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Port pricing, a case study on cost-based charging policy for coastal ports in Thailand

Jatuporn Suwanpargpraek
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PORT PRICING: A CASE STUDY
ON
COST-BASED CHARGING POLICY FOR COASTAL PORTS IN THAILAND

by

Jatuporn Suwanpargpraek

Thailand

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.

Signature: 
Date: 26 October 1988

Supervised and assessed by:
Dr. H.E. Haralambides
Lecturer
World Maritime University

Co-assessed by:
Dr. J. Lüsch
Ingenieurhochule für Seefahrt
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ACKNOWLEDGEMENT

I wish to express my gratitude to Professor Dr. A.D. Couper, Course Professor of General Maritime Administration (GMA1) course, World Maritime University (WMU), and Professor Dr. Ahmed Monsef, former professor at WMU, for their valuable comments and advice on the preparation of this paper.

The same gratitude also goes to visiting professors, Dr. H.L. Beth - Port of Hamburg, Captain E.K. Mangels - Department of Maritime Studies of Bremen, and Dr. C.S. Lalwani - University of Wales Institute of Science and Technology.

In particular, I am deeply indebted to Dr. H. E. Haralambides, WMU, for his indispensable guidance, constructive comments and helpful suggestions in the preparation and development of this paper.

I also would like to express my special thanks to Mrs. Inger Battista, English Language Lecturer, WMU, for her helpful revision of the English language.

I am most grateful to all those persons who have directly and indirectly contributed their knowledge and helpfulness to undertaking this paper. Special thanks to all staff and Librarian of WMU.

Finally, my greatest appreciation to all the members of my family and my friends for their support and encouragement in my studies.
CHAPTER 1

INTRODUCTION
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INTRODUCTION

1.1 Background

Like many other developing countries, Thailand has continuously developed port facilities. A large amount of money has been invested in various projects, for both domestic coastal and international trade services. The number of cases, especially of the coastal port development projects whose benefits generate from the port to the hinterlands and to the country as a whole are insignificant. The use of the facilities is low as well as the cargo throughput. As a result, the revenue earned by the port from the charges to the users is much lower than the level of costs in providing facilities and services.

In a report by UNCTAD "Port Pricing, 1975" it was identified that such a situation may result from the following possibilities:

i. Mistakes in investment planning, which may result in a permanent gap between revenues and costs,

ii. The initial low utilization of new investment when the gap is normally temporary,

iii. The fact that certain port assets are indisposable (the minimum size of an asset is greater than the one actually required).

Solving this kind of problem, the port authority actually uses pricing as a tool policy and objective to contribute to the effort to attract users for the better utilization of port facilities. However, pricing can influence such a situation
to some circumstances, especially when the demand for port facilities and services is elastic. If it is inelastic in relation to prices, pricing measures can not waive this situation and other measures which are more authorized than pricing may have to be applied.

Considering the situation in Thailand where the facilities for coastal port services are employed more than the need, the existing port charges against the users are low but the use of the facilities has never been maximized. In other words, the demand for coastal port facilities is very low and inelastic in relation to the charges. These may result from either (i), (ii) or (iii) as mentioned earlier.

Nevertheless, it does not mean that pricing has no benefit to coastal port operation and management in Thailand. As long as the following reactions from the government towards coastal port and shipping development are undergone, pricing is always needed.

a. The effort of the government contributing to the development of coastal ports and shipping aiming to the newly constructed ports will play an important role as a foundation for the hinterland's economy, coastal shipping, on the other hand, will play an efficient role in domestic cargo transportation. As a consequence, the demand for coastal port facilities and services will increase. In other words, port pricing will play a role in port management and port operation - how to determine the price at the level which can either encourage the use of port facilities and services or to help the port authority earn enough revenue to recover costs and have some profit for the improvement and expansion of facilities and services in the future.

b. The government policy for the transport sector in the
present Sixth National Social and Economic Development Plan (1987-1991) set out that transport activities which are commercially operated have to be self-financing or if they are served as public utilities they have to be operated on the basis of proper return on investment. In this case, the government body concerned as well as the port authority or port manager need to have an idea on the level of the charges at which the proper return on investment can be generated.

c. The projects on coastal ports development are proposed to be undertaken, during the present Sixth National Social and Economic Development Plan, by the Harbour Department of the Ministry of Communications. These projects are including port capacity improvement, port development and the feasibility study for future coastal ports development.

At this stage, it is considered essential for the port manager as well as for the government body concerned who makes and controls policy, to know what the costs of the port are and to generate certain charges to cover costs. Furthermore, it is also important to know how to use port facilities economically, since the investments are very costly. In this respect, port charges will perform its important role and function.

It is therefore, believed that this case study to some extent is useful. Though, the author is also aware that the result from the study may not be used in practice due to many constraints which make it difficult for a small coastal port to balance the income and expenditure from the charges. Nevertheless, it can provide direction and objective for designing the charges for coastal ports in Thailand.
1.2 Objectives

The objectives of the study are to formulate a policy guideline on coastal port pricing and charging system which provides the port authority the revenue that can cover costs of providing facilities and services and can encourage the efficient use of the coastal port facilities at the same time.

Thus, costs other than costs in providing port facilities and services will not be taken into port costs account. The reason is because these costs, such as social costs (water, air and noise pollution, etc.) effected by port operation, are not direct costs of the port and they do not directly generate revenue to the port authority.

The proposed charges in this study are therefore, to be based on the formulation of financial costs and revenues analysed basically on information on port and cargo handling improvement as was recommended in the Study of Coastal Shipping Development in Thailand 1984, JICA, mainly.

1.3 Scope of the Study

The study will focus on one coastal port which has been chosen for a case study only - Port of Tha Thong, one of the two ports which are selected to be developed as a network of domestic coastal shipping from Bangkok to the southern part of Thailand.

To complete the study, the six main chapters will be covered. Apart from the introduction in this chapter, the conceptual approach to port pricing will be summarized in Chapter 2.

This chapter is intentionally written in a manner to recall the main concepts of port pricing to the reader, what role port pricing plays in port management, what possible objectives the port can set, what type of charging system can be
used, and how to formulate the charges are to be included.

Chapter 3 will deal with an evaluation of the coastal port and shipping situation in Thailand. It is meant to introduce general information on coastal ports and shipping activities in Thailand to the readers before getting into the specific aspect on port pricing.

After these introductions, in Chapter 4 the author will deal with a case study on the costs based principle for a coastal port user charge in Thailand. In this connection, costs and revenues per ton of the port throughput will be formulated, using the Tha Thong Port as a case study.

The result from Chapter 4 will bring the conclusion of an alternative proposal for a pricing policy and charging system of coastal ports in Thailand, taking into account the possible constraints on a pricing objective. These are to be discussed in Chapter 5.

Finally, in Chapter 6, the conclusion drawn from facts and findings will be dealt with.

1.4 Definitions and Assumptions

A. Definitions:

Coastal Ports - A terminal and an area within which coastal vessels are loaded and/or discharged cargo trading between ports in the Kingdom of Thailand and ports in neighbouring countries.

Port Charges - General term covering both port dues and specific port tariffs. (Ref.: Item 18, Bibliography)
Port Dues - Charge applied either on ship or on cargo (or both) for the general use of the port, without any service being specified.
(Ref.: Item 18, Bibliography)

Specific Port Tariff - Charge applied for the performance of a specific port services
(Ref.: Item 18, Bibliography)

Port Authority - The port entity which, under various names, is responsible for the administration of the port.
(Ref.: Item 18, Bibliography)

Port Entity - A public or private body providing some (or all) of the port services and facilities. A port may contain several port entities.
(Ref.: Item 18, Bibliography)

Port Users - Shipowners, shippers, consignees, etc. who use the port services and facilities.

Baht (฿) - Thai currency. The official rate of exchange in 1987: 25.5 Baht = 1 US$ (Bank of Thailand)

B. Assumption:
The following assumptions have been made in conducting the study:

a. The development of domestic coastal shipping is carried out completely as was recommended in "The
b. The project case of this study will be the trade route between Bangkok - Songkhla - Tha Thong recommended to be developed as a single network in the first stage of the development of coastal shipping between Bangkok and the south, and,

c. The profile of and the cargo handling equipment at the ports are to be developed accordingly to the above-mentioned study.
CHAPTER 2

THE CONCEPTUAL APPROACH TO PORT PRICING
CHAPTER 2
THE CONCEPTUAL APPROACH TO PORT PRICING

2.1 Introduction

It has been realized by most port authorities that the system of pricing adopted in the port is a significant factor for the improvement and expansion of port facilities and the effectiveness of port asset utilization.

The port authority actually earns revenues from the charges imposed on the user of port facilities and services provided by the port. Generally, these charges, include the charges for services rendered to land carriers, ships and against cargo, which are influenced sensitively by many factors, such as location, ownership, competition, method of operation, organization, objective and financial structure of the port. Therefore, by one or other reason the charges are often set below the cost levels or even at "no charge" (which, however, is very rare). Nevertheless, they can be recovered by either cross-subsidy or by the subsidy from the government, depending on the pricing policy of the port authority as well as the government of the country in which the port is located.

This chapter will be the sumary discussion on principle aspects of port pricing.

2.2 Objectives of Port Pricing

There are several objectives of port pricing which can be used in formulating port charges. However, the main objective is to use pricing as a tool for contributing the effort to the use of port facilities and services to be in the most efficient manner. In this connection, the charges are to be set at the level which will encourage the utilization of the port
facilities. Conversely, when port facilities are short (demand for port facilities is higher than supply) the port authority may, again set pricing objectives to discourage some users from using the port. In this case, the charges will be set so high that only those users who use the port assets efficiently and have benefitted considerably from the port facilities and services, can use them.

The other important objective of port pricing which is of particular interest for ports in developing countries, is to establish port charges at a level which tend to keep the benefits generate from port improvement in the country. In other words the port authority must ensure that the generated benefits will not go to a foreign country through foreign users or shipowners. This can be the case of foreign shipowners who are in a monopolistic position and who may have a possibility of not passing on the benefit derived from the port to the country in which the port is located. (Ref.: Item 18, Bibliography)

Some other possible objectives which the port authority should try to incorporate when formulating the pricing policy and its charges, include the following:- (Ref.: Items 18 and 19, Bibliography)

a. To build up financial reserves for the port against unexpected falls in revenue or rises in costs.

b. To meet the financial costs of the port.

c. To attain a specific or maximum achievable return.

d. To provide an incentive to port users to improve their facilities and services.
e. To provide guidelines on port an investment policy by determining the effective demand for existing and new facilities.

2.3 Constraints on Port Pricing

In practice, it is not easy for the port authority to achieve its pricing objectives. The port authority has a certain capability to exercise control on the level and structure of port charges, due to many constraints which are summarized as follows:- (Ref. Items 4, 18 and 19 Bibliography)

A. Cost Constraints

Practically, the port authority should try to cover the costs incurred in providing facilities and services or at least to cover the variable (or escapable) costs associated with a particular operation, through port charges. On the other hand, the port needs profits to finance future investment or to meet possible future deficits. As a result, the port will not be able to recover costs other than the corresponding benefits derived from the charges.

B. Institutional and Legal Constraints

These include the influence of government policy on the control of transportation investments and pricing levels, the local and national statutory controls on the levels and nature of port charges, the government policy on capital and revenue subsidies, the discrimination or special treatment of certain users may limit the application on port charges, and the control exercised by the port authority and private operators in the port.
C. Financial Constraints (Liquidity)

The port authority needs to ensure that the inflows cover the outflows of cash, with respect to the financial port objectives.

D. Competitive Constraints

In a competitive situation, the level of port charges will be influenced by the existing competition. As a result, the port authority can no longer pass on increases in costs through increases in charges and thus tends to set the rate at a level equivalent to or even lower than the competing ports.

