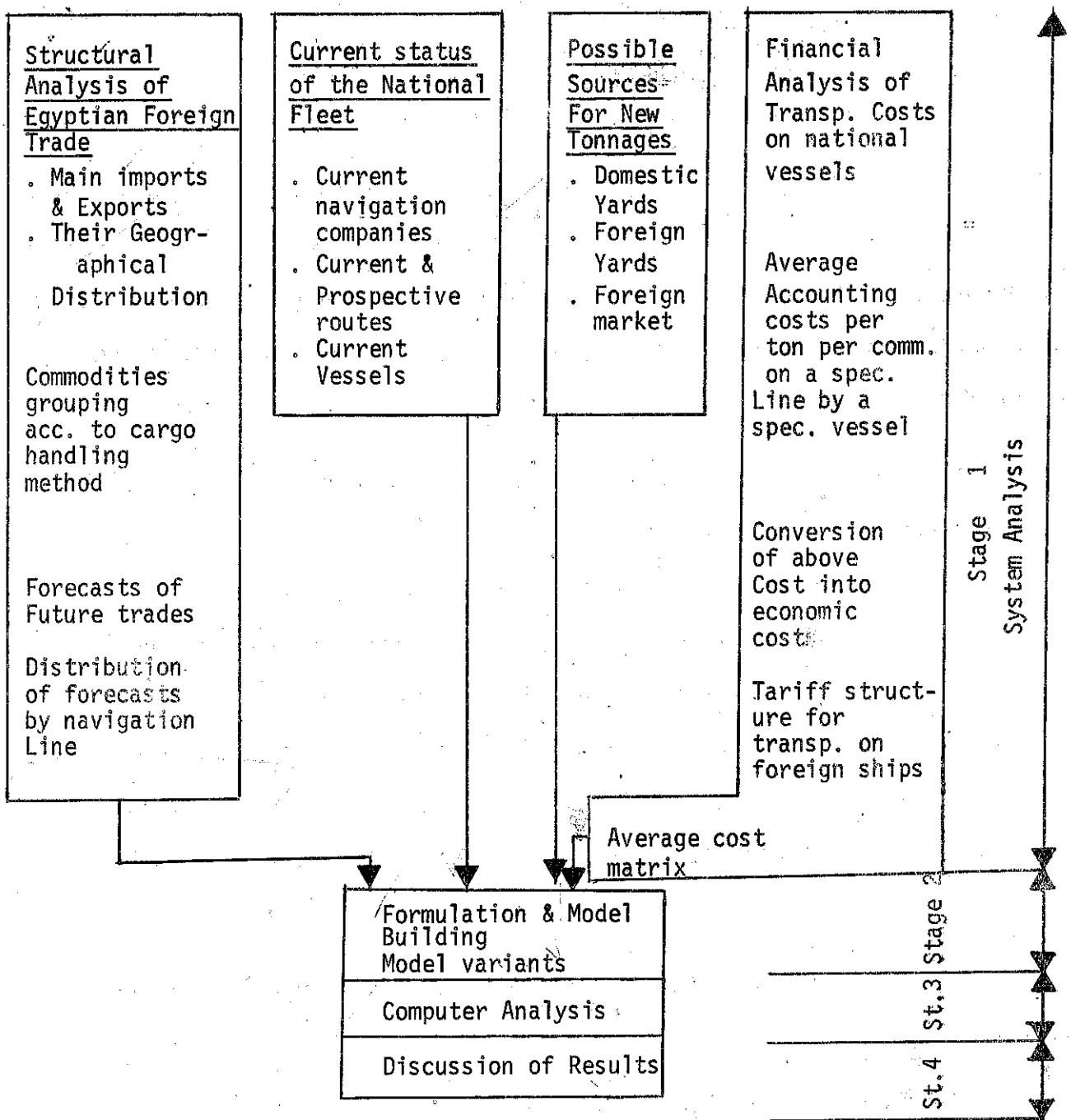

Fig (1.1): Schematic Representation of Layout of Research stages & Phasing.

financed by part of the World Bank second loan to the Egyptian Railways and,

(c) Interviews & visits to the officials in the related agencies.

The resort to (ENTS) has several reasons. Chief among these is that ENTS so far constitutes an official document or data base of the transport sector that has to be referred to be the parties concerned with transportation planning to ensure consistency in their endeavours and conclusions.

The first source of data aquisition namely; data forms was used for the following reasons:

1. To update any official data published.
2. To obtain detailed information or data that is not available in the available consultants reports.
3. To obtain official, first hand, documented information from the agencies directly involved to be referred to at the end of this study upon discussing the final results with the parties concerned.

The forms used are shown in Appendix (A) "Data collection Forms". They are:

Form 01: Navigational Line Data.

Form 02: Fleet composition of a Maritime Company.

Form 03: Ship's Data

Form 04: Questionnaire to a Maritime company.

Form 05: Data of a shipbuilding Yard

Form 06: Ship's Revenue and Expenditure statement.

1.6 Organization of This Study Report:

After this introduction, chapters 2 & 3 are devoted to the theoretical background of the subject. Since the maritime transport business has its own characteristics and terminology, chapter 2 is devoted to elucidate these aspects through a quick review of the alternative ways of securing foreign trade transport with special emphasis on the trends and characteristics of the liner, charter and bulk markets. Chapter 3 emphasizes the economic merits of establishing national fleets to the national development and elaborates on the international dimensions of the issue. Chapter 4 is a transition to the Egyptian situation where a review of the present status of the national fleet and its contemporary problems are highlighted. Chapter 5 is an outlook of the future demand on transporting the Egyptian foreign trade in an attempt to delineate the size of the problem under investigation. Chapters 6 & 7 are the highpoint of this study where a mathematical analytical framework is devised and applied to the encountered problem from a macro and national perspective. Eventually, chapter 8 is a review of the main results and recommendations yielded by the previously devised treatment.

CHAPTER 2

Maritime Transport
A Background Review

CHAPTER TWO

2.1 - INTRODUCTION

The maritime transport industry is characterized by its own structural organizational. It is sometimes felt that the main features of such organization are not familiar to those countries interested in practising their command over their seaborne trade. This fact is attributed to the lack of information due to the confidential aspect of the maritime conference operations. This fact continued till the United Nations Conference of Trade and Development revealed recently much of the inherent mechanisms of such industry. Maritime transport might even have its own terminology. Therefore, this chapter has been introduced to provide background information and illucidate issues that are considered essential throught this report. It is divided into two sections. The first deals with a review of the alternative ways of securing foreign trade transport while the second gives a quick overview of the recent development and future trends in shipping.

2.2. - ALTERNATIVE WAYS OF SECURING FOREIGN TRADE TRANSPORT

Upon considering the ways by which foreign trade transport may be secured, a country is normally encountered with two major methods; either through national or foreign vessels. In both cases it is bound to deal with the three major schemes in which the maritime transport industry is organized namely; the liner service operations, the charter

market, and the shipping contract. These schemes will be the major concern of this chapter. The issue of establishing national fleets will be discussed in more details in chapter 3.

On the other hand liner service might be outside or through liner conferences. These are institutional framework incorporating the liner operators of a given line or navigation range to eliminate or minimize competition among them and agree upon the line Freight rate in a quasi monopolistic way that has some advantages in providing stable rates over a predetermined future period.

The Charter market is organized in several forms that include the pure tramp, the dry-bulk, and the liquid-bulk or tanker markets. The charter relates basically to the vessel on the contrary of the shipping contract that relates to the cargo irrespective of the carrier vessel. Chartering is made either on a voyage or on a time basis.

While the charter is related basically to the vessel, the shipping contract on the contrary is related to the cargo to be transported irrespective of the vessel used in the transport. The following sections will elaborate on the previous features.

2.2.1 - The Liner Conference Operations

2.2.1.1 - General

Liner shipping for developing countries is of major importance for the carriage of the greatest part of their import and/or export commodities rather than bulk commodities which are normally transported in the tramp or bulk modes.

The majority of the liner services are provided within the framework of liner conferences. These are non-corporate institutions entered into by the liner operators who cover a particular trade. There are some 300 conferences in the world each covering a single trade. Sometimes a conference might cover only the inward or the outward leg of the trade. The conference is not responsible, in general, to provide shipping services. The main objective of the conference is to eliminate competition among the liner owners by agreeing upon a common tariff structure.

2.2.1.2 - Types of Conferences

Conferences may be classified into three broad groups:

1. Open conferences: they operate mainly in the trade from and to the U.S. of America. Joining such conferences is opened to any shipowner. There is a degree of competition within such conferences since there can be no strict allocation of cargo lifting rights. This might lead to some bad results such as overtonnaging of cargo then the reduction of lead factors and hence the increase of the freight rates.
2. Closed conferences: In these conferences there is some system of allocating sailings or loading rights. New entrant to such conferences should get the approval of all members. One important factor in accepting new entrants is the balance between trade sizes and the vessel tonnages offered.

2.2.1.3 - Advantages vs. Disadvantages

The advantages of liner conferences might be summarized in the following items:

1. For shippers, certain discounts are given if they promise to confine all their shipments to conference member liners, such discounts are in the order of (5 to 15 %) and are given according to two systems:

   (a) The "dual - rate system":
   in this system conference discounts are given at once according to a contractual agreement.

   (b) The "deferred rebate system":
   in this system conference discounts are given for a certain period of loyalty at the conclusion of a second such period

2. Relatively stable freight rates along a certain route.

3. Adequate frequency of sailings at predeclared timetable (with ships full or not) and an adequate coverage of ports.
   N.B.: Existing conference rates are typically no more than 3-10% of the f,o,b prices. The same conference rates are applied to all shipments of a certain commodity regardless of the shipper or shipment size.

4. Due to the stable freight rates and frequency of service, shippers can reduce their storage costs.

5. Coordination in the spacing of sailings and sharing of parts to reduce duplication of sailing and competition for congested berths.

6. Sometimes also, revenues of a certain route are pooled among conference members after reduction of operating expenses.

7. Certain trades require specialized characteristics that shipowners alone may be reluctant to provide due to its risks without the support of the conference.

On the disadvantages side is the monopolistic nature in fixing freight rates and the nonpublication of such rates. This is not exactly an anticompetitive tool rather than a coordinating one.

Eliminating competition is not always a favourite phenomenon in the long run. For instance, due to the fact that conferences might impose certain restrictions on liners on the right of cargo lifting, shipowners might move gradually to faster ships in order to be able to lift the most attractive cargoes having higher freight rates. Eventually when all conference shipowners move to faster ships, their costs will increase and accordingly their tariff rates. Therefore, the main line of attacking conferences is that their existence leads to excessive costs rather than excessive profits. This fact is supported by the insensitivity of demand to cost increases due to the loyalty ties of shippers; a situation which enables conferences to pass on any increase in their tariff rates.

2.2.1.4 - Cost Structure

Once a shipowner has committed his ship to take a particular conference sailing, his only variable costs are the costs of handling cargo into, out of, and within the ship. This constitutes roughly 25%

of the total costs. The other 75% are fixed costs for each voyage. These other cost items are mainly capital charges, including depreciation, wages and stored, fuel and repairs and maintenance. When the liner operator decides to make a voyage only the capital charges and some maintenance charges are fixed; the other items are variable since they can be avoided by not making the voyage. Capital costs vary from vessel to vessel and depend on several factors such as age, propelling, ... etc. Therefore the cost items are as follows;

Cargo handling costs

Capital costs

voyage costs

Another way of classifying costs in liner shipping is to divide them between sea haul and port time costs. In short sea trades, port time costs are a big proportion of total costs. This means that attempts to reduce the cost of sea transport will be more successful if they concentrate on port time than on reducing sea time. This explains why unitization of cargo first took place in short sea services.

2.2.1.5 - Tariff Structure

Conferences adopt a highly complex structure of freight rates. There may be several hundred different rates for the same route. Commodities being carried are differentiated to the maximum extent possible to enable slightly higher rates to be charged. The rates could be either to enable conferences to maximize their profits or their carryings. Each cargo item is charged roughly" What the traffic will bear" according to the value of the cargo.

Liner rates include the costs of cargo handling which are more or less independent of the value of the cargo.

Tariff rates are mostly based on weight/ measurement (volume) basis, i.e. freight rates are applicable per unit weight or unit volume, whichever yields greater revenue. The most frequent tariff subdivision of commodities are according to:

(a) The unit value of goods

i.e. applying the rule "What the traffic will bear", for example

commodity A, not exceeding $ 5 per ton ——— rate class 3

" " " " $ 10 " " ——— " " 2

" " " " $ 15 " " ——— " " 1

(b) The physical characteristics of the goods, for example

commodity Y, not exceeding 80 cu-ft per 20 ton gross weight

——— rate class 3

commodity Y, not exceeding 90 cu-ft per 20 ton gross weight

——— rate class 2

commodity Y, not exceeding 100 cu-ft per 20 ton gross weight

——— rate class 1

One disadvantageous aspect of conference pricing is their device of averaging their freight rates. So far as a port authority is concerned, the effect of averaging means that every benefit gained by organizational improvements or by investment in the port are spread over all the other ports in the range. Congestion surcharges are imposed only

when some ports become much worse than expected to be. However there is no clearly defined level for the limit beyond which a port is regarded as congested.

2.2.2 - THE CHARTER MARKET

2.2.2.1 - Alternative Forms

The charter market trades include several forms, chief among these are the tramp, the bulk carriers (dry or liquid), and the specialized trades. The market, on the contrary to the conference liner, is characterized with a greater deal of competition and that there is no institutional framework for it. On the other hand, in the charter market, chartering might be on a vayage basis (single or consecutive) or on a time basis that might extend to several years.

The charter market is not a single homogeneous one but rather a series of inter-looking markets. For instance, it would seem that the dry cargo (bulk) and the tanker market are separate, but they are not. Tankers could be cleaned to enter grain trades. For example, combined carriers are designed precisely to switch between markets as commercial opportunities arise. In the long-term time charter markets freight rates tend to be very close to the long run average cost of the vessels, including a profit for the owners. In the voyage charter market freight rates are determined entirely by the day-to-day supply and demand situation for tonnage.

2.2.2.2 - The Pure Tramp Market

Tramp ships are owned by shipowners per se. The vessels are unspecialized and can carry a wide variety of goods. The tendency is that tramp ships be a tween deck vessel able to carry liner-type cargo. The tramp shipowners might let their ships to liner operators on a charter basis. The tramp chartering agreement may be based on the carriage of two or more types of cargoes to fill their space, rather than on the traditional pattern of one full homogeneous cargo.

Competition in the tramp market is somewhat real since there are many owners and many charterers. Long term arrangements rarely last for more than two years.

The major part of the world tramp ships are diesel engined and therefore there are only slight variations in their fuel costs. One item that is highly variable is the cost of repairs.

Oil ores, grains, coal & coke, metals & scrap, sugar, fertilizers, timber, cement, phosphate, salt, etc. whenever available are usually more economic to be transported in full shipload bulk carriers. Two main possibilities of such carriers:

a- The relatively small vessels between 10,000 & 17,000 DWT. These are usually more versatile and referred to as "handy tramps".

b- The single deck bulk carrier that may reach 80,000 DWT. These may be either specialized for one type of cargo or general for 2 or more cargoes e.g. (oil/ore - ore/grain).

2.2.2.3. Dry-Bulk Carriers

The dry cargo bulk carriers are very often owned by independent shipping enterprises and are let on time charter rather than a voyage charter basis. A significant proportion of the vessels are owned by industrial companies. Time charters beyond seven years are somewhat rare. Throught their ownership of the cargo being carried and the tonnage used in the market, the industrial companies exercise a considerable control over this market.

2.2.2.4 - The Liquid Bulk (Tanker) Market

This is a more established and settled market. The major customers are the international oil companies. Ships are either owned by such companies (around two fifth of total supply) or by independent owners.

In the liquid bulk as well as the dry bulk trade, up to 90% of the traffic is handled by ships under the control of the enterprises which own the goods being carried. The residual 19% is only available in the market. The no. of charterers is relatively small, therefore, the conditions for competition are partly absent. One consequence of this situation is that variations in freight rates in this small market are enormous. A 2% increase in the general demand for oil carriage for instance represents a 20% increase in demand in the free spot market on the contrary of the dry bulk market which is relatively more stable. The tramp market is even more stable.

The large oil companies are traditionally the main dealers for chartered vessels and contracts since they manage usually to establish storage depots and/or refineries at their importing ports.

2.2.2.5 - Time and Voyage Charters

In the charter market ships are available in the following forms:

1- voyage charter

2- time charter

In the voyage charter market there is a floor below which rates cannot fall, but no ceiling. The floor is set by the voyage costs of ships minus the costs of lay-up. At this position the ship is not covering its company overheads, its capital depreciation costs nor even its voyage costs. It is simply losing less by voyaging than by laying up.

When freight rates fall, the first vessels to move into lay-up are those with the highest voyage costs. These may not be the vessels with the highest total cost. Old vessels are normally depreciated to zero and thus will have very small capital cost, but relatively high voyage costs. New vessels tend to have a reverse position.

In the voyage charter or spot market, the ship owner is responsible for all costs, except the costs of loading and unloading the vessel. About 40% of his costs will be capital costs. The remainder are the direct or voyage costs (i.e. costs not incurred when ship is idle). The shipowner in this case should ensure that the charterer does not unreasonably delay the ship at ports because he is paying the costs of the ship and crew while in port. Charters, therefore, have provisions for demurrage payment when a ship is delayed beyong a specified no. of days. There is also payment of dispatch money when the ship is cleared from the port in less than the specified no. of days.

2.2.2.6 - Long-Term Charter Market

In the long-term time charter market, owners are always ready to charter their vessels when rates are high and thus securing super normal profit in the long run. Charterers on the other hand are unwilling to charter, in at such basis they prefer to pay high rates in the spot market since this lasts normally for a relatively short period.

In this market the costs borne by the shipowner include normally, the capital costs, crew cost, and maintenance, but do not include bunker costs. The charterer pays bunker costs and all cargo handling costs. Provision is normally made for a regular period of off-hire each year for annual maintenance.

2.2.2.7 -\"The Bare Boat" Charter

The chartering contract is called charter party - A common type of such party is "the bare boat" charter party. In such situation, the shipowner provides the ship without crew to the charterer. The shipowner is responsible for the capital charges and for accumulating replacement funds and also for bringing the vessel up to class at periodic surveys. The charterer is responsible for crewing the vessel. The bareboat charter is common among liner companies due to the increased capital costs of new vessels. This imposes problems on financing new vessels. Under bareboat arrangement, financing can be left to specialized finance agencies while operation is left to liner operators. It would be most advantageous to have the ship owned in a low-tax-high-wage country, bareboat chartered to a subsidiary in a low-wage-high tax country of a charter rate that gives all the profit to the owing company.

2.2.2.8 - The Shipping Contract

The shipping contract is not an arrangement regarding a particular ship but an arrangement for the provision of certain carriage services of say so many million tons per annum between certain specified points at a particular monthly volume-irrespective of the type of vessels used.

2.3 - RECENT DEVELOPMENTS & FUTURE TRENDS IN THE MARITIME INDUSTRY

2.3.1 - Recent Developments in Ship Sizes & Types

Since 1963 the average ship size increased drastically. The DWT of the world fleet between 1963 & 1974 increased three folds while the number of ships increased only 38%. This trend was limited to tankers and bulk carriers. General break bulk carriers increased almost marginally.

Several "specialized" ships are being developed to transport single commodities such as : liquified gas carriers, chemicals carriers, oil product tankers, timber carriers, car carriers, ... etc. Some of these "specialized" vessels are versatile in a certain sense; e.g. the oil/bulk (CB), the oil/bulk/ore (OBO), and the bulk/vehicle carriers. These configurations are beneficial for triangular operations whereby time of ballast is reduced.

In general cargo emphasis was focussed on reducing handling operations. Several innovations were developed with one common feature; the prepackaging" of cargo units to minimize handling time.

The "Lift on/Lift off" vessels include barge carriers and containers. Container ships may be "fully cellular" with guide rails to facilitate stowage. Semi-container ships can carry containers plus one or more other commodities. The types of barge-carrying vessels are LASH (Lighter Board Ship) and the SEABEE. 24 ships are in service of the first group while 3 are of the second. Theoretically LASH ships operate independent of the ports. Actually since they carry normally also containers, they are handled in the port area. Door - to - Door services were also expected in case of the availability of inland waterways.

The "Roll - on / Roll - off ships can accommodate lorries and other whealed vehicles by means of ship or port ramp. There has been also in the recent years a growing need for general cargo ships of a multipurpose nature such as the "open" ships. These are quick opening hatches, fast-response cranes of varying lifting capacities.

Most of the newly built ships are motor diesel ships. Due to power limitations, big tankers are steam-turbined or gas-turbined. Nuclear ships are very few.

Within the development of the total trade, tanker cargoes have been the fastest growing. Their share of the trade has increased. From about one half of the total at the beginning of the sixties to roughly 60% in the mid seventies. Within the drycargo group, the fastest growth has been in the carriage of the main bulk commodities. Since the early 60's the volume of dry cargo carried has about doubled but the volume of the five main bulk commodities has increased rather more. These

commodities are iron ore, grain, coal, bauxite/alumina and phosphate rock. They constitute 40% of the total dry cargo trade at present.

An important development over the last 20 years in world shipping is the movement of cargoes away from carriage by liners towards carriage in bulk and often specialized vessels.

In the liquid bulk, the trend appears to be developing towards increasing refinery capacity at the sources of crude oil so that it is expected to find refined products being increasingly carried rather than crude. Oil companies may indulge in a large-scale scrapping of refining capacity in the developing countries to enable more crude to be refined at the source. There will be a similar trend for other raw materials.

2.3.1.1. - Factors Affecting Ship Sizes

In general the ton-mile cost of big ships are lower than the same cost for smaller ships provided that ships are used to their capacity. This is the reason behind the development of larger tankers. This trend was only feasible because of the parallel technological development in oil charging and discharging pumps. The time taken to discharge a 500,000 ton tanker remains the same as that time required to discharge a 16'000 tanker in the fourties. Similar trend, although at a smaller scale happened with cargo ships. In 1965 there were no dry bulk carrier over 80'000 DWT. In 1976, almost over 25% of the world fleet is over this size. This problem is most obvious for the break bulk ships. The only practical upper limit

to their size increases in cargo handling. The bigger the dry cargo the bigger the distances cargo has to be moved horizontally on ship a more is its port time. A 20,000 DWT ship spends in port more than twi 10,000 DWT ship, and therefore the vessel making the lowest ton mile is not necessarily the one that makes the lowest overall costs.

2.3.2 - Main Features of Future Trends

As for the near future, the impact of inflation and high fue cost in view of the energy crisis on the technological changes in shi ping will be towards applying existing technologies rather than innov new ones. The high costs of shipbuilding might make modernization an of current ships financially attractive. There has also been a trend towards increasing ship speeds to increase return-on-investments. Wi the recent increase in fuel bunker costs this trend will be limited s higher speeds fuel consumption increases exponentially. Optimum spee must be individually calculated on a voyage basis.

Increased costs of cargo handling will continue the trend tow unitization of cargo. But which type of unitization ?
Containerization are spread over routes between developing & develope countries but they are facing unbalance of trade on both directions a some capital-intensive requirements in the ports of the developing co

CHAPTER 3

Establishment & Operations of National Fleets

CHAPTER THREE

3.1 - INTRODUCTION

The economic importance of trade is always greater than that of shipping. Since the majority of foreign trade is usually ocean-borne, it follows that shipping has an obvious role to play in handling this trade. For a country to enhance its national development, interests of national users have to be protected through several means. Chief among these is the establishment of national flag ships interested in the first place in national trading needs rather than in the cross trade business.

The main advantages of establishing national fleets are to prevent disruption of shipping services during hostilities and to reduce the economic dependence of the country. Due to the quasi monopolistic nature of the liner conferences, and the relatively weak bargaining position of the developing countries, the establishment of national liners might allow such countries to influence conference decisions. On the other hand national shipping fleets assist in export promotion and ensure economic integration of wide countries through its coastal services or among a group of cooperating countries. The major advantages of shipping are its impact on the balance of payment. The attainment of an equilibrium in the balance of payment is obviously an objective sought by developed as well as developing countries who particularly suffer from severe pressures in their trading with the outer world. This point, however will be dealt with later in more details.

Shipping fleets can be established or expanded for one of the following reasons:

a- As an import substitution to the transportation services of the country's imports.

b- As an export earning industry through securing transportation of national exports on national means and,

c- As both import substituting and export earning.

On the other hand, investing in shipping might bring about specific merits as compared with other opportunities for several reasons. For example the flexibility of ship operations and its transferability from one route to another reduces (but not eliminates) the risk of very big losses. In the extreme case if it is required to get rid of the investment committment, the active second hand market of ships will facilitate such decisions. In addition, the gestation period in shipping industry is less than any other industry.

3.2 - THE ISSUE IN ITS INTERNATIONAL PERSPECTIVES:

The low participation of developing countries in world shipping is attributed to the fact that activities in this field are under control of a small group of the developed market-economy countries. Developing countries export 61% of the world seaborne cargoes, but they own less than 7 percent of the world fleet. The contrast is particularly very pronounced in the bulk trades where developing countries export 90% of the tanker cargoes and more than one third of the main dry bulk cargoes, yet own less than 6% of the world fleet of tankers and bulk carriers. In view of this

adverse situation, UNCTAD V has issued in Manilla 1979 its 40/40/20 resolution. According to such a resolution, UNCTAD calls for an equitable participation of a third world country in the transport of its own trade that amounts to 40% of its imports, while the remainder 20% may be engagement in cross-trade.

The developed market-economy countries not only dominate the transport of a much greater tonnage than they generate by their own trade, buk maintain their domination despite their increasing inability to supply their ships with labour force which is one of the critical inputs of shipping. The shipowning companies of the developed countries might have been expected to transfer some of their investments in order to establish shipping companies in the developing countries that can provide the necessary labour, but instead they use cheap labour from the world's poorer countries and at the same time retain complete ownership and control of the vessels through the device of registering ships under "Flags of convenience", without giving an equitable share in the benefits of shipping operations either to the countries which provide the flags or to the countries which provide the labour. Twenty percent of the world's merchant shipping and 30 percent of its ocean-going tankers for instance are registered under 2,484 Liberian flags of convenience. Under the Liberian maritime legislation enacted in 1949 a shipowner can have his ship built anywhere,-sail it anywhere (few Liberian ships have ever docked in Liberia), and hire crew of any nationalities. Registration fees are extremely small ($ 500 and 100 a year afterwards, plus $1.20 per ton of ship at registration and an annual charge of $ 0.10 per ton). These charges remained the same since 1949.

There are two valid grounds for a developing country to develop its national shipping activities. First, it is usually a trading nation that generates its own cargo traffic, and second, it can operate more economically than the traditional maritime countries can operate under their own flags. For many developing countries in general and for Egypt in particular, entry into bulk shipping for instance would offer a logical revenue for industrial development since it is a direct, foreward linkage economic acticity for countries which serve as quarries, mines and oil wells for the extractive industries of developed countries. It would offer the country a direct possibility for evolving from its passive role as a supplier of natural resources to an active role contributing to the economy and the balance of payments.

3.3 - ECONOMIC MERITS OF ESTABLISHING NATIONAL FLEETS

3.3.1- Analysis of the Transportation cost Chain:

The total cost of bringing an imported commodity to its consumption market is made up of several items. It is that total cost plus the profit margin that equals the ultimate selling price. Upon tracing a commodity item from its source at the exporting country to its destination in the importing market, the following main items could be identified:

a- The basic producer price

b- The cost of inland transport to the exporting port.

c- Port cost in the export country

d- Cargo handling cost aboard ship

e- Cost of maritime freight, insurance , ... etc.

f- Unloading cost in the import port.

g- Port cost in the importing country

h- Custom duty cost

i- Inland transportation and distribution cost in the consumption market.

