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WORLD MARITIME UNIVERSITY
MALMO-SWEDEN

PORTS IN GUATEMALA
POLICIES FOR IMPROVEMENT
THEIR ACTIVITIES

By

Cesar Augusto Quiroz Samayoa

G U A T E M A L A

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

MASTER OF SCIENCE DEGREE

in

GENERAL MARITIME ADMINISTRATION

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

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ACKNOWLEDGEMENTS

I would like express my gratitude to God for giving me the opportunity to complete all my activities at the World Maritime University. Malmö, Sweden.

To my Professor Dr. Ahmed Abdel Monsef, for his advice, interests and patience in the development of my studies and this present paper I wish to express special thanks and appreciation.

My colleague and friend Joao Prates Bebiano who offered valuable advice and assisted in the revision of this paper deserves special acknowledgement.

Finally I would like to offer thanks to the authorities and personnel of The World Maritime University such as Professors, Visiting Professor, English Language Programme Teachers and all those persons who assisted me in my studies and the preparation of this thesis.

INTRODUCTION

The present paper is divided into six chapters, the first chapter refers to important aspects of Guatemala, such as : geography, government, economy, industry, resources and transport.

The second chapter is a theoretical analysis giving a general overview of the organization of port infrastructure followed by a description of the sea-port functions.

The framework of port statistics needs for management and port users in order to improve efficiency and effectiveness of ports has been analysed as well.

Then there is a description of the types of ports and their function and a theoretical analyses of port planning and port labour; Finally the general disposition of the ports considering the need of their development has been established.

The third chapter is a theoretical analyses giving a general overview about port appraisal, finances and port tariffs.

Chapter four briefly described the characterization of Guatemalan ports, considering general and technical aspects, with emphasis on the information necessary for maritime transport using the port facilities of the country.

Then the role of the ports concerning economic development of the country, followed by the ports' economy in Guatemala, is analysed in short.

Finally the principal theme of this paper will be studied by identifying the main problems of ports in Guatemala in order to make a clear distinction between the problems which originated at a national level and those which originated at the port level.

Chapter five is devoted to suggesting some policies and measures to solve the problem referred to in chapter three, with emphasis on main problems, such as the setting up of a National Port Plan, the creation of a National Port Authority, improvement of port statistics and modernization of port infrastructures, structures and services.

In chapter six certain terms used in this paper will be defined which are considered important for the understanding of the subjects presented. The commentaries, annexes and bibliography constitute the final part of this chapter and of the present paper.

It is important to make clear that with this paper the intention is solely to make some suggestions and not necessarily to give solutions to the problems referred to in this paper.

Finally I would like to point out that the present paper can be complemented in the future both to develop the matters analysed and to introduce new ideas to contribute to the improvement of ports' activities in Guatemala.

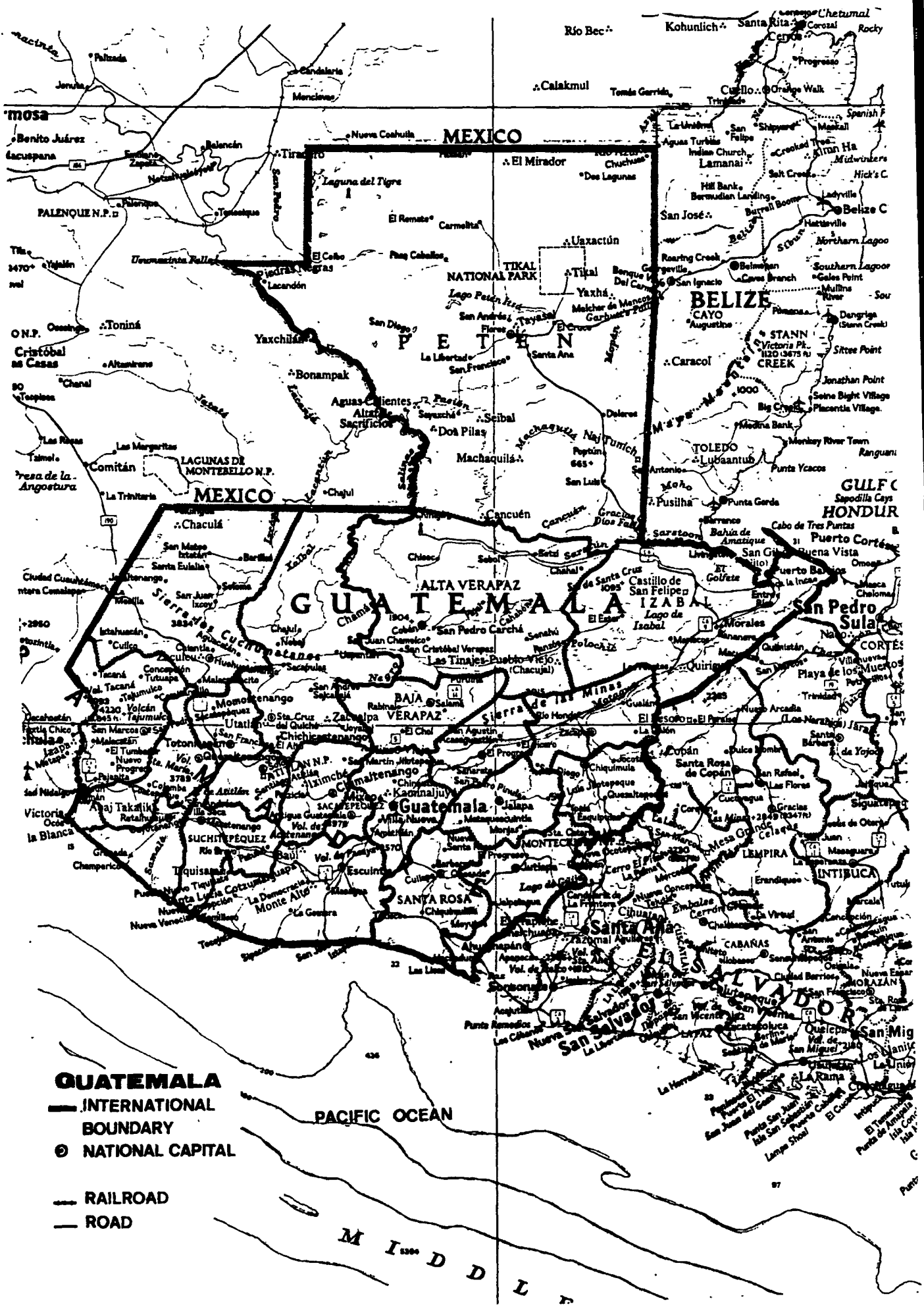
OBJECTIVES

This theme was chosen to point out the present main problems of Guatemalan ports both at national and port levels and to present some suggestions to solve them.

As can be deduced from what was said before, part of the objectives will be of interest of government bodies specially for those who are responsible for port operation and development.

At the same time to create an interest in all those who by one form or another are involved in port and maritime activities.

Finally it is intended that the present paper could serve as a source of information to the state institutions linked with port operations, ports and other entities or persons to whom it may interest.



- GUATEMALA**
- INTERNATIONAL BOUNDARY
 - ⊙ NATIONAL CAPITAL
 - RAILROAD
 - ROAD

PACIFIC OCEAN

M I D D L E

CHAPTER I

PRESENTATION OF GUATEMALA

1.1.GEOGRAPHY

Guatemala is the northernmost and most populous of the five Central American Republics. Its neighbors are Mexico, Belize, Honduras, and El Salvador. It has a Pacific coastline 320 kilometers (200 mi) long and an irregular Caribbean coast line that spans only 80 kilometers (50 mi). Its total area is 108,889 square kilometers. And its population is about 10 million.(1)

The heavily populated central highland region, where Guatemala city is located, constitutes about one-fifth of the country's land surface. The Caribbean lowlands have fertile river valleys. The sparsely populated department of Peten makes up the northern part of the country.(2)

Guatemala has two seasons; wet (May-October) and dry (November-May).

1.2.GOVERNMENT

The constitution defines the country as a sovereign democratic republic. The constitution also established three branches of the government which are executive, legislative, and judicial.

1.3.ECONOMY

The Guatemalan economy, traditionally dominated by agriculture, has grown at a rapid pace in recent years.

It is projected that by the end of the century, more people will be engaged in commerce and industry than in farming.

Coffee, still the single most important product, accounted for about 30 % of total export earnings in 1980 and contributed an estimated 1 % of the real gross national product (GNP). Falling world coffee prices in 1979 and 1980 weakened Guatemala's balance of payments position and caused the level of foreign reserves to fall from their all-time high reached in 1978.

Although international coffee prices are running below 1977's record levels, a strong export performance in other agricultural commodities (cotton, sugar, cardamon, citronella, and maize) has kept the balance of payments from deteriorating as much as would have occurred otherwise, given the world recession and deteriorating investment climate.(3)

The foreign trade of Guatemala is mainly with the United States. Guatemala also has foreign trade with E.E.C. Countries, Japan, Republics of Central American and Venezuela. Table 1 and the graph 1 shows the last six years of this trade.

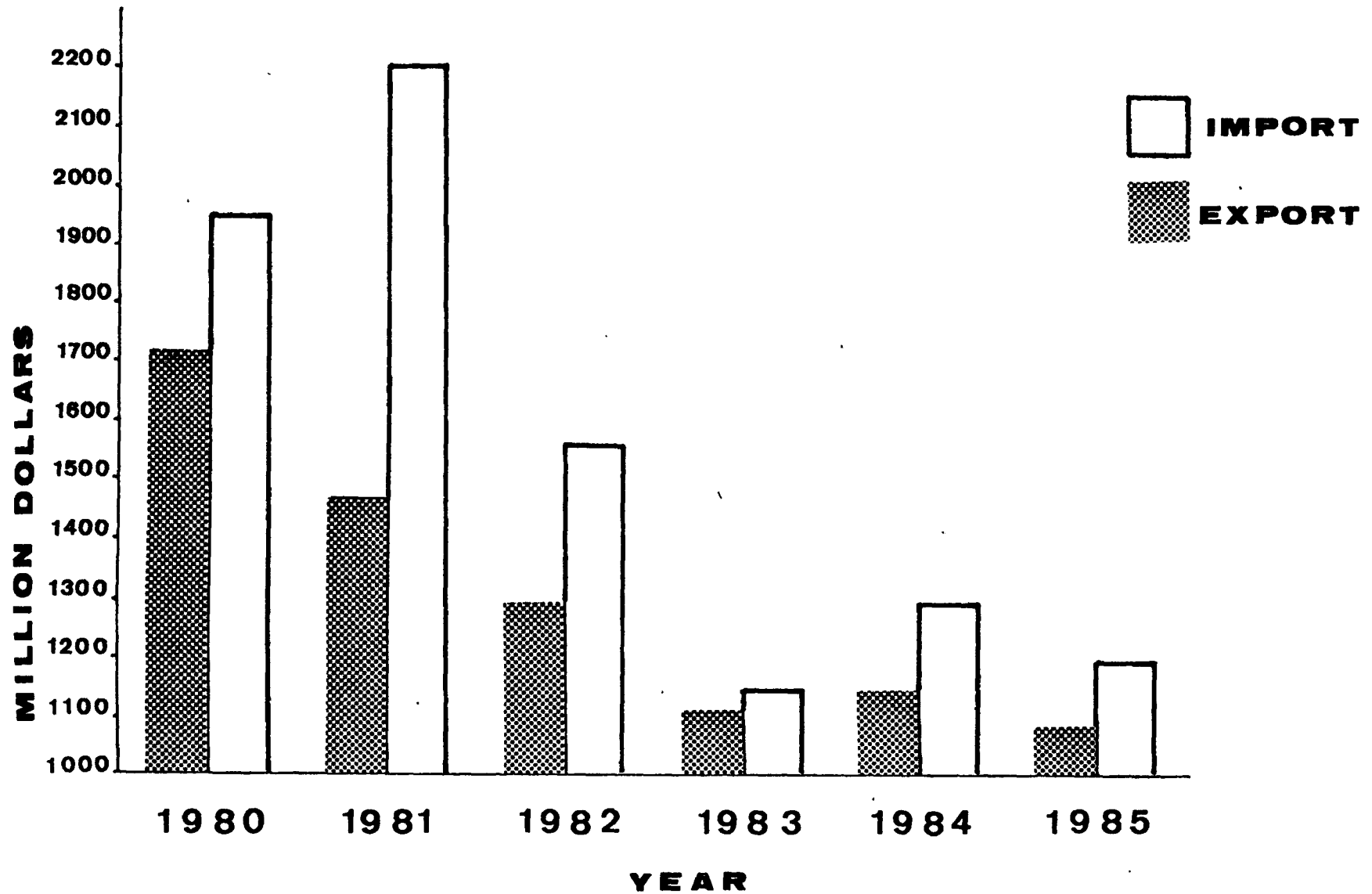
TABLE 1

GUATEMALA FOREIGN TRADE (million dollars)

| YEAR | EXPORT | IMPORT | BALANCE |
|------|--------|--------|---------|
| 1980 | 1720 | 1950 | -230 |
| 1981 | 1460 | 2200 | -740 |
| 1982 | 1280 | 1550 | -270 |
| 1983 | 1092 | 1135 | - 43 |
| 1984 | 1132 | 1278 | -146 |
| 1985 | 1060 | 1175 | -115 |

Sources: UN Survey 84 and Banco de Guatemala.(4)(5)

GRAPH 1
GUATEMALAN FOREIGN TRADE



SOURCES: UN SURVEY 84 AND BANCO DE GUATEMALA

Increased public and private investments are expected to support economic growth rates for the foreseeable future.