E. Operational or Capacity Constraints

The volume of cargo throughput and the operational capacity of facilities affect on the level of port charges. In other words, the port can only charge what the port offers.

2.4 Port Pricing Concepts

There are four basic alternative approaches to a port pricing policy. (Ref.: Items 4 and 18, Bibliography)

A. Economic Approach

This approach usually implies the use of marginal cost pricing to ensure the efficient use of port facilities and services. Thus, average costs (AC) are only equal to marginal costs (MC) when the port operates near the capacity level. If MC<AC, the use of the port facility drops below capacity level.
B. **Financial Approach**

This approach usually sets the price at a level which can cover both fixed costs and variable costs and can provide an adequate return on investments.

C. **Impact Pricing Approach**

This approach is usually derived from the view that a port is part of public transport infrastructure and pricing is based on the following impacts:

i. A regional and national development plan.

ii. An existing level and distribution of economic activity.

iii. A national economic policy including a policy toward redistribution of wealth.

iv. Some financial resources of government and ability to provide subsidies of alternatively to reinvest profits.

v. An impact of services on users and others and the resulting value of services to users.

D. **Incentive Pricing Approach**

This approach is usually based on the charge which can attract users who are capable of using port facilities efficiently. It is generally designed to encourage efficient use of resources, technological improvements, and increased productivity.

Each approach has certain strengths, but they are not all mutually exclusive. It is often found advantageous to apply a mixed pricing strategy.
2.5 Principle of Port Pricing

The characteristics of pricing principles have been divided into, at least, four different strategies. The use of each principle should be consistent with the objectives of the port and to the extent of its control over the use of port resources. These four characteristics are:- (Ref.: Items 4, 6, 11 and 18 Bibliography)

A. Pricing Principle Based on Cost

The basic idea of this principle is that the revenues earned from each tariff item should be sufficient to cover the costs involved in providing facilities and services. For measuring these costs, five different strategies have been developed:

i. **Average Annual Cost Method**

   Use accounting data to determine average annual costs for providing facilities and services, and the revenues from the set tariffs should meet total cost of port operations. The rates from this method are flat rates that correspond to average unit costs. This method is commonly used for the formulation and revision of port charges.

   Total cost per ton can be assessed by dividing the total costs of the port by total port throughput.

   This total cost per ton generally provides the upper-limit of charge. It is, on the other hand, regarded as a total cost recovery pricing which may be too high and difficult to implement due to many constraints, especially competition between ports or between modes of transport.
ii. **Fixed and Variable Costs Method**  
Define costs into fixed and variable costs. The basic rates for each tariff are set in such a way that revenues which cover variable costs are provided. Fixed costs are covered by adding a fixed percentage to the variable costs or by preparing separate tariffs. The rates will be flat rates per unit cost of use of facilities and services. This method is principally used for pricing variable resources such as cargo-handling labour.

The variable costs per ton can be assessed by dividing costs by the output at maximum capacity.

iii. **Marginal Cost Pricing Method**  
The marginal costs for providing facilities and services for different levels of utilization of and the level of demand for those facilities are determined through an operational analysis and by making a projection of these two factors to the life of tariff. The rates will be flat rates similar to those used to cover variable costs and fixed costs as mentioned in (ii) above.

The marginal costs of use of facilities and services are defined as the amount of costs by which one additional unit of throughput causes the costs of operation and management, and maintenance and renewal of infrastructure to increase. On the other hand, they provide the lower-limit of charge.

This marginal costs method is believed to be an appropriate basis for pricing even when the port authority has made mistakes with the investment policy, such as to have over or under investment on
port facilities; or when the port has experienced large and unexpected changes in demand. If the marginal costs are used to set prices, the facilities of the port will be efficiently used. However, there is a disadvantage of marginal cost pricing when there are economies of scale which result in financial deficits. This because the marginal cost pricing of the service will not generate enough revenue to cover the costs. Similarly, if there are unsatisfactory economies (diseconomies of scale), charges levied at marginal cost will produce a surplus over cost.

iv. Congestion Cost Pricing Method
This method is an extension of (iii), but it also takes the cost of delay to users into account. Either a queueing theory or operational analysis is used for estimating the increase in average delays to port users. The rates can be fixed based on a weighted average of the expected level of utilization of port facilities. However, both (iv) and (iii) methods are not commonly used because they require a high level of analysis of costs and operations.

v. Performance - Related Rates Method
This is a mixed method of (i) and (iii). The basic charges are set by using (i), but a rebate or penalty is included in the calculation and is given to port users according to their performances — above or below the specified standards. This method is occasionally used for pricing both space and storage.

B. Pricing Principle Based on Benefits
These benefits are measured by using market prices for
the cargo and transport services. The FOB price and value at the production site are used for export cargo, while the CIF price and the delivered price are used for import cargo. For shipowners, shipping prices for different commodities on different routes are required. There are two pricing strategy analyses:

i. To estimate the total benefits for each group of users and then set the rates to recover the costs to have a certain profit. The rates will be segmented according to type of commodity, trade route and type of shipping services.

ii. To measure the change in benefits resulting from the improvements in port operations and facilities. The benefit of the shipowner is the reduction in vessel turnaround time or from the opportunity to use larger vessels. The benefits of the cargo owner is a saving or decreasing time for cargo movements through the port, a reduction in loss and damages, and an opportunity to ship cargo in different forms - bulk or bagged. The rates will be segmented as in (i).

The tariffs are charged either to cargo owners or the shipowners depending on how the benefits are apportioned. It is a "what the traffic can bear" principle.

C. Pricing Principle Based on Competition

This principle is based on the competition for ocean transport and is concerned with the sensitivity of port users to change in prices, requiring a determination of the available substitutes for transporting cargo through the port.
i. The pricing strategy, deals with the substitutes for the port, relies on comparative pricing to competing ports. Thus, the charge must be set at the level which is comparable or lower than those at competing ports.

ii. The pricing strategy deals with the substitutes for the shipping services and cargo, based on total port charges per ton of cargo handled compared with the total transport costs of the cargo and with the value of the cargo. The rates are set to keep the proportion of total transport cost accounted by port charges within a specified range.

iii. Based on a more detailed analysis of the competition both in transport and trade. The competition is measured in form of price elasticity for shipping services and for cargo being shipped. Thus strategy is used only to modify tariffs and not to design them. The existing rates are adjusted in accordance with elasticity. If it is mostly inelastic the increment will be the largest, and if it is most elastic the increment will be smallest. This strategy deals with the substitutes for the shipping services and cargo, as well.

D. The Promotion Principle

This principle is mostly applied in order to improve the use of certain facilities or to improve the allocation of traffic within the port. In other words, charges are fixed in order to attain some specific and mostly temporary objectives which may also be of a macro-economic nature.
2.6 Port Pricing Systems

There are two types of terminology always used in port pricing systems, "port dues or port charges" and "specific port charges". (Ref.: Items 4, 6 and 18, Bibliography)

A. Port Dues or Port Charges

These are charges made against the use of the port facilities as a whole. The charges are normally calculated on the basis of:

i. the volume of weight of cargo, called "port charge on cargo" and levied on the shipper, receiver, cargo owner or operator, and

ii. the GRT or NRT or length of the vessel, called "port charge on ship" levied on shipowner or operator.

B. Specific Port Charges

These are charges against the shipowner, ship operator, or cargo owner, etc. for the use of a specific port services, which include berth occupancy or dockage, aids to navigation, berthing/unberthing, pilotage, towage, storage/warehousing, wharfage, water supply, crane and demurrage. See the summary of a possible charging system in Table 1.

2.7 General Framework for a Port Charge Formulation

From the previous discussions on port pricing objectives, concepts, strategies, and systems, the framework for a port charge formulation can be summarized as shown in Figure 1.
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<td></td>
<td></td>
</tr>
<tr>
<td>1. Port dues on ship</td>
<td>Utilization of general maritime facilities and services</td>
<td>Two parts: size of ship and type of ship</td>
<td>Gross tonnage* (or grt or length)</td>
<td>Flat rates for different groups of gross tonnage* (or grt or length) and different types of ship (passenger, bulk carriers, etc.)</td>
</tr>
<tr>
<td>2. Pilotage</td>
<td>For piloting the ship</td>
<td>Size of ship</td>
<td>Idem.</td>
<td>Flat rates for different groups of gross tonnage* (or grt or length)</td>
</tr>
<tr>
<td>5. Berth occupancy</td>
<td>Occupation of berth by ship</td>
<td>Three part tariff. Size of ship. Nature of quay. Time at berth</td>
<td>Gross tonnage* (or grt or length) per day</td>
<td>Flat rates per day for different groups of gross tonnage* (or grt or length), and different types of berth (break bulk, ore, oil, etc.)</td>
</tr>
<tr>
<td><strong>B. Charges on cargo</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Port dues on cargo</td>
<td>Utilization of the port (all general facilities and services)</td>
<td>Two parts: weight and nature of cargo</td>
<td>Metric ton</td>
<td>Flat rates per ton for different groups of products classified according to: (a) the nature of the cargo (ore, oil, general cargo, etc.) (b) what cargo can bear</td>
</tr>
<tr>
<td>7. Cargo handling on board</td>
<td>All operations for cargo from the ship's hold to the quay (and vice versa)</td>
<td>Two part tariff. Weight and presentation of cargo (bulk, bags, palletized, etc.)</td>
<td>Metric ton</td>
<td>Flat rates per ton for different groups of cargo classified according to cargo-handling method</td>
</tr>
<tr>
<td>8. Cargo handling on quay</td>
<td>All operations for cargo from quay to shed or delivery (and vice versa)</td>
<td>Idem.</td>
<td>Idem.</td>
<td>Idem.</td>
</tr>
<tr>
<td>9. Storage</td>
<td>Use of transit shed. Free period until ship is fully discharged</td>
<td>Three part tariff. Weight. Volume (or stacking condition). Time cargo spends in shed</td>
<td>Metric ton and day</td>
<td>Progressively increasing rates per ton per day for different groups of cargo having the same volume (or the same storing conditions)</td>
</tr>
<tr>
<td>10. Warehousing</td>
<td>Use of warehouses. No free period</td>
<td>Idem.</td>
<td>Idem.</td>
<td>Flat rate per ton per week for different groups of cargo having same storage characteristics</td>
</tr>
</tbody>
</table>

*As defined by IMCO.

The major factors of this charge formulation framework include the following:-(Ref.: Item 4, Bibliography)

i. The formulation of goals.

ii. The development of pricing strategies.

iii. The accounting for the costs of the port in providing facilities and services.

iv. The determination of the productivity of port facilities in performing different activities.

v. The estimation of costs to port users and the effects of competition on the demand for port services.

The framework in Figure 1 uses a cost accounting system to determine the fixed and variable costs, while the performance analysis is used to determine how the variable costs change with the level of demand. The marketing analysis estimates costs to port users in transferring cargo in the port, while the competing ports tariffs analysis estimates costs of using these ports for transferring cargo and the analysis of user costs provides information on the effects of changes in both tariff rates and port performance.
FIGURE 1 - FRAMEWORK FOR PORT CHARGE FORMULATION

Formulation of Goals

Preparation of Strategies

Performance Analysis by Activity

Forecast Demand

Cost Analysis by Activity

Revision of Tariff Items

Related to Fixed Costs

Financial Analysis

Revision of Tariff Items Related to Variable Costs

Analysis of Costs by Port Users

Comparative Tariff Analysis

Marketing Analysis

Revision of Demand Forecast

Revision of Tariffs

Source: Ernst G. Frankel, Port Planning and Development
CHAPTER 3

EVALUATION OF COASTAL PORTS AND THE SHIPPING SITUATION IN THAILAND
CHAPTER 3

EVALUATION OF COASTAL PORTS AND THE SHIPPING SITUATION IN THAILAND

3.1 Coastal Ports

Due to her physical geography, Thailand has about 2,700 kilometer (Ref. Item 8, Bibliography) of coastline extended from the Eastern seaborad southwards the east and the west coasts of the peninsula. Along which about 22 shallow draft coastal ports, excluding private owned wharves, are scattered. Most of these ports vary greatly in size and cargo throughput. Some are wooden wharves exclusively used for landing fish and small volume of cargo. The others are used for domestic cargo transportation and sub-regional trade to Malaysian ports and Singapore. However, they are limited to high tide only. They are riverine and subject to severe draft restrictions at the entrance channel, many have a channel depth of only 0.5 m or less below MSL. The problem of continuous siltation from riverborn and littoral sources necessitates frequent channel dredging.