It is self evident that the price paid by the ultimate consumer covers the above cost items plus a profit margin and hence he is the one that pays for such costs. Any distinction between FOB & CIF prices is therefore irrelevant in this respect. The question now is to whom accrue these cost payments. It is clear that items (a) through (d), inclusive, accrue to the exporting country while items (f) through (i) accrue to the importing country. The undecided item is (e),maritime freight and insurance.

For a developing country, the insurance component of item(e) usually accrues to a foreign country even if the insurance company was a national one since these companies normally reinsure at other foreign companies. Viewing such a developing country once as an exporter and once as an importer, it follows- that the benefits obtained by such a country from possessing its own national fleet would be in the first case the fright earnings of its export that would otherwise go to a foreign shipping company. In the second case, the benefits would be the savings obtained by securing transport of imports on national rather than foreign means.

3.3.2 - Impact of National Fleet Investments on the Balance of Payment:

As pointed out in the previous section, the main advantages of national fleet establishment are the freight earnings of carrying exports as well as the savings obtained in the foreign exchange payments of freight rates of imports. These two items have a positive impact on the balance of payment. Upon assessement of the ultimate net effects, however, several adjustments have to be accounted for in order to find out the realistic impact of such investment and avoid any oversimplification of the problem. These adjustments could be broadly classified into basic items and secondary items. Each item per se might have a positive (gain) or a negative (loss) effect. The basic items are as follows:

a- Freight payments saved on carrying imports (gain)

b- Freight payments earned on carrying exports (gain)

c- Disbursements formely made by foreign ships that are foregone by the new ships (loss)

d- Disbursements made overseas by the new ships (loss)

e- Capital investments of the new ships.

The secondary items include:

f- Gross freight earnings on cross trades among countries other than the native country (gain)

g- Gross receipts from the carriage of passengers other than the native country (gain)

h- Imported contents of current (operating) inputs (loss)

i- Imported contents of capital inputs or charter hire paid to foreign owners (loss)

The disbursements formerly made by foreign ships include several subitems such as:

- Former spending of foreign ship crews in national ports.
- Remitted part of the citizens formerly working on foreign ships to their home country.
- Dues formerly paid by foreign ships in the national ports
- Fuel, stores, ... etc formerly purchased by foreign ships at national ports excluding the import elements.
- Cargo handling costs. For liner operations such costs are included in the freight rates. If tramp operations are considered, then they are separate and usually paid by the shipper.

On the other hand the disbursements made overseas by the new ships will include such items as:

- Port and canal dues.
- Cargo handling costs (whenever applicable)
- Expenditure of national crews in foreign ports
- Bunkers, stores taken overseas
- Repairs made overseas
- Insurance payments in foreign exchange. (Even if the insurance company is a national one since these usually reinsure in other countries).
- Agent commissions paid in foreign exchange.

The adjustments required for the new capital investments of the new ships will depend on whether such ships are simply purchased from abroad or built completely at home or any combination in between. Building ships at national yard involves usually certain imported component. Foreign exchange lost by building ships in the national yards instead of exporting them is not taken into account except if results in a loss of certain export orders.

3.4 - OPERATIONAL OPTIONS OF NATIONAL FLEETS:

The operation of an established national fleet could take one of many variant forms. These could be broadly classified into liner (inside or outside existing conferences) and non-liner operations. The country should seek the most economical way of shipping its cargoes at least cost whether inside or outside conferences and whether by liners or non-liners methods.

3.4.1 - Liner Operations

By joining an established liner conference, a national line will be of a limited influence in reducing the level of the freight rates applicable to the country's main commodities since the voting power of a new line in the conference is usually limited. If the country is the sole exporter of particular commodities, it might succeed in affecting minor influences. Joining a conference will enable the country to have a look from inside particularly at the cost and profits of a conference liner operations. Since such information is usually confidential, it is usually difficult for a country to play a double role as a shipper and as a shipowner. It is unrealistic, on the other hand, for a country to accept

unnecessarily high freight rates on the ground that some of the extra profits will accrue to it.

The cost structure of a given conference may be unnecessarily high due to a large servicing area covered by the conference or vessels calling on too many ports. It might be beneficial to split the conference into more conferences each having a limited area. Liner companies are usually reluctant to such split particularly if they can compensate any operational inefficiencies through higher freight rates. Therefore, intergovernmental contacts and pressures should be exerted to change this situation. For such contacts to take place a government must possess a national shipping line.

When freight rates reach a point that endangers the country's trading interest, non-conference liner operations should be seriously considered. This is not always an easy decision since conference sailing frequencies and port coverage might prevent shippers from breaking their conference loyalty to benefit from the reduced freight rate of the new non-conference line. However, such a decision could be made if the freight rates will increase the commodity price beyond its prevailing market price or even reducing returns to producers below acceptable levels. If the country's cargo volume is insufficient to produce the minimum frequency demanded by overseas buyers, then pooling agreements should be made with meighbouring countries dealing with the same destinations.

A new liner has to choose between entering the line conference or operating outside it. The advantages of the first option are:-

a- access to the tied shippers on equal terms with other members.

b- an agreed share of the conference freight revenue.

The advantages of the second option are:-

a- freedom in fixing freight rates.

b- act most effectively in the interest of its country's trade.

3.4.2 - Non Liner Operations:

Charter, tramp, and contract methods are the most familiar forms of non-liner operations. They are traditionally the cheapest forms of shipping and may provide a more promising area rather than liner shipping. The use of national ships for charter or contract might be an opportunity at which the interests of shippers and shipowners of a country can be met. Maximum benefits of this configuration could be achieved by bulking of commodities. This area will contribute towards strengthening the country's position in shipping since while having a group of organized shippers they will have the vessels that could be used for their shipments.

Liner trade is different from voyage trade for there should be regularity of service. The ship serves a wide range of shippers at different ports. Each route has a unique cargo mix. Therefore, the characteristics of a ship working on a certain line or route should conform with these features. Liner vessels are usually more fast than tramp vessels, more complicated in construction of internal holds, and carry complicated cargo handling equipments to cope with the diversified pattern of cargo and enter ports with inadequate handling equipments.

On the other hand, due to the fact that a liner vessel carries several cargoes with several bills of lading while a tramp vessel may carry one bill of lading for all cargoes abroad, the organizational and administrative overheads of operating a liner vessel are much more than those of a tramp vessel.

CHAPTER 4

Current Situation of The Egyptian National Fleet

CHAPTER FOUR

4.1 AN OVERVIEW:

The functional elements of the maritime sector in transport Egypt are divided among more than one governmental institutions as well as private sector companies. However, the ministry of Maritime transport is in charge of the overwhelming components of the sector as shown in Figure (4.1). The ministry was established in 1971 to take care of the constantly increasing problems of the sector and is currently attached together with the remainder of the transportation sector in one ministry namely, the Ministry of Transport, Communications, and Maritime Transport.

In this chapter apart from the rest of the various parts of the maritime transportation sector, we shall be particularly focussing on two main aspects; shipping and shipbuilding. The former gives an indication of the current national tonnages capable of carrying the Egyptian sea-borne trade while the latter indicates the capabilities of the domestic yards in increasing these tonnages.

4.2 THE SHIPPING ACTIVITY:

The sole public shipping company is the Egyptian Navigation Co. (ENCO). Besides, a number of privately owned and joint-venture shipping companies have been established after 1973 in accordance with the open-door policy under law no. 43, 1974. The main companies in this group comprise Alexandria shipping & Navigation Co., Pan Arab Shipping Co., and FAMCO lines.

Fig : (4 . 1)

GENERAL ORGANIZATION OF THE MARITIME TRANSPORT SECTOR IN EGYPT

	SHIPPING COMPS	PORTS & HARBOURS	CARGO BROKERING	SHIPBUILDING & REPAIR	STEVEDORING	STORES & SHEDS	SHIPPING AGENCIES	SHIPS' SUPPLIES
MINISTRY OF MARITIME TRANSPORT	(1) Egyptian Navigation Co. (ENCO)	(1) Alexandria Port Authority (2)Ports & Lighthouses Dept.	(1)the Egyptian Co. For Maritime Transportation (MARTRANS)	(1)Egyptian Shipbuilding &Repair Co.	(1) Canal Stevedoring Co. (2) Arab Stevedoring Co.	(1) Egyptian CO For Stores.	(1) Alexandria Co. For Shipping Agencies (2)Canal Co. For Shipping Agencies	(1)Egyptian Co. For Ship Supplies& Maritime Works.
SUEZ CRAL AUTHORITY		(3) Canal Co. For ports works (port constr.		(2)Port-Said Shipyard.				
MINISTRY OF INDUSTRY				(3)Alexandria Shipyard				
PRIVATE SECTOR	(2) Alexandria Shipping and Navigation Co. (3) Pan-Arab Shipping Co. (4) FAMco Line (5) Others							

4.2.1. The Egyptian Navigation Co. (ENCO):

This is the sole public owner of the Egyptian national fleet. It has almost 41 general cargo ships having an overall deadweight tonnage of 221.035 DWT. and Liquid bulk carriers of 93067 DWT. One of them was recently allocated to dry bulk (grain) trades only. In addition the fleet has 4 passenger vessels having a total capacity of 2170 passengers. As table (4.1) shows, the fleet units are made up of hetrogenous types and built at various shipyards which constitute real problems with regard to repair and maintenance. Moreover, almost 26% of the fleet tonnage have exceeded their economical life, which is traditionally set at 20 years (table 4.2). Consequently, 14 vessels with an overall deadweight tonnage of 117,220 are scheduled to be laid-up by ,1985. Another 8 units with 19,315 DWT are scheduled for lay-up between 1985 and 1990 (table 4.3). On the other hand the already contracted tonnages of the company from the national yards as of August 1979 amount to 5 ships with an overall deadweight tonnage of 39330 DWT. as given by table (4.4) . The last 3 ships in this table are provided through a Danish supplier (B & W) and are partly financed by the Danish aid loans together with the required technical assistance.

ENCO'S fleet units are now operating on 8 navigation conference lines that connect Egyptian inbound and outbound trade with Europe, N. America, Mediterranean, Black Sea, Red Sea, and India (Table 4.5). There are certain proposals to open a new line, the Far East Conference line.

Table (4.1): Composition of the Commercial Fleet, 1979 (Excluding Passenger Vessels)

NO.		Nomenclature	DWT	Building Date	Buildigg Yard	Remarks
1	GENERAL CARGO	ALEXANDRIA	12815	1972	Alexandria Yard.	
2		CLEOPARRA	10018	1944	Oregon Shipbuilding, U.S.A.	A Victory Type ship having room for 100 Passengers
3		EL SHATBYY EL IBRAHIMIA RAS EL - TIN EL ANFOUSHI	8250 8250 8250 8250	1976 1976 1976 1976	Shemoda shipbuilding, Japan Shemoda shipbuilding, Japan Shemoda shipbuilding, Japan Shemoda shipbuilding, Japan	
4		RAMSES 2 ISIS NEFERTITI AMOUN	8230 8230 8230 8230	1976 1977 1978 1979	Alexandria Arsenal, A.R.E. Alexandria Arsenal, A.R.E. Alexandria Arsenal, A.R.E. Alexandria Arsenal, A.R.E.	
5		MOUNTAZA MANDARA MARIOUT ABU - KIR	7500 7500 7500 7500	Dec.1975 1976 1976 1976	Kiroshema shipbuilding, Japan Kiroshema shipbuilding, Japan Kiroshema shipbuilding, Japan Kiroshema shipbuilding, Japan	
6		6 TH OCTOBER	7480	1973	Spain shipbuilding, Spain	
7		STAR OF ASWAN	6700	1948	U.K.	
8		STAR OF LUXOR STAR OF SUEZ PORT SAID	6692 6692 6692	1948 1948 1949	Gantieri Ruinite Dell Adriatico San Marco, Italy	
9		RAFAH	6665	1977	Port Said, A.R.E.	
10		YEMEN	5310	1958	Gdynia shipbuilding, Poland	
11		SALAH EL DIN MANSOURA AMERIA SHARKIA	4200 4200 4200 4200	1972 1972 1973 1974	Port Said, A.R.E. Port Said, A.R.E. Port Said, A.R.E. Alexandria, A.R.E.	
12		EL FAYOUM EL MENIA	4000 4000	1967 1970	Port Said, A.R.E. Port Said, A.R.E.	
13		EL NIL	3920	1953	Gantieri Ruiniti Adriatico, trieste, Italy	
14		ARMANT EL NASSERIA	3470 3470	1948 1953	William Gray & Co. U.K.	Steam Driven
15		CANAL EL SUEZ ASSIUT EL ZAGAZIG	3215 3215 3215	1961 1962 1964	Port Said, Shipyard, A.R.E.	Machinery & Engines are manufactured in W.Germany
16		TANTA BENHA	3048 3048	1958 1958	Szczecin shipyard, Poland	
17		BLOUDAN HELWAN ABU SIMBEL	2895 2895 2895	1960 1960 1960	Schiffsworft Neptum Shipyard, W. Germany	
18		CALAL EL DESOUKI ADNAN EL MALKI OM SABER	1400 1400 1400	1962 1962 1962	Hungary	Main Engines were replaced by W. German ones
19	GRAIN	EL AGAMI	38117	1975	Japan	
20	TANKERS	EL MOURGAN	34840	1959	NORWAY	
		EL SAD EL ALI	20110	1960	West Germany	

Table (4.2): Distribution of ENCOFleet* According to Units
Age in January 1, 1979.

Ships Type	Less than 5 Years		5 to 10 Years		10-15 Years		15-20 Years		More than 20 Years		Grand Tatal
	Name	DWT	Name	DWT	Name	DWT	Name	DWT	Name	DWT	
GENERAL CARGO SHIPS	Nefertiti	4230	6- Oktober	7480	Fayoum	4000	Assiout	3215	Nassria	3465	
	Rafah	6665	Amria	4200	Zagazig	3215	G.Dessouki	1400	El - Nil	3920	
	Isis	8230	Alexandria	12815			A. Malki	1400	Port Said	6692	
	Shatby	8250	Salah El-				Om Saber	1400	Armant	3470	
	Ibrahemia	8250	Din	4200			Suez Canal	3215	S. of Suez	6692	
	Ras El Tin	8250	Mansoura	4200			Bloudan	2895	S. of Luxor	6692	
	Anfoushi	8250	Menia	4000			Helwan	2895	S.of Aswan	6700	
	Ramsis	8230					Abu-Simbel	2895	Cleopatra	10018	
	Mandara	7500							Yemen	5310	
	Marriout	7500							Tanta	3048	
	Abu - Kir	7500							Benha	3048	
	Mountaza	7500									
	Sharkia	4200									
Total		98555		36895		7215		19135		59055	221035
Tankers	Agami	38117					Morgan	34840			
							Sad Ali	20110			
		38117						54950			93067

* Excluding Passenger Vessels
Source: ENCO Files.

Table (4.3): Ships to be Laid-up by 1985 & 1990

No.	By 1985				Between 1985 & 1990			
	Nomenclature	DWT	Type	Remarks	Nomenclature	DWT	Type	Remarks
1	Yemen	5310	G.C		1 Canal El Suez	3215	G.C	
2	Cleopatra	10018	G.C		2 El Zagazig	3215	G.C	
3	Star of Suez	6692	G.C		3 Bloudan	2895	G.C	
4	Star of Luxor	6692	G.C		4 Helwan	2895	G.C	
5	Star of Aswan	6700	G.C		5 Abu-Simbel	2895	G.C	
6	Port Said	6692	G.C		6 Galal El Dessouki	1400	G.C	
7	El Nil	3920	G.C		7 Adnan El Malki	1400	G.C	
8	Assiout	3215	G.C		8 Om Saber	1400	G.C	
9	El-Nasseria	3465	G.C					
10	Tanta	3048	G.C					
11	Benha	3048	G.C					
12	Armant	3470	G.C					
13	El Mourgan	34840	Tanker					
14	El Sad El Ali	20110	Tanker					

N.B: Although economic life of ships is traditionally set to 20 years, it has been assumed in the above table that the ship will remain in operation 5 additional years.

G.C = General Cargo.

Table (4.4): Already Contracted Tonnages of the Egyptian Fleet (August 1979)

No.	Nomenclature	DWT	Expected date of Starting Operation	Type	Building Yard
I.	Egyptian Navigation Company				
1.	Sidi-Bishr	6500	1979	General Cargo	Port Said Shipyard
2.	Memphis	8230	1979	General Cargo	Alexandria Shipyard
3.	Three Sister Ships New Version of Ramses	8200	1980 & 1981	General Cargo	Alexandria Shipyard (Danish Steel, Equipments and Technical Assistance).

Table (4.5) ENCO OPERATING CONFERENCE LINES

Line Name	Depot	Ports Along Line	Distance Between Port & Predecessor (Nautical Miles)
I - Current Navigation Lines	Alexandria		
(1) North West Europe	Alexandria.	Antwerp	3155
		Rotterdam	104
		Hamburg	319
		Bremen	147
		Wismar	316
		Gdansk	326
	Alexandria		4046
(2) North America	Alexandria	Leghorn	1240
		Genoa	72
		Kadesh	936
		Lisbon	286
		N. York	3200
		Baltimore	410
		Philadelphia	370
		Charlestone	594
		Montrial	2117
	Alexandria		5069
(3) England	Alexandria	Dover	3043
		Swansea	409
		Mull	622
	Alexandria		3231
(4) Adriatic	Alexandria	Venice	1208
		Trieste	62
		Rijieka	114
	Alexandria		1158
(5) India	Suez	Port-Sudan	698
		Bombay	2344
		Karachi	512
	Suez		2800
(6) East & West Mediterranean	Alexandria	Askandarona	515
		Piraeus	664
		Genoa	972
		Naples	351
		Leghorne	2264
		Marseille	274
		Barcelona	209
	Alexandria		1473
(7) Black Sea	Alexandria	Borgas	866
		Novorsk	210
	Alexandria		1075
(8) Red Sea	Suez	Jeddah	635
		Port Sudan	161
	Suez		698
II Proposed Lines:			
(1) Far East	Suez	Port Sudan	698
		Mossawa	320
		Colombo	2480
		Rangon	1268
		Singaport	1109
		Hong - kong	1454
		Koba	1372
		Yokohama	357
		Aden	6829
		Port Sudan	653
		Jeddah	161
	Suez		635
(2) West Africa	Alex.	West-African Coast	

The contribution of ENCO fleet in the transportation of the Egyptian dry cargo foreign trade is exceedingly low and amounts to 4% approximately (see table 4.6). If petroleum trade is included, this percentage may reach as low as 2%.

The annual turn-over of ENCO in 1977 & 1978 amounts to L.E 40884632 & 45127507 respectively.

On the operational side, the overaged tonnage of the fleet units leads to an increased operating expenses as well as excessive idle time and delays.

Table (4.7) shows the annual operating cost items for ENCO units in 1978. The total expenses amount to L.E. 20.5 million. In 1977 & 1978, the overall idle time of the fleet approaches 50% of the total time whether due to maintenance, weather, holidays, or port congestion reasons, (table 4.8). Further details of the operational characteristics of ENCO fleet are included in the attached statistical tables.

In view of this situation, the current 5-year plan (1980 - 1984) has allocated almost L.E. 144.5 million for the addition of 16 new vessels to the national fleet.10 units of thes vessels are to be built in foreign yards at an investment cost of L.E. 81.5 million (in foreign exchange) while the remainder 6 ohips are to be built at the domestic yards with an overall investments of L.E. 63 million (see table 4.9).

Table (4.6): Percentage of Tonnage Carried by ENCO to total Volume of Trade Size

(000 ton)

	Year				
	1975	1976	1977	1978,	1979
Trade Size of Egypt(000 tons)	12294.5	12092.9	14244.8	16754.6	18094.3
Borne by ENCO (000 tons)	474	463	602	664	776
%	3.86	3.83	4.2	3.96	4.28

Source:

Ministry of Planning, Draft Five-Year Plan (1980 - 1984).

Table(4.7): Fixed Annual Operating Expenses for ENCO Fleet Units (1978)

(000 L.E.)

Ship Name	Crew Wages	Food	Insur-ance	Stores	Maint. (Local)	Maint. (Foreign)	Depr.	Adm. Exp.	Oil & Fuel	Water	Total
Alexandria	166.2	36.3	103.5	146.4	78.2	45.1	96	95.5	255.9	8.3	995.4
Shatby	125	30.7	54.3	82	15.3	90.5	126.3	32.5	188.8	3.9	749.2
Ibrahemia	102.8	20.6	55.7	37.2	25.1	7.5	126.3	32.4	190	3.7	601.2
Ras El - Tin	117.4	23.4	54	49.2	25.9	102.3	126.3	37.3	203.8	3.9	743.5
Anfoushi	112.8	26.9	57.2	92.2	21.5	132.3	126.3	42.4	228.5	2.4	842.3
Ramses	110.4	20.3	54.3	106.4	32.8	10	125	36.4	189.2	4.9	689.6
Isis	117.2	19.1	59.8	80.4	51.1	19.7	135	27.2	183.7	2.8	696
Montaza	92	16.8	50	70.9	38.5	40.3	115.2	13.9	209.6	2.4	667.5
Mandara	100.8	15.5	50.6	53.5	36.1	32.5	115.2	37.3	177.9	6.7	625.9
Mariout	103.9	21.1	46.5	60.5	27.5	93.1	115.2	35.2	160.5	4.7	668
Abu - Kir	100.4	18.2	46.8	73.2	16.4	19.5	115.2	37.8	191.9	8.4	627.9
6 - Oktober	102	20	48	109.8	45.2	56.2	163.4	41.5	229.1	2.3	817.7
Rafah	116.1	21.8	43.7	114.9	9.4	49.3	55.5	32.3	140.2	2.5	585.7
Nefertiti	105.1	15.9	43.4	84.1	9.1	30.2	101.3	21.2	141.3	3.0	554.2
Yemen	86.3	12.7	33.1	74.1	150.3	13.2	41.4	18.1	58.8	2.9	491
Salah El Din	80.9	20.3	29.2	49.8	43.8	3.1	38	16.8	100.4	2.8	385.5
Mansourah	84.6	15.4	28.1	116	54.3	0.8	38.1	16.0	108.3	2.1	463.6
Amriah	87.3	13.6	27.8	44.6	48.6	4.9	37.9	39.8	118.8	2.5	425.8
Sharkiah	77.9	19.7	33.5	99	81.3	25.1	38.2	29.4	136.1	2.8	543
Fayoum	76.7	13.5	25.9	53.5	66.5	10.2	35.2	19.1	92.3	2.6	395.5
Menia	75.4	17.8	28	41.1	90	16.8	38.6	20.8	76.9	3.2	408.7
Nassriah	34.5	0.1	16.2	3.2	1.8	-	1.1	0.6	-	0.1	57.6
Canal-El-Suez	61.2	7.8	16.6	35.2	31	12.3	16.4	18.1	40.2	1.9	240.7
Assiout	67.5	10.3	19	37	67	22	19.6	15.4	39.2	1.8	298.8
Zagazig	94.5	19.4	20	35.5	87.8	7.5	22.9	15	35.6	1.3	299.4
Tanta	63.8	8	24.3	23.5	145.8	1.2	33	14.4	48.6	1.8	364.3
Benha	67.1	8.7	24.8	28.7	142.8	6.3	32.9	11.5	39	1.9	373.7
Bloudan	66	9.6	21	40.6	45	6.7	12.3	14	60	2.1	277.4
Helwan	58.4	7	17.3	42.3	220.2	17.7	12.3	17.7	45.7	1.5	439.6
Abu - Simble	64.4	7.9	17	32.4	102.7	10.8	12.2	12.3	49.5	1.1	310.1
Galal Dessouki	60.9	11.4	9.9	26.4	59.3	0.8	9.2	8.9	31.7	3.0	221.5
Adnan Malki	50.5	10	10	24.1	53.7	7.8	9.2	7.2	29.1	1.1	203.2
Om Saber	36.4	0.4	36.4	0.4	9.3	37.6	94.5	-	4.6	-	284.2
Cleopatra	149.9	14.3	66.3	59.2	100.6	12.8	11.9	27.2	255.3	6.1	703.5
Star of Luxor	105.4	13.1	55.6	43.2	56.3	2.9	8.5	16.3	30.9	1.9	334.3
Star of Aswan	114.5	25.4	44.5	48.6	30.2	1.1	8.9	23.6	64.5	1.3	362.7
El Nil	77.1	22.8	23.3	68.2	153.5	1.3	12.3	17.7	64.3	5.7	446.2
Agami	142.4	19.2	91.3	92.7	100.4	46.8	352.5	111.4	357.3	4.2	1317.9
Mourgan	156.4	0.4	107.1	30.1	61.8	-	40	65.8	45.1	2.5	509.3
Saad Ali	186	38.2	71.9	62.1	42.5	-	37.8	41.9	44.1	3.2	528
Total	3768.1	643.2	1638.6	2409.2	2563.8	960.7	2567.2	1103.9	4673.6	121.3	20449.7

Table(4.8): Analysis of Working & Idle Time of ENCO Fleet in 1977 & 1978.

		1977						1978					
		Egyptian Ports		Foreign Ports		Total		Egyptian Ports		Foreign Ports		Total	
		Days	%	Days	%	Days	%	Days	%	Days	%	Days	%
Working Time	Sailing					2697	20.1					2656	20.4
	Stevedoring	2147		2048		4194	31.2	2154	16.5	1984	15.2	4138	31.7
	Chartering					48	0.4					79	0.6
	Total					6939	51.7					6873	52.7
Idle Time	Maintenance	2856	21.3	330	2.4	3186	23.7	3036	19.5	353	2.7	3389	26
	Weather	13	0.1	134	1.1	147	1.1	39	0.3	156	1.2	195	1.5
	Holidays	3	-	133	1	136	1	1	-	215	1.6	216	1.6
	Port Congestion	1855	13.8	357	2.7	2212	16.5	1444	11.1	248	1.9	1692	13
	Other	519	3.9	285	2	804	5.9	329	2.5	352	2.7	681	5.2
	Total	5246	39.1	1239	9.2	6485	48.3	4849	37.2	1324	10.1	6173	47.3
	Grand Total					13424	100					13046	100

Table (4.9): Draft Five - Year Plan (1980 - 1984) For ENCO

Building Yard	Ship Type	DWT	Year										Total	
			1980		1981		1982		1983		1984			
			No.	Value 000L.E	No.	Value 000 L.E	No.	Value 000 L.E	No.	Value 000 L.E	No.	Value 000 L.E	No.	Value 000 L.E
Foreign Yards	G. Cargo	15000	3	17616	1	5872	-	-	-	-	-	-	4	23488
	Bulk grain Carrier	35000 to 42000	-	-	1	8500	1	8500	1	8500	1	8500	4	34000
	Passenger	1000 pass. & 200 Cars	1	12000	-	-	-	-	1	12000	-	-	2	24000
Total			4	29616	2	14372	1	8500	2	20500	1	8500	10	81488 (1)
National Yards			-	945 (2)	-	-	-	-	-	-	-	-	-	945
	G.Cargo	8200	2	15842	1	7921	-	-	-	-	-	-	3	23763
	Multi-Purpose	12800	-	-	-	-	1	12751	1	12751	1	12751	3	38252
Total			2	16787	1	7921	1	12751	1	12751	1	12751	6	62961
Grand Total			6	46403	3	22293	2	21251	3	33251	2	21251	16	144449 (3)

(1) All in Foreign Exchange
(2) Completion of Ships under Construction.
(3) The Foreign component depends on ship type and varies between 55& 65 %.

Source: Ministry of Planning.