Substantial petroleum exploration by a variety of international oil companies will further strengthen the economy.

Also, despite the government's increased expenditure for social, public health programs, education, and rural development, distribution of the country's wealth is still highly concentrated.

1.4. RESOURCES

Despite depletion, the forests are still among Guatemala's richest natural resources; They cover nearly 42 % of the total area. The forests yield net woods, timber, oils extracts and gum. Mahogany, cedar balsam and chicle for chewing gum are being exported.

Official surveys of Guatemala's mineral wealth show deposits of coal, gold, chromium, copper, iron, asbestos, quartz and uranium all waiting to be extracted. The principal commercial minerals are antimony, nickel, marble, silver and petroleum which are being exported. Guatemalan waters are rich in fish, including shrimps, snapper and tuna. The principal seafood exported is shrimps.

1.5. INDUSTRY

The principal industrial products in the country are : cement, sugar, flour, processed food, textiles,

furniture, chemicals, cloths, alcohol and metals.(6)

1.6. TRANSPORTATION

In 1984, the total length of Guatemala's road system was 27,429 km (16,422 mi), of which 11 % was paved. Two International highways cross Guatemala ;The 824 km (512 mi) long Franklin D. Roosevelt Highway (part of the Pan American highway system) and the Pacific Highway . The construction of a new 500 km (310 mi) long highway network began in 1985.

Guatemala Railways operates 866 km (538) long of the public railway, and there is also a 290 km (180 mi) long platation line.(7)

Few of the rivers and lakes are important to commercial navigation. The Caribbean coastal ports are Puerto Barrios and Santo Tomas which is Guatemala's chief port; The pacific coastal ports are Champerico, San Jose and Quetzal.

As Guatemala does not have its own national fleet, almost 95 % of the international trade in Guatemala is carried by the foreign line services.

In Guatemala the marine sector is neglected and essentially needs to be attended.

Footnotes and References

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CHAPTER I I

ROLES OF PORTS IN ECONOMIC DEVELOPMENT

2.1 PORT INFRASTRUCTURE

The infrastructure of a transportation system is formed by the fixed elements that make it possible for the modes of transport to perform its function of transportation.

In the case of maritime transportation, these fixed elements are the route and the binding points of the earth, such as the ocean and its ports.

The infrastructure of maritime transportation is formed by the ocean, the ports, the channels and the naval industry.

2.2 CONCEPT OF THE PORT

The Port, by its classic definition according to the Dictionary of the Spanish Royal Academy is: " A place on the coast, protected from the wind and prepared for the security of ships and for the operation of traffic."

The definition applies to the traditional port, however, the concept of port has changed through time following an evolution parallel to industrial development and maritime traffic.

The industrial development, with the evolution of

the train and the steam ship, permitted a considerable growth of maritime commerce, thus forcing the ports to adaptation.(1)

Since the operation of loading and unloading was easier when the ships were docking, they had to improve the wharfs and prepare an area to store merchandise.

At the same time, as the ships were bigger and needing more space to execute the manoeuvres, it was necessary to have an area with sufficient water. This resulted in the construction of sheltered areas very far from the docking areas to ensure safe anchorage.

In proportion, each time the traffic increased, it was necessary to have greater land area, not only to store, but also, to establish the various ports services.

Geographical factors, the economic growth of the country, traffic factors and local conditions, all influence ports development.

The geographical factors of the port are those derived from its geographical situation in relation to the great current of maritime traffic or the extent and economic importance of its zone of land influence.

The economic growth of the country influences the maritime traffic in general, and has a direct repercussion on the ports through which the traffic is directed.

Naturally, the regional growth of its " hinterland "

influences the port in a direct manner but at the same time, the growth of the port improves the benefit of the resources of the zone permitting low cost of interior transportation and making the establishment of industries easier.

The kind of goods that is transported through the port notably influences the growth of it. Naturally, depending on the kind of merchandise, such as bulk, general freight, and petroleum. The development of the port installations will be directed to save the traffic in demand and, at the same time, when the port adapts to a specified traffic system it will produce an increase of demand.(2)

The local conditions of all types, such as nautical conditions, tides, currents and fog ; of subsoil, which makes the construction of the ports easy or difficult; urban areas, auxiliary services, population; territorial conditions, like amplitude or scarcity of surface; influence considerably the development of the port.

2.3 FUNCTION OF THE SEA-PORTS

The sea-ports contain the principal centers of expedition and reception of the merchandise that constitute the exterior commerce.

There is a certain number of reasons why the ports can have a decisive role in the economic and social development of a country. This in part, can be explained by the functions that a sea-port can have. These are:

-Commerce

-Transportation

-Employment

-Industry

-Flow of foreign exchange

-Politics (3)

To attempt to separate and analyze the functions of sea-port it should be noted that it is not possible to separate them.

Although it is possible to establish a specific analyses without a formal correspondence with the model previously defined, the existence of a the port, and more so, to have the necessary facilities, influences the commercial activities of a country. Furthermore, to have suitable port facilities gives a country the opportunity to follow a policy of diversification of a commercial region.

This way, the companies involved in port activities, can be in a position to use their management connections to promote the development of the foreign commerce.

A sea-port is a point of connection between maritime transportation and all forms of internal transportation. The task of a port, within the total chain of transpor-

tation, from the seller to the consignee, is to provide a quick, safe and economic, tie between maritime and land transportation.

The extent to which the function of transportation can be made by the port, depends on the quantity and quality of the means that it offers.

If a country has a proper port of great output, this port not only fulfils the function of economizing of foreign exchange but also if is a source of income.

There are, nevertheless, more aspects that do not have anything to do with the development of commerce, but that must be taken into consideration when the function of the ports is evaluated in economic development.

These aspects are, especially the effect on employment and the effect on industrialization around the port.(4)

Without going into details, it can be said that a port is a supplier of jobs, either in relation with the handling of the ship and the cargo, or with other economic activities. Due to its different functions, a port can be considered as a primal force in the development of an entire nation. Nevertheless, in order to obtain a certain level of quality port operations are needed.

2.4 PORT STATISTICS

According to my experience Port Statistics in Guatemala are scarce and which at the same time causes prob-

lems for the immediate solutions of definite projects of growth and improvement of the ports. For that reason, some basic port statistics should be compiled monthly, weekly and daily in accordance with the needs of the management planning and decision making.

It is necessary to point out the necessity to define clearly the aims of the statistical activities in port which must contribute in increasing the efficiency of the management.

Relevant statistics are those that shows the real situation of the port installations of a country, that is not only useful for the country, but also for the companies of navigation which might have the intention to call the country's ports at a specific moment.

It should be given importance to know how to handle and to present such information, in a way that the person who uses it, can have a general idea of the situation of a port in its different functions.

Summing up, the object of the port statistics is to cover in a continuous way certain specific isolated factors about ships, freight and land traffic, and with this information to obtain the efficiency of a port during a determined period of time.

In Guatemala there is statistical control, however this study could contribute to a possible revision and improvement of the existing statistic activities.

The statistics that must be covered by the ports are:

INVENTORY

This type of port statistics present systematically the basic functions of a port, referred to the traffic of merchandise and/or people from a ship to the warehouse or other means of transportation in addition to the special means of cargo handling equipment and port services.

The details about the number, legal forms and economic functions of the ports, companies of services, the description of the port organization structure, and the facts about the individual main port, are very important.

This statistical analyses are complete if they give information on the more important technical details, such as: capacity, age and condition of the port facilities. The berthing facilities, handling and warehousing represent a functional unit.

The statistics of inventory require the particular facts of each berth. To do this, the following basic information for each berth must be determined:

1. Infrastructure

a) Types of berths

General cargo, oil, container, Roll-on/roll-off, passenger, mixed and supplies.

b) Age of construction

c) Technical data

Depth of water alongside the berth, length of berth, surface of the water and width of berth.

2. Super-structure

a) Fixed cargo handling equipment of the berth; with the main technical characteristics, such as, capacity, reach, age etc.

b) Storage facilities

Classified by types, transit sheds, warehouses, open-air storage, stacking and marshalling areas for containers and vehicles, refrigerated storage, silos, tanks, etc.

In addition, it is necessary to record all information that can determine the traffic operation and the cargo handling of the port.

This information is the following:

- Entrance channels, basins by number and depth
- Navigational aid facilities, number of pilots, boats, number and power of tugs, radio and radar installations, beacons and lights.
- Facilities for ship repairs and maintenance. (5)

The information about the port facilities is easy to obtain and its fundamental job is the continuous control of the inventory. This inventory is important for the port economy, because the technical data and organized facilities, altogether, determine the efficiency of the ports.

The maximum total capacity of the port is not possible to obtain from the statistics of inventory with addition of the capacities of the individual technical facilities.

Nevertheless, there are individual indicators of efficiency in individual port sectors, such as:

- goods clearing by berth
- goods clearing by meter of berth
- mean time used by the cargo in port storage.

SHIP TRAFFIC

This group of data is of vital importance to ports, owing to the high cost of most of the port facilities necessary to operate vessels in the harbour. A detailed analysis of the present and likely future ship traffic is needed to provide the most adequate facilities and furthermore all ports should maintain complete records of ship traffic.

The basic information in order to cover these port statistics are as follows:

-Type of ship, type of operation (liner ship, tramp ship) and area of activity (cabotage, international traffic)

-Within each type, the ships may then be differentiated by their sizes, which may be expressed by various measurements, such as the gross registered tonnage (GRT), the net registered tonnage (NRT), the dead weight tonnage (DWT), and the physical dimensions (length, beam and draught of the over all).

In most ports, only one of these three measurements is recorded, the choice being related to the system of port charging.

-Ship traffic in each berth, tonnage, cargo traffic in entrance and departure.

-To record the essential information on the turn-round time of ships. For each call of a ship, at least the following should be recorded:

. Date and time of arrival at the port

. Date and time of berthing

. Date and time of departure from the port

-It could also be useful to record for each ship the port at which her voyage began and the port of destination, in order to analyse the main ports of call of the shipping companies; To record the different flags of the ships calling the port is also important.

The data previously referred to, not only inform about the intensity of the traffic measured by the number of ships that call the port, but they also indicate the significant changes in respect to the size of the ships and perceptible tendencies toward their specialization.

Also, based on the previous data, and complemented by indicators of efficiency that are based on the time ships spend at the port, such as, waiting time stay ships and time of loading and unloading, it is possible to determine the future needs of the berths and irrespective technical requirements.

CARGO FLOWS

The most conclusive statistics, referring to the efficiency of a port, are the statistics of cargo flow, as they show the volume and the structure of goods clearing.

The goods clearing is presented, in quantitative form; the consideration of the volume of transport is decisive in the context of evaluating the capacity of the port economy.

To differentiate the cargo structure the following details should be followed by shippers and consignees:

- . The proportion of general cargo and bulk cargo
- . The composition of the cargoes cleared as regards each group of goods.

- . The flow of cargo by types of traffic, including the transit traffic.
- . The flow of inbound and outbound cargo

The classification of the clearance in general and bulk cargo is determined by the techniques of handling cargo and packing.

The statistical facts concerning the relation between general and bulk cargo are important as national economic criteria. In the handling of general conventional cargo, characterized by a heterogeneous structure of cargo, the substitution of man power by technical equipment, is only possible if statistical data is available.

Statistical facts such as the composition of cargo flow by traffic groups, by countries of origin and destination, are necessary in order to clearly show the existing interdependence between the commercial policies.

Other statistics of merchandise which offer essential information about of the port are those concerned with the flow of inbound and outbound cargo. The flow of inbound cargo, which is manipulated almost exclusively by the port of the region in question, shows by its volume and composition, the level of development of the productive industry of the port and its immediate environment.

The statistical investigation of the interior traffic concerning the commercial regional area, or supra-regional area of cargo loaded or unloaded, is of special

importance for the port in its function of linkage with the total chain of transportation; it also shows the interrelation between the economic development of the interior area and the activities of the port.

In annex 2, shows some forms which can be used for data collection for the statistical information. (6)

2.5. TYPE OF PORTS

In this analysis each individual port is combined in general groups by geographical, economic and other similarities. According to this preliminary of classification the types of ports can be described:

1. by its location in respect of the sea:

- on the coast
- in a bay
- in a fluvial estuary
- in a fluvial fiord
- on a lake
- in a channel

2. by the type of waves, such as:

- open waves
- high tides
- dike waves
- floodgates from deep draught

The characteristics of an open waves port is its open connection with the sea and the changing levels of water in the basin.

3. by the amount of its activities

- international
- regional
- local

These criteria, are based in the geographical importance of a port within the network of maritime commerce.

4. by the relative conditions to the custom regime;

- free ports and customs ports

5. by property;

- federal
- state-owned
- municipal
- city
- private

Frequently it is very difficult to make a distinction by the criteria of property, because usually there are mixed forms.

6. by the type of maritime traffic;

- liners
- tramps
- terminals
- trans-shipments

For a port to be classified as a liner port, it needs to offer programmed liner services.