A. Main Coastal Ports

Out of the 22 shallow draft coastal ports mentioned above, about 8 are considered as major ports handling more than 100 thousand tons of cargo throughput. Most of these ports are located in the southern peninsula, namely: (Ref.: Items 9 and 13, Bibliography)

In the Gulf of Thailand:
- Bangkok
- Sri Raeha

In the eastern side of the peninsula:
- Ban Don/Tha Thong
- Pak Panang
FIGURE 2
LOCATION OF MAIN COASTAL PORTS
AND TRANSPORT NETWORKS
On the western side of the peninsula:
- Kantang
- Krabi

See the location of the ports and transport network in Figure 2 and the volume of inbound and outbound cargo in Table 2.

### TABLE 2 - DOMESTIC CARGO MOVEMENT THROUGH MAIN COASTAL PORTS

(All Commodities)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ton</td>
<td>Ton</td>
<td>Ton</td>
<td>Ton</td>
<td>Ton</td>
<td>Ton</td>
</tr>
<tr>
<td></td>
<td>Bangkok</td>
<td>505,253</td>
<td>29,927</td>
<td>440,190</td>
<td>49,972</td>
<td>418,850</td>
<td>54,999</td>
</tr>
<tr>
<td></td>
<td>Sri Racha</td>
<td>670,554</td>
<td>308</td>
<td>611,824</td>
<td>802</td>
<td>537,240</td>
<td>635</td>
</tr>
<tr>
<td></td>
<td>Ban Don/Tha Thong</td>
<td>20,028</td>
<td>280,849</td>
<td>54,050</td>
<td>300,642</td>
<td>117,619</td>
<td>293,706</td>
</tr>
<tr>
<td></td>
<td>Pak Panang</td>
<td>758</td>
<td>157,832</td>
<td>21,415</td>
<td>182,242</td>
<td>10,811</td>
<td>229,907</td>
</tr>
<tr>
<td></td>
<td>Pattani</td>
<td>310</td>
<td>1,042</td>
<td>4,109</td>
<td>7,500</td>
<td>1,075</td>
<td>12,290</td>
</tr>
<tr>
<td></td>
<td>Songkhla</td>
<td>2,900</td>
<td>419,362</td>
<td>5,360</td>
<td>555,931</td>
<td>16,036</td>
<td>463,324</td>
</tr>
</tbody>
</table>

Source: Compiled from "Transport Statistic Data", 1987 Ministry of Communications.

**B. Administration and Management**

The Ministry of Communications is responsible for the fundamental policy and planning of the transport sector,
including ports, and executing of its responsibilities through its own departments in cooperation with other government agencies related to transport such as the Ministry of Finance, the Ministry of Commerce, the Ministry of Industries, the Office of Prime Minister, etc.

The Harbour Department, of the Ministry of Communications, is responsible for the construction and extention of coastal ports, using the funds mainly from two sources: loans from overseas financial institutions, such as IBRD and the annual budget. After the completion of construction the responsibilities are subject to be handed over to the Ministry of Finance, who in turn contracts them to provincial administration bodies in which the ports are located, to manage the ports. Regarding the maintenance of port facilities and channel dredging, they are under the Harbour Department.

For the operation and management of the ports, the government uses the policy to encourage the private sector to participate in main commercial coastal ports, and the provincial administrative bodies have to follow this policy. So far, this concept has not really been successful. The three ports which have already been constructed, only the Tha Thang has been leased to a private company to operate commercially but it has been used mainly for offshore suppliers. The other two, Krabi and Pattani have not yet been able to find a private operator, and are being managed by provincial administrative bodies which lack the required experience and know-how on port management affairs. This leads to other problems of insufficient and non-standardized way of port management. In other words, the use of these newly constructed ports, for public facilities of the hinterlands, as was initially aimed, has been very low and as a result the objectives have not been reached.
Generally, the existing coastal ports are managed and operated in such a way that:

i. port facilities located within the municipal area are managed by the municipality,

ii. port facilities located in the provincial area other than the municipality are managed and operated by the provincial body, and

iii. other facilities owned privately are managed and operated freely by private companies.

There is no real port authority set up. As mentioned earlier, the port is managed by a few provincial officers who lack experience in port management. However, the small and simple port authority is recommended to be set up to carry out the routine management of port activities such as repairs of cargo handling equipment, buildings, yards and warehouses, and to maintain the cleanliness of the port site. In other words, the obligation of the port authority has to be limited within its ability depending on its situation. The organization will consist of four sections:- (Ref.: Item 9, Bibliography)

- General/personnel Section
- Accounting/Revenue Section
- Port Service/Stevedoring Section
- Technical/Engineering Expert

The responsibilities of each section is summarized as follows:

i. General/Personnel Section
   - to carry on general affairs
   - to employ the staff
- to guard the port site
- to prepare statistics and plans

ii. Accounting/Revenue Section
- to manage the budget
- to collect the port charges and rental fees

iii. Port Service/Stevedoring Section
- to rend the facilities (wharves, transit sheds and fields)
- to supply water
- to maintain the cleanliness of the port site

iv. Technical/Engineering Expert
- to maintain equipment
- to keep the wharves and channels in good condition
- to make expansion plans

On top of this the port authority has the Committee Board responsible for providing laws, acts and regulations, making budgets, adjusting interests of various clients and setting tariffs/port charges.

See the proposed organization of a Coastal Port Authority in Figure 3.
FIGURE 3
THE PROPOSED ORGANIZATION CHART OF A COASTAL PORT AUTHORITY

Total Number of Staff: 15
Director 01
Chief 02
Clerk 04
Guard.Driver 05
Loan from other offices 03 (police, custom house, expert) 03

Source: The comprehensive Development Study of Coastal Shipping in Thailand, JICA, 1984
C. Port Facilities and Profiles

The dimensions and technical descriptions of the coastal ports can be found in Figure 4. However, the new developed ports are basically designed to accommodate two cargo vessels with 1000 gross register ton each. The description of the ports are approximately as follows:

- Approach channel depth 3-5 M. below LLW.
- Wharf width 25 M.
  Wharf length 195 M.
- Backing area, stacking 2,400 - 5,000 M²
  warehouse 1 x 2,000 M²

Generally, cargo handling equipment in the ports is inadequate. Most of the ports have only a wharf and one or two warehouses. Users have to provide themselves with the handling facilities at the port. Nonetheless, to encourage and develop coastal shipping and to increase port efficiency the following equipment is recommended to be installed at coastal ports.

- truck crane
- fork-lift

D. Port Charges

As mentioned earlier in this chapter, most of the coastal ports and fishery ports are privately managed and thus, they are not bound to any official port charge systems. At present port charges are levied only at Tha Thong, the State Railway Petroleum Wharf and Krabi ports. Each port charges on its own basis. However, there are only a few items which are charged on coastal port users, such as:

- wharfage
- throughgoing cargo charges
### FIGURE 4 - COASTAL PORT FACILITIES AND PROFILES

<table>
<thead>
<tr>
<th>COASTAL PORTS</th>
<th>SOUTH THAILAND</th>
<th>THAILAND</th>
<th>GULF OF THAILAND</th>
<th>EASTERN SEABOARD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ANDAMAN SEA COAST</td>
<td>EAST COAST</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Facilities

<table>
<thead>
<tr>
<th></th>
<th>Fishing</th>
<th>Oil</th>
<th>Dry Cargo - Domestic</th>
<th>Dry Cargo - Foreign</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restricted</td>
<td>☑️ ☑️ ☑️</td>
<td>☑️</td>
<td>☑️ ☑️ ☑️</td>
<td>☑️ ☑️ ☑️</td>
</tr>
<tr>
<td><strong>Approach Channel - Limiting Depth</strong></td>
<td>-0.3 - 0.7</td>
<td>-25 - 15</td>
<td>-0.5</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Mean Sea Level</strong></td>
<td>+0.3 +1.8</td>
<td>+22 +1.9</td>
<td>+0.5</td>
<td>+0.0</td>
</tr>
</tbody>
</table>

#### Government Wharf - Existing

- ✓

#### Municipal Jetty - Existing

- ✓

#### Fowler Wharf - Existing

- ✓

#### Private Fish Wharves

- ✓

#### Oil Wharf/Depot

- ✓

#### Cargo Wharves

- ✓

#### Water Supply

- ✓

### Notes

1. Port Functions

   - Fishing (landings)
     - > 50: 20 - 50: 5 - 20
   - Oil deposits
     - > 100: 50 - 100: 5 - 50
   - Dry cargo - Domestic
     - > 50: 20 - 50: 5 - 20
   - Dry cargo - Foreign
     - > 50: 20 - 50: 5 - 20

2. Oil imports to CHUMPHON handled through offshore pipeline remote from the estuarine port.

3. Channel depths inferred where not confirmed by recent survey. Depths given in metres below LWOST.

4. Minor structures for passengers and miscellaneous small cargo.

5. Updated based on JICA Study (Ref.: Item 9, Bibliography)

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- charges on trucks use
- cargo handling charges on crane usage
- garbage charges to vessels alongside
- channel dues
- storage charges

In addition, there are some other minor additional charges to be paid.

E. Future Development of Coastal Ports

During the Fifth National Development Plan (1982-1986), coastal Port Development Projects have been executed for Tha Thong, Krabi, Pattani, Songkhla and Phuket. Some other improvement projects, especially maintenance dredging, have been carried out as well.

In the present Sixth Plan (1987-1991) the following projects on coastal ports/coastal deep-sea ports are proposed to be continued and/or be started. (Ref.: Item 15, Bibliography)

- Completion of Songkhla and Phuket deepsea ports.
- Study on selected coastal ports in the south.
- Capacity improvement of port at Narathiwat.
- A study of coastal transport development.
- Regular maintenance of channels.
- Hydrographic and hydrology survey projects.
- A study and design of breakwater at some coastal ports.
- Training project for dredging staff.

3.2 Domestic Coastal Shipping Activities

A. Role of Domestic Coastal Shipping and Cargo Movement

Coastal shipping used to play an important role in
domestic cargo transport system. Until 1970 when a road network as well as a railway started developing parallelly to coastal networks, then the role of domestic coastal shipping has consequently declined slightly year by year. In 1978 the figures showed that the market share of coastal shipping accounted for only 2% of the overall domestic cargo transport.

A recent estimate shows that coastal shipping share dropped to 1% of the total interurban freight transport in 1984. See Table 3.

### TABLE 3 - MODAL SPLIT FORECAST OF INTERURBAN FREIGHT TRANSPORT, 1991 AND 1996 (LOW ESTIMATION)

<table>
<thead>
<tr>
<th>Mode</th>
<th>Million Tons</th>
<th>Billion Ton-Km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road</td>
<td>160.0</td>
<td>201.0</td>
</tr>
<tr>
<td>Rail</td>
<td>5.6</td>
<td>6.9</td>
</tr>
<tr>
<td>River</td>
<td>10.1</td>
<td>12.8</td>
</tr>
<tr>
<td>Coastal</td>
<td>2.1</td>
<td>2.8</td>
</tr>
<tr>
<td>Sub Total</td>
<td>177.8</td>
<td>223.5</td>
</tr>
<tr>
<td>Lighterage</td>
<td>17.0</td>
<td>21.3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>194.8</td>
<td>244.8</td>
</tr>
</tbody>
</table>

Source: Ministry of Communications, Transport Sector Analysis and Prospectives, Vol. 1
Presently, domestic coastal shipping plays only a certain limited role in the long distance route especially between Bangkok/Sri Racha and the south, which shares about 70% of total traffic or about 1.0 million tons.