4.2.2. Private Sector Shipping Companies:

According to law 43, several privately owned shipping companies have been formed. Table (4.10) shows the major companies established under the auspices of the law according to the information of Egypt Transport study, of 1977. Another company was formed after 1977 by the name of "Egypt-Edko Maritime shipping Co." as a joint-venture with a Norweigian co. The company will own as a start two passenger vessels (one already started operations between Suez & Hodeida) and one dry bulk grain carrier 40,000 DWT).

One shortcoming of the application of law 43 in the maritime shipping sector is that it does not stipulate that the newly formed companies should own its vessels and raise the Egyptian flag on them. Some companies charter ships use foreign crew for their operation and hence do not represent any gain to the Egyptian economy.

4.3. Domestic Shipbuilding Capabilities:

The major shipbuilding & repair companies in Egypt include

- Alexandria shipyard (Ministry of Industry)
- Port Said shipyard (Suez Canal Authority)
- Egyptian Shipbuilding and Repair Co. (Ministry of Maritime Transport).

Other companies include "Timsah Shipbuilding Co", "Suez Marine Arsenal", and "The Arab Contractors Arsenal" in Ismailia. These are generally

Table (4.10)

PRIVATELY OWNED FLEETS

Company	Ship	DWT
Alexandria Shipping and Navigation Company		
Passenger RORO Cargo	AL ANOUD	400
	Jordan	3,700
	Kuwait	3,700
	Gada	5,600
	Cairo	9,000
	Unnamed	10,000
	Total	32,000
Pan Arab Shipping Company Cargo	Ibn Korra	1,700
	Ibn Jubair	1,700
	Al Idrisi	2,100
	Al Biruni	2,100
	FEDA	10,000
	WAFA	10,000
		27,000
FAMCO Line	In Process of Formation	
	Total	59,600

Source: Ministry of Transport, "Egypt National Transport Study", Phase I, 1977.

small yards for the construction of small units such as barges, tug boats,...etc.

The "Egyptian Shipbuilding and Repair Co." is specialized in the maintenance of ENCO fleet units. The company used to be a private company until it was nationalized in 1962, at which time it was "Subordinated to the General Organization for Maritime transport. Since nationalization, the company has suffered from a lack of working capital and a lack of access to long-term capital to build the drydocks required for the maintenance of the Egyptian national fleet units. This in turn involved ENCO in long delays in repairs and large outlays of foreign exchange. The company has now a 6000 tons dry-dock for ship repair operations. It faces now problems of shortage of skilled workers, partially because of emigration to Arab countries. It also lacks land for expansion because of its location in Alexandria port area.

4.3.1. Alexandria Shipyard:

This is the largest shipyard in Egypt. Several vessels have and are being built for ENCO in this yard. Ship types that could be built in the yard are:-

- General cargo, RO/RO, container ships up till 20,000 DWT.
- tankers up till 20,000 DWT.
- passenger ships up till 180 m long.

In addition, other units could be built in this yard e.g.

- Floating docks up till 25000 ton, lifting capacity.
- Tug boats, Floating cranes, dredgers, pilot boats,...etc. up to 16000 hourse power,
- Lighters for inland waterways.

Alexandria shipyard was built between 1962 and 1970 wit. Russian assistance. It is also located in Alexandria port area. The Company has:

- 3 slip-ways for shipbuilding
-, one 80,000-ton dry dock for ship repair
- one mechanical slip-way

The maximum capacity in Alexandria yard could be estimated at 52000 Dead waight tons annually.

The mechanical slip-ways is devoted for the construction of small units. The maximum lifting capacity of this slip-way is 600 tons.

Table (4.11) shows the building capabilities and building time at the yard.

The yard has in 1979 concluded the construction of two general cargo ships, 8230 DWT each for the Egyptian Navigation Co. These are the last of 6 sister ships built at the yard for the national fleet.

Table (4.11): Building Capabilities of Alexandria Shipyard

Specification	Type	Approximate Building Time (Months)	Approximate Setting Time (Months)
1 Till 20,000 DWT	General Cargo Ships	20	4
2 Till 30,000 DWT	Tankers	20	4
3 Till 20,000 DWT	Multipurpose RO/RO	20	4
4 Till 20,000 DWT	Containers Ships	20	4
5 Till180,mLength	Passenger ships	20	4 Pilgrimage
6 Till 25,000,t lifting capacity	Floating docks	20	4
7 Auxiliary units till 16,000 HP	(a) Tugs	12	4
	(b) Floating Cranes	12	6
	(c) Dredgers	18	6
	(d) Fishing boats	8	4
	(e) Servicing boats	33	3
	(f) Pilotage boats	3	3
	(g) Military boats	12	6
8 In land navigation units, all tonages	Barges	2	1

N.B:- Four units more than 1000 DWT could be processed simultaneously from items 1 to 6.
Six units of items 7&8 could be worked simultaneously.

Source: Ministry of Planning.

The yard has currently three projects that are financed by the Danish aid loans and are replacing the soviet designs after the withdrawal of their experts.

The first project of Alexandria shipyard financed from the Danish aid is the construction of two general cargo vessels 8100 DWT each. The contract of this project was signed in July 1978. The size of the contract is D.Kr 31,800,000 and is financed from the Danish loan no. V of 1977. This contract represents 35% of the total equipment and technical assistance. The rest 65% is financed by suppliers credit to be repaid in 7 years at semi-annual payments at 8% interest rate. The project started in January 18,1979 and is scheduled to end by January 18,1981. By the end of 1978, D.Kr. 4,550,000 were used from the loan in addition to D.Kr. 8,503 660 of the supplier's credit. By the end of 1979 these amounts are expected to be D.Kr. 21,000,000 & D.Kr. 43,646,102 respectively.

The first ship (Akhnaton) is already finished while the other (Tohotmus) was scheduled to be completed by the end of December 1979. The total amount of equipments supplied for each ship including technical assistance & experience amounts to L.E. 5,004,263 while the selling price of the vessel amounts to L.E. 7,728,000.

The second project is the construction of a third dry cargo vessel 8100 DWT. The contract of this project was signed in Dec. 20, 1978. Its size amounts to D.Kr. 13, 445, 812 and is financed from the Danish loan no.VI

to Egypt which was awarded in 1978. This contract constitutes 35% of the total equipments of the project. The nemainder 65% amounts to D.Kr. 23, 187, 938 and are financed by suppliers credit at the same terms as the previous project. The project started in 30th April 1979 and is due to end by April 30, 1981. By the end of 1979 it is estimated that D.Kr. 5, 500,000 are used up of the loan in addition to D.Kr. 18, 33, 826 of the suppliers credit. The total amount of equipments for this ship including technical assistance is L.E. 4,993, 253 while the selling price is L.E. 7,728,000.

The third project is the construction of two multipurpose ships, 12000 DWT each. The project contract was signed in June 11, 1979 and amounts to D.Kr. 40,262,688. This contract is also financed from Danish loan no VI. Again it constitutes 35% of the total equipments while the remainder is financed by supplier's credit at the same terms as the previous projects. The project has not yet started since the delivery of equipment has not begun. The project duration is two years from the start of delivery. It is expected that by the end of 1979 D.Kr. 813,000 will be used up. The selling price of the ship is L.E. 12, 751,000.

A fourth project for the construction of a sister ship as those of the third is almost certain.

Details of the previous projects as well as a computation of the foreign exchange components in their cost are shown in tables (4.12) & (4.13).

Table(4.12) Size & Financing of Building Projects at Alexandria Yard in co operation with Danmark.

(D. Kr.)

	Project Size	Financed By		
		Aid Loan	Export Credit	Normal Comm. Credit
First Project (Ships N1 + N2				
- Danish B&W) Design Assistance	1,800,000	1,800,000	-	-
- Danish (B&W) Hard ware deliv	67,500,000	23,625,000	43,875,000	-
	69,300,000	25,425,000		
- General Technical Assistance:				
. Additional Design Assist.	1,800,000	1,800,000	-	-
. Danish advisors in Yard	4,739,500	4,739,500	-	-
. Egyptians training ar Danmark	127,000	127,000	-	-
Total Gen. Tech. Assistance	6,666,500	6,666,500		
Total of Proj.	75,966,500	32,091,500 (1)	43,875,000	
Second Project (Ship N3)				
- Danish B&W) Design Assistance	360,000	360,000		
- Danish (B&W) Hardware Deliv.	35,673,750	12,485,812		(2) 23,187,938
- Danish (B&W) Advisors in Yard	600,000	600,000		
Total of Proj.	36,633,750	13,445,812		23,187,938
Third Project (Ships N4 + N5)				
- Prep. of Design	4,182,000			
- Royalty N4	300,000	4,680,000		
- Royalty N5	198,000			
- Danish (B&W) deliveries	109,718,666	35,582,688		74,135,978
Total of Proj.	114,398,666	40,262,688		74,135,978
Forth Project (Ship N6)				
- Design assistance	320,000	320,000		
- Danish (B&W) Deliveries	54,859,000	17,830,000		37,029,000
Total of Proj.	55,179,000	18,150,000		37,029,000
GRAND TOTLA	282,177,916	103,950,000	43,876,000	134,352,916

(1) 31,800,000 in 77 & 291,500 in 78.

(2) To be repayed in 14 semi-annual installments at an interest of 8 %

Source: Danish International Development Agency (DANIDA), "Supplier's Check.

Table(4.13): Percentage of Foreign Component of Cost to Selling Price for Ships under Construction in Alexandria Shipuilding Yard.

Ship Description	Cost of Foreign Supplies (Package Deal)		Selling Price L.E	% age of Foreign Component in cost to selling Price
	in D.Kr.	in L.E.		
DWT 8100 (N1 or N2)	34,650,000	4,347,000	7,728,000	56%
DWT 8100 (N 3)	36,633,750	4,595,870	7,728,000	59%
DWT 12600 Multi-Purpose "Hamlet Ship"*	57,199,333	7,175,916	12,751,000	56%

- 1 L.E. = 7.97 D.Kr.

* Danish Design by B & W Shipbuilding Co.

Compiled From Previous Table.

4.3.2. Port Said Yard:

Operation of this yard has been affected by the hostilities in the area prior to 1973. After resumption of its activity, the main slip-way can accomodate one ship up till 18000 DWT or alternatively 2 ships, 12000 DWT simultaneously. There are currently no contracts for the main slip-way. However, it is investigating with the Egyptian Navigation Co, the possibilities of constructing 4 multipurpose ships 12,800 DWT. The yard has constructed in the past general cargo ships of the following tonnages:

3200	DWT
4200	DWT
6500	DWT

The building time is estimated as shown in table(4.14)
Fifty two percent of the construction costs are in foreign exchange.

4.4. Contemporary Problems of The Sector:

At the end of this chapter the main problems encountering the maritime transportation sector in Egypt could be summed up briefly. The first of these is the very low contribution of the national fleet in securing transportation for Egypt's foreign trade. The current size of the Egyptian foreign trade of dry cargo (i.e. excluding petroleum) is estimated

Table (4.14): Building Capabilities of Port Said Shipyard

	Specification	Type	Approximate Building Time (Months)	Remarks
1	18,000	General Cargo or multi-purpose	24, First Ship 8,each subseq. ship.	150 m overall length
2	12,800DWT[1)]	General Caro or multi-purpose	same as above	
3	6,500 DWT8	General Cargo	16, First ship 6,each subseq. ship.	already built in the yard
4	4,200 DWT	General Cargo	12, First ship 4,each subseq ship.	already built in the yard
5	3,200 DWT	General cargo	same as above	already built in yard

(1) Two ships could be processed simultaneously

Source: Ministry of Planning.

at 18 million tons. Less than 4% of this amount is transported by the national fleet units. Top officials in the Ministry of Maritime Transport estimate the amount of freight charges paid to the foreign ships annually by more than U.S. $ 800 million. A large proportion of this amount (= U.S. $ 150 million) is paid for the transport of wheat imports whose trade amounts to 5 million tons annually while almost no bulk grain carriers are available in the national fleet. Likewise, petroleum trade whether the coastwise trade from oil wells to their refineries or the export trade are continuously increasing without an adequate liquid bulk tonnages among the fleet units.

Another problem is related to the fact that the currently available tonnages on the national fleet are overaged. More than 25% of the deadweight tonnages have exceeded the economic life traditionally set to 20 years. A large part of the current vessel types are hetrogenous and of obsolete designs. Aside from the managerial problems of ENCO, the national fleet shipping company, the currently available ship types do not cope with the recent technological trends in shipping which reduce port times and expedite cargo handling rates. Beside ENCO, a number of private and joint-venture shipping companies have been established under law 43. However this law should stipulate that these companies should own their vessels and raise the Egyptian flag in order to secure their earnings to the Egyptian economy rather than foreign countries.

On the other hand. Alexandria shipyard whose sole customer was ENCO has been producing so far only Russian design ships which are unable

to cope with the technological innovations in shipping. Container cargo for instance could not be transported by these ships. The multi-purpose "Hamlet" type ships that are supposed to be built in yard are expected to solve this problem by providing ships capable of carrying, general, container, and dry bulk cargo. Such ships if built in Egypt will be the right type since it would provide a great deal of flexibility in operation.

CHAPTER 5

Foreign Trade Forecasts

CHAPTER FIVE

5.1 General

In this chapter we will be concerned with the following three issues:-

a) To select and construct commodity lists that make up the bulk of the Egyptian foreign trade on both the import and export sides and to classify and arrange commodity items on these lists in an appropriate and convenient way to maritime transport.

b) To decide upon the most reliable forecasts of individual items on the commodity lists at the planning horizon (s) to be accepted for this study.

c) To break down above forecasts among operational routes or navigational lines according to their geographical distribution pattern.

5.2. Commodity Lists

The eeconomies of developing countries are usually not complicated. Therefore, a relatively small list of commedities can be established to account for a high proportion of the total trade. Therefore, the preparation of such a list is highly desirable as a first step towards foreign trade forecasts.

To decide upon the commodity import and export lists, statistics of CAPMAS for the years 1975, 76 & 77 have been investigated for this

purpose. The first 20 to 25 items of such statistics as far as freight is concerned were identified,. These items, with some minor modifications to include items for whom reliable forecasts are available, made up the required lists. CAPMAS statistics have the disadvantage of neglecting some commodities imported by GOFI and other ministries and released according to the "Temporary Admission Rule". Such items, however might be ignored at this stage since they are not constant bulky components in the import pattern. Table (5.1) shows the decided upon lists in the final form together with the percentage (weight) of each of its items in Egypt's trade during the years 1975 through 1977.

It could be noted here that the pattern of import did hardly vary in these years i.e. the ranking of the items on the import list was almost the same. The most significart items on the imports list are the bulk items such as grains (mostly wheat), fertilizer, coke & coal, cement, and Butane.

On the exports side, raw cotton assumes the first place as far as value is concerned. Crude petroleum comes also in the very beginning and is expected in the near future to assume an increasingly important position on the list particularly after the return of Sinai oil wells to Egypt. Agriculture crops come next particularly potatoes, oranges, rice, and water melon. Again this pattern was consistent throughout the 3 years.

The next step is to classify the preaccepted items on the commodity lists in a way convenient for the obiectives of this study. An apparent

Table (5.1): Significant Items in Egypt's foreign trade and their percentages to total trade by weight

Exports				Imports			
Commodity List	%age in Foreign Trade			Commodity List	% age in Foreign Trade		
	1976	1977	1978		1976	1977	1978
1. Onions	1.11	1.36	0.94	1. Meat, Frozen	0.37	0.43	0.40
2. Vegetables	0.29	0.57	0.46	2. Fish, Frozen	0.37	0.43	0.40
3. Fruits	0.12	0.08	0.11	3. Vegetables	0.06	0.04	0.00
4. Cotton, textile	0.22	0.23	0.24	4. Fat oils	2.70	2.28	2.17
5. Cotton, waste	0.24	0.23	0.00	5. Tobacco	0.24	0.27	0.24
6. Fish	(..)	(..)	(..)	6. Chemicals	2.68	3.96	5.53
7. Rice	3.28	3.45	2.10	7. Light machinery	0.00	0.00	0.00
8. Sugar	0.61	0.90	0.95	8. Fruit	0.18	0.13	0.08
9. Raw cotton	2.57	2.22	0.19	9. Dairy Products	0.45	0.36	0.48
10. Cement, bags	0.38	0.20	0.08	10. Paper & pulp	2.19	1.62	1.79
11. Starch crops	2.45	2.57	1.45	11. Raw Cotton	(-)	1.02	(-)
12. Citrus	2.65	2.64	2.00	12. Sugar	1.75	1.45	2.88
13. Phosphate	1.86	0.91	2.21	13. Cement, bags	6.19	11.30	11.4
14. Fertilizers	0.49	0.36	0.37	14. Flour	4.15	5.67	7.47
15. Corn	0.03	0.04	0.00	15. Wheat	24.21	22.31	24.14
16. Cement, bulk	0.00	0.00	0.00	16. Corn	5.34	5.92	7.50
17. Sorghum & millet	(-)	(-)	(-)	17. Salt, sulphur	-	-	-
18. Petroleum, crude	60.96	61.66	39.68	18. Coal, Coke	10.58	10.09	6.89
19. Petroleum, Products	0.00	0.00	2.28	19. Iron Ore	-	-	-
20. Iron & steel	0.59	0.00	0.02	20. Fertilizers	4.45	4.54	0.23
				21. Cement, bulk			
				22. Butane	1.63	1.79	2.00
				23. Petroleum, Products	0.03	0.01	0.01
				24. Lumber & Timber	3.48	0.76	5.20
				25. Iron & Steel scrap	0.73	1.06	0.31
				26. Heavy micry & vehicles (1)	0.01	0.01	0.01
Percentage of above items to total trade	77.85	77.42	53.08	Percentage of above items to total trade	71.83	75.28	80.98

(..) no data available
(-) Less than 0.01

(1) vehicle average weight assumed 1000 kg.

problem is encountered at this stage, namely the problem of nomenclature and grouping or classification. The significance of such problems could be understood in view of the problems they might create in any subsequent comparison of available forecasts of certain items either individually or collectively.

There are several reasons for classifying commodities. If we trace a specific commodity in the international trade we find that this commodity will pass through the following stages:

- as an item in the lists of the inland transportation mode (s) moving the commodity from its source to the port of the exporting country.

- as an item in the export list of the exporting country.
- as a cargo item in the maritime transport ship and in the tariff list of such a ship.

- as an item in the customs tariff lists of the importing country.
- as an item in the inland transport list of the importing country bringing the commodity to its final destination.

In each of such stages a commodity is both named and classified.

It is self-evident that it would be beneficial to unify the commodity names throughout the above stages to trace cargo movements. This is actually not the case since names are not standard. A commodity

might be named in the different lists as an automobile, a motor, a motor car, or a car. This nonstandardization of names imposes real problems in relating the freight rates of the liner conferences lists to the trade statistics lists. An international standardization of names faces certain problems such as that of language. However, this could be solved by applying one of the standard designations (or codes) for each commodity in the respective list. The choice of which standard is not real since most of them are cross referenced to each other.

The function of nomenclature is identification. The function of classification is grouping commodities of similar characteristics. The basis for such grouping differs widely. For instance:

- exports classification is usually according to the industrial or agriculture groupings within the country.
- freight tariffs classification is based on the transport characteristics such as packaging, way of handling, stowage,...etc.
- in customs list, classification may be based on a number of complicated factors.

Therefore, a uniform system of classification is not possible. But as with nomenclature, the problem could be solved by referring against each commodity in the classification list to one international commodity designations. Governments and organizations are thus free to use any classification system that suits their own needs.

For the purpose of this study, a classification according to the way of cargo handling is evidently the most appropriate one. The broad classification of cargo in this case would be: General, Bulk, and specialized cargo. In order to allow for a possible treatement of the issue of containerization, general cargoes were divided into containerizable and break bulk cargoes. Similarly bulk cargoes were differentiated into liquid and dry bulks. Therefore the final classification came under the following headings:

a) General cargo, containerizable.

b) General break bulk cargo

c) Dry bulk cargo

d) Liquid bulk cargo

e) Special handling cargo.

5.3. Recent Studies of Foreign Trade Forecasts

There has been quite a reasonable number of serious studies of foreign trade forecasts in the recent years. They have dealt with the subject either explicitly or implicity as part of more general topics.

Due to the fact that these studies vary in their underlying assumptions, and methodologies, it is felt mandatory, for the sake of completeness to give a quick review of such studies chief among which are:

1. "Development policy: Ports of Egypt, strategy for 1980-2000" by Fredric R.Harris, Inc.-January 1978.

2. "Egypt National Transport study, ENTS" - Phase I, 1977.

3. "Master plan for Storage & Distribution of Food Grains in Egypt"-by Black & Veatch International-September 1978.

4. "Appraisal Report: Port of Alexandria Project "by the World Bank-March 1976.

5. "The Future Prospects of Food in the Arab Countries-1975-2000", by the Arab Food and Agriculture Organization - September 1978.

6. Other studies focussing on single commddities e.g.:-

   a) "A Planning study of the Egyptian Fertilizer Sector", by the World Bank, 1977.

   b) A Cement sector study by H.K. Ferguson, Int. Cleaveland Ohio/ USA.

Hereafter we give a quick review of the above studies:

5.3.1. Fredric Harris

This study which was concluded in early 1978 has forecasted the composition and volume of Egypt's foreign trade, except for liquid bulk, for the period 1980-2000 in order to evaluate plans and proposals to expand port capacities in Egypt. The study as a whole has been subject to a general discussion of its main results and underlying assumptions by all the parties concerned and therefore is reliable to a large extent. The study was based on the following assumptions:

1) The huge trade deficit will continue, though at reduced rates until 1985.

2) Income and prices will continue to rise to reflect local & international inflation. Prices are speculated to double on the average and income triple up to 1985, thus narrowing the differentials between shadow and current prices.

3) Oil will be by 1985 a major export commodity.

4) Open door policy will begin to increase the volume of, and diversify exports up to 1985.

5) Wheat imports will slow down.

6) Peace prospects in the area will promote trade.

The general methodology adopted could be summarized in the following:-

1. Zoning of Egypt into appropriate zones.
2. Selection of foreign ports which are representative of countries trading with Egypt.
3. Forecast of national consumption and production for each zone by major commodity groups for the period from 1980 till 2000 at 5 years intervals.
4. By analysing the zonal surplus and/or dificit, commodity imports and/or exports were decided.
5. By identifying the possible sources of Egyptian imports and the possible destination of its exports the least cost routes were

determined using network algorithms.

6. Foreign trade distribution within this least cost pattern among ports is then derived and the total transport cost is estimated.

It could be easily deduced that this methodology presents an idealistic or normative picture for foreign trade allocation among the various routes and ports. This is feasible, however, only if the decisions influencing such allocation were rational enough and coordinated, an assumption which is somewhat doubtful in view of the practical considerations. Such an idealistic assumptions will, however, affect the trade distribution rather than the foreign trade volumes forecast. Figure (5.1) gives the commodity classification by major grouping and Figure (5.2) shows the zoning system of the outer world and the ports considered to represent each zone.

Table (5.2) shows the detailed forecasts of the study by major commodity groupings and handling category for five year intervals between 1980 and 2000.

5.3.2. Egypt National Transport Study (ENTS)

The commodities analyzed by ENTS are broken into two main groups:

1. Farm Food products that include wheat & flour, sugar cane & sugar vegetables, corn-Maize, Rice, Citrus, Other Fruits, Sorghum, Onions, Meat and
2. Manufactures and mining which are mainly cement, fertilizer and fertilizer materials including phosphate, cotton & textiles, Basic Iron & steel, & non ferrous metals.

Fig (5.1): Harris Classification Of Commodities by Major Grouping.

A. CONTAINERIZED CARGO

1. Meat
2. Fish
3. Vegetables
4. Onions
5. Fruits & Nuts
6. Consumer Goods
7. Fats & Oils
8. Tobacco
9. Cotton Textiles
10. Cotton Waste
11. Chemicals
12. Machinery

B. NEO-BULK CARGO

1. Flour
2. Rice
3. Sugar
4. Raw Cotton
5. Cement
6. Paper & Pulp
7. Intermediate Goods

C. SPECIAL CARGO

1. Lumber
2. Iron & Steel & Articles
3. Heavy Machinery & Vehicles

D. DRY-BULK CARGO

1. Wheat
2. Corn
3. Salt, Sulphur, etc.
4. Phosphates
5. Fertilizers
6. Coal & Coke
7. Iron Pyrites
8. Cement

E. LIQUID BULK CARGO

1. Petroleum, Crude
2. Mazout, Diesel, etc.
3. Petroleum Shale Oil, Other Than Crude
4. Butane

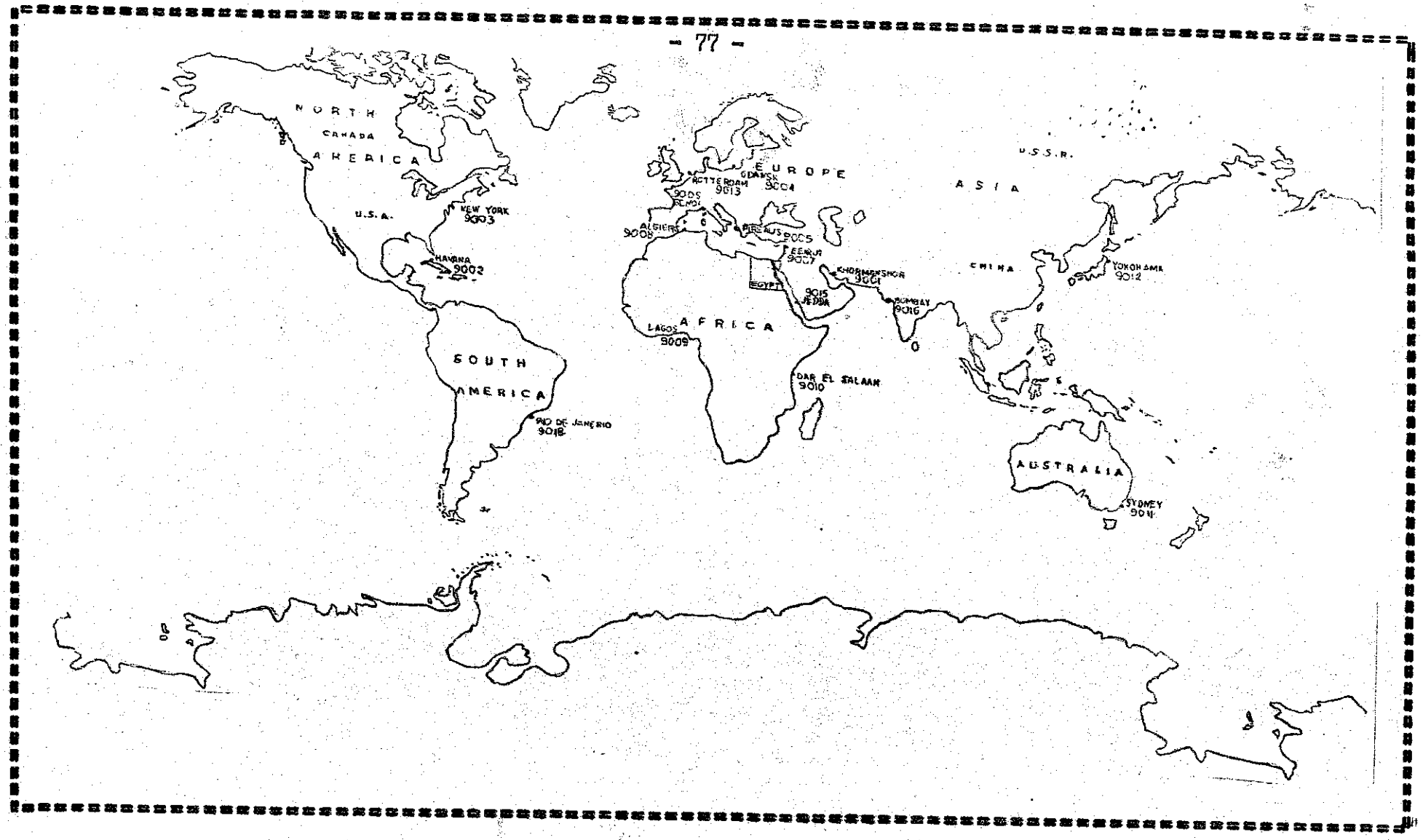

Fig. (5.2): Zoning System of Outer World By F. Harris and representing Ports.