There is an additional difference when the ships call within their routes; If they are used as departure points or final ports of call, they are terminal ports, but if a port is used to call during its course, it is an intermediate or traffic port.

7. by the structure of the cargo they transfer;

- general cargo
- bulk cargo
- passengers
- containers
- lash
- roll on/roll off
- ferries

8. by its deversification

- specialized ports
- universal ports

These are the ports that actually handle traffic, but not within the framework of a chain of transportation. Example of this kind of port is the shipyards, ports supplying fuel, coastal and fishing ports. Furthermore, these are the ports in which the traffic is done within a chain of transportation, but especially concentrates on a unique type of cargo. Examples of these type of ports are the ports handling mineral, oil, coal and bulk.

The universal ports are the ports that accomplish all the functions of maritime manipulation.

9. by the interior traffic to/and from the port

- railroad
- interior sea route or fluvial
- road traffic
- oil pipeline

10. by the type of freight

- Commercial
- industrial
- expedition

11. by the direction of freight flow

- Importation
- exportation
- trans-shipment (7)

2.6. GENERAL DISPOSITION OF A PORT

For a port to effectively carry out its necessary operations it must be protected from the current and the wind. The protected area, either by proper natural conditions of the coast or by artificial protection, constitutes the surface of a sea-port.

The sea surface is subdivided into anteport, channel and basin. The anteport is the closest to the ocean.

There are no docks, nor surface in land communications with the network of land transportation.

This area is used for anchorage and it is the place of waiting time of the ships before docking. It is also used as a manoeuvring zone. This surface is protected against exterior waves. The anchoring place should have sufficient depth, the water surface and the necessary anchoring, the minimum agitation and a manoeuvring clear zone.

The channel is an area of the port with a necessary depth and width for the ships to get from the anteport to the basin. The channel normally is marked out with beacons and if necessary its depth is maintained by dredging.

The basins are usually rectangular areas, limited by the docking piers that form the limit between land and sea.

In this way, all the complex structures of the ports, such as railways, highways, platforms, warehouses and cargo cranes are located on the wharves.

The width of the docks vary a great deal, as well depending on the type of freight to be handled and other circumstances. Likewise the width of the area of storage varies, as well as the reception and delivery of freight situated behind the warehouses and platforms.

To achieve the general disposition of the port mentioned above, it is necessary to fulfil exterior, interior and complementary installation.

Exterior work consists of putting limits to the port and protect the exterior access, as this area suffers the direct action of the ocean. On the other hand interior work which is protected, refers to servicing the ships.

Among the outer work areas we have: Shelter, access, defence of coasts, maritime signals and lights and entrance and position of buoys.

Interior work refers to docks, land areas, platforms, warehouses, land access, shipyards and dams.(8)

2.7 Port Planning

Within the broad National strategy, the development of each individual port must be comprehensively planned. The development of a port consists of a combination of medium term and long term planning of new facilities, but in the case of an existing port, a programme of short term action to improve the management, the present facilities and their use.

For each investment there must be, firstly, a planning phase, which ends in a recommendation on which course of action the port should follow, giving only a broad treatment of each technical aspect; secondly, a decision phase, which can be substantial and includes the securing of funds; thirdly, a design phase, which turns the chosen plan into detailed engineering designs, and lastly, the construction or implementation phase.

The scope of this paper solely deals with the planning phase, because our country is in need of covering this fundamental process.

Planning in any case is oriented towards future objectives and development.

The long term plan or the master plan, as it is often called, consists of a view of the future situation as it will be after a series of individual developments have been carried out.

The master plan will be set within the framework of the National Ports Plan and will in turn provide a framework within which the medium term plans for action can be drawn up and specific project defined. This principle of going from a broad long term plan to a detailed medium term proposal should be a standard procedure.

There will always be an urgent need for moderate technical and operational improvements, such as the extension of available storage space, and the introduction of additional cargo-handling equipment. Improvements of this kind are independent of future capital investments and should not be delayed until the main investment plan is finalized.

Long term planning

In order to prepare the master plan it is necessary to ascertain the development framework, within which each port will be operating. For this purpose it is necessary to consider the following aspects.

- I) The role of the port, which may include some or all of the following tasks:

- a) To serve the international trading needs of its hinterland as reflected by traffic forecasts.
- b) To assist in generating trade and regional industrial development.
- c) To capture an increased share of international traffic either by trans-shipment or by inland routing.
- d) To provide transit facilities for distant hinterlands not traditionally served or for neighbouring land-locked countries.

II) The extent of the port's responsibility for infrastructure needs, as follows:

- a) Marine responsibility, which may be total, from landfall to berthing.
- b) Landward responsibility, which may be total, including road and rail links between port and inland depots.
- c) The land use policy for the port, which may have freedom within fixed boundaries, or freedom to acquire or dispose of adjoining land either on the open market or with compulsory purchase, or freedom to acquire non-adjoining land for storage, for inland clearance depots, or for additional berths at new coastal locations.
- d) The financial policy as regards the port, which may be either fully commercial, self-supporting and with

freedom to set tariffs as necessary, or subject to public control as an instrument of national development.

The land-use aspect and that of the major water areas and channel developments are the most vital features of the long-term plan, for example in a container terminal or a major terminal for ore requires an area of tens of hectares.

The long-term plan will place more emphasis on what is desirable than on what the trends seem to show to be likely.

The land-use aspect and that of major water areas and channel developments are the most vital features of the long term plan.

Modern technological developments have made the need for ample land space still more operative than was the case in the past.

The industrial planning policies of the central government together with the National Ports Plan when available should give much of the framework necessary to set each port's objectives. But it would be unreasonable to expect those responsible for such policies to be very precise at the outset since their understanding of the possibilities of port development is likely to be incomplete.

Since the short and long-term investment plans form part of the same sequence of financial investment and of

economic benefits, the whole sequence should be considered as one programme.

The best that can be done at the present time is to try to set out a series of the main investment alternatives and to calculate at each main date of investment and of commissioning what the costs and the benefits will be.

The master plan should have a continuous existence as a formal part of a reference document. It should be modified periodically, as a result of a definite decision to take a fresh look at the whole future situation at a given date.

Project planning or mid-term

A project plan usually takes the form of a feasibility study of the best way to satisfy a particular requirement and it is followed by the design phase. The project plan must be consistent with the master plan and it must be seen as one step in its implementation.

The procedure of devising a project plan involves finding the solution to a specific requirement and culminates in a justification for investment. It is normally carried out as a clear cut project with a well defined programme of work. It is advisable to prepare a summary bar-chart of the full range of the project activities, in a form similar to that in graph.2 (see annex 1) The project plan has three main stages indicated by the vertical arrows. The first stage, which after a period set aside for agreement by the authorities, leads to a broad project definition, should take perhaps 20 %

of the time available, even if little thought has been given to the needs of the future port before start the project.

Furthermore, if no MASTER PLAN exists, it may be necessary for a substantial amount of time to be allocated first to the collection of traffic data and to the carrying out of the preliminary geological and hydrographical surveys.

The work of the second stage includes the preparation of detailed traffic forecasts and broad engineering studies, and the specification of all the feasible alternatives, together with rough cost estimates for each. It also includes the important task of considering, for each alternative, what operational plan and cargo handling methods will be used. In order for the answers to these practical questions should be realistic, a productivity forecast to be made on the basis of progress recorded to date in consequence of the short term improvements. This stage should take at least 30 % of the project time.

The third stage involves the carrying out of the analyses, which will show which of the alternatives are the more attractive, and it culminates in a recommendation for a single solution. It is likely to be the longest stage, taking more than 30 % of the time. It includes, first, the carrying out of performance calculation to determine what level of service will be given by each combination of traffic and facilities, and then, on the basis of these performance figures, the filtering out of alternatives, using economic and financial analysis.

In summary, the port planning team will need to be provided with the skills and the time needed to carry out each of the following analyses:

- i) A performance analyses to determine the effect of different levels of the port capacity at the level of service provided to the port's customers.
- ii) Engineering studies to determine the feasibility and approximate cost of each design.
- iii) Operational planning to determine how the proposed facilities will be used and what the productivity and the operating costs will be.
- iv) An economical analyses to compare the desirability of each alternative in terms of the stream of costs and benefits it generates.
- v) A financial analysis to determine what the revenue will be at different traffic levels and tariffs and furthermore, whether such revenues will support the costs of the facilities and the servicing of any loans. The effect of the project on existing costs and the resulting financial viability of the whole port, must also be studied.

A complete port development plan must include provision for many facilities which are auxillary to the main port operations of trans-shipping and storing of cargo. These range from fire fighting and rescue services to document handling and data processing systems. They will generally require financial provision, which in total can be a substantial addition to the overall costs of the project.

It is not necessary, for the supervision of a general port planning project, to use methods of monitoring and control in detail.

A simple method of control is to identify successive goals, or milestones, along a bar-chart, and to check progress towards each of these goals at regular progress meetings.

Monthly progress meetings would be appropriate in most cases. These meetings should be informal, technical and as extensive as the subject demands.(9)

2.8. Port labour

Labour is of particular importance in the handling of cargoes of a berth.

The main aspects of port labour to consider are:

- the quality of the port labour
- the manning levels in the gangs
- deployment of labour
- their supervision

2.8.1. Quality of labour

The main work unit in the organizational structure of a berth is the labour gang; in the ship operation there are shipboard gangs and quay gangs.

The efficiency of the operation obviously depends to a large extent, on the ability of the gangs to handle the cargo safely, speedily and correctly; these are the basic skills of a dockworker.

Recruiting and selecting labour is itself a skilled and important task. It is necessary to analyse each job carefully and decide what particular personal attributes are desirable to carry them out effectively.

It is necessary to have a plan for promotion, management succession, as well as making sure that there are exist always a men in reserve to replace the foremen, supervisors and managers when the need arises.

Training is vitally important in dock work. It is too often assumed that cargo-handling is straight forward and that men will somehow 'get the hang of it' as they go along.

Management must provide good training in the basic skills of dockwork: how to use stevedoring gear and how to handle cargo correctly, safely and speedily.

As well as basic training, it is necessary to provide training schemes for the more specialized skills of tallying, winch and crane driving, operating for klift trucks and other equipment, while hatmen, foremen and supervisors need training in their skills, too.

The keys to high gang output and good labour relations among dock workers are: sound selection and pro-

motion policies, effective training schemes, sensible working hours, good working conditions and attractive incentives.

2.8.2. Manning levels

The manning level is the number of men desirable in a quayside gang.

The likely causes of delays are labour factors; then it is essential to employ just the right number of men on each job.

Manning levels must be set, therefore, to match the job on hand, according to the type of cargo being handled, the working conditions at the time and the equipment available for handling the cargo must be considered.

Manning levels should be related to the amount of physical work involved.

Another consideration is the working conditions the men are faced with concerning the position in which the cargo is stowed and how well it is stowed.

Another factor is the equipment being used, particularly for moving and stowing cargo in the vessel's hold.

As labour costs are a major item of expenditure, it is particularly important to get manning levels right, because of the direct relationship between labour costs and productivity.

2.8.3. Deployment of labour

Efficient use of labour resources is not simply a matter of manning levels but depends just as much on the way the men are deployed in each work area. Many of the delays on the berth are caused not by having too few men in the gangs but by poor deployment and poor organization of their work. So, after fixing the size of the gang to easily cope with the work involved, it is necessary to deploy the men sensibly within the various stages of the operation.

2.8.4. Supervision of labour

It is extremely important that berth labour is closely and constantly supervised to ensure that only good working practices are followed, to avoid the poor quality of service to users that results from poor labour performance.

The supervisors and foreman have considerable responsibility for labour performance, and must pay particular attention to direct and close supervision.

There is no doubt, then, that attention to labour factors is a very important element in getting the best possible performance from the berth.

It is important to select and train the workers carefully, to set sensible and appropriate manning levels, to deploy the workers effectively within the activities of the quay operations and to make sure they are properly supervised.(10)

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CHAPTER I I I

PORT APPRAISAL, FINANCES AND TARIFFS

3. Economimic appraisal

3.1. Appraisal methodologies

The economic appraisal of a project consists in comparing the cost with the benefits to be derived from it which implies the selection of the project that will provide the maximum return.

For this, however it is necessary to have adequate information and there are few developing countries with the statistical data which would permit an accurate computation of macro-economic costs and benefits; Few have input-output matrices; The knowledge of elasticities of traffic is stay limited. This is the reason why the World Bank (*) normally prefers to allocate all costs and benefits of the project to the direct user: ship and cargo. However the macro-economic approach is considered to be the right direction to follow in the future. Then, a developing country like Guatemala must start to make the necessary efforts in order to have a reliable and adequate statistical system and planned information necessary to introduce an appraisal methodology for port investment satisfying both the internal and international requirements such as those of the World Bank.

(*) As pointed out by Jean C. Grosdidier de Matons in "Economic and Financial Appraisal of Port Project at World Bank: a review of policy and practice"

The optimal project

For a project to be financed by the World Bank (*), it is necessary not only to be viable but also to be optimal.

The optimal project is the one which has a wider safety margin than any other and does not necessarily consist of physical facilities. In fact, physical development is no panacea for the problems of ports in developing and developed countries. In certain cases more economic benefits may derive from managerial and administrative improvements together with adequate maintenance.