Table 4 below illustrates the share of traffic by mode of transport between Bangkok/Sri Racha and the south. In 1975 the total traffic from Bangkok/Sri Racha to the south was shared by road, rail and coastal shipping within percentage of 36, 26 and 38 respectively. Since then, these figures have slightly changed with the increasing trend in road and coastal shipping but have decreased in rail. On the return traffic from the south to Bangkok, coastal shipping, instead of rail, shared a small percentage with a decreasing trend.

**TABLE 4 - PERCENTAGE OF TRAFFIC SHARED BY MODE OF TRANSPORT ( % )**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bangkok/Sri Rach - The South</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road</td>
<td>36</td>
<td>40</td>
<td>44</td>
<td>39</td>
<td>37</td>
<td>35</td>
<td>45</td>
</tr>
<tr>
<td>Rail</td>
<td>26</td>
<td>22</td>
<td>17</td>
<td>15</td>
<td>14</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>Coastal Shipping</td>
<td>38</td>
<td>38</td>
<td>39</td>
<td>46</td>
<td>49</td>
<td>49</td>
<td>45</td>
</tr>
<tr>
<td><strong>The South-Bangkok</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road</td>
<td>73</td>
<td>82</td>
<td>81</td>
<td>79</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Rail</td>
<td>15</td>
<td>12</td>
<td>15</td>
<td>16</td>
<td>16</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Coastal Shipping</td>
<td>12</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: Ministry of Communications
As far as types of commodities are concerned, there are not many commodities suitable for coastal shipping transportation, not even on the main route between Bangkok and the south. Table 5 shows that about 80% of cargo transported by coastal shipping is petroleum products from Bangkok and Sri Racha to the south, the rest is dry cargo of which 45% is fertilizers.

### TABLE 5 - COASTAL TRAFFIC BETWEEN BANGKOK/SRI RACHA AND THE SOUTH, BY MAIN COMMODITIES ("000 TONS")

<table>
<thead>
<tr>
<th>Year</th>
<th>Petroleum Products</th>
<th>Dry Cargo</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bangkok/Sri Racha to the South:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>645</td>
<td>172</td>
<td>817</td>
</tr>
<tr>
<td>1983</td>
<td>777</td>
<td>178</td>
<td>955</td>
</tr>
<tr>
<td>1984</td>
<td>911</td>
<td>183</td>
<td>1,094</td>
</tr>
<tr>
<td>1985</td>
<td>866</td>
<td>149</td>
<td>1,015</td>
</tr>
<tr>
<td></td>
<td>The South to Bangkok:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>0.8</td>
<td>60</td>
<td>61</td>
</tr>
<tr>
<td>1983</td>
<td>0.4</td>
<td>51</td>
<td>51</td>
</tr>
<tr>
<td>1984</td>
<td>0.9</td>
<td>50</td>
<td>51</td>
</tr>
<tr>
<td>1985</td>
<td>0.3</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Total Traffic Between Bangkok and the South:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>646</td>
<td>232</td>
<td>678</td>
</tr>
<tr>
<td>1983</td>
<td>677</td>
<td>229</td>
<td>1,006</td>
</tr>
<tr>
<td>1984</td>
<td>912</td>
<td>233</td>
<td>1,145</td>
</tr>
<tr>
<td>1985</td>
<td>866</td>
<td>209</td>
<td>1,075</td>
</tr>
</tbody>
</table>

Source: Ministry of Communications
B. Operators and Fleets

Coastal shipping operators in Thailand can be classified into two kinds according to the types of vessel, e.g., tanker operator and cargo vessel operator.

As regards tanker operators, there are about 29 operators which own about 66 tankers with a total of approximately 98,000 dead-weight tons. The sizes of the firms vary from the largest owner of 18 tankers to a majority owner of one tanker. The average size of domestic tankers is 1,475 dwt.

The cargo vessel category has about 32 operators who own about 74 vessels with an approximate of 50,000 dead-weight tons, all together. As with the tanker operators, all of the cargo vessel operators own only one vessel, except one company named the "Harinsut Shipping Company", the leading coastal shipping operator, which owns eighteen wooden vessels, of which ten are operated by the company itself, on the regular domestic coastal shipping services between Bangkok and Songkhla ports in the south and occasionally a few voyages to Malaysian ports. Whereas, the remaining eight vessels are leased to three other operators who give irregular services between Bangkok and Songkhla, Ko Samui, Pak Panang, Ban Don in the South. These operators are privately owned and operated and are self-subsidied with no government support.

According to the information on fleets, most of the vessels are old with an average age of about 20 years difference in ship types. The average age of a tanker is nineteen years while it is twenty-one years for the cargo vessels. Not only the fleet is old but it also lacks modern ships participating in the domestic coastal shipping trade. The summarized figures are shown in Table 6.
TABLE 6 - OPERATORS AND FLEETS' COMPOSITION FOR DOMESTIC COASTAL SHIPPING, 1981

<table>
<thead>
<tr>
<th>Description</th>
<th>Tanker</th>
<th>Cargo Vessel</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of operators</td>
<td>29</td>
<td>32</td>
</tr>
<tr>
<td>No. of vessels</td>
<td>66</td>
<td>74</td>
</tr>
<tr>
<td>Total dead-weight tons</td>
<td>97,400</td>
<td>50,500</td>
</tr>
<tr>
<td>Average age</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>Average size</td>
<td>1,475</td>
<td>700</td>
</tr>
</tbody>
</table>

Source: Ministry of Communications.

C. Government Role in Domestic Coastal Shipping Development

In order to encourage the use of domestic coastal shipping services, the Thai Government has decided to follow the development strategy recommended by JICA in Coastal Shipping Development in Thailand 1984 which included:
(Ref.: Item 9, Bibliography)

i. The development of shuttle trade route between Bangkok and Songhla and Ban Don to be the main trade route for domestic coastal shipping between Bangkok and the south.

ii. A general cargo vessel of 700 dwt size suitable for the services.

Besides, the on-going study project of Coastal Transport System and Associated Inland Waterways and River Transportation in Thailand has been undertaken by HD.
CHAPTER 4

COSTS AND REVENUES OF THE PORT
(A CASE STUDY OF THE PORT OF THA THONG)
It has been discussed in Chapter 2 that the principle of port pricing has different distinctions which are to be used depending on the objectives of the port. As regards to the objectives of this study, which aim at "formulating a policy guideline on coastal port pricing and charging systems that provides the port authority the revenues that can cover costs of the port and can encourage the efficient use of the facilities", it is considered that costs incurred in providing port facilities and services is essential to be used as principle for the establishment or development of pricing policy, and will facilitate to meet the aims. Therefore, the objective of this chapter is to conduct a case study aiming at identifying the categories of costs and revenues of the port, formulating and determining total costs and revenues per ton of port throughput. The final results of this chapter will be used as a basic criterion for the alternative policy objectives on coastal port charge in Thailand. For this purpose, Tha Thong (Ban Don) Port will be used as a case study.

4.1 Nature of Costs and Revenues of the Port

A. Nature of Costs

In principle, a pricing system has only to deal with economic costs (the costs of the resources used, such as capital, land and labour, which have alternative uses), while in practice those costs which have no alternative use (such as when a quay or wharf once is built it is useless for anything other than transferring goods between ships and inland, or break water is another example) but the port has to deal with these costs because the port
needs to provide a cash flow to meet the payment which the port must make. Therefore, whether or not they are recognized as economic costs, they will be counted (Ref.: Item 18 Bibliography).

Basically, costs of the port have two different categories:

i. **Fixed Costs:** These costs are defined as "unavoidable costs", since they cannot be avoided whether or not the facility or service is used. They include: (Ref.: Item 4 Bibliography)

- Land
- Capital dredging
- Basins, breakwaters, drains, quays, docks, slipways, buoys, roads, canals, bridges, sluices, jetties, embankments, fences, etc.
- Buildings, sheds, warehouses, workshop buildings, office buildings, security buildings, silos, gates, firehouses, etc.
- Floating craft (other than cargo barges, floating cranes, etc.) water/fuel barges, water/fuel supply installations, navigational aids, mooring/docking equipment, telecommunications equipment, etc.
- Cargo handling equipment such as forklifts, gantries, cranes, straddle carriers, shiploaders/unloaders, stackers, unstackers, floating cranes, ramps, cargo barges, etc.

Fixed costs tend to be relatively low for a small port, but this is compensated for by high variable cost of operation. Dredging a new channel, building more berths and installing more equipment will increase a large amount of the fixed costs of the port. However, it will also reduce the variable cost
per unit as larger vessels are used and cheaper handling techniques become feasible.

Fixed costs, when expressed in terms of cost per ton will decrease when the cargo throughput increases.

These costs can be converted into an annual flow through depreciation, which will be discussed more later.

ii. Variable Costs or avoidable costs: These costs, which include items listed below (Ref.: Item 4 Bibliography) are avoidable if that service or facility is not used.

a. Port Facilities and Services Use by Ships:

- Pilotage
- Fixed marine facilities
- Buildings
- Channels and basins
- Administration and general expense
- Towing boats
- Water, electricity, etc.
- Depreciation

b. Cargo Handling Related Expenses:

- Equipment operating costs
- Equipment maintenance and replacement costs
- Fuel, oil and electricity supply costs
- Shortage of cargo costs
- Insurance costs
- Equipment and cargo facilities deprecations
- Miscellaneous
c. **Land and Building Related Costs:**

- Land maintenance costs
- Building maintenance costs
- Depreciation
- Administrative costs

d. **Financial Costs:**

- Interest costs on borrowings
- Taxes and dues
- Losses and write offs
- Bad debts
- Charges by banks and other financial institutions.

e. **Administrative Costs:**

- General administration
- Engineering and planning
- Consulting and other services
- Computer and communication services
- Hiring and firing costs
- Depreciation
- Entertainment, marketing costs
- Insurance costs
- Personnel expenditures
- Travel
- Sundry expenses such as police, medical, audit, etc.

When expressing variable costs in terms of cost per ton they will probably remain fairly stable until a berth becomes under pressure to accept high tonnage throughputs. At this point, variable costs per ton will tend to increase due to the need to work overtime.
For the total costs of the port will, in the beginning of the project, be high while the throughput is low, but will be decreased afterwards.

Figure 5 illustrates the relationship between port cost per ton and port throughput. It can be seen that the total port cost reaches a minimum value when the rate of reduction in the fixed cost per ton equals the rate of increase in the variable cost per ton. (at point A) (Ref.: Item 21 Bibliography)

![Figure 5 - Variation of Port Costs and Port Throughput](image)

**Figure 5 - Variation of Port Costs and Port Throughput**

**B. Revenues**

The typical revenue account of the port includes the following groupings. (Ref.: Item 4 Bibliography)
i. **Cargo Handling and Storage Revenues:**

- Crane and other cargo handling equipment hire charges
- Cargo handling operation charges
- Transfer and movement of cargo charges
- Warehousing charges
- Operations of floating cargo equipment charges
- Floating equipment hire charges
- Rent for storage
- Administration of cargo operations
- Overtime charges
- Miscellaneous cargo related charges

ii. **Ship Related Revenues:**

- Pilotage fees
- Port dues
- Wharfage
- Channel user fees
- Towage
- Mooring and docking
- Water, electricity, telephone supply
- Miscellaneous

iii. **Land and Building Charges:**

- Rent for storage areas and land
- Rent for buildings
- Miscellaneous income

iv. **Financial and Interest Revenues:**

- Interest on deposits
- Exchange income
- Profit on disposal of assets
In order to limit the scope of the study, the Tha Thong (Ban Don) Port is to be taken as a case study. The reasons for this proposal are given below:

a. This port is the only newly built port which is considered the largest domestic cargo throughput for both dry and liquid products.