Table 5.2
Table 3.1

EXPORT AND IMPORT FORECASTS BY COMMODITY GROUPINGS AND HANDLING CATEGORIES
(IN THOUSANDS OF METRIC TONS)

	ANNUAL TONNAGE EXPORTS						ANNUAL TONNAGE - IMPORTS				
	MAJOR COMMODITIES	1980	1985	1990	1995	2000	MAJOR COMMODITIES	1980	1985	1990	1995	2000
HANDLING CATEGORY "A" CONTAINERIZABLE CARGO	ONIONS	213	344	533	927	1403	MEAT	30	52	77	108	144
	OTHER VEGS.	224	238	356	3541	6484	FISH	12	6	3	1	0
	FRUIT & NUTS	304	378	847	1591	2593	VEGETABLES	136	173	221	282	350
	COTTON TEXTILE	77	113	163	229	313	FATS & OILS	481	707	1126	1516	2272
	COTTON WASTE	16	21	27	34	43	TOBACCO	29	37	47	60	76
	FISH	30	52	77	108	144	CHEMICALS	650	81	1 60	1353	1727
	CONSUM. GOODS	55	70	89	114	145	LIGHT MACHY.	53	68	87	110	142
							MISC. CONSUMER	235	300	383	489	623
	TOTAL	921	1273	3366	6504	11,130	TOTAL	1626	2173	2902	3919	5350
HANDLING CATEGORY "B" NEO-BULK CARGO	RICE	324	478	1126	2094	3504	PAPER & PULP	240	306	890	616	637
	SUGAR	142	182	380	710	1338	RAW COTTON	45	73	81	91	103
	RAW COTTON	150	150	155	150	150	SUGAR	41	14	0	0	0
	INTERMED. GOODS	70	74	78	82	88	CEMENT	783	1057	0	0	0
	CEMENT	134	134	213	0	0	FLOUR	498	635	0	0	0
	TOTAL	820	1018	1947	3036	5078	TOTAL	1810	2385	471	589	740
HANDLING CATEGORY "C" SPECIAL CARGO	IRON & STEEL	56	90	145	233	375	LUMBER	575	926	1491	2401	3868
							IRON & STEEL	1300	1200	1200	1200	1200
							HVY. MACHY. & VEHS.	19	251	320	408	521
	TOTAL	56	90	145	233	375	TOTAL	2072	2377	3011	4009	5589
HANDLING CATEGORY "D" DRYBULK CARGO	PHOSPHATE	143	183	233	297	379	WHEAT	3171	4189	5550	5417	4608
	FERTILIZER	0	6303	6367	6360	6273	CORN	426	212	0	0	0
	CORK	0	0	381	1748	3783	SALT, SULF. ETC.	113	182	295	472	758
	CEMENT	0	0	8	3152	11,858	COAL & COKE	2000	2000	296	2000	2000
							IRON PYRITES	122	196	315	589	823
							FERTILIZER	641	0	0	0	0
	TOTAL	373	6486	6981	11,557	22,293	TOTAL	6475	7079	8159	8395	8189
GRAND TOTALS		1970	8867	12,439	21,330	32,876		11.783	13,714	14,543	15,915	19.8 8

Source : "Development policy ; ports of Egypt , stratagy for 1980- 2000 by Fredric Harris Inc.-January 1978 .

The analysis was based on commodity (surplus deficit) on the governorate level. Surplus is defined as domestic production in excess of estimated consumption in a governorate. This would be available for shipment to other governorates or for exports. Adjustments are made in per capita consumption to allow for variations due to living standards whenever applicable.

For forecasting purpose, existing consumption rates were first established as follows:

1) Total consumption = total production (avarage 1972-74) + imports-exports.

2) Consumption per capita = $\frac{\text{Total consumption}}{\text{total population (1973)}}$

3) Total consumption for each governorate = $\frac{\text{consumption per capita}}{\text{Governorate population}}$

Therefore, consumption forecasts are largely based on population increases assuming constant rates of per capita consumption (except for the case of wheat & flour where a 4% increase is assumed).

Although ENTS is regarded as an official document since it is published by the Ministry of Transport, it is believed that its forecasts have been outdated by Harris study which was published in september 1978.

5.3.3. Master Plan for Food Grains Distribution in Egypt

The grains considered and analyzed in this study include wheat, corn, sorghum and millet, rice and barley. The general methodology adopted for developing imports and/or exports projections was as follows:

1. Production projections were made by assemblying historical figures for areas harvested and production of the major grain crops were assembled by governorate for the period from 1955 through 1978 from Ministry of Agricultural statistical reports. Trend patterns were then measured by least squares regression. Appropriate models were selected to extend these trends for projections of the crops considered through year 2000. Trends projections were made separately for the area harvested and yield. Production projections are made by multiplying projected areas by projected yields. The models used for fitting of area & yield data were exponential models using time-variable exponents. The exponents on the time variable found to give the most appropriate models are as follows:

	Area Planted		Yield	
Crop	Lower Egypt	Upper Egypt	Lower Egypt	Upper Egypt
Wheat	1.0	1.0	1.8	1.8
Corn	0.2	1.0	1.0	0.2
Sorghum	Inapplicable	1.0	Inapplicable	0.2
Barley	0.2	0.2	1.0	1.0
Rice	0.2	0.2	1.0	1.0

2. Demand projections were then made based on investigation of the future change in population patterns and changes in average per capita consumption. These projections were made separately for rural and urban segments and for the different governorates and regions of the country. Per capita consumption implies such factors such as taste, preferences and customs, and per capita income. Increase in income depends upon the income elasticity of demand for each product. Populations are based on (CAPMAS) reports. The projections indicate that Egypt's total population will be approximately 43,750,000 by July 1,1985 and 59,635,000 by July 1,2000. Percentages of rural population to total populations are projected as follows:

Region	July 1,1985 %Rural	July 1,2000 %Rural
Lower Egypt	68.8	61.0
Middle Egypt	77.7	72.3
Upper Egypt	70.0	61.9

The reported income elasticities from CAPMAS reports are as follows:

Commodity	Income Elasticity Coefficients	
	Urban Population	Rural Population
Cereal Grains	0.13	0.54
Edible Oils	0.33	0.54

3. Supply and demand balances are then established as shown in table (5.3)

4. Projected import requirements for wheat, flour, bread and macaroni (expressed as wheat equivalent) are then derived from the projected net deficits by applying a loss factor of 4 per cent to the projected net deficits.

Summary of Results

1. Quantity of wheat grown within ARE will increase till 1990, then decrease to the year 2000 due to decrease in available land for wheat. These quantities are:

1977	1.683,000	MT
1990	2,231,000	MT
2000	1,796,000	MT

2. Wheat imports are either in the form of whole grain wheat for domestic milling which is decided upon according to the domestic milling capacity or imported flour expressed as wheat equivalent. Projected wheat imports are as follows:

Table (5.3)

PROJECTED SUPPLY AND UTILISATION* BALANCES

Year	WHEAT			CORN			SORGHUM AND MILLET		
	Production MT	consumption MT	Surplus or Deficit MT	Production MT	consumption MT	Surplus or Deficit MT	Production MT	Consumption MT	Surplus or Deficit MT
1977	1,682,812	5,712,216	4,029,404	2,639,518	965,110	1,674,408	856,558	469,673	386,885
1978	1,719,555	5,890,073	4,170,591	2,691,999	945,196	1,746,803	870,658	463,784	406,874
1979	1,747,395	6,075,136	4,317,817	2,743,871	925,634	1,818,237	884,591	457,861	426,730
1980	1,798,098	6,264,105	4,468,007	2,795,722	906,159	1,889,563	898,545	451,864	446,681
1981	1,835,814	6,465,159	4,629,395	2,846,969	887,903	1,959,066	912,347	446,372	465,975
1982	1,876,499	6,670,767	4,794,268	2,898,219	869,706	2,028,513	926,188	440,814	485,374
1983	1,917,917	6,881,022	4,963,105	2,948,874	851,599	2,097,275	939,881	435,191	504,690
1984	1,960,225	7,095,820	5,135,595	2,999,240	833,582	2,165,658	953,630	429,507	524,123
1985	2,003,380	7,315,229	5,311,849	3,049,326	815,666	2,233,660	967,240	423,756	543,484
1986	1,994,551	7,672,058	5,677,507	3,050,392	809,108	2,241,284	981,891	423,735	558,156
1987	1,974,388	7,935,651	5,961,263	3,051,570	793,524	2,258,046	990,801	419,012	571,789
1988	1,961,133	8,209,932	6,248,799	3,053,104	778,275	2,274,829	999,815	414,378	585,437
1989	1,948,901	8,495,409	6,546,508	3,054,998	763,340	2,291,658	1,008,725	409,821	598,904
1990	1,937,942	8,792,641	6,854,699	3,057,224	748,724	2,308,500	1,017,741	405,346	612,395
1991	1,928,628	9,041,387	7,103,543	3,058,798	735,470	2,323,328	1,026,651	401,773	624,878
1992	1,913,873	9,299,127	7,385,254	3,060,673	717,889	2,342,784	1,035,562	395,536	640,026
1993	1,899,118	9,561,508	7,662,390	3,062,836	700,506	2,362,330	1,044,471	389,301	655,170
1994	1,884,366	9,828,567	7,944,201	3,065,273	683,318	2,381,955	1,053,382	383,060	670,322
1995	1,869,612	10,100,315	8,230,703	3,067,972	666,351	2,401,621	1,062,293	376,823	685,470
1996	1,854,859	10,376,598	8,521,739	3,070,920	649,598	2,421,322	1,071,204	370,591	700,613
1997	1,840,102	10,657,622	8,817,520	3,074,109	633,073	2,441,036	1,080,115	364,368	715,747
1998	1,825,352	10,943,222	9,117,870	3,077,528	616,768	2,460,760	1,089,025	358,152	730,873
1999	1,810,596	11,233,406	9,423,099	3,081,165	600,705	2,480,460	1,097,935	351,963	7 5,972
2000	1,795,841	11,527,997	9,732,156	3,086,012	584,857	2,500,155	1,106,844	345,784	7 1,060

Year	RICE			BARLEY		
	Production MT	Consumption MT	Surplus or Deficit MT	Production MT	Consumption MT	Surplus or Deficit MT
1977	2,401,701	1,114,328	1,287,373	89,527	86,135	3,392
1978	2,426,391	1,158,483	1,267,908	88,899	87,224	1,675
1979	2,450,167	1,205,043	1,245,124	88,297	88,313	16
1980	2,472,618	1,253,165	1,219,453	87,728	89,403	1,675
1981	2,494,097	1,304,523	1,189,574	87,172	90,490	3,318
1982	2,514,682	1,357,663	1,157,019	86,633	91,578	4,945
1983	2,534,449	1,412,672	1,121,777	86,121	92,665	6,544
1984	2,553,456	1,496,548	1,056,908	85,612	93,753	8,141
1985	2,571,759	1,528,361	1,043,398	85,124	94,842	9,718
1986	2,590,055	1,615,439	974,616	84,773	93,688	8,915
1987	2,607,127	1,685,397	921,730	84,426	94,549	10,123
1988	2,623,629	1,758,779	864,850	84,092	95,421	11,329
1989	2,639,592	1,835,783	803,809	93,464	96,305	12,841
1990	2,655,052	1,916,613	738,439	83,446	97,202	13,756
1991	2,669,470	1,989,788	679,682	83,138	98,111	14,973
1992	2,683,433	2,063,977	619,456	82,835	99,035	16,200
1993	2,696,969	2,141,222	555,747	82,541	99,969	17,428
1994	2,710,102	2,220,812	489,290	82,255	100,922	18,667
1995	2,722,846	2,302,806	420,040	81,975	101,887	19,912
1996	2,735,220	2,387,215	348,005	81,704	102,867	21,163
1997	2,747,252	2,474,137	273,115	81,434	103,860	22,426
1998	2,758,947	2,563,590	195,357	81,171	104,870	23,699
1999	2,770,330	2,655,636	114,694	80,915	105,896	24,981
2000	2,791,406	2,750,266	31,140	80,664	106,936	26,272

* For human food, not including industrial uses or livestock feed except in the case of barley which is primarily used for brewing and livestock feed.

Source: "Master Plan For Storage & Distribution of Food Grains in Egypt", by Black & Veatch Int., Sept. 1978.

Year	Whole Grain Wheat For Domestic Milling MT	Imported Flour (Wheat equivalent) MT
1985	5,171,000	353,000
1990	6,372,000	452,000
2000	9,032,000	789,000

3. There will be a surplus of production over needs in corn and sorghum available for industry, animal feed, or export from 1977 through 2000.

4. Rice shows a current surplus that is available for export. This surplus will gradually decline till the year 2000.

5. All imported flour and grains other than wheat are handled now in bags. By the year 1986, all wheat imports(other than flour) will be handled in bulk at ports. Bagging will be made up country.

6. Table (5.4) summarized the projections to year 2000 of imports of wheat for domestic milling and wheat flour.

5.3.4. The World Bank Appraisal Report of Alexandria Port

This report has been issued in March 1976 and therefore is prepared somewhat earlier than other forecast reports. The forecasts included are those of Alexandria port only. However, these constitute the overwhelming majority of the Egyptian trade. The forecasts were made till 1980 and the level of traffic, as the report stated is expected to remain the same for the next 3 or 4 years. The procedure adopted in the forecasts are summarized hereafter:

Table 5.4

Summary of Projected Imports of Wheat for Domestic Milling and Flour (in wheat Equivalent). 1977-2000

Year	Urban Governorates		Lower Egypt		Middle Egypt		Upper Egypt		Frontier Egypt		Total Egypt	
	Wheat MT	Flour MT	Wheat MT	Flour MT	Wheat MT	Flour MT	Wheat MT	Flour MT	Wheat MT	Flour MT	Wheat MT	Flour MT
1977	1,431,300	339,093	870,900	484,166	300,300	124,852	735,000	(164,989)	3,000	66,951	3,340,500	850,073
*1981	1,810,800	202,005	1,689,000	102,602	510,300	3,429	1,158,000	(538,142)	3,000	78,729	5,171,100	(356,581)
1985	1,810,800	481,099	1,689,000	166,860	510,300	101,601	1,158,000	(488,148)	3,000	91,812	5,171,100	353,224
1990	2,470,800	330,442	2,170,200	176,203	570,300	221,557	1,158,000	(389,325)	3,000	113,144	6,372,300	452,021
1995	2,620,800	538,782	3,024,000	185,801	930,300	56,557	1,158,000	(141,818)	3,000	181,302	7,736,100	820,624
2000	3,085,900	516,816	3,795,000	129,049	1,110,300	49,786	1,158,000	28,572	183,000	65,119	9,332,100	789,342

* Planned milling capacity in this year exceeds consumption requirement, so computer indicated negative flour import. Actual expectation is around 4.321,000 MT wheat and 500,000 MT flour (wheat equivalent) imported in 1981.

Source: "Master Plan For Storage & Distribution of Food Grains in Egypt", by Black & Veatch Int., Sept. 1978.

1. Traffic was classified into: general cargo, dry bulk, and liquid bulk.

2. For certain bulk items like coal, timber, fertilizers, and petroleum traffic, where individual commodity projections were possible on the basis of field data and personal discussions, such estimates were used. For instance:

   a) Coal imports will go up due to the addition of a third blast furnace in Helwan plant and fourth one in 1980.

   b) Timber imports projection is based on the reconstruction activities in the canal area.

   c) Fertilizer estimates are made in view of the impact of increasing the domestic production capacity (2 urea plants in 1979).

   d) Petroleum imports & exports are based on discussions with the petroleum planning & refinery authorities.

3. For all general cargo items and the remainder of the bulk commodities, projections were made on the basis of growth factors used by the IBRD in the aggregate foreign trade volume projections for Egypt. The rate of growth in constant price trade volumes of each commodity group was taken to represent approximately the rate of growth in physical volume of the items included. The rates are 16% for capital goods imports, 10% for intermediate goods imports, only 1% in cotton exports, 3% in rice exports, 6% in agricultural exports and 12% in manufactured goods exports.

The projections yielded are shown in table (5.5) General cargo imports are expected to go up from 3.0 to 4.4 million tons between 1975 & 1980. Total trafic in timber and bagged fertilizers is to decline from 1.1 million tons to 0.75 mainly due to the expected decline in bagged fertilizer traffic.

5.3.5. The Future Prospects of Food in the Arab Countries

This study which has been conducted by the Arab FAO contains detailed projections of the major food commodities for each country in the Arab World. The commodities involved include wheat, sorghum, rice, strach crops, sugar, oil seeds legumes, vegetables, fruits, meat, dairy products and fish. Foreign trade forecasts are made through analysis of both production and uses of each commodity in the respective countries. Production is based on productivity & cultivated area trend projections. The consumption component of the uses side is based on population and per capita consumption projections. The results of Egypt for the years 75 through 2000 (5 year interval) are reproduced in table (5.6) As a general observation it is to be noted that the results of this study are (with the exception of wheat) generally higher as compared with other studies.

5.3.6. Other Individual Commodity Forecasts

Fertilizers & Fertilizer Input Material

Up till recently, Egypt was not self-sufficient in fertilizers, it imports introgenous, phosphatic, and compound fertilizers.

Table (5.6): Port of Alexandria

Traffic Projections, 1975-1980

	1974 (Actual)	1975	1976	1977	1978	1979	1980
A. General Cargo							
Imports	1,986	3,000	3,310	3,640	3,960	4,170	4,420
Exports	1,246	1,270	1,375	1,460	1,495	1,600	1,725
Total A	3,232	4,270	4,685	5,100	5,455	5,770	6,145
B. Dry Bulk							
Imports	5,986	6,360	6,515	6,740	7,250	7,370	7,580
of Which: Fertilizers (10 % in bags)	1,030	900	600	600	600	300	300
Exports	56	30	50	50	50	50	50
Total B	6,042	6,390	6,565	6,790	7,300	7,420	7,630
Total A + B	9,274	10,660	11,250	11,890	12,755	13,190	13,775
C. Liquid Bulk							
Imports	5,610	6,000	6,000	4,500	4,000	4,000	4,000
Exports	585	750	800	1,500	2,250	2,250	2,250
Total C	6,195	6,750	6,800	6,050	6,250	6,250	6,250
Total Traffic (A+B+C)							
Imports	13,582	15,360	15,825	14,880	15,210	15,540	16,000
Exports	1,887	2,050	2,225	3,060	3,795	3,900	4,025
Total	15,469	17,410	18,050	17,940	19,005	10,440	20,005

Source: "Appraisal Report: Port of Alexandria Report"

by The IBRD, March 1976.

Table (5.6): Summary of Food Commodities Forecasts of Egypt (1975-2000) by the Arab FAO

(+) ex (000 tons)

Year / Commodity	1975	1980	1985	1990	1995	2000
Wheat	3247	3941	4556	5319	6236	7232
Maize	424	777	861	1084	1359	1939
Rice	++ 151	++ 39	++171	98	514	1062
Starch Crops[1)]	++ 65	++2000	++ 25	++ 165	++ 134	+ 101
Sugar	117	++102	++ 6	++ 32	++ 165	+ 341
Oil Seeds[2)]	++ 751	+1009	++065	+1063	+1216	+1272
Legumes	151	64,9	117	179	265	330
Vegetables	++ 185	+ 672	+600	+ 517	+ 406	+ 319
Fruits	+1955	+ 140	+ 9	84	244	330,1
Meat	83	143	252	252	455	512
Poultry	3	14	25	24	28	16
Dairy	97	160	222	239	155	84
Fish	39	50	63	80	95	114

(+) exports, otherwise imports
(1) 80% Potatoes

Source: Future of Food Economics in Arab Countries (1975-2000), Part 3, Foreign Trade, Arab FAO, Khartoum, September 1978.

It also imports pyrite and sulphur required in the production of sulphuric acid, which in turn is an intermediate input to the production of single super phosphate.

In a recent study by the World Bank[1] an analysis of the actual (1975) situation is given in addition to proposals for future expansion policies. According to such a study, Egypt imported 919 thousand tons of fertilizers in 1975 which account to 52.75% of its total fertilizer demand.

With the newly established production capacities, the above study states that Egypt will be completely self-sufficient in nitrogenous fertilizer up to 1987. However there will be a need for the import of triple superphosphate in the period between 1982-1984 at the rate of 18,000 tons annually. In the period 1985-1987, this figure will increase to 68,000 tons per annum. A normative export oriented strategy has been revealed by the same study. A potential export market of 500,000 tons per year of final product could be captured and maintained if certain capacity expansions could take place. Alternatively, a smaller export market of 250,000 tons per year could result if a smaller expansion program is carried-out. However a realistic figure of 100,000 tons was set by different seenarios.

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1) "A Planning study of the Egyptian Fertilizer Sector", 1977.

Cement Forecasts

The Egyptian cement office (ECO) is in charge of marketing all the domestic production of the various companies. Since there is always a varying lag period between payment and actual delivery, actual consumption could not be accurately evaluated. Specialists familiar with the cement market in Egypt intuitively estimate demand to be 10 to 20% higher than paid orders. Paid orders increased from 2.88 million tons in 1971 to 4.14 million tons in 1976, at an average annual rate of 7.47%.

A consulting firm* has conducted a recent study in March 1978 to estimate cement imports till 1986. Cement orders were taken as the best available indicator of demand. They are fully paid in advance thereby expressing demand on the part of the consumers. In order to forecast future demand, Egypt was divided into 7 demand regions namely;

Region I : Cairo, Guiza, Qualiobia
Region II : Damietta, Dakahlia, Sharkia
Region III : Suez, Ismalia, Port Said
Region IV : Fayoum, Beni-Suef
Region V: Alexandria; Bahera
Region VI: Menufia, Gharbia, Kafr El Sheikh
Region VII: Upper Egypt

The frontier governorates were excluded: The model used to forecast

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* H.K.Ferguson, International, Cleveland Ohio/USA.

regional consumption was based on estimating the historical trend in per capita consumption of cement in each governorate, projecting future per capita consumption by extrapolating such trends, and multiplying the projections by governorate population as forcasted by CAPMAS. The later demand projections were adjusted by 10% & 20% as two scenarios to allow for latent demand. Similarly lower & upper limits were set for local supply. The results are shown in Fig. (5.3) from this Figure import fiqures could be estimated to vary; between 1.1 & 3.0 million tons by the end of 1985 & between 2.4 & 4.4. million tons by the end of 1986.

On the other hand, most imports were made in bags. In a recent development at Alexandria port, cement is currently imported in bulk. A floating cement silo is currently providing mechanical packaging of bulk imports to be directly loaded aboard trucks, thus minimizing port time for cement ship, reduce congestion, and enhance ship unloading.

5.4 Development of Foreign Trade Forecasts

The commodity import/export lists decided upon in section 5.2 were very much identical to the lists developed by F.R,Harris in its study"Development Policy: Ports of Egypt 1980-2000". Therefore the results of this later study has been consulted as a first step. The central theme of our study is not a forccasting one. Hence it doesn't make any sense duplicating efforts. Time and budget limitations are additional consideration. Moreover the results of Harris study have been subject to throughout evaluation

by several related agencies in a joint open seminar and consequently have been refined. However, in addition to Harris forecasts, there have been several respectable studies in the past few years made by foreign consultants or reputed local research teams that provide forecasts of individual items or a group of similar items. Since the emphasis of these later studies is usually focussed on a single commodity or a group of few commodities, the forecasts yielded are usually made in view of a comprehensive and detailed analysis of the demand and supply side and consequently are highly reliable. Therefore, as a second step, Harris forecasts have been updated and refined in view of these considerations as will be shown in the next sections. With the exception of the items mentioned in these sections, Harris forecasts have been accepted.

5.4.1. Agricultural & Food Commodities

a) Food Grains

In this category Veatch forecasts have been accepted as the most reliable source, since it is based on a throughout analysis of the sector. Supply was based on cultivated area and yield trends while demand was based on population and per capita consumption. All trends have been statistically validated. Details of the analysis were made on the governorate level with discrimination between urban and rural areas. The break down of wheat imports into wheat and flour equivalent were based on an accurate survey of the milling capacities.

For wheat and flour imports, Veatch, forecasts for the years 1985 and 1990 are:

Wheat	5,171,000	&	6,372,000	tons respectively
Flour	353,000	&	452,000	tons respectively

In comparison with Harris forecasts these are generally higher although the differences are not great except for flour imports in 1985, on the in general agreement with those of the AFAO.

For corn there are wide discrepancies between Veatch and Harris forecasts. For instance Harris projected corn imports in 1985 and exports in 1990 . Veatch on the contrary projected a surplus for exports of 2234000 and 2309000 tons in those years respectively. There is also a wide difference in the magnitude of Veatch exports in 1990 and those of Harris (381000 only).

Sorghum and millet were treated together by Veatch while omitted from Harris list. Sorghum and millet surplus in 1985 and 1990 are projected to be 543000 and 612000 respectively. On the contrary, ENTS has projected sorghum imports of 198000 in 1985. On the other hand, AFAO forecasts heavy sorghum imports of 861000 and 1,084000 in 1985 and 1990.

For Rice, Veatch forecasts exports of 10 43000 and 738000 in the respective years, i.e. it assumes a decreasing rate of export. Harris

assumes an increasing rate. AFAO forecasts rice imports of 98000 tons by 1990 which is a rather pessimistic forecast.

b) Other Food Commodities

(Meat, Fish, Starch crops, Sugar, Vegetables, Fruit, Dairy Products and Citrus).

For the above commodities, the study of the AFAO seems to be most reliable. On one hand it is more recent than other studies. On the other, it is prepared using the most reliable data available and was subject to an assessment by top specialists of the sector. As a general observation forecasts of AFAO are generally higher than the other studies.

Meat imports are estimated at 277000 & 356000 tons in the respective years which is slightly higher than ENTS estimates, of which 252000, 332 000 tons are meats and 25000 and 24000 tons are poultry.

Frozen fish exports are estimated at 63 and 80 thousand tons. Starch crops (which are mostly 80% potatoes) are an important item on the export list of Egypt. Neither Harris nor ENTS lists have shown such item explicity, it might have been included implicitly in the vegetables category. In view of the AFAO study an export figure of 210,000 & 165000 tons is accepted for 1985 & 1990.

For sugar there is almost a consensus among all forecasts available that there will be no imports of sugar beyond 1985. This fact is accepted. However on the exports side there are wide variations in the exports estimates. While AFAO estimates sugar exports in 1985 and 1990 at only 6000 and 32 000 tons, Harris estimates these amounts at as high as 182000 and 380 000. These over estimates were avoided particularly in view of the fact that AFAO Forecasts are supported by ENTS results.

Vegetables are estimated to be exported in 1985 and 1990 at 600,000 and 517 000 tons respectively. These forecasts of AFAO are in agrement with ENTS. No vegetable imports are assumed on the contrary of Harris results.

The exports figure of Harris for fruits is excessively high (378 & 847 thousand tons respectivley). AFAO estimates fruit exports of 9000 tons in 1985 and imports of 84 000 in 1990. Most probably, these differences are due to differences in items grouping. Since certain items are treated separately such as citrus fruits, AFAO estimates are accepted.

Dairy products are forecasted by AFAO to be 222 000 & 239 000 tons in 1985 & 1990.

Citrus fruits which are an important item on the exports list are mostly oranges. No individual forecasts are available except those of ENTS. Citrus exports in 1985 & 1990 are estimated at 559000 & 709000 tons respectively.