It is very important to consider schemes which include major training elements, to increase the effectiveness of port services.

It does not mean that physical elements should be excluded but that the institutional and human resource element constitute the hard core of an optimal project.

Test of economic optimum

Test of economic viability of port projects are normally the present net value, based on a discount cash flow of costs and benefits.

Usually the socio-economic benefits are considered beneficial to the community as a whole including finance in financial terms at the micro-economic shipowners;

(*) As pointed out in op. cit.

the benefits level. The calculation ignores the multiplier effect of the economic benefits and of the financial revenue distributed in the national economy. It does not include the environmental effects as these can not be quantified.

Distribution of economic benefits

Economic benefits, or savings, resulting from investment in ports accrue mainly to shipping under the form of reduction in handling costs and losses of cargo, faster ship turnaround time, increases in ship size and elimination of congestion. These benefits are passed back to the country in the form of reduced freight rates and increased of traffic demand the port and consequently increased of foreign currency earnings and employment.

However, to retain the benefits from port improvements, an adequate tariffs system should be set up and implemented.

3.2. Financial appraisal

The financial appraisal needs to be conducted according to an economic appraisal, because tariffs, an essential element of port finance, are determined only after the port's economic objectives are known. Tariffs should reflect the economic rate of return.

In fact, the rate of return on fixed assets in use is generally employed as a guide to the soundness of port finances. However, the criterion, when applied to ports,

raises a number of issues concerning the definition of fixed assets, their evaluation, the depreciation rates, and the significance of the rate of return itself.

That is why the World Bank (*), for example, uses a criterion of conservative pragmatism in its evaluation of port finances, that aims at putting the port on the safe side, at eliminating operating subsidies and at preventing the port from being a drain on the national budget, the resources of which are always limited.

The general criteria are that:

- There should be "a reasonable" return on revalued fixed assets; this varies with circumstances, especially if the port conducts, or has an interest in cargo handling

- The port should be able to pay for interest and redemption of loans, at market interest rates; and

- It should finance a substantial part of its investments from its own resources

(*) As pointed out in op. cit.

3.3. Port tariff

Port tariffs should be set up aiming at the following three objectives:

(a)-to achieve a level that will ensure the port's overall financial viability

(b)-tariffs should be related to costs

(c)-tariffs should be economically effective and optimize the use of facilities

The setting of tariffs at a level which makes the port financially viable does not meet major difficulties.

As ports of developing countries are in a monopolistic position, an increase in traffics has little effect on the demand for port services; in addition, port users are much more sensitive to the quality of port services (such as fast turn-round of ships and cargoes) than to their price.

In fact, port tariffs amount to some 5% to 10% of the final cost of merchandise, which is contrary to common belief, so the impact of their increases on the cost of living is minimal.

It must be pointed out, however, that cost-based tariffs also have a weakness; they do not encourage port managers to reduce their costs, which tend to be taken for granted. This is why it is a good practice to have

users' representation at the board of a port authority:
they exercise pressure to keep costs and tariffs at rea-
sonable levels.(1)

Footnotes and references

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CHAPTER IV

PORTS IN GUATEMALA

4.1 General information about the ports in Guatemala

The ports on the Caribbean Sea are Puerto Barrios and Santo Tomas de Castilla, the latter port being the main port of the country. The Pacific port of Champerico which is used mostly for fishing, and the port of San Jose are of lesser significance. There is a new port on the Pacific, Puerto Quetzal, which is almost finished.

All the ports are government owned and they are semi-autonomous with a board of managers who issue the development policies, approvals of the budget and controlling of the achievements of the ports. Each port is a separate enterprise with its own resources and personnel.

P U E R T O Q U E T Z A L

A new port area has recently been constructed, just east of San Jose harbour which is protected by breakwater. It is the first multipurpose Guatemalan port on the Pacific Ocean, opening services to international oceanic transportation.

This port is the link which connects exporters and importers in Guatemala with international commerce.

Due to its geographical position, Puerto Quetzal provides services to the maritime traffic to Asia, the

west coast of the American Continent and the whole world through the Panama canal.

COMMUNICATIONS

Puerto Quetzal is located 100 Km. (62 miles) away from the city of Guatemala, which is the capital of the Republic and 402 Km. (250 miles) way from the ports on the Atlantic Ocean, connected by highway and railroad.

There are also air transportation facilities near Puerto Quetzal.

PORT OPERATIONS

Puerto Quetzal has structural facilities and some modern equipment which make it a safe and operational port, offering the following services:

Ship services:

- a) aid to navigation
- b) pilotage boat
- c) pilotage
- d) mooring and unmooring
- e) use of the port
- f) anchoring

Cargo Services:

- a) stevedoring (private enterprise)
- b) transference
- c) storage: Warehouse 96 m. by 80 m. and open storage areas.

Ships that can be attended:

- a) General cargo vessels
- b) Bulk cargo vessels
- c) Containers
- d) Roll-on / Roll-off vessels
- e) Barges
- f) Passengers ships
- g) There are also service areas for pleasure yachts (1)

Technical information about the port:

Puerto Quetzal is located on the Pacific Ocean to the East of San Jose. Its geographical position can be defined as follows:

Latitude: 13 54' 50'' N and Longitude 90 47' 04'' W.

The protected zone is formed by a major break-water of 1,140 m. (3,740 feet) in length, a minor break-water 307 m. (1,007 feet) in length and the north dike 367 m. (1,206 feet) in length, all of this to assure security and safety.

Access channel

The access channel to the basin provides security at the entrance and exit of the ships. It is 210 m. (689 feet) wide and 12 m. (39 feet) deep.

Maneuvering basin

The basin is circular, with a diameter of 400 m. (1,312 feet) and 12 m. (39 feet) deep, which facilitates the maneuvering of the ships.

Tides

The maximum range of tide is 1.83 m. (6 feet).

Docks

The main dock, located in the easter part of the installation, was conceived as a multipurpose terminal. It is 800 m. (2,625 feet) in length and a platform which is 56 m. (184 feet) wide including a ramp which is 56 m. (98 feet) in length and 30 m. (84 feet) wide with a capacity of 100 Tons. to provide service to Ro/ro vessels located at the northern end of the principal wharf. (2)

P U E R T O S A N T O T O M A S

D E C A S T I L L A

Puerto Santo Tomas de Castilla is the principal port in Guatemala. It is located on the Caribbean Sea, giving services to international oceanic transportation.

Due to its geographical position, Puerto Santo Tomas de Castilla provides services to maritime traffic in the Caribbean, Europe, the East Coast of the American continent and the rest of the world through the Panama canal.

COMMUNICATIONS

Puerto Santo Tomas de Castilla, is located 302 Km. (188 miles) away from city of Guatemala, which is the capital of the republic. The port is connected with the capital by highway and railroad.

There are also air transportation facilities, 8 Km. (5 miles) away from the port.

PORT OPERATIONS

Puerto Santo Tomas de Castilla has the structural facilities and modern equipment which make a safe and operational port, offering the following services:

Ship Services:

- a) aids to navigation

- b) pilotage boats
- c) pilotage
- d) mooring and unmooring
- e) use of the port
- f) anchoring

Cargo Services:

- a) stevedoring (public and private enterprise)
- b) transference
- c) Storage: Warehouses area of 35,018 squad meters, uncovered storage space and circular area of 143,275 squad meters, no refrigerated space.

Other services

- a) Fresh water; Pipe-lines alongside the quay. Delivered by hoses belonging to port. Rate: 15 Ton/hour
- b) bunkering
- c) ship repair
- d) provisions
- e) repatriation

Ships spare parts can be sent to a vessel calling at Santo Tomas de Castilla by air or sea freight but care must be exercised in their addressing and marking, as local import duties may be imposed otherwise.

Ship that can be attended:

- a) general cargo vessels
- b) bulk and ore cargo vessels
- c) containers
- d) Roll-on/roll-off vessels
- e) oil tankers
- f) liquid petroleum gas (LPG) vessels
- g) barges
- h) passengers vessels
- i) pleasure yachts

Technical information about the port:

Puerto Santo Tomas de Castilla is located in Amatique bay on the Caribbean Sea, southwest of the town Barrios. Its geographical position can be defined as follows:

Latitude 15 41' 44' N and Longitude 88 37' W

Access Channel

The access channel, as well as with the manoeuvring basin are marked by light buoys driven by batteries which are recharged by solar energy.

The channel has a depth of 9,75 m. (32 feet), at the marginal quay there is a depth of 10,00 m. (33 feet).

Maneuvering Basin

The basin has a depth of 9,14 m. (30 feet), and the space for maneuvering is a considerable, which facilitates the maneuvering of the ships.

Tides

The maximum range of tide is 0,60 (2 feet)

Docks

The main dock is 914,4 m. (3,000 feet) in length and capable of handling six general cargo vessels, with a depth alongside of 10,00 m. (33 feet). The dock is equipped with modern warehouses, bulk handling gear and cranes (maximum capacity: 55 T.). There is a tanker berth at the eastern end of the pier, whose diameter of 8 inches is coupled to a ten-inch shore line. (3)

P U E R T O B A R R I O S

Puerto Barrios one of the oldest ports in Guatemala. It is located on the Caribbean Sea. Despite the bad conditions of the port, it still gives services to international oceanic transportation.

Due to its geographical position, Puerto Barrios provides services to maritime traffic in the same way as Puerto Santo Tomas de Castilla.

COMMUNICATIONS

Puerto Barrios is located 305 Km. (190 miles) from the city of Guatemala, the capital of the republic, and it is connected by highway and railroad.

Air transportation facilities can be found 1,6 Km. (1 miles) away from the port.

PORT OPERATIONS

Puerto Barrios offers the following services:

Ship services:

- a) aid to navigation
- b) pilotage boat
- c) pilotage
- d) mooring and unmooring

e) use of the port

f) anchoring

Cargo Services:

a) stevedoring (public enterprise)

Ship that can be attended:

a) general cargo vessels

b) bulk and ore cargo vessels

c) bulk petroleum products vessels

Technical information about the port:

Puerto Barrios is located in a well protected bay called Amatique, which is a bay on the Caribbean Sea to the north of Barrios. Its geographical position is:

Latitude 15 43' N and Longitude 88 36' W

The access channel and maneuvering are the same for both ports.

Tides:

The maximum range of the tide is less than 30,48 centimetres (1 foot).

Docks:

There is one dock, 643,7 m. (2,112 feet) long with seven berths, and a depth of alongside 9,14 m. (30 feet) with two berths, 7.92 m. (26 feet) long, two berths 7,62 m. (25 feet) long, one berth 7,00 m. (23 feet) and 6.40 m. (21 feet). (4)

Puerto de San Jose and Champerico is in very bad condition and they give poor services, for that reason is not necessary to go in details.

3.2. The role of the ports concerning the economic development of the country.

Ports represent an essential link in the maritime transport chain.

For a developing country ports are a crucial factor to consider, owing to the fact that if a port is inadequate for the type and volume of traffic arriving at the port, the economy will suffer.

At the same time ports must be efficient, i.e. to be in a position to operate ships and private services, which enable a reasonable turn round of ships in port.

The importance of this aspect can be better understood through figures. In fact considering that about 50% of the total cost of transport is port costs (5), one can understand the important negative impact for a country's economy to have inefficient ports.

Most products exported by developing countries are raw materials and agricultural products with a very high elasticity in the international markets therefore, an increase in price of these commodities due to higher transport costs will create the impossibility to compete unless the producers have to support the differential which is not socially acceptable and not possible to maintain in the long run.

As far as imports are concerned developing countries import mainly manufactured goods most of them with a very low elasticity in the international markets. It means that an increase of costs due to transport, including port costs must be supported by the importing country considering that the exporters will not absorb those costs. Consequently the burden is borne by the consumers of the importing country.

Consequently efficient ports can contribute decisively to increasing the exports and reducing the cost of imports by making the economical development of a country dynamic.

Additionally efficient ports will attract more traffic which means an increase of foreign exchange earnings which is an obvious factor of interest for the country.

Regional development can benefit immensely from port development. The exports are possible and consequently the production is stimulated and tends to grow and develop. The employment rise and the commercial and social equipment and services must be created. This results in the region being promoted and progress made.

Particularly the road/rail connection needs to link the port with its hinterland is also a multiplier factor for the economy because it enables a better chain of the regional production, attraction of people to its vicinity and creation and development of communities and towns.

Efficient port facilities and services will encourage the industrial development by attracting industries dependent on maritime transport, such as refineries and transit industries, shiprepairing supply of victuals, stores and lubricants and so on. This will give rise to durable economic activities.

To invest in development is then to invest in the development of a country, since adequate structures and efficient services are provided contributing to reducing transport costs, attracting traffic and promoting trade.

4.3 The ports economy in Guatemala

The Guatemalan ports derive their economy from the revenue charges to the port users and generally the charges are divided into:

- charges for ships
- charges for commodities
- charges for other services

These services include mainly the following:

- ship entrance charges
- port dues
- berth occupancy
- pilotage
- tug and marine craft services
- stevedoring charges
- crane hired to ships
- water to Ships
- lights and navigational aid

The following table shows the trade movements in the years of 1970 and 1975 and from 1980 to 1985 in all the ports of the country.