In 1985, coastal traffic through this port amounted to 411 thousand tons, of which 356 thousand tons, about 85% was petroleum products. (See table 5 in Chapter 2)

There are also cargo from foreign imports through this port, which amounted to 1000 tons a year, mostly chemical and agricultural products from Singapore.

b. This port, where hinterland covers the provinces of Surat Thani, Phangnga, Phuket and some upper parts of Krabi and Nakhonsi Thammarat, is expected to be one of the two basic service ports (the others in Songkhla) which link the upper southern peninsula with Bankok, the starting and terminal point of the coastal trade route. (See Figure 6)

A. Cargo Forecasting

Data on cargo through Tha Thong Port forecasting is taken from the JICA Study (Ref.: Item 9 Bibliography) and is shown in Table 7.
FIGURE 6 - HINTERLAND OF MAIN COASTAL PORTS

Source: The Comprehensive Development Study on Coastal Shipping Development in Thailand, 1984
### Table 7: Estimated Cargo Through Port of Tha Tong/Ban Don

<table>
<thead>
<tr>
<th>Commodities</th>
<th>1987</th>
<th>1992</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>General cargo</td>
<td>88</td>
<td>118</td>
<td>176</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>14</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td>Construction materials</td>
<td>27</td>
<td>41</td>
<td>70</td>
</tr>
<tr>
<td>Agricultural products</td>
<td>20</td>
<td>28</td>
<td>38</td>
</tr>
<tr>
<td>Fishery products</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Forestry products</td>
<td>71</td>
<td>79</td>
<td>92</td>
</tr>
<tr>
<td>Fuel</td>
<td>296</td>
<td>310</td>
<td>339</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>519</td>
<td>605</td>
<td>769</td>
</tr>
</tbody>
</table>

### B. Costs of Tha Thong Port

Statistic on investment, maintenance and administration costs of the ports are basically derived from the JICA Study (Ref.: Item 9 Bibliography).

The Tha Thong Port was built in 1981 and was completed in 1983. The construction took place in one stage. The capacity of the port is estimated to cope with the estimated cargo throughput up to the year 2000. Thus, there will be no additional facility needed before this period but the replacements for equipment, open storage and road access take place after the initial investments depending on the economic lifetime.

As mentioned in Chapter 3, the master plan of a newly developed port is designed basically to accommodate two cargo vessels of 1000 gross register ton each. The basic facilities of the port consist of:
- Two concrete wharves with overall length of 193.6 m. and 93.6 m.
- Apron width is 14.18 m. for both.
- Channel depth is 4.6 - 4.8 m.
- Covered storage of 2,000 square metres of two wharves.
- Paved open storage of 5,000 square metres.
- Unpaved open storage of 18,000 square metres.
- Other supported facilities, such as gate and cargo handling equipment.

The total initial investment costs for the above structures were estimated to 181.7 million Bahts (at 1987 prices). However, the 16.8 million Bahts for initial investment of equipment plus 8.5 million Bahts for replacement costs of storage and road are estimated and added up to the total costs. See Tables 8 and 9.

In other words, these costs are grouped into three main categories:

i. **Fixed Capital Investment Costs**: These are fixed and consist of the costs for the following capital investments. The detail of which is shown in Table 4.

   a. **Construction of Wharf**: For the reason that only the total amount of construction costs of Tha Thong port can be obtained, while the detail of costs of each capital assets is required. Therefore, the estimation has been made based on the estimated construction costs in the JICA Study Vol. 2, Table A.17-1, from which each capital asset is weighted against the total construction costs of wharf. The estimated percentages of each are as follows:
## TABLE 8 - INVESTMENT COSTS OF THA THONG PORT
(1987 PRICE)

Unite: Million Bahts

<table>
<thead>
<tr>
<th>Year</th>
<th>Costs</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>181.7</td>
<td>Capital investment for wharf (56.7 million Baht) and dredging (125 million Baht)</td>
</tr>
<tr>
<td>1982</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1983</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1984</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1985</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1986</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1987</td>
<td>4.2</td>
<td>First investment for equipment</td>
</tr>
<tr>
<td>1988</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>4.2</td>
<td>Second investment for equipment</td>
</tr>
<tr>
<td>1990</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1993</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>8.5</td>
<td>Replacement of open storage road</td>
</tr>
<tr>
<td></td>
<td>4.2</td>
<td>Replacement of 1987 investment</td>
</tr>
<tr>
<td>1997</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>4.2</td>
<td>Replacement of 1989 investment</td>
</tr>
<tr>
<td>1999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Accordingly, the total initial construction costs of Tha Thong Port of 56.7 million Bahts at 1987 price plus 8.5 million Bahts replacement costs are estimated and shown in Table 9 column (1).

b. Capital Dredging Costs are the initial dredging costs of 95 million Bahts for the navigation channel. It is estimated to 125 million Bahts at 1987 price.

c. Equipment Costs: It is assumed that two 20-ton truck cranes and six 2-ton fork-lifts are equipped at the port. The total investment cost is estimated to 16.8 million Bahts (based on basic information in JICA Study Vol. 2, Table Annex 8), of which 8.4 million Bahts is assumed as the initial investment costs in 1987 and 1989 each year equally, and another 8.4 million Bahts is for the replacement costs which will be taken place in 1996 and 1998, respectively. It has to be noted that no inflation is taken into account.

ii. Annual Fixed Costs which are defined as the costs incurred in the maintenance.
a. Wharf and other assets than dredged channel, site preparation and equipment were assumed to be 1% of the construction costs. Thus, this percentage will be counted in each item of the capital costs of construction.

b. Dredged channel which was estimated to be 2.5% of the initial dredging cost.

c. Equipment is assumed to be 5% of the price.

See Table 9, column (5) and (6).

iii. Variable Costs or Operating Costs which will be included in 2 main cost items.

a. Cargo Handling Expenses was estimated to be 30 Bahts/ton (at 1987 price), including labour, fuel, overtime, pellet and management costs.

b. Administration Expenses where by the port authority has to pay for staff salaries and overtime, office expenses, office equipment and maintenance and other administrative expenses incurred in the administration of the port. These expenses have been estimated to be 500,000 Bahts. For the reason mentioned earlier, this cost component will be stable until port throughput is over the capacity of the port, therefore, this cost is assumed to be stable up to the year 2000 at 2.0 Baht/ton.

To convert the fixed capital costs which occurred at a point of time to a series of annual fixed assets spreading
over the period of lifetime, the provision for deprecia-
tion and interest is used, through the process of amorti-
zation (1).

Table 9 illustrates how the annual fixed capital and
maintenance costs are assessed. The annual fixed capital of
assets in column (4) is calculated by multiplying the
investment costs in column (1) by the annual capital
charge $r/1-(1+r)^{-n}$ in column (3) which is computed at 13%
interest rate (2) through its life-time. See example (3).

The life-time of assets is actually determined by the
Revenue Code, which is not available. Therefore, the
estimate has been roughly made based on the ESCAP Study
and the UNCTAD Handbook (Ref.: Items 5 and 21 Bibliogra-
phy, respectively). See Table 9 Column (2).

The computed total annual fixed and maintenance costs is
32.21 million Baht which 80% accounted by annual fixed
assets and 20% by maintenance costs.

(1) The amortization method financially amortized at compound
interest of the asset value over its life. This method gives
constant annual capital costs made up of a constant annual
interest on the initial costs plus constant annuity for the
capital amortization.
Total annual capital costs = $rc/1 - (1 + r)^{-n}$
where: $c =$ initial cost, $r =$ interest rate and
$n =$ economic life time of the assets.
(Port Pricing, UNCTAD Secretariat, 1975)

(2) It is assumed that the different types of assets which have
different economic lifes and depreciation rates, as well as
the different sources and types of loan have different rates
of interest, will effect depreciation and interest rate at
13%.

(3) Example: Total annual costs of wharf = $(\underline{\frac{.13}{1 - (1+.13)^{-50}}} ) 15.88$
= 2.07 million Bahts
<table>
<thead>
<tr>
<th>Description of Assets/Costs</th>
<th>Investment (Million Baht)</th>
<th>Life Time Year</th>
<th>Annual Capital Charges at 13%</th>
<th>Annual Fixed Assets (1)x(3)</th>
<th>Maintenance Cost % of Investment (5)</th>
<th>Annual Maintenance Cost (6) (1)x(5)</th>
<th>Total Annual Fixed and Mtce. Costs (4)+(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction of Wharf:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wharf</td>
<td>15.88</td>
<td>50</td>
<td>0.1303</td>
<td>2.07</td>
<td>1</td>
<td>0.16</td>
<td>2.23</td>
</tr>
<tr>
<td>Open Storage</td>
<td>3.40*</td>
<td>15</td>
<td>0.1547</td>
<td>0.52</td>
<td>1</td>
<td>0.02</td>
<td>0.54</td>
</tr>
<tr>
<td>Buildings</td>
<td>2.84</td>
<td>50</td>
<td>0.1303</td>
<td>0.37</td>
<td>1</td>
<td>0.03</td>
<td>0.40</td>
</tr>
<tr>
<td>Transit Sheds</td>
<td>5.67</td>
<td>50</td>
<td>0.1303</td>
<td>0.74</td>
<td>1</td>
<td>0.06</td>
<td>0.80</td>
</tr>
<tr>
<td>Road Access</td>
<td>13.60*</td>
<td>15</td>
<td>0.1547</td>
<td>2.10</td>
<td>1</td>
<td>0.07</td>
<td>2.17</td>
</tr>
<tr>
<td>Site Preparation</td>
<td>3.40</td>
<td></td>
<td>0.13</td>
<td>0.44</td>
<td>1</td>
<td>0.03</td>
<td>0.47</td>
</tr>
<tr>
<td>General Facilities</td>
<td>5.67</td>
<td>50</td>
<td>0.1303</td>
<td>0.74</td>
<td>1</td>
<td>0.06</td>
<td>0.80</td>
</tr>
<tr>
<td>Engineering</td>
<td>5.10</td>
<td></td>
<td>0.13</td>
<td>0.66</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contingency</td>
<td>9.64</td>
<td></td>
<td>0.13</td>
<td>1.25</td>
<td></td>
<td></td>
<td>1.25</td>
</tr>
<tr>
<td>Sub-Total</td>
<td>65.20</td>
<td></td>
<td></td>
<td>8.89</td>
<td></td>
<td>0.43</td>
<td>9.32</td>
</tr>
<tr>
<td>Dredging</td>
<td>125.80</td>
<td></td>
<td>0.13</td>
<td>16.25</td>
<td>2.5</td>
<td>3.13</td>
<td>19.38</td>
</tr>
<tr>
<td>Equipment</td>
<td>16.80*</td>
<td>10</td>
<td>0.1840</td>
<td>3.09</td>
<td>5</td>
<td>0.42</td>
<td>3.51</td>
</tr>
<tr>
<td>TOTAL</td>
<td>207.0</td>
<td></td>
<td>28.23</td>
<td>3.98</td>
<td></td>
<td>32.21</td>
<td></td>
</tr>
</tbody>
</table>

Note: Assets have no scrap value.