Onion exports are projected by Harris at 344 000 and 583000 tons. No AFAO estimates are available. ENTS estimates are much lower. However Harris Forecasts are accepted for onions and the remainder of the agricultural items.

5.4.2. Industrial and Mining Materials:

Phosphate Rock

This item constitutes a bulky exporting item. By 1985 it is assumed that Abu-Tartour project will be in operation. Almost 7 million tons of phosphate rocks are to be concentrated. Six million tons of the concentrated raw material are to be exported. Harris forecasts did include such amount within the fertilizer items. However, phosphate is treated here as an idependent item. Six million tons are assumed to be exported in 1985 and 1990.

Fertilizers

In the case of fertilizers the IBRD forecasts have been accepted as the most reliable source*. They are based on the survey of the sector. All

* Forecasts of this study have been recently confirmed by a recent study conducted at INP in 1979 and entitled"Techno-economic study for the Future Prospects of Fertilizers Industry and Agriculture Development in Egypt".

expectations indicate that Egypt will reach self sufficiency up 1980. Harris fertilizer imports forecasts are consistent with these expectations. This, however holds true for nitrogenous fertilizers. Egypt will still remain an importing country of phosphatic fertilizers. Import forecasts in 1985 and 1990 by the World Bank are 68 000 and 70 000 tons respectively.

On the export side the Bank's export figures are estimated at 100,000 tons in the respective years. These are much lower than Harris forecasts. The only interpretation for this difference is that Harris forecasts do include the expected exports of Abu-Tartour phosphate rocks. This interpretation is validated in view of the lower estimate of phosphate exports by Harris (i.e. Abu-Tartour phosphate was treated as a fertilizer rather than phosphate rocks).

Cement

Again for cement a reliable sector study by H.K.Ferguson is available. Therefore its estimates have been taken. Harris forecasts cement exports of 134 000 tons in the reference years, which is against current indications. Imports are estimated by Ferguson at:-

1.1 to 3 million tons by the end of 1985

and

2.4 to 4.4. " " " " " " 1986., Fig(5.3)

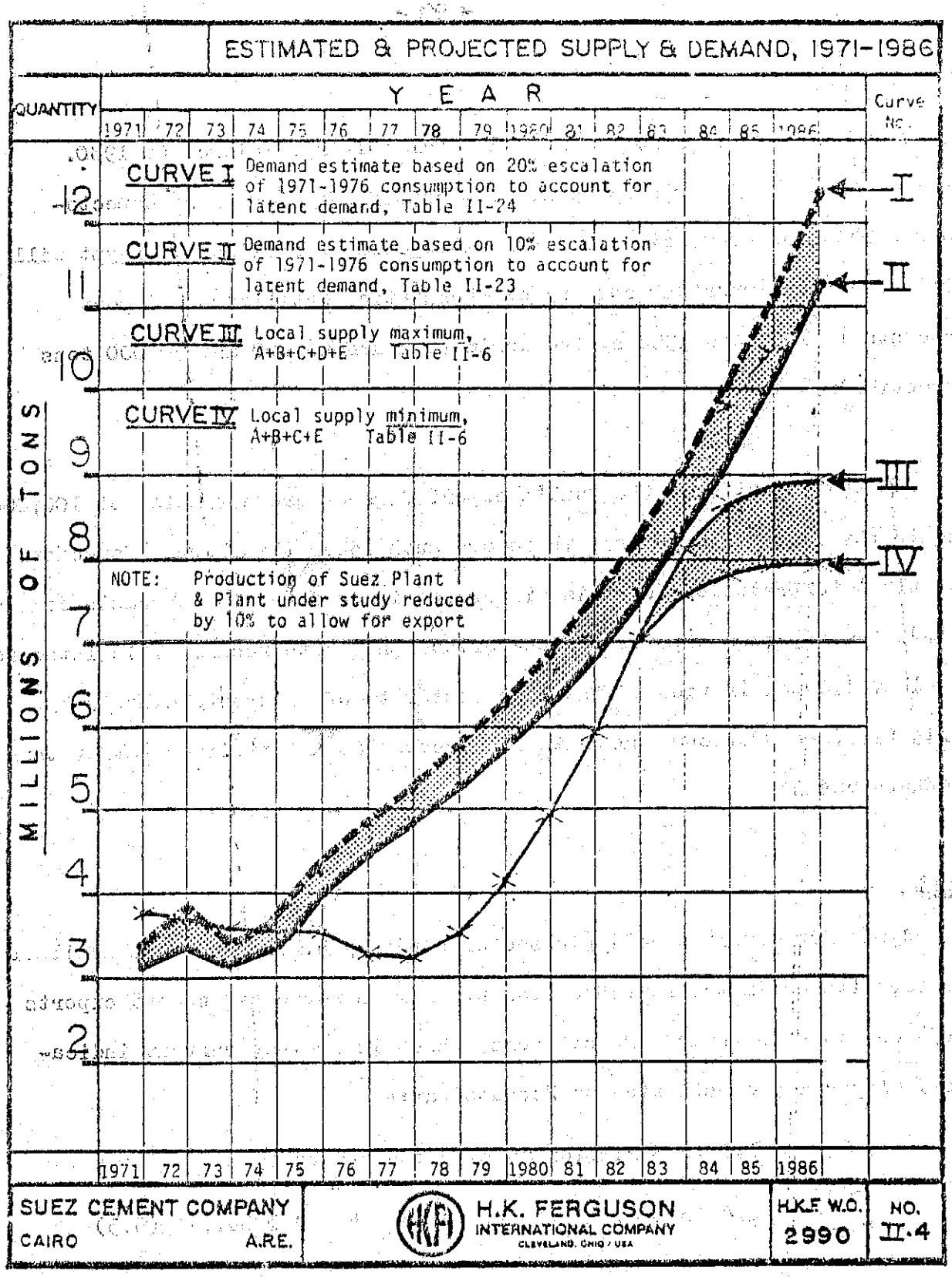

Fig. (5.3); H.K. Furguson forecast for cement

Therefore by linear extrapolation the most likely estimates for 1985 and 1990 were taken as 2 and 6 million tons respectively. Again in contrast to Harris figures all such quantities are assumed to be received in bulk.

Coal:

All coal imports are used to manufacture coke which is a major input for the production of pig iron at Helwan plants, according to ENTS coal imports are estimated by industry specialists at 2 million tons at 1985 and 1990. These are also the same forecasts of Harris.

The final form of foreign trade forecasts for 1985 and 1990 are shown in table (5.7).

5.5. Trade Distribution

This section is concerned with the geographical distribution of the commodity trade forecasts which have been developed in the earlier section. This geographical distribution of trade according to origin regions as for imports and destination region as for exports together with their import/export ports will eventually help in allocating trade forecasts among alternative navigation lines.

5.5.1. Methodology

A rough distribution has been developed by Harris for his trade forecasts. Such distribution has not been detailed to the line level. Trade

Table (5.7): Final Form of Foreign Trade Forecasts

1985 & 1990.

EXPORTS			IMPORTS		
Commodity Items	1985	1990	Commodity Items	1985	1990
Group 1:			Group 1:		
1. Onions	344	583	1. Meat, Forzen	277	356
2. Vegetables	600	517	2. Fish, Frozen	63	80
3. Fruits	9	0	3. Vegetables	00	0
4. Cotton, Textile	113	162	4. Fat oils	707	1024
5. Cotton, Weate	21	27	5. Tobacco	37	47
6. Fish	0	0	6. Chemicals	830	1060
	1087		7. Light Machinery	68	87
			8. Fruit	0	84
			9. Dairy Products	222	239
				2204	
Group 2:			Group 2:		
1. Rice	1043	738	1. Paper & Pulp	306	390
2. Sugar	6	32	2. Raw Cotton	73	81
3. Cotton, Raw	150	150	3. Sugar	00	0
4. Cement, Bags	0	0	4. Cement, Bags	0	0
5. Starch crops, Mostly Potatoes	165	210	5. Flour	353	1462
6. Citrus, mostly orange	559	709		732	
	1923				
Group 3:			Group 3:		
1. Phosphate Rock	6000	6000	1. Wheat	5171	6372
2. Fertilizers	100	100	2. Corn	0	0
3. Corn	2234	2309	3. Salt sulphur	182	293
4. Cement	0	0	4. Coal & Coke	2000	2000
5. Sorghum & Millet	543	612	5. Iron Ore	106	316
	8877		6. Fertilizers	68	70
			7. Cement, Bulk	2000	5000
				9527	
Group 4:			Group 4:		
1. Petroleum, Crude	5809	6390	1. Butane	182	164
2. Petroleum, Product	881	969	2. Petroleum Products	274	274
	6690			456	
Group 5:			Group 5:		
1. Iron & Steel	90	145	1. Lumber & Timber	926	1491
	90		2. Iron & Steel Scrop	1200	1200
			3. Heavy machinery & vehicles	251	320
				2377	

has been roughly distributed according to the following categories:

1. Via Gibraltar.
2. Via Red Sea.
3. East Mediterranean.
4. West Mediterranean.

The methodology adopted is a normative rather than a positive or an "actual" one. After zoning both the outer world and Egypt into several zones, a network algorithm has been applied to find-out the optimum chain or route between each origin-destination pair.

However, in our study, the approach adopted is positive or actual rather than a normative one. Such a degree of rationality is not assumed in trade scheduling procedures and allocation among the navigation routes. Moreover, no structural changes have been assumed in the trade pattern at least in 1985. Recent trends revealed after the open door policy are assumed to continue by 1985. Minor changes are assumed for 1990. This concept has governed the methodology adopted in trade distribution. This methodolgoy is summarized in the following:-

1. Commodity destination and commodity source matrices have been constructed for both the export and import lists respectively for the year 1978, based on historical statistics, cells of these matrices gave the weight "percentage" by which each commodity item is distributed among the importing/exporting countries. The matrices showed also

the weight each commodity assumes in the total trade.

2. Trend extrapolations of such percentages have been made for the year 1985. Certain modifications and adjustments have been assumed for 1990.

3. Trade distribution for each commodity was then directly obtained through multiplication of the respective percentage at 1985 or 1990 by the commodity trade forecasts.

4. From information about the ports served by each route (current or proposed), a table for the countries connected with Egypt through each route is constructed as shown in table (5.8)

5. Trade volumes along individual lines are obtained by aggregating Egypt's break bulk (containerizable and not containerizable) trades with countries along that line. Line trades are classified into imports and exports. Bulk trades are grouped into separaate categories since these are usually transported by non-Liner means. Line interferences (country's served by more than one line) are usually resolved by distributing the country trade among the respective lines. The final form of trade distribution is given in table (5.9).

Table (5.8): Countries Connected to Egypt Along Different Lines

Line	Countries
1) North-West Europe (Continental)	East Germany- Finland-Poland. Denmark - Portugal Sweden-Norway-Belgium-West Germany France-Netherlands-Luxemburg-Morocco - K.of Monaco
2) North America	U.S.A-Mexico-Canada-Cuba, Marocco Argenti a-Dominican
3) England	England-Ireland
4) Adriatic	Yugoslavia-Austria-Albania-Hungaria-Czechoslovakia Italy.
5) India	India-Iran-Pakistan-Srylanca-Gulf Area-Iraqu-S.Yemen Somalia-East African Countries - Bangladesh.
6) East & West Medit.	Syria-Lebanon-Libya-Tunisia-Algeria-Jordan+Turkey+Italy-Cyprus-Greece-Malta-Switzerland+Spain-Morocco-
7) Black Sea	U.S.S.R.-Bulgaria-Rumania+Turkey
8) Red Sea	Saudi Arabia-Sudan-Ethiopia-Yemen-Djibouti
9) Far East	China-Philippine-Japan-Indonesia-Thailand+S.Yemen South & North Korea, Hong-Kong, Singapore Malysia-Australia

Table (5.9): Aggregation of Break Bulk cargo Forecast by Line and Bulk cargo Forecasts by commodity, 1985-1990.

(000 Tons)

COMMODITY TYPES		CONTAINERIZABLE CARGO		OTHER BREAK BULK CARGO		TOTAL BREAK BULK		BULK CARGO	
		1985	1990	1985	1990	1985	1990	1985	1990
Line 1	IMP	529.9123	677.5003	498.7816	341.0052	1028.6939	1018.5055		
	EXP	243,7803	229.4693	187.0681	172.2936		501.7629		
Line 2	IMP	528.7818	753.1382	213.7822	274.0408	742.594	1027.179		
	EXP	17.211	23.47671	125.4664	88.9274	142.6774	112.1041		
Line 3	IMP	47.0199	62.9418	47.792	12.48	94.8119	75.4218		
	EXP	29.0844	46.9424	152.27	193.025	181.3244	239.9674		
Line 4	IMP	78.2397	113.1276	188.6776	248.6723		162.456		
	EXP	53.9751	64.8073	321.60025	285.4375	375.5754	350.2448		
Line 5	IMP	5.6855	7.2505	0.859	1.185	6.5445	8.4355		
	EXP	148.379	137.3737	84.1639	86.2394	223.5439	223.6131		
Line 6	IMP	176.9949	296.9387	794.4108	99.596	971.4057	395.2347		
	EXP	365.8317	364.6105	537.19925	416.4167	903.0309	781.0272		
Line 7	IMP	621.3317	793.6938	953.318	58.67	1674.6497	852.3638		
	EXP	141.066	235.474	336.9363	407.0381	478.0023	-642.5121		
Line 8	IMP	3.0193	3.9785	1.7136	2.181	4.7329	6.1625		
	EXP	87.0167	86.3068	125.4591	134.6774	212.4758	220.9842		
Line 9	IMP	208.9889	276.4959	4.4982	5.733	213.4871	282.2289		
	EXP	0.18	0.1551	49.9922	50.3842	50.1722	50.5423		
Line 10	IMP	0.0555	0.0705	0.01	0.0	0.555	0.0705		
	EXP	0 0.2712	0.3888	0.469	1.513	0.7402	1.9018		
Wheat	IMP							5171	6372
Corn sorghum & Millet	EXP							2234	2309
	EXP							543	612
Iron & Steel	IMP							1200	1200
	EXP							90	145
Timber	IMP							926	1491
Timber	IMP							926	1491
Iron Ore	IMP							106	316
Coal & Coke	IMP							2000	2000
Salt & Sulphur	IMP							182	293
Cement	IMP							2000	5000
Phosphate Rock	EXP							6000	6000
Fertilizers	IMP							68	70
	EXP							100	100
Pet. Grude	EXP							5809	6390
Pet.	IMP							274	274
Products	EXP							881	969
Butane	IMP							182	164

CHAPTER 6

Model Formulation & Application

CHAPTER SIX

6.1 Introduction

The present and subsequent chapters constitute the high point in this study. After covering the theoretical aspects relevant to our problem (chapters 2 & 3) and analysing its supply and demand sides (chapters 4 & 5) a return is made to the study objectives previously outlined in section 1.2. An attempt is made here to fulfill these objectives and answer the major questions raised in conjunction with them.

For the sake of continuity, it might be beneficial to reassure in this introduction that our main objective is to draw up some sort of a master plan for the maritime transportation sector in Egypt. It is hopeful that such a plan will be able to bring together the major economic activities related to sector and secure some harmony among them in an attempt to satisfy some kind of a national optimum. Such a plan, if properly designed will assist the identification of an integrated system of projects that make up a consistent investment program.

Moreover, the intended master plan should provide adequate answers to some of the crucial questions encountering the sector. Chief among these are:

- The optimum size & composition of the national fleet
- The appropriate scale of operation of the fleet units all over the various navigation routes.
- The allocation of the currently available fleet units.

- The appropriate policy of securing the excessive trade size on the foreign vessels.
- New vessel additions for fleet development
- Contribution of the domestic building capabilities to such additions
- Identification of the foreign sources for these additions.
- The investment size necessary for any development objective, etc ...

6.2. Model Formulation:

The previous questions, and others, lend themselves to an LP-type optimization model. Early attempts for formulating this model have revealed certain drawbacks that are tried to be overcome in this current attempt*.

6.2.1. Planning Horizon:

One of the considerations associated with building such type of planning models is the uncertainty about the future. Although the size of the uncertainty problem could be to a certain extent identified through sensitivity analysis, uncertainty on several occasions might prevail the entire model and the standard sensitivity analysis might be inadequate or burdensome. Therefore, the accompanying uncertainty in forecasting in

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* See for instance: A.M. FARAHAT "A Planning Optimization Model For The Egyptian Maritime Transport Sector", I.N.P. Memo. 1082, May 1975.

addition to the dynamic nature of the factors and parameters relevant to the problem make the decision of a reasonable planning horizon for the model an important task.

It is believed, due to the above factors and the instability expected to associate the beginning of a development plan to the Egyptian commercial fleet, that a medium range planning horizon (between 5-7 years) will be reasonable for our environment. The period is considered to be adequate to carry out any measures yielded by the model and in the same time it is capable of being integrated in longer-term plans.

6.2.2. Summary Table:

The proposed formulation of the problem could be illustrated through the aid of a problem summary table such as the one given in figure (6.1). The table depicts a two - dimentional array in which the (i) dimension (rows) represents the trade elements of the Egyptian foreign trade and the (j) dimension (columns) represents the transportation features of such trade elements. Trade elements are broadly classified into general as well as bulk cargo elements. General cargoes are defined in this context as those dry cargo break bulk items that are normally transported by liner ships. Although foreign trade forecasts for these items are made on the commodity level they are not dealt with in this formulation on such a detailed level. Alternatively they are grouped according to the navigational lines along which they are transported. In order to test the scope of operations of the fleet units, the lines considered here are made up of both lines in current operation in addition to

The Modeling Matrix

		TRANSPORTATION								CONFIGURATIONS					
		NATIONAL SHIPS								FOREIGN SHIPS					
		Curr. Available and Remaining in service by 1985		Possible Additions From											
		General Cargo	B.C.	DOMESTIC YARDS			FOREIGN SOURCES (YARDS, MARKET)								
				GEN. C.	BU	CON.	GEN. CAR.	BULK CAR	CONTA.	SPEC	C L	SE CON	T R	Charter V.B.	Charter TIME BASIS	Trade Size (DOC Ton)
	DWT															
GENERAL CARGO	L.1															
	L.2															
	L.3															
	L.4															
	L.5															
	L.6															
	L.7															
	L.8 L.9															
BULK CARGO	DRY BULK															
	LIQUID BULK															
	SPECIAL															
	CURRENT. AVAIL. NO. OF UNITS			CONSTR. COST/UN. 1			COST PER UNIT (L.E.)									
				FOREIGN EXCHANGE COMPONENT/UNIT												

Fig. (6.1): General Lay-Out of Summary Table

proposed new lines. On the other hand, general cargo on each of the navigational lines might alternatively be classified into containerizable and non-containerizable cargoes. This latter classification makes it possible to investigate the issue of the advent of containerization to the maritime industry and reach some preliminary decisions regarding this issue.

On the contrary of general cargoes, bulk cargoes are dealt with here on the commodity level, one row for each bulk commodity. These are broadly classified into dry bulk, liquid bulk and special bulk commodities such as the liquified petroleum gases (LPG).

On the other hand, the table columns represent the alternative transportation features for the respective (row) commodities. Transportation features are mainly divided into national means and foreign means. National means are in turn subdivided into currently available means that are scheduled to remain in service by the planning horizon of model application and possible additions to the national tonnages that will be yielded as an output of this model. Several sources are considered for fleet tonnage development which include domestic yards, foreign yards, and foreign markets. Each of the previous subdivisions is further subdivided acc. to vessel type into general cargo, bulk container, multi-purpose, or special cargo vessels. Within these latter divisions, one column in the table is established for each DWT of the corresponding vessel type. Foreign means of transportation include, foreign conference liners, shipping-contract and charter vessels. Foreign vessels chartering could be made on a bare

boat basis, a voyage charter basis, or a time-charter basis. (long or short term).

In addition the summary table will show such information as foreign trade size for each row of the table by the year of model application, the number of the currently available ships, unit prices for proposed ship additions, and the foreign exchange components of these prices.

6.2.3. The Decision Variables:

The decision variables of the model could simply be defined as the amount of foreign trade cargo corresponding to a particular row in the summary table that are transported during the planning horizon year by a particular transportation feature that corresponds to a particular column in the same table. Therefore each cell in the summary table corresponds to one decision variable. The variables are numbered in a sequencial order starting from the upper north west corner in the matrix and ends in the lower south east corner, therefore if,

m = Total number of rows in the summary table

i = Row index

n = Total number of columns

j = Column index.

Then the decision variables will be defined as

$$X_{(i-1)\,n+j}$$

6.2.4. A Zero- One Matrix:

Since each decision variable will represent a certain combination of a cargo index and a transportation index, and since some of such combinations are impossible by their nature (e.g. the transport of a liquid oulk cargo by a general cargo liner), it follows directly that such variables have to be forced to a zero value in the model solution. This is achieved by inputing a zero-one matrix to the program data. With the exception of a very small portion that has to be read according to actual trade practices, the zero-one matrix could be constrcuted according to predetermined logical relationships. To arrive at the general form of this matrix, Let us define the following variables as shown in the next page.

Then the general lay-out of the zero-one matrix will be as given by figure (6.2).

6.2.5. Objective Function:

Cost minimization has been decided upon as the appropriate objective function of the model under development. This decision has been taken based on the justification presented in chapter 1, Since Egypt is not considered as a maritime country, fleet development is not an objective per se nor will its operations be directed towards cross trade and revenue earning. Rather the true perspective to consider the national fleet development problem should be within the overall context of minimizing the cost of securing transportation of the Egyptian foreign trade. This explains also the introduction of both national and foreign transportation means simultaneously in the model formulation. The analysis of the

Let,

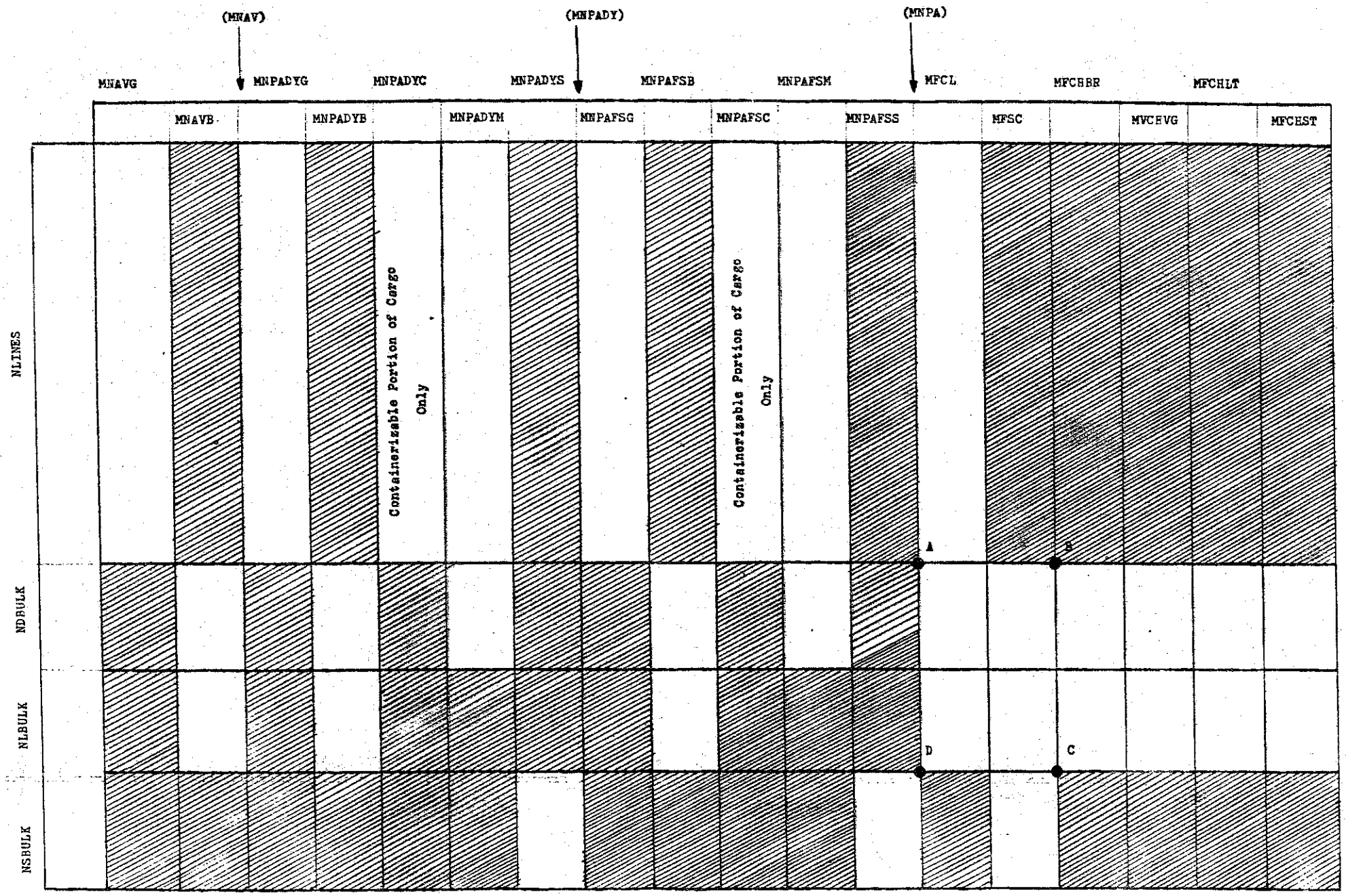
MNAVG = National means of transportation, available in service by application year, general cargo ships.
MNAVB = " " " " " " " " " " " " " , bulk cargo ships.
MNPADYG= " " " " , possible additions, from domestic yard , general cargoships.
MNPADYB= " " " " " " " " " , bulk cargoships.
MNPADYC= " " " " " " " " " , Container ships.
MNPADYM= " " " " " " " " " , multi-purpose ships.
MNPADYS= " " " " " " " " " , special ships.
MNPAFSG= " " " " " " from foreign sources, general cargo ships.
MNPAFSB= " " " " " " " " " , bulk cargo ships.
MNPAFSC= " " " " " " " " " , Container ships.
MNPAFSM= " " " " " " " " " , multi-purpose ships
MNPAFSS= " " " " " " " " " , special ships.
AFCL = Foreign means of transportation using conference liners.
MFSC = " " " " " shipping contract.
MFCHBR = " " " " " charter ships, bare boat basis.
MFCHVG = " " " " " " " , voyage basis.
MFCHLT = " " " " " " " , Long - term time basis.
MFCHST = " " " " " " " , short - term time basis

and Let,

NLINES = No. of Lines in the transportation matrix.
NDBULK = No. of dry bulk commodities considered.
NLBULK = No. of liquid bulk commodities considered.
NSBULK = No. of Special Bulk commodities considered.

and Let,

MNAV = MNAVG + MNAVB,
MNPADY = MNAV + all national means of transportation that could be added by the domestic yards.



Note: Rectangle ABCD is read acc. to actual configuration of transport.

Fig. (6.2): General Outline of Problem Zero-One Matrix

cost items is very crucial to the successful application of this model. It entails significant issues such as the issue of economic versus financial costs and how to deal with the earnings resulting from transporting Egyptian exports on national vessels. Therefore, cost estimates for the objective function terms will be separately treated in a separate section later on.

6.2.6. Model Constraints:

Eventually the current formulation of the model allows for the inclusion of 5 sets of constraints either in whole or in part. As a first version of model application, all five sets could be considered as a "reference case". Several variants of the model could then be obtained by relaxation of some of these constraints individually. For instance, relaxation of investment constraints might reveal the absolute optimum size of the national fleet. Likewise, relaxation of domestic building capacity constraints might reveal the optimum absolute capacity of such industry, ... and so on. The model set of constraints should reflect the following facts:

1. That the tonnage of general cargo borne on a certain route or the tonnage of bulk commodity items borne by the different features of transportation should equal the expected trade size of this commodity or along this route during the year of application of the model.