TABLE 2 FOREIGN TRADE IN GUATEMALA (in thousands of tons)

| PORT | 1970 | 1975 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| BARRIOS | 539 | 586 | 880 | 731 | 656 | 471 | - | - |
| Import | 282 | 154 | 238 | 121 | 75 | 60 | - | - |
| Export | 257 | 432 | 642 | 610 | 581 | 411 | - | - |
| S. TOMAS | | | | | | | | |
| CASTILLA | 667 | 1019 | 1579 | 1650 | 1721 | 1751 | 1911 | 1469 |
| Import | 535 | 791 | 1004 | 1158 | 1067 | 956 | 1070 | 1018 |
| Export | 132 | 227 | 575 | 492 | 654 | 795 | 841 | 451 |
| SAN JOSE | - | 1000 | 281 | 302 | 274 | - | - | - |
| Import | - | 804 | 81 | 59 | 34 | - | - | - |
| Export | - | 196 | 200 | 243 | 240 | - | - | - |
| CHAMPERI- | | | | | | | | |
| CO | 107 | 110 | 100 | 76 | 68 | 87 | - | - |
| Import | 56 | 26 | 2 | 6 | 8 | 19 | - | - |
| Export | 51 | 84 | 98 | 70 | 60 | 68 | - | - |
| QUETZAL | - | - | - | - | - | 278 | 428 | 478 |
| Import | - | - | - | - | - | 92 | 124 | 109 |
| Export | - | - | - | - | - | 186 | 304 | 369 |
| TOTAL | 1313 | 2717 | 2842 | 2759 | 2721 | 2588 | 2340 | 1947 |

Source: Comision Economica para America Latina y el Caribe (CEPAL)

The table below shows the ship movements in the Guatemalan ports for the period from 1980 to 1985. Mostly these ships consist of bulk cargo, dry cargo and general cargo.

TABLE 3
NUMBER OF SHIPS VISITING
GUATEMALAN PORTS

| P O R T | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 |
|------------------------|------|------|------|------|------|------|
| BARRIOS | 325 | 291 | 257 | 111 | - | 29 |
| SANTO T. CASTILLA | 788 | 765 | 737 | 821 | 805 | 898 |
| SAN JOSE | 155 | 133 | 177 | 116 | - | - |
| CHAMPERICO | 32 | 27 | 54 | 69 | - | - |
| QUETZAL (new port) | - | - | - | 85 | 146 | 207 |
| Total for all Ports | 1300 | 1216 | 1225 | 1202 | 951 | 1134 |

Source: Comision Economica para America Latina y el Caribe (CEPAL)

TABLE 4 FOREIGN TRADE *

(in thousands of tons)

| PORT | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 |
|-------------------------------------|-------|-------|-------|-------|------|-------|
| BARRIOS | | | | | | |
| Imports | | | | | | |
| Fertili- | | | | | | |
| zers | 90.8 | 35.5 | 5.9 | - | - | - |
| Wheat | 124.4 | 58.9 | 52.0 | - | - | - |
| Exports | | | | | | |
| Sugar | 218.3 | 66.2 | 114.3 | - | - | - |
| Banana | 415.1 | 438.9 | 467.3 | - | - | - |
| SANTO T. CASTILLA | | | | | | |
| Imports | | | | | | |
| Wheat | - | - | - | - | - | 54.2 |
| Gasoline | 131.9 | 102.6 | 102.6 | 76.5 | - | 98.9 |
| Diesel and other oil products | 140.4 | 88.3 | 80.8 | 66.6 | - | - |
| Petroleum products | 67.9 | 100.2 | 106.8 | 137.9 | - | 114.6 |
| Paper and its products | 113.2 | 107.0 | 99.6 | 105.0 | - | - |
| Fertilizers | - | 185.5 | 172.5 | 122.5 | - | 96.9 |
| Exports | | | | | | |
| Coffee | 112.5 | 128.4 | 156.9 | 124.2 | - | 156.0 |
| Sugar | 119.6 | 30.3 | 90.3 | 14.8 | - | - |
| Banana | 23.0 | 11.2 | 6.2 | 177.5 | - | 28.0 |
| Cotton | 16.6 | 16.7 | 14.4 | 7.8 | - | 3.2 |
| Petroleum | - | 104.0 | 222.1 | 309.9 | - | - |

*Source: Comision Economica para America Latina y el Caribe (CEPAL)

The following analysis is to show the financial position of the one important port in Guatemala, during the years of 1983 to 1985.

TABLE 5
INCOME (thousands of quetzales) *

| | 1983 | 1984 | 1985 |
|-----------------------|---------|---------|---------|
| 1.-Charge on ships | 1518.9 | 1249.4 | 2174.2 |
| 2.-Tax import-export | 9853.3 | 11146.2 | 14567.4 |
| 3.-Storage | 1651.2 | 1795.3 | 2391.6 |
| 4.-Other services | 116.8 | 123.9 | 173.9 |
| 5.-Building rentals | 147.7 | 189.6 | 217.4 |
| 6.-Shore handling | 1266.6 | 2414.5 | 1956.8 |
| 7.-Maritime transport | 127.4 | 159.1 | 195.7 |
| T O T A L | 14663.9 | 17078.0 | 21742.4 |

* Official exchange: Q.1.00 = U.S. \$.1.00

Source: Puerto Santo Tomas de Castilla, memoria de labores 1985.-

TABLE 6
EXPENDITURE
(thousands of quetzales) *

| | 1983 | 1984 | 1985 |
|---|---------|---------|-------------|
| 1.-Salaries and other expenses | 6050.7 | 7288.9 | 8169.6 |
| 2.-Flow transference | 666.9 | 398.3 | 442.1 |
| 3.-Direct investment | 105.0 | 1587.6 | 1762.1 |
| 4.-Industrial and/or commercial operations. | 4664.2 | 5129.1 | 5645.0 |
| 5.-Public debt | 301.4 | 0.7 | ---- |
| T O T A L | 11788.2 | 14404.6 | 16018.8 (6) |

* Official exchange: Q.1.00 = U.S. \$.1.00

Source: Puerto Santo Tomas de Castilla, memoria de labores 1985.

The Guatemalan ports contribute part of their profits turnover directly to the state as can be seen in the following financial statement of 1985.

The net profit was distributed according with the government resolution N. 35-83. (7)

TABLE 7
(in thousands of quetzales) *

| | | |
|---------------------|----------|----------|
| STATE | (70 %) | Q.4006.5 |
| LABOUR PORT | (15 %) | Q. 858.5 |
| INTERPRISE | (15 %) | Q. 858.5 |
| T O T A L (100 %) | | Q.5723.5 |

* Official exchange: Q.1.00 = \$.1.00

Source: Puerto Santo Tomas de Castilla, memoria de labores 1985.

4.4. IDENTIFICATION OF THE PRINCIPAL PROBLEMS OF THE GUATEMALAN PORTS

The principal problems of the Guatemalan ports at a national and port level can be described as follows:

4.4.1. Principals problems at national level.

4.4.1.1. Organization.

There are many governmental institutions dealing with port matters, such as:

a) The Ministry of Communications Transport and Public Works which is responsible for:

- . Economic and feasibility studies for port development
- . Construction of ports infrastructure
- . Dredging of access channels
- . Navigational aids
- . Management of Puerto Quetzal, San Jose, Champerico and Puerto Barrios

b) The Ministry of Economy which is in charged of:

- . Economic and feasibility studies for port development

c) The Ministry of Defense which dealing with:

- . Port safety
- . Marine commandancy
- . Hydrographic studies

d) The Ministry of Finance which is responsible for:

- . Budget approval for ports
- . Managment of Santo Tomas de Castilla Port
- . Setting up of national plans for development and explotation of ports

e) The Ministry of Health and Public Wealth which is responsible for:

- . Health requirements for ports
- . The issue and control of the compulsory document which should be carried by all vessels calling at Guatemalan ports

All the aspects as far as port activities are concerned have not been controlled either in a permanent or specialezed way by any of the government institutions.

The absence of a national plan and inadequate coordination has resulted in many expensive investments using foreign currency.

4.4.1.2. Administration

On the other hand the lack of a National Port Authority to co-ordinate all of the ports' activities in an integrated way does not create the necessary condition to formulate priorities and consequently investments are being made where they are not so necessary.

The present situation is far from being satisfactory considering the absence of National Ports Planning taking into consideration the national interest.

It is also important to stress that the political instability constitutes an important factor to the formulation and implementation of short and medium range projects for ports.

It was established earlier, that four of the ports come under the Ministry of Communications, Transport and Public Works, while the other come under the Ministry of Economy. The relationship between the ports and the ministries is concerned "only" in approving the annual budget and the ministries do not coordinate themselves regarding the ports performance and development.

On the other hand the ministries have issued any strategy or plan for port development and control their of efficiency. It appears as though ports have been making investments without coordination. Consequently there are certain duplications in port facilities on the same coast and for the same purpose, often serving the same hinterland. (8)

Puerto Barrios was the most important port in the past and served as the main international traffic center of the country.

Since many years the port has been neglected which has caused substantial deterioration of both infrastructure and superstructure.

At present important constructions and repairs should be made to bring the port to a reasonably operational state, including the total replacement of the cargo handling equipment.

This situation is due, mainly, to the inexistence of an institution to coordinate the port's needs and reflects the lack of attention devoted to port problems at a national level.

As a consequence the port's productivity is very low and together with deficient port communications with the hinterland causes a strong negative impact on the final cost of our imports and exports.

As far as communications with the port's hinterland is concerned it is important to point out that cargoes are transported essentially by road.

This situation deserves to be deeply analysed in terms of comparative cost/benefit with railway transport.

The basic reasons to justify this approach are the evident high costs of road constructions and maintenance

imposed by the present system and a possible railway network considering the significance of distances involved.(9)

It should be added that the monopoly of road transport result in higher prices of goods transported in prejudice of the consumers.

At present there is an intention to close the road linking the north and central zones of the country with the principal port of Guatemala, which would be replaced by train transport.

However, due to lack of proper maintenance the railway infrastructure is so degraded that it can hardly afford an adequate response to such an increase of the traffic.

4.4.2.Principal problems at port level.

The main problems at port level are, related with port development and performance which naturally is linked with their management, operation and training.

These aspects can be analysed in details as follows:

- . There is no individual plan or policy for port development, taking into consideration the changes in trade and shipping and its impact on present and future port performances.
- . The port tariffs have been established without deep consideration of the relevant fac-

tors to be previously considered specially the port operating costs, i.e. it can be said that in practice (there is no structure to study the tariffs of the ports vis-a-vis the port costs on a sound basis and its impact on the final price of goods imported and exported. (*))

- . At present Guatemalan ports have the lowest tariffs of Central America, however its costs are higher than the other ports in the area.
- . Experience shows that port statistics are inadequate or even inexistent which obviously constitute an important bottleneck for port planning and management of current decisions.

Another problem which the ports are facing regarding finances, is the cost control system. It does not reflect the real expenses which the ports incur in order to handle the cargo.

(*)) For example in 1987 was find out that Puerto Barrios did not have port tariffs formally established although arrangements were made with port operations companies.

On the other hand, Santo Tomas de Castillo Port, being the most important port of the country although having a tariff structure it is not, normally, followed as a rule but adjusted on a case-by-case basis, which shows the inconsistency of the system.

- . The administrative process regarding inbound and outbound cargo documentation is too bureaucratized which obviously result in slow turn round of ships in ports and consequently additional costs of maritime transport.

- . Another important problem to consider is the low productivity due to lack of adequate port equipment, training of dock labour force and efficient management. Consequently ports are facing shortage, and in particular lack of cargo handling equipment which causes the following problems:
 - Inadequate planning for acquisition and maintenance of equipment

 - Scarcity of spare parts in stock

 - Lack of a duly trained dock labour force leading to inefficient use of equipment, personal accidents, damage to cargo and delays in the operation.

- . There are no specialized terminals in Guatemalan ports mainly for oil and chemical products, and storage of dangerous goods. These products are handled in general cargo terminals which represents a threat for the safety of port and personnel working in the port area. (10)

- . Also the landing and handling of both bulk cargoes and containers are not being done under efficient conditions due to a lack of sufficient and qualified personnel and adequate equipment.

- . The political instability also affects the ports policy and their development, considering that:
 - The changes of government usually bring about, changes of personnel at the different management levels which, tends to rearrange the existing situation introducing a factor of inertia in the development of port activities.

- . Another important problem to consider is the fact that capacity of decision making for important port matters is not always available port managers are frequently out of the port area on duty in Guatemala city.

Footnotes and References

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CHAPTER V

PORTS IN GUATEMALA SOME SUGGESTIONS FOR IMPROVEMENT OF THEIR NEEDS

5. Some suggestion for improvement of their needs

5.1. National Level

In chapter III the main problems at a national level related with the Guatemalan ports were analysed.

After considering the aforesaid problems the following policies and guide lines are suggested in order to develop the relationship between the National Plan and Port Planning.

A) In relation with port activities which are scattered between different governmental institutions one would consider to suggest the following:

- . The ports' activity should be integrated essentially in the Ministry of Communications, Transport and Public Works in order to have a single Ministry in charge of the ports' policy.