Sources: (1) Calculated as explained in i (a)(b) and (c) under B.
(2) Based on ESCAP Study and UNCTAD Secretary Handbook (Ref.: Items 5 and 21, Bibliography)
(3) Calculated from annual capital charge = r/1-(1+r)^-Y based on incorporated depreciation and interest rate at 13%.
* 50% represents initial investment and 50% represents replacement costs.
C. **Costs of Tha Thong Port per Unit of Throughput**

How costs per unit of throughput over the lifetime of the port are measured has already been described in Chapter 2. For the purpose of this study, the total annual costs will be calculated in three different assumptions.

i. Annual total costs which will include depreciation and interest of capital assets, maintenance and operation costs, and other costs incurred in providing port facilities and services. The costs per ton are assessed by dividing annual total costs by total throughput at maximum capacity in year 2000.

ii. Annual total costs will be split into two different categories:

a. Category "A" which includes depreciation and interest of assets or capital investments including capital dredging, and excluding costs of equipment and operation and maintenance. Practically, these costs can, to a certain extent, can be subsidized.

b. Category "B" includes annual maintenance and operational cost and costs of equipment engineering and contingency. These costs should not be subsidized.
<table>
<thead>
<tr>
<th>Cost Items</th>
<th>Depreciation/Interest Rates of Assets</th>
<th>Depreciation/Interest Rates of Equipment</th>
<th>Maintenance Costs</th>
<th>Operating Costs</th>
<th>Total Annual Costs</th>
<th>Costs/Ton* (Baht)</th>
<th>Cost Category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8%</td>
<td>13%</td>
<td>20%</td>
<td>8%</td>
<td>13%</td>
<td>20%</td>
<td>8%</td>
</tr>
<tr>
<td>Wharf</td>
<td>1.29</td>
<td>2.07</td>
<td>3.18</td>
<td>0.16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open Storage</td>
<td>0.40</td>
<td>0.52</td>
<td>0.73</td>
<td>0.02</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buildings</td>
<td>0.23</td>
<td>0.37</td>
<td>0.57</td>
<td>0.03</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transit Sheds</td>
<td>0.46</td>
<td>0.74</td>
<td>1.13</td>
<td>0.06</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road Access</td>
<td>1.59</td>
<td>2.10</td>
<td>2.91</td>
<td>0.07</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site Preparation</td>
<td>0.27</td>
<td>0.44</td>
<td>0.68</td>
<td>0.03</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Facilities *</td>
<td>0.46</td>
<td>0.74</td>
<td>1.13</td>
<td>0.06</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dredging</td>
<td>10.0</td>
<td>16.25</td>
<td>25.0</td>
<td>3.13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td>0.41</td>
<td>0.66</td>
<td>1.02</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contingency</td>
<td>0.77</td>
<td>1.25</td>
<td>1.93</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment</td>
<td>2.51</td>
<td>3.09</td>
<td>4.02</td>
<td>0.42</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>15.88</strong></td>
<td><strong>25.14</strong></td>
<td><strong>38.28</strong></td>
<td><strong>3.98</strong></td>
<td><strong>10.52</strong></td>
<td><strong>32.89</strong></td>
<td><strong>42.73</strong></td>
</tr>
</tbody>
</table>

|                         | **TOTAL** | **14.7** | **23.23** | **35.33** | **44** | **70** | **106** (ii) |
|                         | **TOTAL** | **18.19** | **19.5** | **21.47** | **54** | **58** | **64** (iii) |

* Cost/Ton at maximum capacity in 2000.
The computed costs per unit is shown in Table 10 and summarized in Table 11. It can be remarked that:

a. Total annual costs per ton of 128 Baht is 38% accounted by capital dredging, 34% accounted by maintenance and operation costs, 7% by equipment costs and the remainder of 21% accounted by other capital costs.

b. Category "A" costs of 70 Baht per ton is 70% shared by capital dredging costs, while the remainder of 30% is shared by the other capital investment costs.

c. Category "B" costs of 58 Baht per ton is 54% shared by operating costs, 20% by maintenance and 16% by equipment cost. The rest of 10% is shared by other engineering and contingency costs.

d. Besides, it is necessary to note that to operate the port at lower capacity will cause unit costs to increase above those of maximum capacity.

TABLE 11 - COSTS PER TON OF THROUGHPUT

<table>
<thead>
<tr>
<th>Costs Categories</th>
<th>Total Annual Costs (Million Baht)</th>
<th>Costs/Ton (Baht) at Maximum Capacity *</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Total annual costs</td>
<td>42.78</td>
<td>128</td>
</tr>
<tr>
<td>ii. &quot;A&quot; category costs</td>
<td>23.23</td>
<td>70</td>
</tr>
<tr>
<td>iii. &quot;B&quot; category costs</td>
<td>19.50</td>
<td>58</td>
</tr>
</tbody>
</table>

Note: (1) * maximum capacity in the year 2000 is 334,000 tons.
(2) 2% inflation is not taken into account.
D. Impact of the Interest Rate

The impact of the interest rate on the costs per ton of throughput is large. Therefore, the choice of a proper rate of interest is most important. Figure 8 illustrates the costs per ton of throughput at different interest rates of 8%, 13% and 20%. See the detailed calculation in Table 10.

FIGURE 7 - ILLUSTRATION OF COSTS PER TON AT DIFFERENT INTEREST RATES
E. Revenues of Tha Thong Port

The revenues of the port, to be considered in this study, is those generated from port users for the benefit they derived from the use of the port facilities and services. Thus, how much the port will earn depends on the basic charges adopted and on the level of the traffic throughput. Consequently, the estimated future revenues of the port will depend on the traffic forecasting which has already been discussed in section A of this chapter.

This section is intended to assess the revenue per ton of cargo throughput.

i. Present Charging System

The detailed Thay Thong Port Tariff, authorized by Surat Thani Provincial Administration on the 15th of June 1983, is shown in Annex 1. The summary is shown in Table 12.
### TABLE 12 - PRESENT PORT CHARGES AT THA THONG PORT

<table>
<thead>
<tr>
<th>Types of Charges</th>
<th>Charging Basis</th>
<th>Charging System</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Charges on Vessel</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wharfage</td>
<td>Baht/Vessel</td>
<td>1,000</td>
<td>first 3 days</td>
</tr>
<tr>
<td>Mooring</td>
<td>Baht/Vessel</td>
<td>800</td>
<td>levied on foreign vessels only</td>
</tr>
<tr>
<td>Pilotage</td>
<td>Baht/Call</td>
<td>6,000</td>
<td>&quot;</td>
</tr>
<tr>
<td>Towage</td>
<td>Baht/Call</td>
<td>1,500</td>
<td>&quot;</td>
</tr>
<tr>
<td><strong>Charges on Cargoes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Through Cargo</td>
<td>Baht/Ton</td>
<td>7-10</td>
<td>depends on goods</td>
</tr>
<tr>
<td>Storage Charges</td>
<td>Baht/Ton/15 days</td>
<td>40-60</td>
<td>warehouse</td>
</tr>
<tr>
<td>Storage Charges</td>
<td>Baht/m²/30 days</td>
<td>20-40</td>
<td>open storage</td>
</tr>
<tr>
<td>Handling Charges</td>
<td>Baht/Ton</td>
<td>50-70</td>
<td>bulky cargo</td>
</tr>
<tr>
<td>Handling Charges</td>
<td>Baht/Ton</td>
<td>20-30</td>
<td>general cargo</td>
</tr>
<tr>
<td>Handling Charges</td>
<td>Baht/Ton</td>
<td>2 - 3</td>
<td>Agricul. products</td>
</tr>
</tbody>
</table>

#### ii. Estimated Revenue of the Port

The estimate of future revenues of the port from the charges levied on users is shown in Table 13 and is made under the following bases: (based on Ref. Item 9 Bibliography)

a. The average size of coastal vessels using the port is 700 dwt or about 380 nrt. with 90% loaded-factor.
b. The average size of foreign vessels occasionally used or entered the port area is 1500 dwt or about 780 nrt., assuming that they are moored in front of the port.

c. The time that the vessel spends in port is not more than three days.

d. Fuel, fish and forestry products will be excluded from the total estimated cargo through Tha Thong Port. The reason is that these types of cargo are considered to be more suitable to handle through private wharves as it is.

e. The estimated cargo throughput, thus, to be used as a basic calculation of revenue and estimated number of vessels are shown in Annex 2, starting from 1983, when the port was started its operation, to the year 2000, when the port is assumed to be in full capacity. After this it is assumed that cargo throughput will be constant until the end of its economic life time.

f. The calculation of annual charges paid by shipowners and cargo owners who have used the port are derived from the following bases:

- Wharfage is 1000 Baht x No. of vessels.
- Mooring is 800 Baht x No. of foreign vessels.
- Pilotage is 6000 Baht x No. of foreign vessels.
- Through cargo charges are assumed to be 75% of the total throughput applying to the average charges is 8.5 x 75% of the total estimated throughput.
- Storage cargo is, then, the amount of 25% applying to the average storage charges of
agricultural products of 40 Baht/ton for both warehouse and open storage use. Thus, storage charges are 40 x 25% of the total estimated throughput.

- Handling charges, which include stevedoring and yard operation charges is 30 Baht per ton averagely.

TABLE 13 - ESTIMATED REVENUE OF THE PORT ('000 BAHTS)

<table>
<thead>
<tr>
<th>Sources of revenue</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue from Vessel:</td>
<td></td>
</tr>
<tr>
<td>Wharf</td>
<td>97.0</td>
</tr>
<tr>
<td>Mooring</td>
<td>1.6</td>
</tr>
<tr>
<td>Pilotage</td>
<td>12.0</td>
</tr>
<tr>
<td><strong>Sub-Total</strong></td>
<td>110.6</td>
</tr>
<tr>
<td>Revenue from Cargo:</td>
<td></td>
</tr>
<tr>
<td>Through cargo charges</td>
<td>389</td>
</tr>
<tr>
<td>Storage charges</td>
<td>610</td>
</tr>
<tr>
<td>Handling charges</td>
<td>1,830</td>
</tr>
<tr>
<td><strong>Sub-Total</strong></td>
<td>2,829</td>
</tr>
<tr>
<td><strong>TOTAL REVENUE</strong></td>
<td>2,939.6</td>
</tr>
<tr>
<td>Revenue per ton of throughput</td>
<td>48</td>
</tr>
</tbody>
</table>
It has to be noted that there are some other minor additional charges from which the port can generate the revenues, such as the charges on trucks, garbages, water supply, electricity, telephone, etc. However, they are small amounts which do not affect the total revenue of the port. It can be seen that it is only 3% of its total revenues which the port earns from the ship while 97% is earned from cargo.

4.3 Conclusion

The concepts of total annual costs of the port defined in this chapter correspond to a throughput equal to the maximum capacity of port infrastructure and other installations in the year 2000. They include depreciation and interest (at 13% per annum) of capital assets, maintenance costs and operating costs. As it is believed that the present inflation rate at 2% will affect a small change to the costs. Therefore, inflation is not taken into account.

The total revenues of the port are easily computed by multiplying existing charges by port throughput estimated to increase up to the year 2000 when the port reaches its maximum capacity. Therefore, it will be found that the total revenues of the port increase according to the traffic, though the revenues per ton remain stable.

The following table summarizes the annual costs and revenues of the port at maximum capacity in the year 2000.

It can be seen that, though these costs are calculated for a maximum capacity of throughput, the deficit between costs and revenues per ton appear very high. This can be remarked that if the port operated at the lower capacity of throughput the deficit would be higher. This is nevertheless related to depreciation and interest rate, used in the calculation, which
impacts very large on costs of the port. Thus, the higher the interest rate is used the lower the annual costs are, and accordingly the lower the deficit will be.