2. The amount of cargo borne by a certain type of ships that will be on hand by the planning period should equal the capacity of the number of vessels of this type assuming a reasonable value for the ship's utilization rate.

3. The required investments to finance building new vessels at the national or foreign yards in addition to those required to purchase new vessels from the international market should not exceed a certain amount specified by the state's planning authority in view of the general plan of the state. This amount of total investments will include both foreign and national currency. However, this constraint may be excluded and the model is used in a reverse way to estimate the total investments required to fulfil a prespecified plan target.

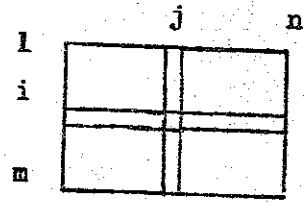
4. The part of the investment to be paid in foreign exchange should be within the permissible amount to be specified by the state's planning authority.

5. The vessels to be added to the commercial fleet through the national shipyards should not exceed the rated capacity of these yards.

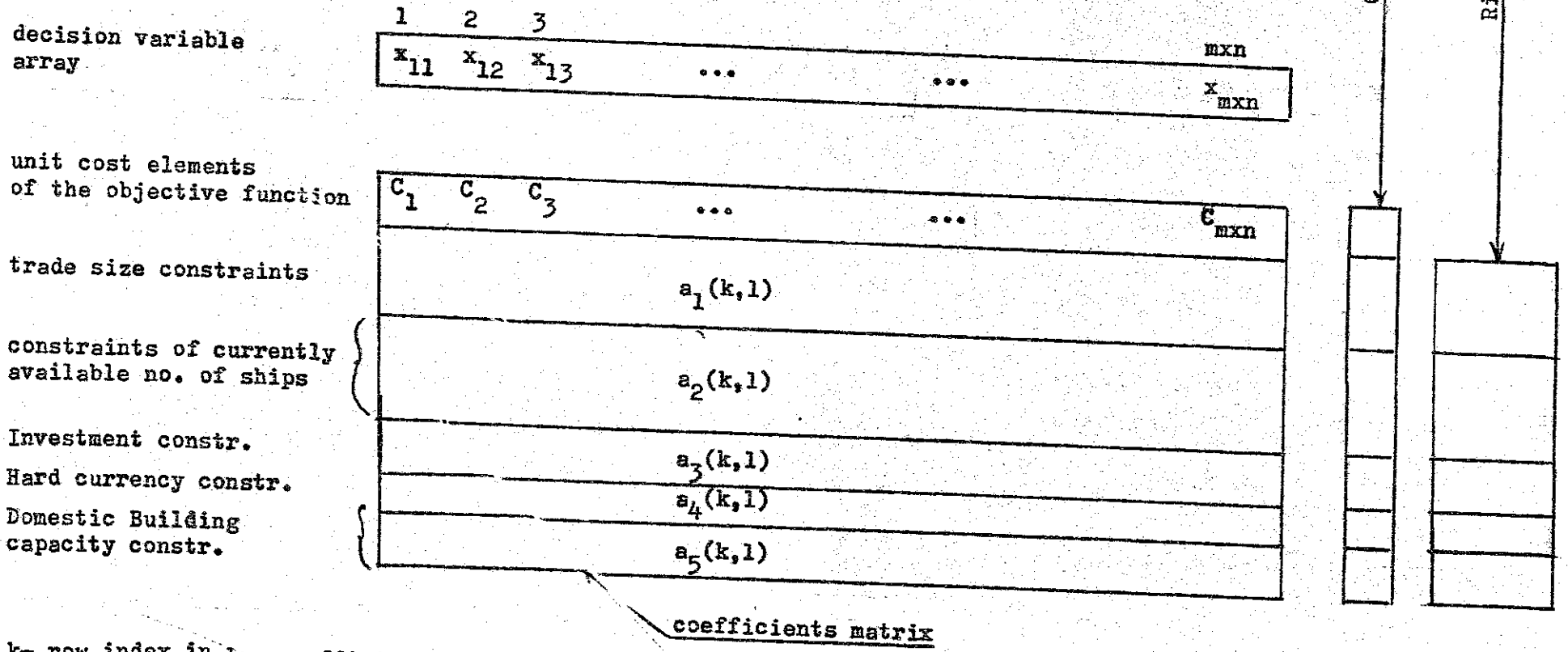
Eventually, the constraints should include any possible decision fixing a lower limit for cargo to be borne on a certain route on national vessels in fulfilment of any policies set to exercise control on certain strategical commodities such as wheat or crude oil.

6.2.7. Standard Format of the Problem:

The final step in the problem formulation is to put the problem in the standard format acceptable by commercially available LP computer packages. The package used in this study is the IBM - MPSX/370 package. Figure (6.3) is a schematic representation of the various components of this format namely:



Summary Table



k= row index in the coefficient matrix of the standard LP formulation.

l= column index in the coefficient matrix of the standard LP formulation.

Fig. (6.3): The Model Formulation Image

1- The Decision Variables Array:

This is a single dimension horizontal array made up of the string of the sequential decision variables corresponding to the one elements in the 0 - 1 matrix. Therefore the maximum length that could be assumed by such array is (m x n). In the IBM package used such variables are denoted by "names" made up of eight alphanumeric digits to improve the identification of these variables and to make them more readable.

2- The Coefficients Matrix:

This is a rectangular matrix whose columns correspond to the model decision variables as shown in figure (6.3). The coefficients of the first row in the matrix give the cost elements of the objective function. The remainder rows correspond to the system of constraints in the problem formulation. These are:

- Trade size constraints (m constraints).
- Constraints of the currently available no. of ships (MNAVG + MNAVB Constraints).
- Total investments constraint (one constraint).
- Hard currency constraint (one constraint)
- Domestic shipbuilding capacity constraints (7 constraints in this application).

If.

- k & l are the row and column indices of the coefficients matrix,
- $a_1(k,l)$ are the coefficients of the trade size constraints,

- a_2 (k, l) are the coefficients of the available no. of ships constraints,

- a_3 (k, l) are the coefficients of the investments constraint,

- a_4 (k, l) are the coefficients of the hard currency constraint,

- a_5 (k, l) are the coefficients of the domestic building capacity constraints,

and if,

- DWT (j) = deadweight tonnage of ship (j) in the summary table,

- STABLE 3 (i,j) = load factor of ship (j) if engaged in transporting cargo (i),

- STABLE 4 (i,j) = average annual no. of voyages of ship (j) if engaged in transporting cargo (i),

- PRICE (j) = Price of adding ship (j) to the national fleet,

- HCUR (j) = hard currency component of ship (j)

- NSHIPS (j) = no. of ships type (j).

and if it is assumed that 10% of the deadweight tonnage of the ship will not be available for trade transport, then the values of the coefficients under investigation will be given by the following equations:

- a_1 (k, l) = 1, for all coefficients of the matrix against the decision variables $x(i,j)$ where,
  $i = 1, 2, 3, \ldots, m$ &
  $j = 1, 2, 3, \ldots, n$
  (one constraint for each i)

$$- a_2 (k, 1) = \frac{1}{0.9 \times \text{STABLE } 3\ (i,j) \times \text{STABLE } 4\ (i,j) \times \text{DWT } (j)}$$

for all coefficients of the matrix against the decision variables $x(i,j)$ where,

$i = 1, 2, 3, \ldots m$ &

$j = 1, 2, \ldots (\text{MNAVG} + \text{MNAYB})$

(one constraint for each j)

$$- a_3 (k, 1) = \frac{\text{PRICE } (j)}{0.9 \times \text{STABLE } 3(i,j) \times \text{STABLE } 4(i.j) \times \text{DWT } (j)}$$

for all coefficients of the matrix against the decision variables $x(i,j)$ where,

$i = 1, 2, 3, \ldots, m$

$j = (\text{MNAV}), \ldots, (\text{MNPA})$

(one constraint for each j)

$$- a_4 (k, 1) = \frac{\text{HCUR } (j)}{0.9 \times \text{STABLE } 3(i,j) \times \text{STABLE } 4(i.j) \times \text{DWT } (j)}$$

for all coefficients of the matrix against the decision variables $x(i,j)$ where,

$i = 1, 2, 3, \ldots, m$

$j = (\text{MNAV}), \ldots, (\text{MNPA})$

(one constraint for each j)

- The constraints on the domestic building capacity constitute a special problem. There are usually a limited number of the building slip-ways that limits the total number of ships that could be built in the national yards irrespective of the size of such ships. On the other hand there is an overall upper limit on the total tonnage of ships that could be built. Therefore, the building capacity constraints have been expressed

using these two types of constraints simultaneously. For the former constraints the coefficients are given by:

$$- a_5 (k, l) = \frac{1}{0.9 \times \text{STABLE } 3(i,j) \times \text{STABLE } 4(i,j) \times \text{DWT } (j)}$$

for all coefficients of the matrix against the decision variables x (i,j) where,

i = 1, 2, 3, ..., m &

j = (MNAV), ..., (MNPA)

(one constraint for each j)

In addition, for the latter constraint the coefficient is given by:

$$- a_5 (k,l) = \frac{\text{DWT } (j)}{0.9 \times \text{DWT } (j) \times \text{STABLE } 3(i,j) \times \text{STABLE } 4(i,j)}$$

for all coefficients of the matrix against the decision variables $x(i,j)$ where,

i = 1, 2, 3, ..., m &

j = MNAV, ..., MNPADY

3- The RHS Array:

Which gives the values of the right hand sides of the respective constraints.

4- The Constraint Type Array:

This is an alphameric array for the constraint-type as follows:

G	for	$>$	type	constraints.
L	"	$<$	"	"
E	"	$=$	"	"
GE	"	$\geqslant$	"	"
LE	"	$\leqslant$	"	"

A matrix generation program has been coded to construct the problem immage as outlined in figure (6.3) and to compute all the above mentioned coefficients.

The program then outputs the data required as an input for the MPSX/370 package in the standard format specified by its manual.

6.3. Model Application

Based on the analysis of the transport cost chain previously given in section (3.3.1) and the cost minimization formulation of the objective function, the current model has been applied as a first stage to find out the optimum scheme of minimizing the cost of transporting the Egyptian imports. Within this framework, Egyptian exports could be best allocated to outgoing vessels. The revenue earned from export transportation will thus contribute in lowering the transport cost of imports.

The year 1985 has been chosen as the planning horizon of the model. This choice will be in parallel agreement with the current 5-year plan and will enable cross reference and comparisons between the two plans. It is intended as a future plan to carry out another application for the year 1990 to investigate the transition from one plan to the other.

The cargo trade elements decided upon in this application is made up of:

- 8 navigational lines currently in operation,

- One proposed line, the far-east line
- Bulk import commodities on the import list of chapter 5.

The transportation features decided upon in this application are given in table (6.1). They are believed to be the most realistic features representative of the current situation and capabilities of the shipyards. The currently available ships remaining in service by 1985 constitute the first 14 items on this table. The number of ships from each type available by 1985 is decided in view of the current composition of the fleet (table 4.1), the lay-up schedule (table 4.3), and the already contracted ships (table 4.4). This number is given by the following table:-

Ship Index	DWT	No off Available by 1985	1990
1	12,815	1	1
2	8,250	4	4
3	8,230	5	5
4	8,200	3	3
5	7,500	4	4
6	7,480	1	1
7	6,665	1	1
8	6,500	1	1
9	4,200	4	4
10	4,000	2	2
11	3,215	2	-
12	2,895	3	-
13	1,400	3	-
14	38,117	1	1

Table 6.1 Transportation Features decided upon in Model Application

Transportation Feature Index	DWT		
1	12815		
2	8250		
3	8230		
4	8200		
5	73500		
6	7480		
7	6665		
8	6500		
9	4200		
10	4000		
11	3215		
12	2895		
13	1400		
14	38117	MNAVB = 1	
15	4000		
16	6500	MNPADYG= 3	
17	8230		
18	20,000 }	MNPADYB= 2 ,	MNPADYC=0
19	30,000 }		
20	12800	MNPADYM= 1,	MNPADYS=0
21	6500		
22	8,230	MNPAFSG= 3	
23	12,800		
24	20,000		
25	40,000	MNPAFSB= 3,	MNPAFSC &
26	60,000		MNPAFSM=0
27	75000 m^3	MNPAFSS= 1	
28	-	MFCL = 1	
29	-	MFSC = 1	
30	20000	MFCHBR = 2	
31	40000		
32	20,0000	MFCHVG = 2	
33	40000		
34	20,000	MFCHLT = 2	
35	40,000		
36	20,000	MFCHST = 2	
37	4,0000		

It should be noted here, that upon deciding the possible additions to the national fleet from foreign sources, second hand ships from the international market have been excluded. An implicit assumption is made in this connection that due to the increased percentage of the over-aged tonnage of the fleet and the rapid change in ships technology, only new ships will be added to the fleet through building in foreign yards.

Another policy has been assumed implicitly in deciding the ship types to be included in the model namely, flexibility. It is believed that the structure of the Egyptian trade does not allow for the operation of highly specialized ships for particular trades. Therefore whenever bulk carriers are considered they are assumed to be of the combined bulk type capable of carrying both dry & liquid bulk cargo. These carriers are normally more expensive than either the dry or the liquid bulk carriers. Similarly, no container ships have been considered in this application. Instead, multi-purpose ships have been included. These ships are capable of transporting general, dry bulk, as well as container cargo. Due to the rapid cargo handling rates of such ships, their port times have been assumed to decrease significantly as compared with general cargo ships.

Trade forecasts for 1985 & 1990 have been dealt with in considerable detail in chapter 5. Chapter 7 is devoted for a detailed analysis of the transport cost estimates of the objective function.

Units ship prices for possible additions from foreign yards are shown in table (6.2). These are 1978 price estimates based on published

figures in "Fairplay" and "Fearnley & Egers Co." The foreign exchange component in the prices of ships built in the domestic yard is assumed to be 0.56. This is a realistic figure based on the computation given in table (4.13).

Table (6.2): Ship Contracting Prices, 1978

Ship Index	DWT	Type	Source	Price million U.S.
15	4000	General Cargo	Building, domestic yards	5.5*
16	6500	" "	" " "	6.7*
17	8230	" "	" " "	7.7*
18	20,000	Bulk Carrier	" " "	122
19	30,000	" "	" " "	144
20	12,800	Multi-Purpose	" " "	12.7*
21	6.500	General Cargo	" Foreign yards	7.8(1)
22	8.200	" "	" " "	9.0(3)
23	12,800	" "	" " "	10.5(2)
24	20,000	Bulk Carrier	" " "	12(4)
25	40,000	" "	" " "	16(4)
26	60,000	" "	" " "	20(4)
27	75,000(sum)	LPG "	" " "	45(4)

(1) Japanese 1978 building prices (1$ = 200 ¥ in 1978)

(2) Fairplay International Shipping Weekly, 18 January 1979.

(3) Interpolation

(4) Estimates based on price levels in Fearnley & Egers chartering Co. Ltd, Review, Various Issues.

* L.E.

The total amount of investments as well as the foreign exchange component have been taken from actual figures of the current 5 year plan as given by table (4.9).

The building slip-ways available at Alexandria shipyards make it possible to build 4 ships up till 12,800 DWT in the same time. At port-said yard, 2 ships is their capapcity. This makes a total of 6 ships in both yards. Building time for each ship as given by Alexandria yard is 24 months of which 4 months are for setting. Therefore the overall building capacity in Egypt in 5-years is estimated to be 15 ships.

Therefore a constraint of 15 has been imposed as an upper limit for the number of ships that could be built in the domestic yards from each ship type individually. Besides, an additional constraint is included for the overall deadweight tonnage built in the domestic yards in the planning period. This limit is computed as follows:

	4 X 20,000	at Alexandria yard	= 80,000
+	2 X 12,000	at Port-said yard	= 24,000
	Total DW tonnage in 2 Yards		=104,000
	Total DW tonnage in 5 years		=270,000

In appendix (c) a computer display of the main input data of the model application is given.

Several versions have been attempted in the current model application. At first the model has been run with all set of constraints included. This is referred to as the reference case. Subsequently, individual constraints have been relaxed individually at each time. Relaxation of the investments constraint for instance will give some insight about the optimum size of the national fleet assuming abundant resources. In a similar way, relaxation of the building capacity constraints will give an idea about the optimum size of such industry in Egypt.

CHAPTER 7

Transportation Cost Analysis

CHAPTER SEVEN

7.1. Introduction:

The sole concern of this chapter is to develop estimates for the maritime transportation cost items of the Egyptian foreign trade in accordance with the formulation devised for the model as given in chapter 6. These cost estimates make up the several elements of the cost minimization objective function. In other words, these elements correspond to the one-cells in the zero-one matrix. It is to be noted here that the cost estimates developed in this respect are the financial costs incurred by the national economy for securing the transportation of the Egyptian foreign trade whether on foreign or domestic means. It is intended as a further investigation in the future to develop from these estimates the economic costs through certain adjustments and shadow pricing. In view of the model formulation and the summary table of chapter 6, the required cost items could be classified in the following way:

(1) Cost items for the liner general cargo trades
- on national means,
- on foreign means,

(2) Cost items for the bulk trade
- on national means,
- on foreign means.

The availability of historical data for the costs of the national fleet units made it possible to derive cost estimates for the liner and

bulk trades transported on national means based on actual figures that reflect the managerial and overall efficiency of operating the Egyptian national fleet. However in other cases where no actual figures are available, cost estimates based on realistic assumptions have been derived. Hereafter is the analysis and procedure adopted for each of the previous items.

7.2 Transportation Cost Estimates For The Egyptian Foreign Trade:

7.2.1. General Cargo Liner Trade:

7.2.1.1. National Means:

The objective of this part of the study is to decide upon appropriate estimates for the average cost per ton of the liner general cargo on each of the domestic transportation configurations i.e. on each of the particular combination of ship type and size. Therefore, the end product of this part could be visualized as filling-up the respective cells of a cost matrix whose vertical dimension represents navigational lines (whether already operation or merely proposed and considered by this model) and whose horizontal dimension represents the respective ship type/size combinations. One major decision has been made here not to develop any standardized cost estimates that might provide an idealized picture that can hardly be realized in actual service in the Egyptian environment. Rather the development of the intended estimates was based on actual performance cost figures that will reflect in the analysis any probable managerial inefficiencies or shortcomings. Any possibilities of reducing the unit cost figures is a managerial issue that fall beyond the scope of this current study.

In order to arrive at the required cost estimates an approach based on the following two elements is adopted:

a- The break-down of the vessels cost items into a fairly detailed level and,

b- Reclassification of such items in a way appropriate and suitable to the purpose of this investigation.

The procedure adopted in developing the intended cost estimates could be summarized in the following 3 main stages. All items being in 1978 constant prices.

1- Collection and analysis of historical cost data.

2- Computation of actual average cost figures of transporting a unit ton of general cargo on the various lines by the various ships and subsequently,

3- Estimation of the average cost figures per ton transported on any line and by any ship.

Hereafter is a detailed description of the steps involved in the above 3 stages:-

(a) Analysis of Historical Cost Data:

The following steps are involved in this stage:

1- Review and cross-checking of cost items in the different available documents (Navigation co. balance sheet, income statement, individual ships , etc.

2- Detailed classification of the cost items of all the individual ships of the national fleet in the following way:-

- Wages
- Material Expenses
  - . Food supplies
  - . Fuel & Oils
  - . Supplies (deck, Engine, and Saloons)
  - . Stationaries
  - . Water
- Services Expenses
  - . Maintenance & repairs
  - . Tugs & pilotage
  - . Stevedoring
  - . Advertizement
  - . Communications
  - . Insurances
  - . Taxes for foreign governments
  - . Commissions
  - . Transportation
  - . Indirect services expenses
  - . Miscellaneous services expenses
- Current Expenses
  - . Fees
  - . Indirect current expenses

The aggregate figures of the above classification are obtained in both local and foreign exchange.

3- Each of the above detailed cost items is then broken down into its fixed and voyage components as shown in the sample form Appendix (D). By fixed is meant those cost items incurred assuming the ship and its crew stands still at the depot port namely Alexandria.

4- Then the voyage component of each cost item is further subdivided into a fixed part that is realized independent of the amount of cargo aboard ship (i.e. if ship sails without cargo) and a variable part that directly depends on the cargo borne (e.g. agents' fees).

5- From the official files of the navigation company, an analysis was carried out for every ship to find-out:-

- Total no. of working days after excluding repair & overhaut delays, tables (7.1) & (7.2).
- Total tonnages carried by the ship.
- Total voyage days on each navigation line.

(b) Actual Transportation Cost Per Ton of Imports:

In the previous stage, detailed analysis of the cost items of each ship was carried out as well as a classification of these items in a way appropriate to our investigation. This analysis was independent of any cargo tonnages carried in past performances of such ships. In this second stage, an attempt is made to derive actual cost figures per ton of cargo already transported in 1978 by the respective fleet vessels. One immediate difficulty that arises in this respect, is how to treat export cargo borne on national ships. Since import trade is

Table(7.1): Analysis of Working Days for ENCO Fleet Units in 1978

Ship Name	Total Period of Analysis	Days at Sea	Days in Ports											
			Stevedoring		Maintenance & Repair		Queueing		Wheather Conditions		Other		Total	
			L	F	L	F	L	F	L	F	L	F	L	F
Alexandria	355	101	114	86	-	-	21	14	-	3	5	11	140	114
Cleopatra	365	39	48	35	53	-	88	6	2	1	88	5	279	47
El- Shatby	420	132	45	106	1	35	29	8	-	14	25	25	100	188
Ibrahemia	296	84	54	71	22	-	25	12	-	-	12	16	113	99
Ras El Tin	301	93	52	62	24	1	27	1	-	6	5	30	108	100
Anfoushi	340	130	47	90	2	3	32	10	-	4	4	18	85	125
Ramses	278	74	65	40	10	5	33	-	-	4	11	36	119	85
Isis	309	76	49	50	71	5	38	2	3	1	1	13	162	71
Nefertiti	290	58	51	51	87	2	11	3	-	4	4	19	153	79
Mountaza	394	108	91	64	31	12	42	10	6	3	5	22	175	111
Mandara	340	96	81	83	2	19	32	2	-	4	3	18	118	126
Mariout	351	90	85	81	9	10	34	20	-	9	5	8	133	128
Abu - Kir	337	91	77	72	-	4	26	-	-	10	18	31	129	117
6- October	341	101	93	68	-	8	36	2	2	2	6	23	137	103
Star of Luxor	306	26	49	42	92	-	56	13	-	1	-	9	197	83
Star of Suez	A	nn	ua	1		S	ur	ve	y					
Port Said	A	nn	ua	1		S	ur	v	ey					
Star of Aswan	353	52	39	45	22	-	37	5	-	1	151	1	249	52
Rafah	447	95	98	133	13	25	60	-	-	3	12	8	183	169
Yemen	365	58	43	67	73	2	30	6	2	2	72	10	220	87
Salah El Din	350	94	52	69	49	9	36	6	-	10	4	21	141	115
Mansoura	345	81	54	61	65	-	32	4	-	5	23	20	174	90
Amria	404	103	71	55	11	-	48	9	4	10	43	16	211	90
Sharkia	340	96	66	43	42	-	34	5	2	1	21	30	165	79

L= Local
F= Foreign

Table (7.1) Continued.

Ship Name	Total Period of Analysis	Days at Sea	Days In Ports											
			Stevedoring		Maintenace & Repair		Queueing		Wheather Conditions		Other		Total	
			L	F	L	F	L	F	L	F	L	F	L	F
Fayoum	376	93	52	52	77	-	38	1	-	16	24	23	191	92
Menia	325	46	53	29	158	-	21	-	-	-	4	14	236	43
El - Nil	r	e p		a	i	r		m o s	t	of		yea	r	
Armant	336	62	58	60	49	-	62	19	2	4	13	7	184	90
Nasseria	A	n n	u	a	l			S	U	r	v e	y		
Suez Canal	364	62	90	32	46	11	51	14	4	2	40	12	231	71
Assiout	353	62	64	47	87	9	47	2	-	11	4	20	202	89
Zagazig	365	43	45	31	76	111	39	4	1	5	5	5	166	156
Tanta	408	65	60	33	103	-	101	6	7	5	12	16	282	61
Benha	366	51	50	47	115	-	69	9	-	-	18	7	252	63
Bloudan	374	71	70	55	56	1	72	9	-	9	16	15	214	89
Helwan	342	41	36	23	195	4	13	-	-	3	17	10	261	40
Abu Simbel	362	37	34	27	142	23	56	4	-	1	32	6	264	61
Galal El Des.	323	69	49	31	69	-	40	14	2	1	37	11	197	57
Adnan El Malky	395	61	48	28	126	16	24	7	2	1	56	26	256	78
Om Saber	A	n n	u	a	l		s	u	r	v e	y			

Table (7.2): Average Annual Working Days of ENCO Units

Ship Index	DWT	Average Annual Working Days*
1	12815	345**
2	8250	341
3	8230	290
4	8200	290
5	7500	342
6	7480	356
7	6665	334
8	6500	334
9	4200	320
10	4000	243
11	3215	287
12	2895	223
13	1400	258
14		345**

* Annual Working Days = 365 - Annual repair days

Annual Repair days = $\frac{365 \times \text{Repair days in table (7.1)}}{\text{Period in Table (7.1)}}$

** Since annual repairs of this ship in 1978 was 0, it is assumed here as 5%.

ملحوظـــة : لجميع المراكب الاضافية الجديدة نفرض أن أيام العمل = ٣٤٥

usually imported on a F.O.B. basis while export cargo is exported on a C.I.F., it follows directly that securing transportation of import trade is a cost saving activity while transportation of export cargo is a revenue earning activity. As stated early in this study, it is blieved that for a developing and non-maritime country like Egypt, national fleet development should be tackled through the more comprehensive problem of minimizing transportation cost of its foreign trade. Consequently cross-trade revenues should not be the main factor governing fleet operation. However, they could be treated in such a way that they don't affect the principal policy of the fleet of carrying Egyptian imports. In a similar way, export cargo is treated as a revenue generating activity that is exercised within the overall policy of securing imports transportation without affecting it. In other words, instead of a ship leaving Alexandria empty to pick-up imports, it should carry out Egyptian exports in such a way that its itinerary or space is not greatly affected. No claims in this investigation could be raised that this is the actual policy already adopted either implicitly or explicitly by the Egyptian navigation company. However, there is a supporting evidence in this respect. In almost 50% of the total no. of voyages in 1978, the company vessels sailed from Alexandria with zero export cargo.

Based on the above analysis, the procedure adopted to decide upon the actual transportation cost per ton of imports could be described in the following steps:-

1. Let

F = The annual fixed cost of a ship, Again, this is the fixed costs incurred annually if the ship is in operation (whether at sea or in port) irrespective of the voyage or cargo characteristics. In other words, this is the annual cost incurred if the ship stands still at Alexandria port for one year ready for departure instruction. F costs realize only during the days the ship is in operation (working days) and diminish if she is in the dock under repair.

V = The annual voyage cost of the ship. This is made up of a fixed component (VF) and a variable component (VV).

VF = The annual fixed voyage costs that are independent of the cargo tonnage aboard ship and realize only during sea days of the voyage. In other words, these are the cost items incurred annually in addition to F if the ship sails during its annual voyages without any cargo aboard.

VV = The annual variable component of the voyage cost that realizes once cargo is borne by the ship and whose magnitude is directly proportion to the amount of this cargo. e.g. stevedoring, agents commissions, ... etc.

and let also,

WD = Total annual working days of the ship after excluding its repair & overhaul days.

SD = Total annual days spent by ship at sea.