This suggestion is based on the fact that the referred Ministry has a greater relationship with ports' sector in Guatemala. Ports are a link in the whole transport chain and one integrated transport policy is needed. It is only the Ministry of transport that can play

that role. Moreover, experience shows that most developed countries have followed a similar organization.

The integration of port sectors under the umbrella of a single Ministry will contribute to improving ports productivity and control, bringing about a positive impact on port users and national consumers.

The main attribution by the Ministry should be to promote the development of the ports sector through the National Port Authority set up for this purpose. This solution does not mean, overlapping of functions involving additional costs but solely to rationalize ports' coordination aiming at improving performance and harmonizing development of the national ports.

B) Another problem pointed out in chapter III was the lack of an adequate National Port Plan and a National Port Authority which is considered necessary to be established, considering the actual circumstances.

These aspects will be analysed in more detail in the next pages.

THE NEED FOR THE NATIONAL PORT PLAN

Technological improvements in recent years have made it essential to plan the transportation system of a developing country as a whole, in order to achieve a balance between the capacities of the various parts.

In maritime transport it is sometimes possible, particularly for bulk and unitized cargo movements, to include the shipping, port and inland transport facilities in one co-ordinated plan. In other cases the ship traffic is not under the control of the planner and it is only possible to co-ordinate the port facilities with those of inland transport and distribution.

Planning a sea-port without considering the connecting roads, rail and other types of transport may lead to serious faults in national communication.

Within the port sector, a balanced plan is needed for each class of maritime traffic. The number of ports, their specialization and their location have to be considered.

"Although some countries still permit free competition between their ports, this is no longer seen as acceptable where national resources are limited."

When a special type of cargo is allowed to spread over a number of ports, serving the same hinterland as may happen without NATIONAL PLANNING, it means either that each can only afford to install low-volume equipment, which will not allow the country to take advantage of the economies of scale obtainable through the use of large carriers, or that each port has to invest large sums in under-utilized terminals.

For all classes of freight, there is a growing need to avoid the over investment which can result from competition in a context of increasingly expensive cargo-handling facilities and that there is a strong case for

regional coordination of investments in specialized terminals.

Dealing with the statement above it is now virtually obligatory for each country to develop its own "NATIONAL PORTS PLAN".

The factors which should be taken into consideration in the preparation of a NATIONAL PORTS PLAN are illustrated in graph 3 (see annex 3). It would be advisable to use this figure as a check list to determine which aspects require further study before any major port investment decision is taken.

The main activities indicated in graph 3 (see annex 3) are the forecasting of the national demand for maritime traffic transport, the surveying of existing ports and the national surveying of the means of transport available for maritime traffic.

A number of related plans will result from this examination: A maritime traffic assignment plan; A national port investment plan; An inland routing plan and a coastal shipping plan.

THE NEED FOR THE NATIONAL PORTS AUTHORITY

A further requirement at this point will be a decision on the policy as to which parts of the port infrastructure will be paid, by the central government and which part will be paid by the individual port authority from its own revenue.

For such reasons there is a strong case for setting up a "SPECIALIST GOVERNMENT AGENCY" with the overall responsibility for co-ordinating port policies at a national level to build up and maintain the capability needed, and to allow a free interchange of ideas with the many interests involved, it may be more appropriate for the agency to be separated from the central government ministry concerned and to take the form of a NATIONAL PORTS AUTHORITY with defined statutory powers, such as those listed below.

The organizational structure of that agency can be better seen in the chart presented in annex 4 .(1)

The main functions of a NATIONAL PORT AUTHORITY should be one of co-ordination and regulation, the principal aim being to prevent the undesirable duplication of investments.

The statutory power which may be appropriate to give to a NATIONAL PORT AUTHORITY are as follows:

- INVESTMENT: power to approve proposals for port investment. The criterion for approval would be that the proposal was broadly in accordance with a national ports plan, which the authority would maintain.

- FINANCIAL POLICY: power to set common financial objectives for ports, with a common policy on what infrastructure will be funded centrally and what infrastructure will be funded locally; advising the government on loan applications.

-LABOUR POLICY: power to set common recruitment standards, a common wage structure and common qualifications for promotion; power to approve common labour union procedures and training policies.

-LICENSING: Where appropriate, power to establish principles for the licensing of port employers, agents, etc.

-INFORMATION AND RESEARCH: power to collect, collate, analyse and disseminate statistical information on port activities for general use, and to sponsor research into port matters as required.

-LEGAL: power to act as legal adviser to port authorities.(2)

C) As far as port communications with the hinterland is concerned a feasibility study should be carried out in order to analyse the existing infrastructures of rail and road transport and irrespective advantages and disadvantages in order to consider the cost/benefit of further development in this area.

D) As regards the problems concerning Port Barrios as described in chapter III the following studies and objectives should be carried out:

STUDIES

1. Analyse in detail the possibility of cargo distribution by the various ports in order to rationalize the port operations, increase productivity and to eliminate port congestion.
2. To study the viability of a joint management for the ports of Santo Tomas de Castilla and Barrios, taking into consideration what was said in the previous point.
3. Analyse the viability of improving Port Barrios improvement which implies a previous technical study on the conditions needed for this purpose.
4. Study of the type of ships and cargoes which are to be handled in the port and the connection system to the hinterland in order to equip the port with the necessary facilities and services.
5. There are other studies such as economical and financial aspects, which should also be carried out in order to complement those previously mentioned.

OBJECTIVES

- a. To avoid port congestions mainly for general cargo and bulk cargo.

- b. Increase port safety both on mooring and unmooring of ships and the operations in the port area.
- c. To create an alternative to Santo Tomas de Castilla Port.
- d. On the basis of the study mentioned to increase the participation of rail in order to have an integrated system of port and hinterland connections.
- e. To promote the development of Port Barrios town area as a result of the increase of port activities and employment.
- f. To create the necessary conditions to achieve competitiveness of Port Barrios and Santo Tomas de Castilla..

5.2. Port Level

In chapter III the main problems affecting Guatemalan ports were described.

A) The analyses and careful attention of those problems enable us to suggest the following policies in order to improve port activities in Guatemala:

- . to establish the necessary conditions for ports' development.

- . to actualize adequate port tariffs in accordance with the costs involved, the port productivity and development. For this purpose a technical commission should be created to study and propose the adequate solution.
- . to improve the efficiency of port services and rationalize and simplify the administrative process and to achieve this objective:
 - analyse the causes of the delays in ship operation and ship services
 - to study the minimum official documents needed for ships clearance in order to avoid excessive bureaucracy
 - adequate training of the administrative personnel
 - optimize the utilization of the EDP system
 - introduce a system of compensation of wages in accordance with productivity gains

B) To improve port productivity the following actions should be taken:

- to plan port operations

- to acquire adequate equipment
- to establish a maintenance programme
- to improve safety
- to establish a management of stocks system for spare parts

C) As far as bulk cargo is concerned the measures to be implemented to increase productivity are:

- to carry out a study of the types of bulk cargo to be handled in Guatemalan ports
- To forecast the traffic of bulk cargos in Guatemalan ports
- to study the equipment which suits to features of bulk traffic to be handled in Guatemalan ports
- to study the future characteristics of bulk carriers, as sizes, drafts, cargo handling, lengths and so on.

D) As regards container terminals some solutions in a general approach will be discussed to considering that solely a specific and accurate study can determine deeper actions. (see annex 5)

The set-up of a container terminal is a very high cost investment considering not only the equipment needed but also the necessary infrastructures such as a container freight station, container terminals, improvement of rail and road systems and so on.

Then it is important to consider all factors involved before taking a decision in this matters.

E) Regarding to the appropriate handling of oil and chemical products:

- In this case it is urgent to set up a separate project for the design and construction of a special jetty away from the main cargo port handling areas, for the handling of liquified gases, petrolium, chemical products and other liquid dangerous chemicals.

The handling of these types of cargo requires a special regime and therefore special facilities away from all other port activities. A budget for such a new facility has to be prepared, together with the justification of the project.

F) In relation with the problem that the ports have neither the facility, nor the organizational arrangements for the storage and handling of dangerous cargoes:

- It is very important to establish the immediate development of a dangerous cargo section within a safety division; and also a especial fenced and protected area needs to be developed for the port the handling and storage of dangerous goods and to be manned by properly trained personnel in the handling of dangerous goods. Nevertheless, this problem can not be solved by the port itself.

The port may wish to seek the assistance of experts for arranging a workshop on dangerous cargoes to train the personnel, to help the departament of security to establish a dangerous cargo area in the port, to advise on the operational requirements and to structure the dangerous cargo section in the depart-ment.(3)

G) Regarding the problem arising with changes of personnel due to the successive changes in government, as referred to in chapter III, the suggestion is for the short/medium range for the increase of personnel training both dock labour force and management. In these circumstances a good performance can be achieved even if changes of personnel occur.

- H) In relation to the problem of port managers usually travelling away of the port for long time, one suggestion could be to introduce a clause in the port personnel statute, to make the permanent stay in the port compulsory or at least of one manager.
- I) As far as port statistics are concerned it was analysed in chapter II. However in short, it can be said that the solution for the problem is to study the type and frequency of statistics used by the port itself and port users and then implement the necessary actions to make them available.

Footnotes and References

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CHAPTER VI

COMMENTARIES

- * The maritime transport is an instrumental factor for the economic development of a country. So far, Guatemala has not been able to achieve a high performance in this sector due, mainly, to lack of resources both capital and human to develop this important economic area.

- * One important aspect to take into consideration is the development of Guatemalan ports, i.e. to provide an adequate infrastructure, equipment, and services in order to achieve a significant level of productivity to the benefit of the maritime sector and the economy of the country as a whole.

- * High investments have been made when considering the financial capacity of the country. However they have not been duly oriented towards rationalization of technical port needs and organization considering the traffic and type of cargo handling in the ports of the Atlantic and the Pacific.

- * Guatemalan ports have not been so far, coordinated by a single authority.

This implies that rationalization must be optimized, as productivity has less room to improve, and utilization of resources can not be used in the most efficient way.

* The coordination of ports under the umbrella of a single national entity is simply a must.

The coordination function should include the planning of ports activities, and services based on accurate information of trade pattern and ships type to be operated in Guatemalan ports, in order to achieve a harmonized development of the ports of the country.

In fact lack of planning can be presented as the main national problem affecting ports.

* The re-organization of Port Barrios is considered to be an important factor to take into account. In fact, not only it appears to be a solution for the congestion of Santo Tomas de Castilla Port, but also to contribute to the development of Port Barrios town and region including the creation of jobs and increasing of commercial activity.

* The acquisition of port equipment for a country as Guatemala should be made very carefully, considering that:

- high sophistication means increasing capital costs
- high sophistication implies a highly skilled and trained labour force
- high sophistication reduces the availability of jobs.

Consequently, as a common sense policy intermediate solutions are the best approach to that problem considering, however, the minimum needs of efficiency and gradual development of ports.

- * The ports statistics must be unified and the methods used must be revised and adjusted on an annual basis.
- * It is important to bear in mind that the improvement of ports productivity and efficiency of ports services could have a significant positive impact on the number of ships calling Guatemalan ports.
- * It is also considered absolutely necessary to develop a system of analytical accountancy to provide the decision makers with up-dated information of port costs, per center of cost per gang, per port workers pool and so on. In order to have a sound basis for important financial and investment decisions and specially for the formulation of adequate port tariffs.
- * Another important area to consider for port development is the hinterland connections of the port.

In this context a study should be carried out to analyse the possibility of introducing the railways in the ports' communication network in order to improve the "cargo flow" to the hinterland and to reduce the final cost of transportation of goods imported and exported.

GLOSSARY

Anchorage. That portion of a harbor (or designated areas outside of harbors) in which ships are permitted to lie at anchor.

Basin. A large slip or dock partially surrounded by quays.

Basin, Turning. An area of water or enlargement of a channel used for the turning around of vessels.

Berth. The water area, at the waterfront edge of a wharf, reserved for a vessel.

Breakwater. An engineering structure to afford shelter from wave action; may be called mole, jetty.

Buoy. A floating object moored to the bottom, to mark a channel or point out the position of something beneath the surface of the water.

Buoy, Sea. The buoy marking the entrance to a channel from the open sea.

Cargo Handling Gear. Derricks, hoists, wharf cranes, lift jacks, etc., for loading or unloading cargo.

Channel. The buoyed, dredged and policed fairway through which ships proceed from the sea to their berth or from one berth to another within a harbor.

Crane, Cargo.A crane especially adapted to the transferring of cargo between a vessel's hold and a wharf or lighter.

Crane, Gantry.A crane or hoisting machine mounted on a frame or structure spanning an intervening space.

Derrick.A mast or tall frame with suitable tackle for lifting heavy weights.

Dock.The water area along side a pier or wharf.

Dredge.A machine for excavating material from the bottom of a body of water classidied by type of excavating equipment used thereon, as bucket dredges, dipper, ladder, hopper, hydraulic.

Gear.A comprehensive term including all the equipment involved in performing a certain operation, as hoisting gear, coaling gear, cargo handling gear.

Harbor.An area of water affording a natural or artificial haven for ships. In a proper and more limited sense an area separated by natural or artificial indentations of shore line from the main body of water, as the area within two headlands or pointsbetween which run the main ship channels leading to an open sea.