<table>
<thead>
<tr>
<th>Costs/Revenues</th>
<th>Million Bahts</th>
<th>Baht/Ton</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Costs:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depreciation and interest</td>
<td>28.23</td>
<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td>3.98</td>
<td></td>
</tr>
<tr>
<td>Operating</td>
<td>10.52</td>
<td></td>
</tr>
<tr>
<td><strong>Total Annual Costs</strong></td>
<td>42.78</td>
<td>128</td>
</tr>
<tr>
<td><strong>Revenues:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>From vessels</td>
<td>0.54</td>
<td></td>
</tr>
<tr>
<td>From cargoes</td>
<td>15.49</td>
<td></td>
</tr>
<tr>
<td><strong>Total Annual Revenues</strong></td>
<td>16.03</td>
<td>48</td>
</tr>
<tr>
<td><strong>Deficit</strong></td>
<td>- 26.75</td>
<td>- 80</td>
</tr>
</tbody>
</table>

However, as mentioned in the beginning of this chapter these computed costs and revenues will be used as a basic direction in proposing the charges in Chapter 5.
CHAPTER 5

A COST-BASED CHARGING POLICY PROPOSAL
FOR COASTAL PORTS IN THAILAND
CHAPTER 5
A COST-BASED CHARGING POLICY PROPOSAL
FOR COASTAL PORTS IN THAILAND

As already indicated in Chapter 4, from which the result on the
calculation of costs and revenues per ton of throughput will be used
as a basic criterion for policy guideline on coastal port charging
systems. Accordingly, this chapter will deal with the examination
of those results along with possible cost constraints on pricing and
propose the alternatives for a pricing policy and charging system.

5.1 Preliminary Considerations

As mentioned in Chapter 2, it is necessary, actually, to take
into consideration all constraints which the port and adminis­
tration have to deal with, when a pricing policy is to be set
up. These constraints and how they influence the determination
of the port have already been discussed. The discussion to
be dealt with here is, however, cost constraint applying to
costal ports in Thailand.

Generally, cost constraints can be discussed considering two
different policies of the port; namely:
(Reference: Item 17 - Bibliography)

i. a subsidization policy system, and
ii. a self-financing policy system.

In the case when the port is entirely subsidized by the
government for any losses made in the port, then there will be
no cost constraints. The port can set the charges levied on
the users at the level which is suitable to the situation.
Possibly, the level of the charges may be very low and lower
than if there is no subsidy. However, it may be dangerous
since it may reduce the incentive of the port management to operate the port efficiently. Furthermore, the port users may use the port facilities uneconomically since the charges are generally set at a lower level.

In the case of a self-financing policy, which aims at securing the independence of the port activities and improving managerial efficiency, it is considered more ideal. The reason is, this system, under which all costs incurred in providing facilities and services have to be covered by port charges. This full costs recovery system, however, will actually be difficult for the port to adopt, because of the following two main reasons.

i. The charges, set at full costs recovery, will be too high to attract the users, and too high to compete with other ports as well as other modes of transport.

ii. It is recognized that the benefits gained from the port are not only to the direct users, like ship operators, shippers and consignees, but also to the national and regional economy and social development.

As regards coastal ports in Thailand, both systems are found too extreme to be the objective of port pricing. Considering that public funds are invested in the development of port infrastructures and should be recovered by means of users charges which are set as appropriately as possible and on the basis of proper return on investment. In this respect, the entire subsidy pricing policy should not be the case. On the other hand, coastal ports are considered as public facilities supporting the economy of the hinterlands. Hence earning profit should not be the main objective of the ports, but an annual budget for the day-to-day operating expenses and for all facilities should be allocated to the port. Therefore, partially direct subsidy for capital and operating expenditures, to some degree, need to be provided by the government.
This would be controversial, if the government aims at balancing revenues and expenditures of the port by introducing the self-financing pricing policy to small coastal ports. In other words, the full costs recovery pricing is applied to public facilities. It is considered not suitable. Since only public facilities are overcharged at full costs recovery level, cargo traffic using private facilities would not be encouraged to use public ports facilities. Furthermore, the existing traffic using public ports would be diverted to use private facilities or other competitive modes of transport, such as roads, if the users feel that they have to pay for the use more than the services they received. Consequently, the public port facilities would be under utilized, and the objective of improving the utilization of the existing port facilities would not be met.

5.2 Proposed Pricing Objective

The previous preliminary consideration clarifies that costs are the main constraint factors which can cause conflicts between objectives which in turn the port authority have to deal with. For example, in order to increase the efficient use of port facilities the charges need to be set at the levels which are compatible with other modes or with private wharves; or to attain a specific or maximum return on investments or to be self-financing require a high basic charges, which recover its total costs, but competition constraints or equity constraints which require users to pay only in proportion to the services received may necessitate lower charges; or to use the port as public facilities will consequently bring to the conflict inefficient port operation and ineffective use of port facilities, etc.

Nevertheless, it is considered that the main objective of a pricing policy for coastal ports in Thailand should aim at encouraging the use of port facilities and services to be as
efficient as possible, securing the ports financial independ-
ence, to a certain extent it should be considered as an
incorporate objective.

5.3 Proposed Charging System

A. Level of Port Charges

It is clear from the proposed pricing objectives in the
previous section that the entire subsidy system is not
an ideal one, as well as the total costs recovery is
not easy to apply. The only solution is to apply subsi-
dization policy. Accordingly, the level of port charges
to be proposed in this section will be based on this
assumption and will be related to costs formulated in
Chapter 4, assuming that:

i. The upper level is set by total costs per ton (no
   subsidy), while

ii. The lower level will be set by category "B" costs
   per ton (with full subsidy to category "A" costs)
   defined in Chapter 4,

iii. The proposed average level would be in line with
    any level between (i) and (ii), and be set by the
    degree of the subsidization policy to category "A"
    costs.

Before going into that step, it is necessary to note in
this section that the concepts of total costs per ton of
throughput formulated in Chapter 4 concern all costs
incurred to the port authority under the condition that
all capital assets are fully used. It is also assumed
that the full utilization of the port is equal to the
throughput levels in the year 2000. The capital assets
are spread over an annual basis through amortization based on depreciation and an interest rate of 13%.

The level of port charges will be determined basically on costs considered to be recovered or to be charged.

i. Total Costs Recovery

From Table 10, the total costs per ton, at full capacity in 2000, is 128 Baht and is considerably higher than revenues received per ton, stable at 48 Baht (see Table 12). Only 38% of its total costs are recovered. The difference of 80 Baht per ton must be recovered by users by means of increasing the existing port charges for about 167%, so that the port can recover its total costs. In other words, costs to be charged at total costs recovery is 128 Baht per ton.

ii. Subsidization

It is assumed that:

a. Fixed capital investments of main infrastructure or category "A" costs (defined in Chapter 4), to some extent, should be subsidized because they are very costly and have a long economic life.

b. Annual maintenance and operating costs, and costs of equipment or category "B" costs (defined in Chapter 4), should not be subsidized but the port should try to operate at a return that, at least, covers these costs.

In the case of subsidization, costs to be
recovered depend on degree of subsidization. From Table 10, if the government gives full subsidy to category "A" costs of 70 Baht per ton, costs to be charged to users would be 58 Baht per ton or category "B" costs per ton. If not, costs per ton to be charged would be in between 128 and 58 Baht. (See Table 14)

**TABLE 14 - SUMMARY OF COSTS BAHT PER TON TO BE CHARGED TO PORT USERS**

<table>
<thead>
<tr>
<th>Proposed Policy Options</th>
<th>Costs to be Charged</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total costs recovery</td>
<td>128</td>
<td>upper limit</td>
</tr>
<tr>
<td>Subsidization:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Full subsidy to &quot;A&quot;</td>
<td>58</td>
<td>lower limit</td>
</tr>
<tr>
<td>- Partial subsidy to &quot;A&quot;</td>
<td>&gt;58&lt;128</td>
<td>proposed charge level</td>
</tr>
</tbody>
</table>

To determine the appropriate charge level requires a detail analysis which gives all answers to the questions relating to pricing objectives, such as the question of the desired income from port charges, the question of the desired level of the utilization of port assets, and the question of modal split. However, due to lack of required information to facilitate computation, only the idea of present charging systems of other transport infrastructure in Thailand and the estimated desired revenues from port charges (revenues which can recover category "B" costs) are considered. Then, it is found that, on the same treatment as the road users, the port
users should be charged not more than 50% of the total costs of the port. In other words, costs to be charged for all services should not be more than 65 Baht per ton. With this level of charges the port can earn revenues which recover category "B" costs two years before the port reaches the level of full capacity in 2000.

Under the above assumption, in order to recover the total costs of the port, the government should provide subsidy to the port authority about 91% of category "A" costs, as the port authority needs to increase its existing charges with about 44%. The distribution of charges to be levied on ship and cargo is estimated as shown in Table 16.

Table 15 illustrates of costs to be charged at different degrees of subsidies provided to the port authority by the government. The higher the percentage the lower the costs to be charged to the users.

<table>
<thead>
<tr>
<th>% of Subsidy to category &quot;A&quot; costs</th>
<th>Costs to be Subsidized</th>
<th>Global Charges</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>128</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>35</td>
<td>93</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>63</td>
<td>.65</td>
<td>proposed charge</td>
</tr>
<tr>
<td>100</td>
<td>70</td>
<td>58</td>
<td></td>
</tr>
</tbody>
</table>
B. The Distribution of Charges

To determine distribution of port charges to shipowner or ship operators and shipper or cargo owners, the reference to present practices in other ports made in the UNCTAD's Report (Ref.: Item 18, Bibliography) is used. In this report, it is estimated that the distribution of charges levied on ships and cargoes vary from 11%-20% and 89%-80%, respectively. This variation depends widely on the function of the port authority. In the case where the port authority performs cargo handling services, for instance, the order of importance of the contribution of port charges is cargo handling charges, port dues, storage charges and towage, etc.

Whereas, the existing charges of coastal ports in Thailand are 3% of its total charges distributed to ships and 97% to cargo (See Table 12), based on the above mentioned figures, the distribution of existing coastal port charges are imbalanced and heavily borne by the cargo owner. This proportion, therefore, should be adjusted. Taking into consideration that the shipowner or ship operator will benefit from new port development considerably high. The dredged channel (which costs more than 50% of its total costs and high maintenance costs) will enable the larger ships to enter the port. As a result, the productivity of ships will increase and ship costs will be saved (economies of scale). Thus, it is reasonable for the shipowner or ship operator to pay higher percentage on charges for the use of port facilities.

The cargo owner, on the other hand, will benefit from services provided on quay by the port. Also, they may be passed on the benefit the shipowner gained from port development through a reduction of freight rate. In
this respect, the cargo owner should pay a high percentage of charges as well as the shipowner. However, they should not pay more than the benefit they derived from the use of port services and facilities, and it may be difficult to compensate for the excess of costs on the port side over revenues on quay side by higher charges on cargo owners, or to say, they should pay on what traffic can bear basis.

Therefore, at least 20% of the charges should be levied on ships and 80% on cargo. Under these proposed percentages, the charges per ton would be 13 Baht levied on ships and 52 Baht levied on cargo. (See Table 16)

**TABLE 16 - DISTRIBUTION OF CHARGES PER TON LEVIED ON SHIP AND CARGO**

<table>
<thead>
<tr>
<th>Level of Global Charges</th>
<th>Distribution of Charges Levied</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>On Ship at (%)</td>
</tr>
<tr>
<td></td>
<td>10   14   20</td>
</tr>
<tr>
<td>128</td>
<td>13   18   26</td>
</tr>
<tr>
<td>65</td>
<td>7    9    13</td>
</tr>
<tr>
<td>58</td>
<td>6    8    12</td>
</tr>
</tbody>
</table>

It has to be noted that these figures provide only the direction of new port charges. The problem of how to revise the charges imposed on each service is another matter which requires the further detailed study, and could not be covered in this study.