Then for each ship, the following three basic quantities could be computed:-

i . Ship Fixed cost per day = $\frac{F}{WD}$

Let this quantity be denoted by (A).

ii. Ship sailing cost per day at sea = $\frac{VF}{SD}$

Let this quantity be denoted by (B) and,

iii. The ship actual variable cost per ton of imports is computed for each line on which she operated. If the ship has operated during 1978 on one line only, then this quantity is given by

$$\frac{VV}{\text{Total import tonnages carried by ship on this line.}}$$

If the ship has operated on more than one line, VV is then divided in proportion to the working days on each line. Let the above computed quantity be denoted by (C). The results of step (iii) is shown in table (7.3).

2- From the quantities (A), (B), (C) for each ship and the average days on each line (ports & sea days), table (7.4), the actual cost per ton of imports on a particular line was computed as follows:

Table(7.3): Average Actual Variable Cost Per Ton of Imports (c) on Various Lines in 1978. (L.E)

Ship Name	N. W. Europe	North America	U. K.	Adriatic	India	E & W Medit.	Black Sea	Red Sea
Alexandria	36.478	36.478				18.729		
Cleopatra		41.538					32.286	
El Shatby	32.286	32.286						
Ibrahimia	80.450	80.450						
Ras El Tin		58.729						
Anfoushi	20.270							
Isis	28.913							
Nefertiti	15.554							
Mountaza	24.177							
Mandara	32.096							
Mariout	24.469							
Abu - Kir	29.194					15.386	15.386	
6 - Oktober								
Star of Luxor						22.535		
Star of Suez								
Port Said								
Star of Aswan	22.815		22.815		12.737	12.737		
Rafah								
Yemen	20.578		20.578					
Salah El Din	26.694		26.694	26.694				
Mansoura	22.213				22.213			
Amria	35.933		35.933					
Sharkiah			14.610		14.610			
Fayoum			20.935	20.935		20.935		
Menia								
El Nil				20.517		20.517		
Armant								
Nasriah				27.561		27.561		
Suez Canal				28.557				
Assiout				23.673		23.673		
Zagazik						11.327		
Tanta				24.175		24.175		
Benha				20.183		20.183		
Bloudan				27.461		27.461		
Helwan				22.961				
Abu-Simbel						83.687		
Galal El Desouki						20.678		
Adnan El Malki								
Om Saber								
Total	452.120	249.481	141.565	242.717	49.560	349.584	47.672	
No. of Voyages	15	5	6	10	3	14	2	-
Average	30.141	49.896	23.594	24.272	16.520	24.970	23.836	-

Let,

D = actual cost of ship per ton of imports on a particular line.

T = total voyage duration on this line

S = Sea days of a voyage on this line

E = Export revenue per voyage

then,

$$D = \frac{A \times T + (S \times B - E) + C}{\text{imports tonnage per voyage}}$$

It is to be noted in the above formula that export cargo revenues are subtracted from voyage variable cost in agreement with the analysis given earlier.

The results of this step are shown in table (7.5). In this table, wide variations are noted for actual cost per ton on the same line for different ships. This is attributed to the following factors:

- The variation in export & cross-trade tonnage from ship to ship.
- The high cost items for some ships.

Table (7.4); Average Voyage Duration on Navigation Lines of ENCO

Line	Total voyage duration (days)	Days at Sea	Days in ports (Local & Foreign)
1. North West Europe	75	24	51
2. North America	120	44	76
3. U.K.	76	22	54
4. Adriatic	63	16	47
5. India	131	37	94
6. East & West Medit.	56	15	41
7. Black Sea	88	9	79
8. Red Sea	22	6	16
9. Far East*		48	

* Proposed Line.

Table(7.5): Actual Cost of ships per ton of Imports on Various Lines

(L.E).

Ship Name	N. W. Europe	North America	U. K.	Adriatic	India	E.& W Medit.	Black Sea	Red Sea
Alexandria	59.762	78.981				94.871		
Cleopatra		86.984					51.369	
El Shatby	65.195	105.816						
Ibrahimia	147.615	144.126						
Ras El Tin		110.822						
Anfoushi	100.555							
Ramses	73.211							
Isis	77.949							
Nefertiti	50.457							
Mountaza	62.553							
Mandara	82.013							
Mariout	54.569							
Abu - Kir	68.586					83.998	55.732	
6-Oktober	A n n u a l s u r v e y							
Star of Luxor	A n n u a l s u r v e y							
Star of Suez						73.313		
Port Said	43.593		52.734		108.212	65.671		
Star of Aswan								
Rafah	56.668		55.232					
Yemen	69.661		83.529	51.870				
Salah El Din	40.728				67.361			
Mansoura	90.834		81.568			44.137		
Amria			50.174			77.443		
Sharkia			82.372					
Fayoum	i n r e p a i r m o s t of the year							
Menia				74.408		86.657		
El Nil	A nn u a l s u r ve y			69.229		42.212		
Armant								
Nasriah				77.573		117.710		
Suez Canal						63.893		
Assiout				106.465		104.258		
Zagazig				43.665		58.561		
Tanta				141.214		126.673		
Benha				121.327				
Bloudan						141.449		
Helwan						78.932		
Abu - Simbel	A n n u a l s u r v e y							
Galal El Desouki								
Adnan El Malki								
Om Saber								

(c) Estimation of Transportation Cost/ton of Imports of Any Ship on Any Line:

In the previous section, actual cost figures per ton of imports have been derived for the fleet vessels according to the actual lines of their operation in 1978. These cost figures are then introduced into the cost matrix previously mentioned in section (7.2.1.1). Since not every vessel has already worked on every line, then an estimate of the cost elements for the remainder cells of the cost matrix has to be worked out. For this purpose the following fixed characteristics have been computed for every ship type in the problem formulation:-

- Ship deadweight tonnage
- Ship fixed cost per day
- Ship sailing cost per day at sea.

On the other hand the fixed characteristics of each line were also computed. These characteristics are:-

- Voyage duration on this line (ports & sea days).
- For every ship and every voyage in 1978, the imports load factor of every voyage was computed by dividing the imports tonnage carried in this voyage by the cargo space of this ship which is taken approximately 90% of its DWT. Then the average imports load factor for all voyages on a certain line was computed and considered as one of the characteristics of this line.

- In a similar way, the average export load factor of each line is also computed.

- Actual variable costs per ton of imports for all voyages on each line are then averaged. The average value is also considered as a line characteristic.

- Eventually the average freight revenue per ton of exports or cross trade on each line was also computed.

Detailed computations of the previous steps are available in the documents of this study. The summary results are illustrated in table (7.6) & table (7.7).

Finally the estimated cost per ton of imports carried by any ship on any given route was computed through a computer program in a way similar to what was adopted in section (b) as follows:

Table (7.6): Ships Characteristics Required for Cost Estimation

Ship Index (j)	Ship Dead-weight DWT(J)	Ship Fixed Cost/day A(j) (000 L.E.)	Ship Sailing Cost/day at Sea B(j)(000 L.E)	Ship Index (j)	Ship Dead-weight DWT (j)	Ship Fixed Cost/day A(j)	Ship Sailing Cost/day at Sea B (j)
1	12,815	1.524	5.947	15	4,000	0.963	3.654
2	8,250	1.131	3.900	16	6,500	0.705	4.141
3	8,230	1.717	4.748	17	8,230	1.717	4.748
4	8,200	1.717	4.748	21	6,500	0.705	4.141
5	8,500	1.053	4.397	22	8,230	1.717	4.748
6	7,480	1.185	5.865	23	12,800	1.524	5.947
7	6,665	0.705	4.141				
8	6,500	0.705	4.141				
9	4,200	0.704	2.998				
10	4,000	0.963	3.654				
11	3,215	0.963	2.811				
12	2,895	0.803	4.466				
13	1,400	0.426	1.765				

* This index is the same as the (j) index in the model formulation. Similar sister ships of the current fleet will have the same index. In case of sister ships, average figures were computed for columns (3) & (4).

- For proposed additions to fleet, estimate costs based on similar currently available units are used.

Table (7.7): Line Characteristics Required for Cost Estimation

Route Index (i)	Route Name	Total voyage duration T(i) (days)	Sea days one voyage S(i) (days)	Avg. Export load factor ALFE (i) (%)	Avg. Imports load factor ALFI (i) (%)	Avg. Exports Freight Rate AFRE (i) (L.E.)	Avg. Variable Cost/ton imp. AC (i) (L.E)	Remarks
1	N.W. Europe	75	24	20	59	42.321	30.141	
2	North Amer.	120	44	3.4	53.8	78.889	30.141	
3	England	76	22	9.5	67.4	57.423	23.594	
4	Adriatic	63	16	14	51	23.432	24.272	
5	India	131	37	5.9	58.1	101.557	16.520	
6	E & W Medit.	56	15	6.5	47.9	45.149	24.97	
7	Black Sea	88	9	15	56	24.112	23.836	
8	Red Sea	22	6	5.0*	60*	43.000*	15.000*	
9	Far East	125*	48	6.0*	60*	55.000*	40.000*	Proposed Line

* Estimated figure. No actual data is available.

Let,

(j) = ship index

(i) = route index

DWT (j) = deadweight tonnage of ship (j), tons

A (j) = fixed cost per day of ship (j), L.E.

B (j) = sailing cost per day at sea of ship (j), L.E

T (i) = total duration (port days + sea days) of one voyage on line (i), days.

S (i) = Sea days of one voyage on line (i)

ALFE(j) = Average load factor of exports on line (i)

ALFI(i) = Average load factor of imports on line (i)

AC(i) = Average variable cost per ton of imports on line (i), L.E.

ED (i,j) = Estimated cost per ton of imports carried by ship (j) on route (i), L.E/ton.

Then,

$$ED(i,j) = \frac{T(i) \times A(j) + S(i) \times B(j) - DWT(j) \times 0.9 \times ALFE(i) \times AFRE}{DWT\ (j) \times 0.9 \times ALFI\ (i)}$$

$$+ AC(i).$$

The final results are given in table (7.8).

Route Index

Table (7.8): Estimation of Average Transport Cost/ton of Imports of Ship (i) on Route (j)

Ship Index	1	2	3	4	5	6	7	8	9
1	53.567	97.031	47.231	50.339	68.837	50.438	46.429	21.418	103.279
2	56.524	102.321	49.821	53.135	74.002	53.100	49.755	22.254	108.254
3	71.337	129.517	62.562	66.585	99.295	66.018	64.106	26.326	134.075
4	71.540	129.898	62.734	66.763	99.636	66.190	64.277	26.381	134.439
5	62.123	113.458	54.353	57.547	82.865	57.480	52.361	23.651	119.113
6	73.610	135.901	63.786	66.916	101.378	66.705	59.040	26.583	140.869
7	58.817	108.061	51.286	54.016	76.670	54.202	46.941	22.629	114.212
8	59.909	110.160	52.195	54.934	78.458	55.099	47.692	22.914	116.236
9	71.732	131.794	62.389	65.728	98.709	65.454	59.391	26.177	136.750
10	91.087	168.064	78.794	82.727	131.160	81.902	75.726	31.375	171.429
11	82.463	152.479	71.294	74.701	116.232	74.236	66.554	28.963	156.715
12	124.697	234.314	106.201	109.685	184.854	108.551	93.355	39.858	235.832
13	115.755	215.362	99.347	103.551	171.646	102.236	93.019	37.821	217.000
15	58.325	105.474	51.420	54.889	77.200	54.759	52.000	22.775	111.198
16	53.611	97.115	47.268	50.377	68.911	50.476	46.463	21.430	103.359
17	71.337	129.517	62.562	66.585	99.295	66.018	64.106	26.326	134.075
18	59.909	110.160	52.195	54.934	78.458	55.099	47.692	22.914	116.236
23	58.325	105.474	51.420	54.889	77.200	54.759	52.000	22.775	111.198
24	53.611	97.115	47.268	50.377	68.911	50.476	46.463	21.430	103.359
25	71.337	129.517	62.562	66.585	99.295	66.018	64.106	26.326	134.075
26	59.909	110.160	52.195	54.934	78.458	55.099	47.692	22.914	116.236

7.2.1.2. Foreign Means:

The foreign means considered in this respect depend on the nature of cargo under consideration. For general cargo foreign conference liners are introduced beside the national ships as possible transportation means. For bulk commodity items, conference liners and shipping contract are considered. Data and information for this part is obtained from MARTRANS through the Ministry of Planning and are illustrated in tables (7.9 to 7.12). Table (7.9) is a zero-one table indicating the appropriate transportation mean for each item of the bulk commodity list of the foreign trade list considered in this study. Table (7.10) is a statement of the freight rate per ton of each item on the commodity list to be transported by its appropriate transportation mean according to the 1978 price levels. The figures given by MARTRANS here are derived either directly from actual rates in the company files for 1978 for items already imported or exported through it or derived from the rates offered in the technical committees for those items directly transported by the shippers or the consignees and not through the company. Table (7.11) is a statement with the average freight rates for general cargo on the foreign conference liners of the various navigational lines. Table (7.12) is an estimate of the bulk carrier chartering rates whether on a voyage or time basis. The source of these figures is "Fairplay International" magazine.

Table (7.9): Transport Means Applicable to Foreign Trade Items

Foreign Trade Item	Transportation Means		Shipping contract	Remarks
	Conference Liners	Tramps		
Wheat Imports			✓	
Corn Imports			✓	
Sorghum Imports			✓	
Iron & Steel Imports	✓		✓	
Timber Imports	✓		✓	
Iron Ore Imports			✓	
Coal Imports	✓		✓	
Sulphur Imports	✓		✓	
Cement Imports			✓	
Phosphate Rock Exp.			✓	
Fertilizers Imports			✓	
Fertilizer Exports			✓	
Crude Petr. Exp.			✓	
Petroleum Prod. Exp.			✓	
Petroleum Prod. Imp.			✓	
Butane Imports			✓	

Table (7.10): Average Freight Rate Per Tan., 1978

U.S except * items in L.E)

Foreign Trade Item	Transportation Means Conference Reams Liners	Shipping Contract	Remarks
Wheat Imports		18.75 23.50	From Australia From U.S (1)
Corn Imports		20.50	From U.S (1)
Sorghum Imports			
Iron Steel Imports	19,700*	17.00 30.00 48.00	Reinforced steel From Greece Cast iron from Furope Cast iron from U. S
Timber imports		31.146*	Freight per cubic meter
Iron ore imports		17.00	
Coal imports		24.00	From U.S (1)
Sulphur imports		45.00 12.50	From U.S (1) From Iraque
Cement imports in bulk		10.00	From Romania
Phosphate Rock export		15.00	To Europe
Fertilizers imports1		13.00	From Romania
Crude Oil Exports		3,000*	
Petroleum Products Exports		11,500*	
Petroleum Products imports		11.250*	

(1) Non American vessels.

Table (7.11): Average Freight rate per ton of general cargo on conference foreign liners

(L.E.)

Line Name	Average Freight Rate/ton
North West Europe	85.010
North America	88.696
U.K.	83.923
Adriatic	55.655
India	39.955
East & West Medit.	38.827
Black Sea	52.506
Red Sea	16.894
Far East	49.082

Table (7.12): Average Monthly Charter Rates of Bulk, 1978

(000 U.S. $)

	Charter Rate					
	Voyage Basis		Time Basis			
			Short Term		Long Term	
DWT	D(1)	L(1)	D	L	D	L
20,000	184	56	184	56	86.8	40
40,	205.2	112	205.2	112	109.2	110
60,000	184.8	180	184.8	180	118.2	177

(1) D = Dry Bulk

L = Liquid Bulk

Source: "Fairplay International", for dry bulk vessels. Rates shown are average of max. & min. rates in 1978.

- MARTRANS Files for liquid bulk vessels.

7.2.2. The Bulk Trade:-

For the bulk trades it was mandatory before deriving any cost estimates to assume the importing countries for the various trade and estimate voyage duration for each trade. For this reason the current origins of the imported commodities are assumed to prevail till 1985. This is in agreement with the practice adopted for liner general cargo. Port times are very much reduced in these trades. This is due to the fact that such cargo is usually loaded in unit ship loads from one origin port. In addition, most of the bulk cargoes are usually loaded and unloaded by mechanical means (except for iron & steel & timber). Another factor that characterizes bulk cargo transport is their high load factor. Such factor is assumed to be 0.9 for all trades except for timber and coke where it is assumed to be 0.6. Annual working days are assumed to be 350 days. Accordingly, the annual number of voyages of a bulk carrier on the various trades was computed as illustrated in table (7.13).

The bulk carriers considered in our model are the combined dry as well as liquid bulk carriers. This assumption is in agreement with the flexibility policy which is believed that it should govern this stage of fleet development. Again import trades have been considered only for this application. Export trades will be allocated within the optimum scheme of voyages to be yielded by the model.

Table (7.13): Assumed Annual No. of Voyages for a Bulk Ship on the Various Bulk Trades

Imported Commodity	Importing Countries	Total Voyage duration (days)	Sea Days, one voyage (days)	Working days per ship per year	No. of voyages year	Load factor %
Wheat	U.S. & Australia	70	45	350	5	90
Iron & Steel	Greece, Europe in general	60	20	350	5.8	90
Timber	Europe in general	60	20	350	5.8	60
Iron Ore	Turkey, U.K, W. G, Switzerland	40	20	350	8.7	90
Coke & Coal	U.S. & Europe	60	40	350	5.8	60
Sulpher	U.S., Iraque, Europe	60	40	350	5.8	90
Cement in Bulk	Romania	40	20	350	8.7	90
Fertilizers	Romania	40	20	350	8.7	90
Oil products	Europe in General	30	20	350	11.6	90
Butane (LPG)	Italy & France	30	20	350	11.6	90

Cost items are classified for the purpose of this section in the traditional way as capital cost, ship cost, and voyage cost.

1- Capital cost: expense for purchasing and owing ship, which includes depreciation of ship price and interest on loan.

2- Ship Cost : expenditure for keeping ship in a working condition e.g. crew cost, stores, lubricating oil, repair & maintenance, insurance, ... etc.

3- Voyage cost : direct costs which include fuel cost, port charges, cargo expense, ... etc.

7.2.2.1. National Means:

The only bulk carrier ship which is currently available and will remain in service by 1985 is "Al Agamy". It is a 38117 DWT carrier formerly used as a tanker and converted into a grain carrier in March 1978. Its cost items have therefore been taken as a guide to arrive at estimates for ship annual cost as well as voyage annual costs. For this purpose the individual cost items for "Al Agami" have been grouped and reclassified according to the classification adopted in this part namely: capital, ship, and voyage costs. The ships annual costs amount to L.E 700,000 whereas its annual average voyage costs amount to L.E. 1,138,000. Capital expenses are relatively low (L.E. 352,500). This is due to the fact that it is purchased several years ago.

The tonnages of the possible additions to the national fleet of the combined bulk carriers that are considered in this application are:

20,000 DWT
30,000 DWT
40,000 DWT
60,000 DWT

These might be built at domestic or foreign yards. In either case, ship prices of table (6.2) were assumed. Straight line depreciation was used to estimate capital costs assuming 15 years as the depreciation period with no salvage value.

For estimating annual ship and voyage costs for the above variants, the actual figures of "Al Agami" were taken as a basis, since these two groups of cost are not in a linear relationship. With the DWT, the following assumptions were made with respect to the 40,000 DWT. Ship:-

DWT	20,000	30,000	40,000	60,000
annual ship costs	66	75	100	133
annual voyage costs	66	75	100	133

The 12,800 multipurpose ship has special characteristics. It can operate on conference lines as well as on bulk trades. The cost figures of the ship "Alexandria", 12800 DWT have also been taken as a starting point. Due to the high cargo handling rates of multipurpose ships, port days and handling costs have been reduced by almost 50%. In case of operating such a ship on regular lines, exports earnings are assumed to reduce annual voyage costs by 50%.

Table (7.14) shows the assumed operating characteristic of a multipurpose ship on the various navigation lines.

Table (7.14): Operating characteristics of a Multipurpose ship on the various lines

Line Index	Voyage Days	Days at Sea	Days in Ports	Annual No. of voyages	Average Load Factor %
1	50	24	26	6.4	59
2	82	44	38	3.8	54
3	49	22	27	6.5	68
4	40	16	24	8.0	51
5	84	37	47	3.8	58
6	35	15	20	9.1	47
7	49	9	40	6.5	56
8	14	6	8	2.8	60
9	87	48	39	3.7	60

Annual Working Days = 320.

7.2.2.2. Foreign Means:

Beside shipping contracts, the most common alternative foreign means of transporting bulk cargo which are under consideration in the model are:

1- Bare boat charter

2- Time charter, short and long term and,

3- Voyage charter.

In addition to the charter money, charterers pay under the bare boat charter for ship cost and voyage cost. Under time charter they pay only for voyage cost. Under voyage charter, the owners pay for all of capital, ship and voyage costs as shown in table (7.15) Therefore, the total annual cost estimates for two ship size alternatives 20,000 and 40,000 DWT under the various forms of chartering are computed and introduced in table (7.16) and the average per ton costs of the various trades, under these chartering forms are given by table (7.17).

A last item in this category is Butane or LPG's in general. These are usually imported from Italy, France, or Greece. Freight rates per ton are shown in table (7.18). LPG ships are usually highly specialized and expensive. Capacity of such ships is normally denoted in cubic meters. One type of such ships has been included as a possible addition to the national fleet from foreign yards. This is a 75,000 cubic meter ship. It costs almost U.S $ 45 million. For conversion purposes to weight a specific gravity of 0.586[1] is used. Since the

(1) Average figure for LPG's as given by officials in the General Authority for Petroleum.

Table (7.15): Distribution of capital, ship, and voyage costs under various chartering forms.

Cost	Bare Boat charter	Time charter	Voyage charter
Capital Cost Ship price Interest	-	-	-
Ship Cost Crew exp. Stores Repair Insurance administ.	X	-	-
Voyage Cost Fuel Port dues Cargo exp.	X	X	-
Charterers payment to owners	Bare boat charter money	Time charter money	Voyage charter money

X = Cost incurred by charterer.

\- = Cost incurred by ship-owner.

Table (7.16): Total Annual Cost Estimates for Chartered Ships

(in Thousands)

	DWT	Bare Boat Charter	Voyage Charter	Long-Term Time Charter	Short-Term Time Charter
Charter Cost, $ Charter Cost, LIE Ship Cost, L.E. Voyage Cost, L.E. Other	20,000	698 ** 558q 630 763 0	1390 1112 0 0 222***	1042 * 834 0 763 0	2208* 1766 0 763 0
Total		1951	1334	1597	2529
Charter Cost $ Charter Cost L.E. Ship Cost, L.E. Voyage Cost Other	40,000	878** 702 70 1138 0	1742 1394 0 0 279***	1310* 1048 0 1138 0	2462* 1970 0 1138 0
Total		2540	1673	2188	3108

* Source: "Fairplay International" rates shown are the average of max & min. rates in 1978.

** Estimate From" assuming approximate equal distribution of annual capital, ship, and voyage costs.

*** 20 % additional cost to account for administrative expenses for voyage charter only.

Table (7.17): Average Per Ton Transp. Cost for Various chartering Forms.

Importing Commodity	Chartering Form							
	Bare Boat		Voyage Basis		Long-Term Time Basis		Short-term time basis	
	20,000	40,000	20,000	40,000	20,000	40,000	20,000	40,000
Wheat	24.4	15.9	16.7	10.5	20.0	13.7	31.6	19.4
Iron & Steel	21.0	13.7	14.4	9.0	17.0	11.8	27.3	16.7
Timber	30.5	19.8	20.8	13.1	24.9	17.1	32.5	24.3
Iron Ore	14.0	9.1	9.6	6.0	11.5	7.9	18.2	11.2
Coke & Coal	30.5	19.8	20.8	13.1	24.9	17.1	27.3	24.3
Sulpher	21.0	13.7	14.4	9.0	17.0	11.8	27.3	16.7
Cement	14.0	9.0	9.6	6.0	11.5	7.9	18.2	11.2
Fertilizer	14.0	9.1	9.6	6.0	11.5	7.9	18.2	11.2
Oil Products	10.5	6.8	7.2	4.5	8.5	5.9	13.6	8.4

capacity of this ship is more than the annual imports of Egypt, it is expected that the per ton transportation cost of this commodity on an owned ship will be higher than its freight rate in the shipping market.

Table (7.18): Freight Rates of Butane (LPG)

(U.S. $ per ton)

Loading port	Country of Import	Freight 1978/79	Freight 1979/80
Pari	Italy)	39	90
Prendisi	Italy	39	62
Piraeus	Greece	-	47.5

Source: Ministry of Planning.

CHAPTER 8
Conclusions

CHAPTER EIGHT

8.1 Conclusions:

In accordance with the analysis given in the previous chapters for the maritime transportation problems of the Egyptian commercial fleet and in view of the foreign trade forecasts as well as the cost analysis presented, the model devised for these problems yielded upon application the following conclusions:

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 and West Mediterranean, Black Sea, Red Sea, and Far East Lines.

2- The United Kingdom line seems to be an exception from the above tendency where it is preferential that the entire import trades on this line be transported on the national vessels.

3- Along with the previous findings the model results showed an equally evident trend that is in favour of adopting a contraction policy as regards the scale of operations. With the current low contribution of the Egyptian national fleet in transporting the Egyptian foreign trade, it seems that the concentration of the fleet operations on fewer lines will be more beneficial rather than spreading its units all over eight lines.

4- Within the framework of the above contraction policy for fleet units operations, the North-West Europe and the United Kingdom lines are considered the best suited lines for operations.

5- If the previous policy is already adopted the optimum pattern of cargo allocation shows that all the imports trade on the U.K. line be transported on the national vessels. However, the total size of imports trade borne on the North West Europe line by national vessels amounts to 675,000 tons. The remainder imports trade size on this line which amounts to almost 785,000 tons will be transported by conference foreign liners. Therefore the percentage of imports trade borne by national ships approximates to 45%.

6- Among the possible alternatives for securing transportation of the bulk items on the foreign means, it seems that the voyage charter means are the most convenient alternative. Within this variant, ships having 40,000 DWT appear to be preferable to 20,000 DWT ships. This holds true for Wheat, Timber, Iron Ore, Sulphur, Cement, Fertilizers, and Oil products.

7- Liquified petroleum gases might not follow this unimodel means of transport. The 182,000 tons of (LPG) expected to be imported in 1985 may need to be transported through shipping contracts similar to the current practice.

8- The optimum scheme of allocating the currently available fleet units on the navigational lines in 1985 is as follows:

(a) The North-West Europe Line:

One 12,815 DWT ship namely; Alexandria

Four 8,250 DWT ships namely; El-Shatby, El-Ibrahimia, Ras-El-Tin and Anfoushi.

Five 8,230 DWT ships namely, Ramsis, Isis, Nefertiti, Amoun and Ikhnaton

Three 8,200 DWT ships

Four 7,500 DWT ships namely, Mountaza, Mandara, Mariout and Abu-kir.

One 7,480 DWT ship namely, 6-October

One 6,665 DWT ship namely, Rafah

One, 6,500 DWT ship

Four 4,200 DWT ships namely, Salah El Din, Mansoura, Amria and Sharkia.

(b) The United Kingdom Line

Three 3215 DWT ships namely, Canal El Suez, Assiout and El-Zagazig.

9- On the other hand, the vessels allocation scheme suggests strongly to lay-up the smaller units of the fleet particularly the following vessels:-

Two 4000 DWT ships namely, El Fayoum and El-Menia

Three 2895 DWT ships namely, Bloudan, Helwan and Abu-Simbel

Three 1400 DWT ships namely, Galal El Desouki, Adnan El-Malki and Om Saber.

This might be attributed to the excessive operating expenses of such smaller units.

10- Meanwhile the allocation scheme proposed by the model results, and assuming that the prevailing load factors will continue to prevail by the year 1985, the outbound vessels of the national 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 ship types and sizes for new additions to the national fleet, the 12,800 DWT multi-purpose 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 ship(s) on the North West Europe line and,
- 5 ships on United Kingdom line.