Harbor, Facilities.Those aids, advantages or conveniences provided for ships as distinguished from those provided by the port for cargo or passengers. Within the scope of this term are included; channels,

anchorage and anchorage basins, mooring posts, mooring basins, dry docks, ship repair plants, tug boats, car floats, lighters, ferries.

Lighthouse. A tower or other building with a powerful light, erected at the entrance of a port, or at some important point on the coast to serve as a guide to mariners.

Pier. A structure or platform of timber, masonry, earth or other material, built usually at right angles to the shoreline of the harbor and extending outwards to deep water, permitting vessels to lie at either side to discharge or receive cargoes or passengers.

Port. A harbor plus terminal facilities.

Port Authority. The administering committee or board of directors of a designated port area in whom is vested the control and administration of certain designated waterfront property.

Port Equipment. Facilities other than actual structures used in the handling of cargo at a port.

Port Facilities. Waterfront terminals, including structures, reservations, equipment appliances and necessary collateral aids or conveniences for embarking and disembarking passengers, and commodities transported or to be transported by water. This would include specifically:

Wharves, piers, sheds, warehouses, railroads, water or street connections, belt railroads and yards, handlings appliances.

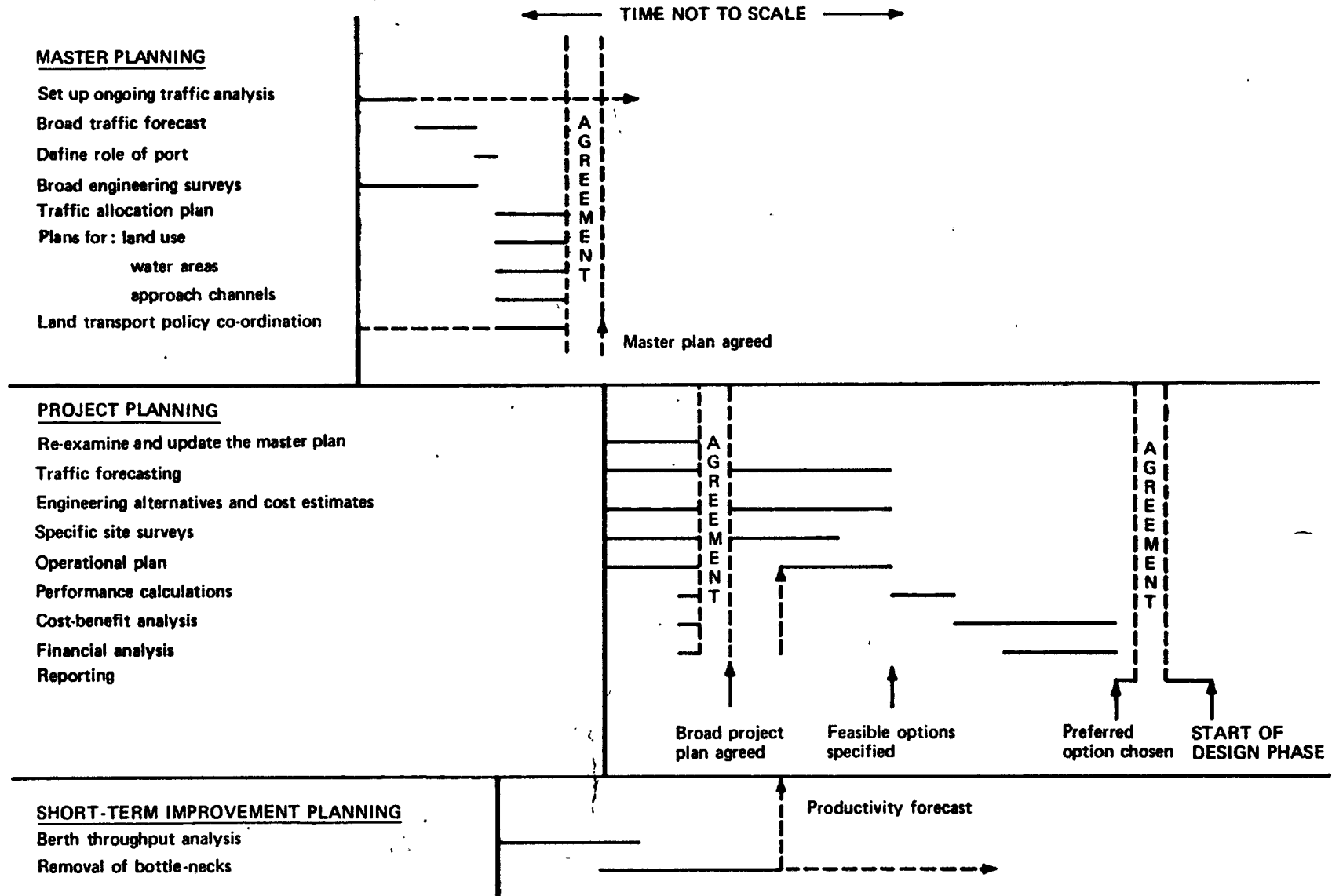
Shed. A structure on a wharf or pier providing protection for cargo, stores, and passengers.

Storage Area. Floor space of wharves and warehouses set apart for storage purposes, as distinguished from areas devoted to constant handling and transshipments.

Transit Shed. Wharf structure for the short-time storage of merchandise in transit.

Warehouse. A structure in which goods may be stored at a minimum risk from fire, theft, fraud or deterioration over such period of time as necessary to make further distribution. Warehouses perform this function for goods in transit or goods being merchandised. Therefore, we have warehouses for transit storage, and merchandising warehouses.

A typical port planning sequence



A N N E X E S

annex

1. Typical port planning sequence
2. Examples of forms for data collection
 - A. Data on ship traffic
 - B. Data on cargo flows
 - C. Berthing facilities
 - D. Port equipment
 - E. Ship traffic
 - F. Cargo flows by types of traffic
 - G. Turn-around time of ships
3. National Port Planning
4. Organization chart of the National Port Authority
5. Dependency tree for container terminal planning

EXAMPLES OF FORMS FOR DATA COLLECTION

Data on ship traffic--Example of form which may be used for data collection by hand

Month:

| Ship No. ^a | Name of ship | Type of ship ^b | Size of ship ^c | Length of ship | Day and hour of arrival | Day and hour of berthing | Day and hour of departure | Tonnage of goods discharged | Tonnage of goods loaded | Draught of the ship | Port of origin | Port of destination | Flag of ship | Owner of ship |
|-----------------------|--------------|---------------------------|---------------------------|----------------|-------------------------|--------------------------|---------------------------|-----------------------------|-------------------------|---------------------|----------------|---------------------|--------------|---------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| 1 | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | |
| 3 | .. | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | |
| etc. ^d | | | | | | | | | | | | | | |

NOTE: Columns (1) to (10) are essential for the port to record.
 Columns (11) to (13) are important.
 Columns (14) and (15) are useful. (See above, Chap. II, para. 5R.)

^a Chronological order of ship arrivals.
^b Break-bulk general cargo, tanker, bulk carriers, specialized, passenger, others.
^c Expressed either in GRT, NRT or DWT.
^d The number of rows in the form will depend on the number of ships to be listed.

Data on cargo flows—Example of form which may be used for data collection

Month:

| Ship No. | Name of ship | Cargo discharged (tons) | | | | | | | | | | Cargo loaded (tons) | | | | | | | | | | | |
|-------------------|--------------|-------------------------|---|-------------------|------------|---|-------------------|---------------|---|---|---|---------------------|-------------------|---|---|-------------------|---|---|---------------|---|-------------------|--|-------|
| | | Bulk liquid | | | Bulk solid | | | General cargo | | | | Total | Bulk liquid | | | Bulk solid | | | General cargo | | | | Total |
| | | 1 | 2 | etc. ^a | 1 | 2 | etc. ^a | 1 | 2 | 3 | 4 | | etc. ^a | 1 | 2 | etc. ^a | 1 | 2 | 3 | 4 | etc. ^a | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | |
| etc. ^a | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly total | | | | | | | | | | | | | | | | | | | | | | | |

^a The number of rows and columns will depend, in each port, on the number of ships to be listed and on the composition of traffic and on the nomenclature of commodities used by the port.

MODELS FOR TABLES OF PORT STATISTICS

Berthing facilities

Year:

| Berth No. | Length | Draught | Width (apron) | Handling equipment | | Transit sheds | Stacking areas | Other facilities | Main traffic |
|---------------------------------|----------------|---------|---------------|---|-----------------------------|---------------|----------------|----------------------|------------------------------|
| | | | | — Cranes (number-type-lifting capacity) | — Pumps (capacity per hour) | | | | |
| Passenger berths | | | | | | | | | |
| 1 | | | | | | | | Passenger terminals | |
| 2 | | | | | | | | | |
| — | | | | | | | | | |
| Break-bulk general cargo berths | | | | | | | | | |
| 1 | | | | | | | | Refrigerated stowage | Chemicals |
| 2 | | | | | | | | | Citrus exports |
| 3 | | | | | | | | | |
| — | | | | | | | | | |
| Container berths | | | | | | | | | |
| 1 | | | | | | | | | |
| 2 | | | | | | | | | |
| — | | | | | | | | | |
| Roll-on/roll-off berths | | | | | | | | | |
| 1 | | | | | | | | | |
| 2 | | | | | | | | | |
| — | | | | | | | | | |
| Oil berths | | | | | | | | | |
| 1 | | | | | | | | | Crude oil petrol |
| 2 | | | | | | | | | |
| — | | | | | | | | | |
| Ore berths | | | | | | | | | |
| 1 | | | | | | | | | Iron ore fertilizers in bulk |
| — | | | | | | | | | |
| Grain berths | | | | | | | | | |
| 1 | | | | | | | | Silo | |
| — | | | | | | | | | |
| Cement berths | | | | | | | | | |
| 1 | | | | | | | | Silo | |
| — | | | | | | | | | |
| Anchorage points | | | | | | | | | |
| 1 | x ^a | | x | | | x | x | | |
| — | | | | | | | | | |

^a x indicates "not applicable".

Port equipment chart

Year:

| <i>Type of equipment</i> | <i>Technical characteristics and capacity</i> | <i>Average lifetime</i> | <i>Age</i> | <i>Purchasing price</i> | <i>Replacement cost</i> | <i>Annual depreciation</i> |
|--------------------------|---|-------------------------|------------|-------------------------|-------------------------|----------------------------|
| Quay cranes | — | | | | | |
| | — | | | | | |
| | — | | | | | |
| Mobile cranes | — | | | | | |
| | — | | | | | |
| | — | | | | | |
| Floating cranes | — | | | | | |
| | — | | | | | |
| | — | | | | | |
| Forklift trucks | — | | | | | |
| | — | | | | | |
| | — | | | | | |
| Trucks | — | | | | | |
| | — | | | | | |
| | — | | | | | |
| Trailers | — | | | | | |
| | — | | | | | |
| | — | | | | | |
| Lighters | — | | | | | |
| | — | | | | | |
| | — | | | | | |
| Tugs | — | | | | | |
| | — | | | | | |
| | — | | | | | |
| Bunker facilities | — | | | | | |
| | — | | | | | |
| Repairing facilities | — | | | | | |
| | — | | | | | |
| | — | | | | | |
| Others | — | | | | | |
| | — | | | | | |
| | — | | | | | |

Ship traffic

Month:

| Type of ship | No. of arrivals | Total GRT or NRT | Total DWT | Average DWT | Total cargo (tons) | | | Average cargo by ship (tons) * | | |
|----------------------------|-----------------|------------------|-----------|-------------|--------------------|--------|-------|--------------------------------|--------|-------|
| | | | | | Discharged | Loaded | Total | Discharged | Loaded | Total |
| (a) Liners | | | | | | | | | | |
| Only discharging | | | | | | | | | | |
| Only loading | | | | | | | | | | |
| Discharge and loading | | | | | | | | | | |
| Other purposes | | | | | | | | | | |
| Total liners | | | | | | | | | | |
| (b) Tramps | | | | | | | | | | |
| Only discharging | | | | | | | | | | |
| Only loading | | | | | | | | | | |
| Discharge and loading | | | | | | | | | | |
| Other purposes | | | | | | | | | | |
| Total tramps | | | | | | | | | | |
| (c) Tankers | | | | | | | | | | |
| Only discharging | | | | | | | | | | |
| Only loading | | | | | | | | | | |
| Discharge and loading | | | | | | | | | | |
| Other purposes | | | | | | | | | | |
| Total tankers | | | | | | | | | | |
| (d) Bulk carriers | | | | | | | | | | |
| Only discharging | | | | | | | | | | |
| Only loading | | | | | | | | | | |
| Discharge and loading | | | | | | | | | | |
| Other purposes | | | | | | | | | | |
| Total bulk carriers | | | | | | | | | | |
| TOTAL a + b + c + d | | | | | | | | | | |

* Total cargo divided by the number of ships.