13- Within the prespecified total amount of investments 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 ship-building 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 the 1980 - 1984 plan incorporates 4 bulk carrier ships to be built at foreign yards and 3 multi-purpose ships at the domestic yard. The results obtained, however, calls for a concentration on the multi-purpose ships in the next 5 years.

15- The preference of the multi-purpose 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 trade rather than bulk trade.

16- While the maximum building capacity of the domestic yards, which is decided by the number of building ship-ways is estimated at 15 ships in the next 5 years, it follows that the capacity utilization of these yards will amount to 33%. Slack capacity could be utilized in building other units for agents other than the Egyptian commercial fleet.

17- The proposed number of the 12800 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 of which 18 million in foreign exchange.

8.2. 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-year 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 the estimates 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 aspect. 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 out-understanding of the problem as well as its solution procedures.

APPENDICES

APPENDIX A

STATISTICAL TABLES OF ENCO

TABLE (A. 1): ENCO Ships, Speed, and Fuel Consumption

(tons)

Ship Name	Power HP	Speed (Knots) Max.	Speed (Knots) Operating	Fuel Type	Fuel Consumption in Ports	Fuel Consumption at Sea
Alexandria	9000	16	14.5	Diesel	4	37
Shatby	6150	14	14.	Diesel	2	23
Ibrahemia	6150	14	13.5	Diesel	2	23
Ras El Tin	6150	14	12.	Diesel	2	23
Anfoushi	6150	14	13.5	Diesel	2	23
Ramsis	5400	16	12.	N.A.	N.A	N.A
Isis	5400	16	13.5	N.A.	N.A	22
Mountaza	6000	14	13.5	Diesel	2	21
Mandara	6000	14	14	Diesel	2	21
Marriout	6000	14	14	Diesel	2	21
6-October	6700	15	14	Diesel	1	18
Rafah	5000	16	13.	Heavy Oil	N.A	19
Nefertiti	4900	16	12.5	Heavy Oil	N.A	22
Yemen	2670	12	10	Diesel	0.35	7
Salah-El Din	3080	14	10.	Diesel	1.75	12
Mansoura	3080	14.	10.5	Diesel	1.75	12
Ameriah	3080	14.5	11	Diesel	1.75	12
Sharkeia	3080	14.5	11.	Diesel	1.75	12
Fayoum	3020	14	11.4	Diesel	1.75	12
Menia	3080	14	11.	Diesel	1.75	12
Abu-kir	6000	14	12.5	Diesel	2	21

Table (A - 1) Continued

(tons)

Ship Name	Power HP	Max. Speed (Knots) Operating	Fuel Type	Fuel Consumption in Ports	Fuel Consumption at Sea
Nasseria	1700	11 N.A.	Mazout	8	21
Suez Canal	1470	11 11	Diesel	0.5	6
Assiout	1470	11 8.5	Diesel	0.5	6
Zagazig	1470	11 9	Diesel	0.5	6
Tanta	1800	12 9	Diesel	0.35	7
Benha	1800	12 8	Diesel	0.35	7
Bloudan	1650	11 8	Diesel	0.75	6.5
Helwan	1650	11 8.5	Diesel	0.75	6.5
Abu-Simbel	1650	11 8	Diesel	0.75	6.5
Galal Dessouki	1000	11 6.5	Diesel	0.50	4.8
Adnan Malki	1000	11 7	Diesel	0.50	4.8
Om Saber	1000	11 7	Diesel	0.50	4.8
Cleopatra	9350	14 12	Mazout	9	44
Star of Suez	4200	13 8	Diesel	1	14
Star of Luxor	4200	13 9.5	Diesel	1	14
Star of Aswan	2900	12 8	Diesel	1	8.5
Port Said	4200	13 9	Diesel	1	14
El Nil	3000	14 8	Diesel	1	12

Source : ENCO

TABLE (A - 2): No. of Voyages and Tonnage Carried by ENCO Units in 1978.

Ship Name	No. of Voyages	Operating Routes	Tonnage Carried (tons)	Ship Name	No. of Voyages	Operating Routes	Tonnage Carried (tons)
Alexandria	3	3 NE Europe, 1 America	33 609	Yemen	2	1 Medit., India	6 392
Ramses	3	NE Europe,	14 266	Tanta	5	Mediterranean	7 694
Isis	3	NE Europe,	16 032	Benha	4	3 Adriatic, I medit	5 865
Nefertiti	2	NE Europe,	18 672	Suez Canal	5	2 Medit. 3 Adriatic	7 893
6- Oktober	5	NE Europe	16 486	Assiout	5	Adriatic	9 597
Mountaza	4	NE Europe	20 570	Zagazig	3	2 Adriatic, 1 Medit	5 918
Mandara	4	NE Europe	22 392	Bloudan	5	4 Adriatic, I Medit	11 162
Marriout	4	NE Europe	22 878	Helwan	3	2 Adriatic, I Medit	5 131
Abu- kir	5	4 NE Europe, I Special	23 148	Abu - Simbel	3	2 Adriatic, I Medit	3 995
Shatpy	3	America	17 135	Armant	4	3 Adriatic, I Medit	9 937
Ibrahemia	3	America, N.E. Europe, Black Sea	19 987	Adnan Malki	5	Mediterranean	3 678
Ras-El-Tin	3	1 America, 2 N.E Europe	27 522	Galal Dessouki	5	Mediterranean	4 134
Anfoushi	3	America,	18 524	Om Saber	-	Not Operating	
Rafah	4	2 U.K, 2 N.E Europe	19 567	Cleopatra	3	Mediterranean	9 693
Menia	3	1 U.K, 2 Medit	10 912	Star of Luxor	2	1 Medit., 1 Black Sea	7 721
Salah El Din	4	3 U.K, 1 N.E Europe	12 638	Star of Aswan	3	Mediterranean	8 024
Mansoura	4	2 U.K, 1 N.E Europe, 1 Adri-	11 517	Port Said	-	Not Operating	
				Fayoum	4	3 U.K, 1 Medit	10 700
Amria	5	2 N.E Europe, 2 India, 1 Spec.	12 861	El Nil	2	1 Spec., 1 Medit.	3 600
Sharkia	4	3 N.E Europe, 1 U.K.	17 232	Star of Suez	-	Not Operating	

Source: ENCO Files.

Total 977073

APPENDIX B

TECHNICAL SPECIFICATIONS OF SHIPS

AT ALEXANDRIA YARD

Technical Specifications of the Ships already built or under construction at Alexandria shipyard.

1. Standard 8230 DWT cargo liner:

- Length between perpendiculars	121	m.
- Overall length	130	m.
- Breadth, moulded	17.08	m.
- Depth moulded to upper deck	9.08	m.
- Draft (summer free board)	7.08	m.
- Max. Deadweight	8230	tons.
- Speed on trials	17.5	knots.
- Main machinery: single slow speed (B&W)		
- Rated HP at 170 r.p.m.	4900	BHP.

N.B. Under construction.

2. Standard 500 DWT Replenishment:

- Length between perpendiculars	49.40	m.
- Overall length	53.00	m.
- Breadth, moulded	9.40	m.
- Depth moulded to upper deck	4.20	m.
- Draft (summer free board)	3.10	m.
- Max. deadweight	500	tons.
- Speed on trials	10	knots.
- Main machinery: single Russky Diesel		
- Rated power at 300 r.p.m.	600	BHP

N.B. Under construction.

3. Standard 13740 DWT General Cargo Vessels:

- Length between perpendiculars	140 m.
- Breadth, moulded	20.6 m.
- Depth moulded to upper deck	12.00 m.
- Draft (summer free board)	9.37 m.
- Deadweight	13740 tons.
- Speed on trials	17.7 knots.
- Main machinery: single slow speed	(B & W)
- Rated power at 110 r.p.m.	9000 BHP

N.B. 4 such vessels are already built.

4. Standard 6500 DWT Dry Cargo Vessels:

- Length between perpendiculars	108.6 m.
- Breadth moulded	16.00 m.
- Depth moulded	16.00 m.
- Draft (summer free board)	6.75 m.
- Max. deadweight	6640 tons.
- Speed on trials	15 knots.
- Main Machinery: Sulzer	
- Rated Horsepower	5000 BHP

N.B. 2 Mulls are constructed for Port Said Arsenal during the hostilities in the Canal area. The finished vessels are for the national fleet.

5. (RO/RO) Multi-Purpose Cargo Ship 12600 DWT:

- Length between perpendiculars 122.3 m.
- Overall Length 132.9 m.
- Breadth moulded 20.5 m.
- Depth to upper deck 12.2 m.
- Design draft 9.1 m.
- Main machinery: one B & W, 6700 BHP at 150 r.p.m.
- Trial speed loaded (9.1 m) at 85% MCR = 15 knots.

N.B. This group is under setting, production is scheduled by the end of 1979.

Appendix (C)

Work Sheet For Cost Analysis

Fuel Consumption in Ports (Diesel) Ton/Day
Fuel Consumption in Sea (Fuel oil) 35 Ton/Day
(Diesel) 2 Ton/Day

Name of Ship
(1) Annual Costs (Local-Foreign)

Items	Local	Foreign	Total	Remarks
Wages	166.2	11.1	177.3	
Commodities	138.1	309.3	447.4	
Services	270	1039.8	1309.8	
Current transfer expenditures	101.3	-	101.3	
Total	675.6	1360.2	2035.8	

(2) Fixed & Variable Costs

Items	Fixed Cost for ship	Variable Cost	Total Cost	Variable Cost Analysis: Fixed Cost for Load	Variable cost per Ton	Total
Wages	166.2	11.1	177.3	11.1	-	11.1
Commodities						
Food	7.6	28.7	36.3	28.7	-	28.7
Fuel & Oil	121.8	134.4	255.9	134.4	-	134.4
Supplies	14.6	131.8	146.4	131.8	-	131.8
Stationaries	-	.6	0.6	.6	-	0.6
Water	-	8.3	8.3	8.3	-	8.3
	143.7	303.8	447.5	303.8	-	303.8
Services						
Repair & Maintenance	3.9	92.5	123.4	92.5	-	92.5
Piloting & Guiding	-	5	5	5	-	5
Stevedoring	-	716.3	716.3	-	716.3	716.3
Advertisements & Reception	-	2	2	2	-	2
Transport,& travel allowances	0.8	1.4	2.2	1.4	-	1.4
Telephone,Telegrams ,Post	-	4.4	4.4	4.4	-	4.4
Insurance Costs	103.5	-	103.5	-	-	-
Customs to Foreign Government	-	135.5	135.5	135.5	-	135.5
Commissions	-	178	178	-	178	178
Miscellaneous Costs	-	13.2	13.2	13.2	-	13.2
Indirect Costs	-	26.4	26.4	26.4	-	26.4
	135.2	1174.7	1309.9	280.4	894.3	1174.7
Current Transfer Expenditures						
Fees	-	4.9	4.9	4.9	-	4.9
Depreciation	96	-	96	-	-	-
Indirect Costs	-	0.4	0.4	0.4	-	.4
	96	5.3	101,3	5.3	-	5.3
Total	541.1	1494.9	2036	600,6	894.3	* 1494.9

* The ship is in berth.

Remarks

Total Load = 12815 Ton
10% Fuel & Supplies 1282
Net Load 11533

Loading Factors
US Voyage
Exports = 133/11533 = 1.5%
Inter Ports 2524/11533 = 21.9%
Imports 7634/11533 = 66.2%

West & North Europe Voyage
(1) First
Exports 6419/11533 = 55.7%
Import 9312/11533 = 80.7%
(2) Second
Exports 377/11533 = 3.3%
Imports 7029/11533 = 60.9%

(3) Ship Voyages

No.	Line	Duration	Pent	Stevedoring		Repair & Maintenance		Ports unvacancy		Bad weather		Other		Total	
				Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign
1	Completion voyage unload	18	-	18	-	-	-	-	-	-	-	-	-	18	-
2	West Europe	145	34	48	29	-	-	14	11	-	1	3	5	65	46
3	USA	102	44	25	27	-	-	-	-	-	-	1	5	26	32
4	West Europe	90	23	23	30	-	-	7	3	-	2	1	1	31	36
5		355	101	114	86	-	-	21	14	-	13	5	11	14	114

Total Working days = 355 (101 sail + 254 Ports)

(4) Information of Transport

Voyage	Line	Exports		Inter Ports		Total		Imports	
		Ton	Value	Ton	Value	Ton	Value	Ton	Value
	USA	-	-	-	-	-	-	181	29388
	West & North Europe	6796	316716	-	-	6796	316716	16341	1165184
	USA	133	13271	2524	79305	2627	92576	7634	552618
		6929	329987	2524	79305	9423	409292	24156	1777190

A) Fixed Cost for ship perday = 541.1 ÷ 355 = 1.5242 Thousand L.E.

Variable Cost for ship per sailing day = 600.6 ÷ 101 = 5.9465 "

Variable Cost per Ton(Imports) = $\frac{894.3}{2636.0}$ 24516 = 36.478 "

B) Net variable Cost

USA Line

- Total variable Cost per voyage = 44x5,9465 = 261,6 Thousand L.E.

" " " " North & West Europe Line:-

57x5,9465 = 339,0 "

- Total variable Cost US Line:-

261.6 - 92.6 = 169.0 "

- " " " " North & West Europe Line:-

339 - 316,7 = 22,3 "

- Total Net variable Cost per day US Line :-

169 ÷ 44 = 3,841 "

" " " " North & West Europe Line:-

22,3 ÷ 57 = 0,3912 "

C) Cost of Import Ton on US Line :-

$\frac{(169 + (102x1,5242)}{7634}$ = 42,503 + 36,478 = 78,981 "

Cost of Import Ton on Europe Line :- "

$\frac{(22,3 + (235 \times 1,5242)}{16341}$ = 23,284 + 36,478 = 59,762

Total Load	12815	Ton
10% Fuel & Supplies	1282	
Net Load	11533	

Loading Factors :-

USA Voyage

Exports = $\frac{133}{11533}$ = 1.5%

Inter Ports $\frac{2524}{11533}$ = 21.9%

Imports $\frac{4634}{11533}$ = 66.2%

West and North Europe Voyages

The First:-

Exports $\frac{6419}{11533}$ = 55.7%

Imports $\frac{9312}{11533}$ = 80.7%

The Second:-

Exports $\frac{377}{11533}$ = 3.3%

Imports $\frac{7029}{11533}$ = 60.9%

Fixed cost for ship perday = 541,1 + 355 = 1,5242 Thousand L.E.

Variable cost for ship in every sailing day =

600,6 + 101 = 5,9465 "

Variable cost for ton (Imports)= $\frac{894,3}{2036,0}$ + 24516 = 36,478 "

Net Changing Cost

US Line:-

Total variable cost per voyage = 44 x 5,9465 = 261,6 Thousand L.E.

Total variable cost = 261,6 - 92,6 = 169,0 "

Net variable cost perday = 169,0 ÷ 44 = 3,841 "

North and West Europe Line :-

Total variable cost per voyage = 57 x 5,9465 = 339,0 Thousand L.E.

Total variable cost = 339 - 316.7 = 22,3 "

Net variable cost per day = 22,3 ÷ 57 = 0,3912 "

Cost of ton import on US Line =

$$\frac{[(1,5242 \times 102) + 169]}{7634} = 42,503 + 36,478 = 78,981 \text{ L.E.}$$

Cost of ton import on Europe Line =

$$\frac{[(1,5242 \times 235) + 22,3]}{16341} = 23,284 + 36,478 = 59,762 \text{ L.E.}$$

Appendix (D)

Model Input Data

TABLE 2 THE COST MATRIX

PART 1

CURRENTLY AVAILABLE
AND
REMAINING IN SERVICE BY 1985

J / I	1	2	3	4	5	6	7	8	9	10	11	12	13	14
CGC1	53.567	56.524	71.337	71.540	62.132	73.610	58.817	59.909	71.732	91.087	82.463	124.697	115.755	0.0
CGC2	97.031	102.321	129.517	129.898	113.458	135.901	108.061	110.160	131.794	169.064	152.479	234.314	215.362	0.0
CGC3	47.231	49.821	62.562	62.734	54.353	63.786	51.286	52.195	62.389	78.794	71.294	106.201	99.347	0.0
CGC4	50.330	53.135	66.585	66.763	57.547	66.916	54.016	54.934	65.728	82.727	74.701	109.685	103.551	0.0
CGC5	69.837	74.002	99.295	99.636	82.965	101.378	76.670	78.485	99.709	131.160	116.232	184.854	171.646	0.0
CGC6	50.438	53.100	66.018	66.190	57.480	66.705	54.202	55.099	65.454	81.902	74.236	108.551	102.236	0.0
CGC7	46.429	49.755	64.106	64.277	52.361	59.040	46.941	47.692	58.381	75.726	66.554	93.355	93.019	0.0
CGC8	21.419	22.054	26.326	26.381	23.651	26.583	22.629	23.914	26.177	31.375	28.963	39.859	37.821	0.0
CGC9	103.279	109.254	134.075	134.439	119.113	140.869	114.212	116.236	136.570	171.429	156.715	235.932	217.100	0.0
WHT2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.200
IAS2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.200
TIM2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.300
ORE2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.200
CKE2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.200
SUL2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.200
CFM2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.200
FER2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.200
OPR2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.100
BUT2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 5 THE COST MATRIX

PART 2

DOMESTIC YARDS

J / I	15	16	17	18	19	20
CGC1	91.09	58.91	71.34	0.0	0.0	45.10
CGC2	168.06	110.16	129.52	0.0	0.0	80.80
CGC3	78.79	52.19	62.56	0.0	0.0	39.00
CGC4	82.73	54.93	66.58	0.0	0.0	41.70
CGC5	131.16	78.46	98.29	0.0	0.0	77.20
CGC6	81.90	55.10	66.02	0.0	0.0	39.30
CGC7	75.73	47.69	64.11	0.0	0.0	44.70
CGC8	31.38	22.91	26.33	0.0	0.0	18.50
CGC9	171.43	116.24	134.07	0.0	0.0	76.70
WHT2	0.0	0.0	0.0	25.40	17.50	46.90
YAS2	0.0	0.0	0.0	21.90	15.10	40.50
TIM2	0.0	0.0	0.0	31.70	22.60	60.80
ORE2	0.0	0.0	0.0	14.60	10.10	27.00
CKE2	0.0	0.0	0.0	31.70	22.60	60.80
SUL2	0.0	0.0	0.0	21.90	15.10	40.50
CFM2	0.0	0.0	0.0	14.60	10.10	27.00
FER2	0.0	0.0	0.0	14.60	10.10	27.00
OPR2	0.0	0.0	0.0	11.00	7.60	0.0
BUT2	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 3 THE COST MATRIX

PART 3

FOREIGN SOURCES (YARDS, MARKET)

J / I	21	22	23	24	25	26	27
CGC1	58.909	71.237	53.611	0.0	0.0	0.0	0.0
CGC2	110.163	129.517	97.115	0.0	0.0	0.0	0.0
CGC3	59.195	69.563	47.265	0.0	0.0	0.0	0.0
CGC4	54.234	64.585	50.277	0.0	0.0	0.0	0.0
CGC5	78.450	89.285	62.011	0.0	0.0	0.0	0.0
CGC6	55.989	66.013	50.476	0.0	0.0	0.0	0.0
CGC7	47.693	64.104	44.463	0.0	0.0	0.0	0.0
CGC8	22.914	24.726	21.430	0.0	0.0	0.0	0.0
CGC9	116.236	134.075	103.259	0.0	0.0	0.0	0.0
WHT2	0.0	0.0	0.0	25.400	16.900	14.500	0.0
IAS2	0.0	0.0	0.0	21.900	14.500	12.500	0.0
TIM2	0.0	0.0	0.0	31.700	21.100	18.700	0.0
ORE2	0.0	0.0	0.0	14.600	9.700	8.300	0.0
CKE2	0.0	0.0	0.0	31.700	21.100	18.700	0.0
SUL2	0.0	0.0	0.0	21.900	14.500	12.500	0.0
CEM2	0.0	0.0	0.0	14.600	9.700	8.300	0.0
FER2	0.0	0.0	0.0	14.600	9.700	8.300	0.0
OPR2	0.0	0.0	0.0	11.000	7.300	6.300	0.0
BUT2	0.0	0.0	0.0	0.0	0.0	0.0	50.000

TABLE 2 THE COST MATRIX

PART 4

FOREIGN SHIPS

I \ J	28	29	30	31	32	33	34	35	36	37
CGC1	85.010	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CGC2	88.696	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CGC3	93.923	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CGC4	55.655	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CGC5	39.855	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CGC6	38.827	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CGC7	52.506	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CGC8	16.894	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CGC9	49.082	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WHT2	0.0	16.900	24.400	15.900	16.700	10.500	20.000	13.700	31.600	19.400
IAS2	19.700	25.333	21.000	13.700	14.400	9.000	17.000	11.800	27.300	16.700
TIM2	0.0	38.933	30.500	19.800	20.800	13.100	24.900	17.100	39.500	24.300
DRE2	0.0	13.600	14.000	9.100	9.600	6.000	11.500	7.900	18.200	11.200
CKE2	0.0	19.200	30.500	19.800	20.800	13.100	24.900	17.100	27.300	24.300
SUL2	0.0	23.000	21.000	13.700	14.400	9.000	17.000	11.800	27.300	16.700
CEM2	0.0	8.000	14.000	9.100	9.600	6.000	11.500	7.900	18.200	11.200
FER2	0.0	10.400	14.000	9.100	9.600	6.000	11.500	7.900	18.200	11.200
DPP2	0.0	11.250	10.500	6.800	7.200	4.500	8.500	5.900	13.600	8.400
BUT2	0.0	32.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 4 NO. OF VOYAGES

PART 1

CURRENTLY AVAILABLE
AND
REMAINING IN SERVICE BY 1985

I \ J	1	2	3	4	5	6	7	8	9	10	11	12	13	14
CGC1	4.600	4.550	3.870	3.870	4.560	4.750	4.450	4.450	4.270	3.240	3.830	2.970	3.440	0.0
CGC2	2.880	2.840	2.420	2.420	2.850	2.970	2.780	2.780	2.670	2.020	2.390	1.860	2.150	0.0
CGC3	4.540	4.490	3.820	3.820	4.500	4.680	4.390	4.390	4.210	3.200	3.780	2.930	3.390	0.0
CGC4	5.480	5.410	4.600	4.600	5.430	5.650	5.300	5.300	5.080	3.860	4.560	3.540	4.100	0.0
CGC5	2.630	2.600	2.210	2.210	2.610	2.720	2.550	2.550	2.440	1.850	2.190	1.700	1.970	0.0
CGC6	6.160	6.090	5.180	5.180	6.110	6.360	5.960	5.960	5.710	4.340	5.120	3.980	4.610	0.0
CGC7	3.920	3.780	3.300	3.300	3.890	4.050	3.800	3.800	3.640	2.760	3.260	2.530	2.930	0.0
CGC8	15.680	15.500	13.180	13.180	15.550	16.180	15.180	15.180	14.550	11.050	13.050	10.140	11.730	0.0
CGC9	2.760	2.730	2.320	2.320	2.740	2.850	2.670	2.670	2.560	1.940	2.300	1.780	2.060	0.0
WHT2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.000
IAS2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.800
TIM2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.800
ORF2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.700
CKF2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.900
SUL2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.800
CEM2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.700
FER2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.700
OPR2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.600
BUT2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 6 NO. OF VOYAGES

PART 2

DOMESTIC YARDS

I \ J	15	16	17	18	19	20
CGC1	3.24	4.45	3.87	0.0	0.0	6.40
CGC2	2.02	2.78	2.42	0.0	0.0	3.90
CGC3	3.20	4.39	3.82	0.0	0.0	6.50
CGC4	3.86	5.30	4.60	0.0	0.0	8.00
CGC5	1.85	2.55	2.21	0.0	0.0	3.80
CGC6	4.34	5.96	5.18	0.0	0.0	9.10
CGC7	2.76	3.80	3.30	0.0	0.0	6.50
CGC8	11.05	15.18	13.18	0.0	0.0	22.80
CGC9	1.94	2.67	2.32	0.0	0.0	3.70
WHT2	0.0	0.0	0.0	5.00	5.00	5.00
IAS2	0.0	0.0	0.0	5.80	5.80	5.80
TIM2	0.0	0.0	0.0	5.80	5.80	5.80
ORE2	0.0	0.0	0.0	8.70	8.70	8.70
CKE2	0.0	0.0	0.0	5.80	5.80	5.80
SUL2	0.0	0.0	0.0	5.80	5.80	5.80
CEM2	0.0	0.0	0.0	8.70	8.70	8.70
FER2	0.0	0.0	0.0	8.70	8.70	8.70
OPR2	0.0	0.0	0.0	11.60	11.60	0.0
BUT2	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 6 NO. OF VOYAGES

PART 3

FOREIGN SOURCES (YARDS, MARKET)

I / J	21	22	23	24	25	26	27
CGC1	4.450	3.670	4.600	0.0	0.0	0.0	0.0
CGC2	2.780	2.420	2.880	0.0	0.0	0.0	0.0
CGC3	4.390	3.820	4.540	0.0	0.0	0.0	0.0
CGC4	5.300	4.400	5.480	0.0	0.0	0.0	0.0
CGC5	2.550	2.210	2.630	0.0	0.0	0.0	0.0
CGC6	5.960	5.180	6.160	0.0	0.0	0.0	0.0
CGC7	3.800	3.300	3.920	0.0	0.0	0.0	0.0
CGC8	15.180	13.180	15.680	0.0	0.0	0.0	0.0
CGC9	2.670	2.320	2.760	0.0	0.0	0.0	0.0
WHT2	0.0	0.0	0.0	5.000	5.000	5.000	0.0
IAS2	0.0	0.0	0.0	5.800	5.800	5.800	0.0
TIM2	0.0	0.0	0.0	5.800	5.800	5.800	0.0
ORE2	0.0	0.0	0.0	8.700	8.700	8.700	0.0
CKE2	0.0	0.0	0.0	5.800	5.800	5.800	0.0
SUL2	0.0	0.0	0.0	5.800	5.800	5.800	0.0
CEM2	0.0	0.0	0.0	8.700	8.700	8.700	0.0
FER2	0.0	0.0	0.0	8.700	8.700	8.700	0.0
OPR2	0.0	0.0	0.0	11.600	11.600	11.600	0.0
BUT2	0.0	0.0	0.0	0.0	0.0	0.0	11.600

TABLE 6 NO. OF VOYAGES

PART 4

FOREIGN SHIPS

J / I	28	29	30	31	32	33	34	35	36	37
CGC1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CGC2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CGC3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CGC4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CGC5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CGC6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CGC7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CGC8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CGC9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WHT2	0.0	5.000	5.000	5.000	5.000	5.000	5.000	5.000	0.0	0.0
TAS2	0.0	5.800	5.800	5.800	5.800	5.800	5.800	5.800	5.000	5.000
TIM2	0.0	5.800	5.800	5.800	5.800	5.800	5.800	5.800	5.800	5.800
OBE2	0.0	8.700	8.700	8.700	8.700	8.700	8.700	5.800	5.800	5.800
CKE2	0.0	5.800	5.800	5.800	5.800	5.800	8.700	8.700	8.700	8.700
SUL2	0.0	5.800	5.800	5.800	5.800	5.800	5.800	5.800	5.800	5.800
CEM2	0.0	8.700	8.700	8.700	8.700	8.700	5.800	5.800	5.800	5.800
EER2	0.0	8.700	8.700	8.700	8.700	8.700	8.700	8.700	8.700	8.700
OPR2	0.0	11.600	11.600	11.600	11.600	11.600	11.600	8.700	8.700	8.700
BUT2	0.0	11.600	0.0	0.0	0.0	0.0	0.0	11.600	11.600	11.600
								0.0	0.0	0.0