Ship traffic—Unit load ships

Month:

| Type of ships | No. of arrivals | Total GRT or NRT | Total DWT | Average DWT | Total number of unit loads (containers - vehicles - barges) | | | Total cargo (tons) | | | | | | | | | | |
|------------------------------|-----------------|------------------|-----------|-------------|---|---------|-------|--------------------|--------|------------|--------|-----------|--------|-------|--|--|--|--|
| | | | | | Empty | Stuffed | Total | Utilized | | Break-bulk | | Total | | | | | | |
| | | | | | | | | Discharge | Loaded | Discharge | Loaded | Discharge | Loaded | Total | | | | |
| (a) Ocean-going * | | | | | | | | | | | | | | | | | | |
| Container ships | | | | | | | | | | | | | | | | | | |
| Only discharging | | | | | | | | | | | | | | | | | | |
| Only loading | | | | | | | | | | | | | | | | | | |
| Discharge and loading | | | | | | | | | | | | | | | | | | |
| Other purposes | | | | | | | | | | | | | | | | | | |
| Total full container ships | | | | | | | | | | | | | | | | | | |
| (b) Feeder container ships | | | | | | | | | | | | | | | | | | |
| Only discharging | | | | | | | | | | | | | | | | | | |
| Only loading | | | | | | | | | | | | | | | | | | |
| Discharge and loading | | | | | | | | | | | | | | | | | | |
| Other purposes | | | | | | | | | | | | | | | | | | |
| Total feeder container ships | | | | | | | | | | | | | | | | | | |
| (c) Roll-on/roll-off | | | | | | | | | | | | | | | | | | |
| Only discharging | | | | | | | | | | | | | | | | | | |
| Only loading | | | | | | | | | | | | | | | | | | |
| Discharge and loading | | | | | | | | | | | | | | | | | | |
| Other purposes | | | | | | | | | | | | | | | | | | |
| Total roll-on/roll-off | | | | | | | | | | | | | | | | | | |
| (d) LASH | | | | | | | | | | | | | | | | | | |
| Only discharging | | | | | | | | | | | | | | | | | | |
| Only loading | | | | | | | | | | | | | | | | | | |
| Discharge and loading | | | | | | | | | | | | | | | | | | |
| Other purposes | | | | | | | | | | | | | | | | | | |
| Total LASH | | | | | | | | | | | | | | | | | | |
| TOTAL a + b + c + d | | | | | | | | | | | | | | | | | | |

* These ships sail on trunk lines.

**Cargo flows by types of traffic
(Tons)**

Month:

| Type of traffic | Cargo discharged | | | | Cargo loaded | | | | | | | | | | | | | |
|-----------------|------------------|----------|---------------|---------|---------------|------|-------|-----------|-------------|----------|---------------|---------|-------------|------|-------|-----------|-----------------------|-----------------|
| | Bulk liquid | Bulk dry | General cargo | Total 1 | Dispatched by | | | | Bulk liquid | Bulk dry | General cargo | Total 2 | Received by | | | | Cargo trans-shipped 3 | Total 1 + 2 + 3 |
| | | | | | Road | Rail | Water | Pipe-line | | | | | Road | Rail | Water | Pipe-line | | |
| Foreign | | | | | | | | | | | | | | | | | | |
| Ocean-borne | | | | | | | | | | | | | | | | | | |
| Near-sea | | | | | | | | | | | | | | | | | | |
| Domestic | | | | | | | | | | | | | | | | | | |
| Transit | | | | | | | | | | | | | | | | | | |
| Re-exportation | | | | | | | | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | | | | | | | | |

Turn-around time of ships—ship productivity

Month:

Break-bulk general cargo ship ^a

| Classes of cargo volume ^b (tons) | No. of ships | Amount of cargo discharged and loaded (all ships) | Time for all ships (hours) | | | | Average ship time (hours) | | | | Tons per ship work- ing hour | Tons per ship hour in port | Tons per ship hour (including waiting time) | |
|--|--------------|---|----------------------------|---------|---------|-------|---------------------------|---------|---------|-------|------------------------------------|----------------------------------|--|--|
| | | | Waiting | In port | | Total | Waiting | In port | | Total | | | | |
| | | | | Idle | Working | | | Idle | Working | | | | | |
| 0- 499 | | | | | | | | | | | | | | |
| 500- 999 | | | | | | | | | | | | | | |
| 1,000- 1,999 | | | | | | | | | | | | | | |
| 2,000- 2,999 | | | | | | | | | | | | | | |
| 3,000- 4,999 | | | | | | | | | | | | | | |
| 5,000- 6,999 | | | | | | | | | | | | | | |
| 7,000- 9,999 | | | | | | | | | | | | | | |
| 10,000-14,999 | | | | | | | | | | | | | | |
| over 15,000 | | | | | | | | | | | | | | |
| Ship without cargo | | | | | | | | | | | | | | |

^a The same table can be used for specialized ships (containers, roll-on/roll-off, bulk carriers etc.).

^b Amount of cargo discharged and loaded by the ship in port.

COUNTRY

National port planning

Industrial sector plans

- Refineries
- Other processing plants
- Mines
- Agriculture
- Major stockholding points

Survey of special traffic

National pattern of

- Consumption
- General manufactures
- International transit traffic

Estimated general cargo demand

Estimated basic demand

Technological possibilities

Estimated national maritime traffic demand

PORT

Port infrastructure funding policy

Maritime traffic assignment plan

National port investment plan

Inland routing plan

Coastal shipping plan

National survey of transport for maritime traffic

Survey of existing ports

For each port

Traditional hinterland

Local traffic demand

- General cargo
- Specialized traffic

Existing facilities

- For general cargo
- For specialized traffic
- For coastal trans-shipment

Road, rail, inland waterway and air route capacities

- Between ports and demand centres
- Coastal routes connecting ports
- Existing coastal fleet

Route capacities

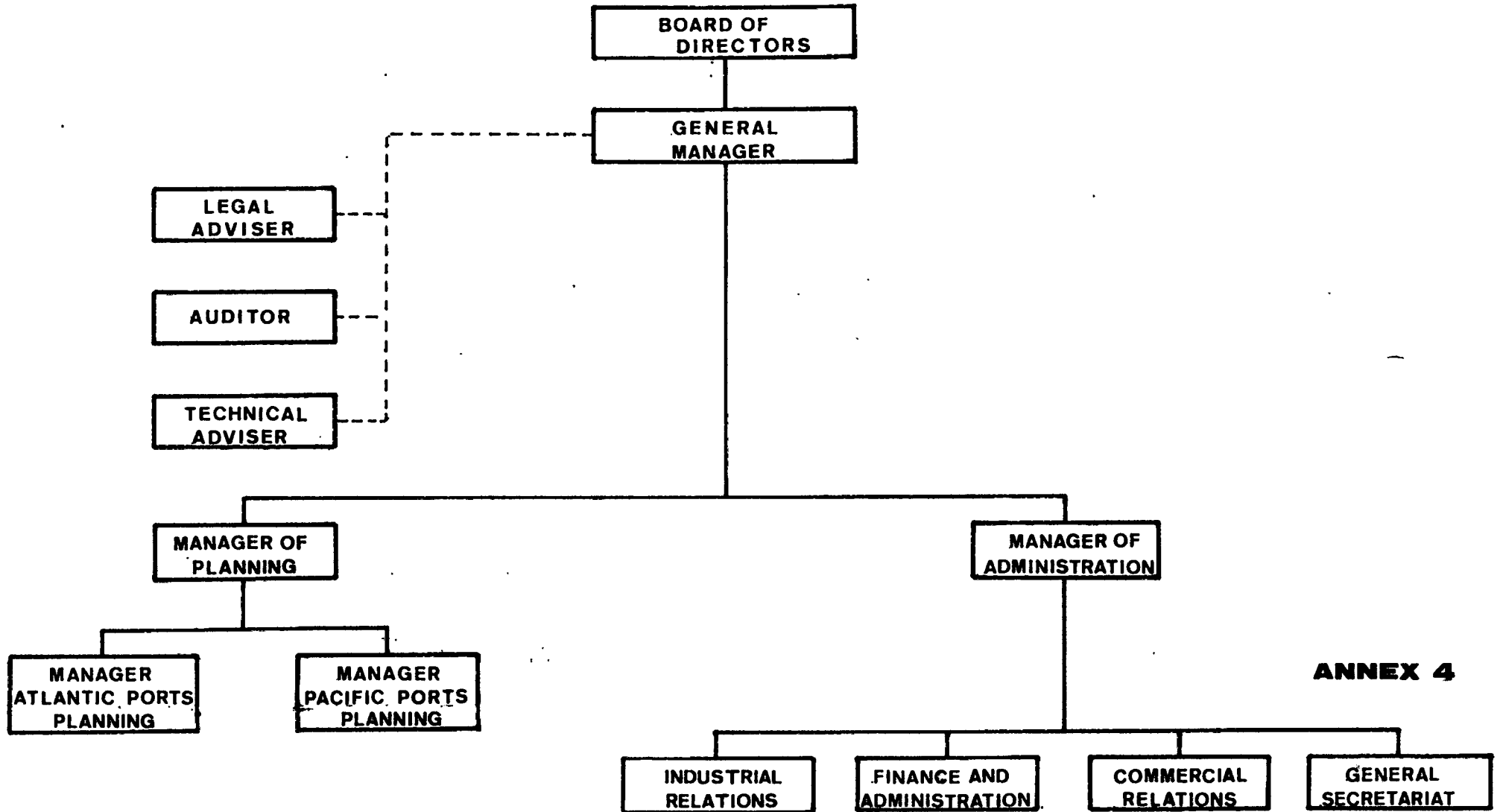
- Road vehicle availability
- Rail rolling stock plans
- Inland waterway fleet

Fleet capacities

MAJOR

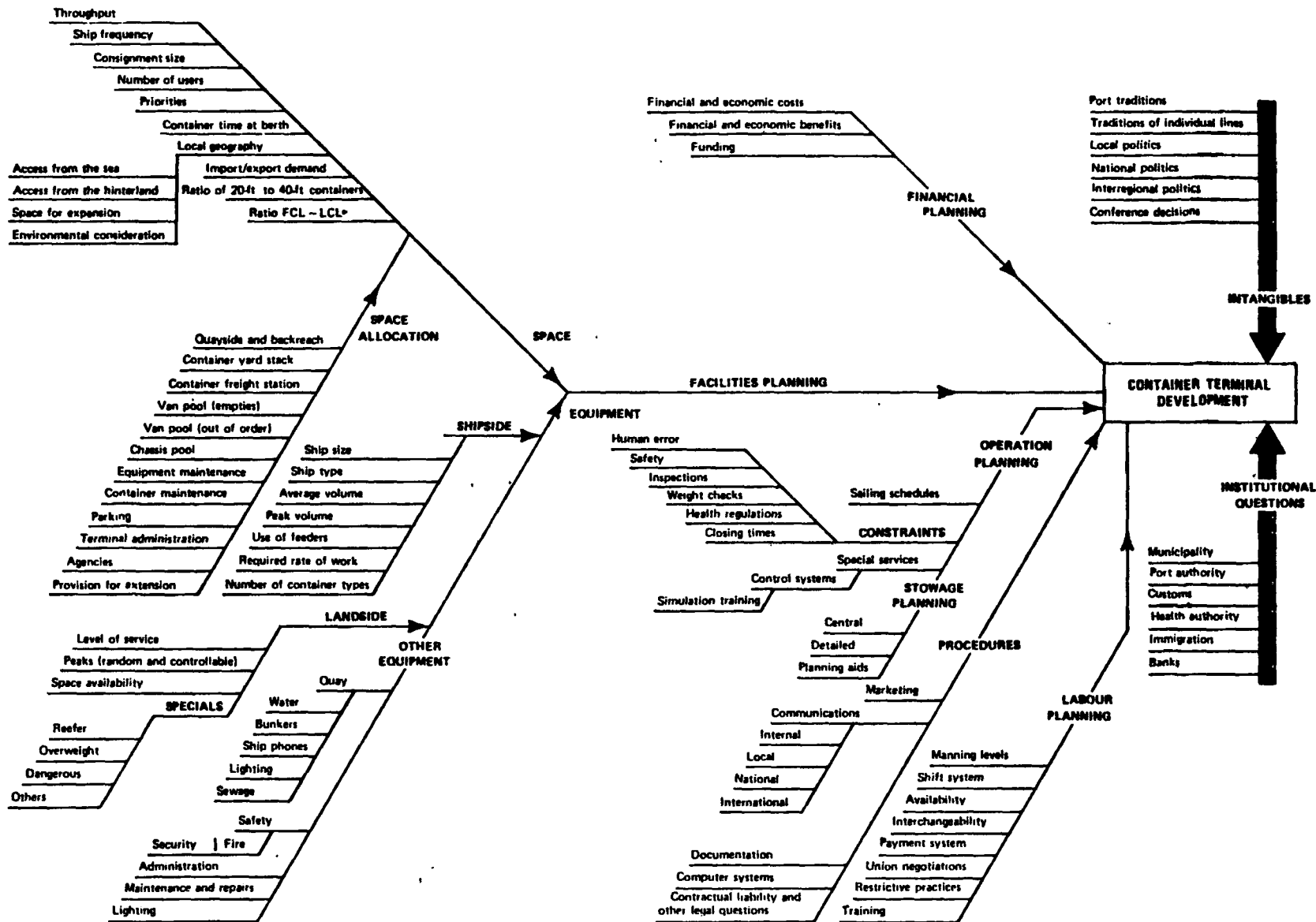
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**SUGGESTED
ORGANIZATION CHART OF THE
NATIONAL PORT AUTHORITY**



ANNEX 4

Dependency tree for container terminal planning



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