**C. The Proposal of Charging System**

The proposed costs to be charged for all services at 65 Baht per ton through port charges can be levied in many
ways related to the various services offered by the ports.

For sea ports a wide variety of charges exist depending on the services offered. ESCAP differentiated in its "ESCAP Port Tariff Review" of July 1984, 8 different headings under which the tariffs can be tabulated as follows: (Ref.: Item 5, Bibliography)

- Water Access
- Berth and Mooring
- Towage
- Pilotage
- Charges on Goods
- Stevedoring
- Container
- Storage

And UNCTAD in "Port Pricing" 1975 differentiated type of charges as summarized below: (Ref.: Item 18, Bibliography)

i. Charges on Ship which include:
   - port dues on ship
   - pilotage
   - towage
   - berthing
   - berth occupancy

ii. Charges on Cargo which include:
   - port dues on cargo
   - cargo handling on board
   - cargo handling on quay
   - storage
   - warehousing

For small coastal ports in Thailand, however, are more
limits as not many different types of cargoes are handled at the ports. It is considered that the revenues of the ports can be expected to be earned from different types of charges, such as wharfage, warehouses, storage charges, cargo handling charges and charges on specific services. And the pricing structure should be as simple as possible - not too many charges as well as not too many variables on the basis of charges are applied.

Though, there are, also, some charges, such as channel dues, pilotage, towage and mooring which should not be applied to coastal vessels used for domestic coastal shipping, but should be imposed on ocean vessels occasionally calling the port to pick up export cargo, or to unload import cargo, or whatever the reason is, if they pass through the channel or use the services they should pay for the charges. Furthermore, private wharf owners who considerably benefit from the use of the dredged channel, for some extent, should be charged for the use so as to balance the costs for using public port facilities.

It is considered that the existing charging system is appropriate with the facilities and services the port provide, unless some types of charges such as channel dues should be added and the structure of the charges should be revised. In other words, the charging system of coastal ports should contain the main charges shown in Table 17.

Again, it is necessary to mention that the detailed study is required for this aspect.
<table>
<thead>
<tr>
<th>Types of Main Charges</th>
<th>Nature of Charge</th>
<th>Charging Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Charges on Ship:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wharfage</td>
<td>For using port facilities and services.</td>
<td>Size of ship-GRT</td>
</tr>
<tr>
<td>Pilotage *</td>
<td>For piloting the ship.</td>
<td>Size of ship</td>
</tr>
<tr>
<td>Towage *</td>
<td>For towing the ship.</td>
<td>Size of ship</td>
</tr>
<tr>
<td>Mooring *</td>
<td>For mooring the ship.</td>
<td>Size of ship</td>
</tr>
<tr>
<td>Channel Dues **</td>
<td>For using the navigation channel.</td>
<td>Size of ship</td>
</tr>
<tr>
<td>Other Charges</td>
<td>Use of port services and facilities.</td>
<td>Size of ship</td>
</tr>
<tr>
<td><strong>Charges on Cargo:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage Charge</td>
<td>Use of transit sheds.</td>
<td>Weight or $m^2$/day/week</td>
</tr>
<tr>
<td>Warehousing</td>
<td>Use of warehouse</td>
<td>Weight or $m^2$/day/week</td>
</tr>
<tr>
<td>Cargo Handling</td>
<td>Delivery cargo from shed to ship or vice versa.</td>
<td>Weight by types of cargo</td>
</tr>
<tr>
<td>Other Charges</td>
<td>Use of port services and facilities.</td>
<td>depends on types of services</td>
</tr>
</tbody>
</table>

**Notes:**  
* Apply to foreign vessels only.  
** Apply to foreign and coastal vessels using private wharves.
5.4 Impact of New Proposed Charges on the Total Revenues of the Port

The new proposed charges at 13 and 52 Baht/ton respectively levied on ships and cargo will result in increasing the total revenues of the port by 35%, out of which about 20% is derived from the ship and 80% from cargo. In other words, it will increase from 16 million Baht earned from the existing charges to 21.7 million Baht from the new proposed ones. It can be said that these new charges can facilitate the port to earn revenues which can recover the category "B" costs (of 19.5 million Baht) of the port plus 10% of category "A" costs. Otherwise, if the category "A" costs are fully subsidized by the government, the remainder of this 10% can be used for other purposes in port operation and management and/or port expansion.

Table 18 shows the comparison of the roughly estimated total revenues of the port, derived from the existing charges and from the new proposed charges. It has to be mentioned that the total revenues of the port are easily computed by multiplying the proposed charges by maximum cargo throughput in the year 2000. Thus, they will represent the maximum revenues the port can earn from the charges to the users for the use of the provided facilities and services.
TABLE 18 - THE COMPARISON OF THE TOTAL REVENUES OF THE PORT EARNED FROM THE OLD AND THE NEW PROPOSED PORT CHARGING SYSTEM

<table>
<thead>
<tr>
<th>Sources of Revenues</th>
<th>Total Revenues (’000 Baht)</th>
<th>Existing Charges (1)</th>
<th>Proposed Charges (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>From ships</td>
<td>544</td>
<td>4,342</td>
<td></td>
</tr>
<tr>
<td>From cargo</td>
<td>15,489</td>
<td>17,368</td>
<td></td>
</tr>
<tr>
<td>Total Revenue</td>
<td>16,033</td>
<td>21,710</td>
<td></td>
</tr>
</tbody>
</table>

Note: (1) Ibid Table 13.
(2) By multiplying total traffic in the year 2000 (334,000 tons) by the proposed charges.
CHAPTER 6

CONCLUSION
CHAPTER 6

CONCLUSION

6.1 Objectives of the Study

The objectives of this study are to formulate policy guideline on a pricing objective and charging system for coastal ports in Thailand.

6.2 Method of Approach

In order to reach the objectives, a simple case study of Tha Thong Port has been conducted. The cost-based principle is applied. Total annual costs are used as a basis in measuring costs per unit of port throughput.

6.3 Tha Thong Port

The Tha Thong Port, situated in the southern part of Thailand, is considered the largest domestic cargo throughput for both dry and liquid products. There are also cargoes from foreign imports through this port, mostly chemicals and agricultural products from Singapore. The port is expected to be one of the two basic service ports in the south which link the upper southern peninsula with Bangkok.

The main basic facilities of the port consists of two concrete wharves, covered and open storages, and cargo handling equipment. The port was built in 1983, with total initial investment costs of 181.7 million Bahts (excluding equipment costs, see table 9).

6.4 Costs of the Port

Costs of the port are categorized into three main items: (see table 9)
A. Fixed Capital Investment Costs which include:

i. Construction of the wharf including open storage, buildings, transit sheds, road access, site preparation, general facilities, engineering and contingency, accounted for 32% of the total fixed costs.

ii. Capital dredging costs, accounted for 60%.

iii. Equipment costs for two 20-ton truck cranes and six 2-ton fork-lifts, accounted for 8%.

B. Annual Fixed Costs include the maintenance and operating of main assets, estimated to be 3.98 million Baht a year.

C. Variable Costs or Operating Costs include:

i. Cargo handling expenses estimated to be 30 Baht/ton or about 10.02 million Baht a year.

ii. Administration expenses estimated to be 0.5 million Baht a year, and assumed to be stable until the year 2000.

The fixed capital costs are converted into a series of annual fixed costs spreading over the period of lifetime by depreciation and interest, through the amortization method, at 13%.

6.5 Costs Per Unit of Throughput

As regards the purpose of the study, total annual costs are used as a basis in measuring costs per ton of throughput, and are differentiated into three alternatives:
A. Total Annual Costs Per Ton are calculated by dividing total annual costs, which include depreciation and interest of capital assets, maintenance costs and operating costs, by total throughput at maximum capacity in the year 2000.

Thus, it should be noted that a charge which is equal to the total annual costs per ton leads to full cost recovery.

B. Total Annual Costs Per Ton are split into two different categories, for charging criteria:

i. Category "A" Costs includes depreciation and interest of assets only, excluding equipment. These costs, to a certain extent, should be subsidized.

ii. Category "B" Costs includes annual maintenance and operational costs, costs of equipment, and others, and should not be subsidized.

The computed costs per unit of each category is shown below:

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Total Costs Million Baht</th>
<th>Unit Costs Baht/Ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Annual Costs</td>
<td>42.73</td>
<td>128</td>
</tr>
<tr>
<td>&quot;A&quot; Category Costs</td>
<td>23.23</td>
<td>70</td>
</tr>
<tr>
<td>&quot;B&quot; Category Costs</td>
<td>19.50</td>
<td>58</td>
</tr>
</tbody>
</table>

6.6 Revenues Per Unit of Throughput

The present charging system imposed to port users is composed of the following types of charges:
A. Charges on Ship

- Wharfage
- Mooring
- Pilotage
- Towage

The last three items are, however levied on foreign vessels only.

B. Charges on Cargo

- Through Cargo Charges (Wharfage)
- Storage Charges
- Warehouse
- Cargo Handling Charges
- Some specific charges on, for instance, water supply, truck, cranage, etc.

The average total charge is 45 Baht/ton, of which 3% is levied on ship and 97% on cargo.

The estimated revenues per ton of the port at maximum capacity in 2000 is 48 Baht, and the estimated total revenues are 16 million Baht.

6.7 Proposed Pricing Objectives

In formulating a pricing objective, the main possible constraints considered to be encountered by the port authority, are taken into consideration. It is found that there is always a conflict between the required objectives: for instance, the income requirements may necessitate a high basic charge, while the consideration of the utilization of port assets may necessitate a lower one. Several solutions can be made, the final choice, in most of the cases, depends on the policy of
the port to set its priorities. Whatever objective has been adopted, the rest may have to be turned down or set as an alternate ones.

However, it is considered that pricing objectives of a coastal port in Thailand should aim at encouraging the use of port facilities and services, also securing the port’s financial independence should be aimed at as an incorporate objective. In other words, the port should not apply either a total costs recovery or self financing policy or entire subsidy from the government, for its financial objective. But it needs subsidy, to some extent to category "A" costs, from the government.

6.8 Proposed Charges

The level of the proposed charges is determined under the conditions that:

i. the upper level is limited by total costs per ton (full costs recovery),

ii. the lower level is limited by category "B" costs at full subsidy to category "A" costs, and

iii. the proposed charge level will be set according to the degree of subsidization policy to category "A" costs, and it can be at any point in between (i) and (iii).

It is also assumed that the category "A" costs should be subsidized, while the category "B" costs should be recovered by the port through the charges from the users.

To determine the appropriate level of charges, the idea of present charging systems of other transport infrastructures in Thailand and the estimated desired revenues from the charges
(revenues which recover category "B" costs) are used as a reference. It is, then, assumed that costs to be charged to users for all services and facilities should not be more than 65 Baht per ton or 50% of its total costs. At this level of charges the port would earn an estimated revenue of about 21.7 million Baht, which can recover its category "B" costs plus 9% of category "A" costs.

6.9 The Distribution of Charges

It is found that the distribution of existing port charges to shipowners or ship operators and shippers and cargo owners is comparatively imbalanced. Only 3% of the charges is distributed to ship owners, while 97% is distributed to cargo owners. This proportion, is, however, considered to be adjusted, taking into consideration that both ship owners and cargo owners benefit considerably high from the new port development. Especially ship owners can operate more economically by using the bigger ships entering into the dredged channel which costs more than 50% of the total costs of the port.

It is, therefore, assumed that the proportion should be, at least, 20 : 80. Thus, the charges per ton at 65 Baht would be 13 Baht and 52 Baht levied on ship owners and cargo owners, respectively.

However, these figures provide only the direction of new port charges. The problem of how to revise the charges imposed on each service requires the detailed study which could not be able to be covered in this study.

6.10 Proposed Charging System

It is found that there are limits on types of cargo handled at coastal ports in Thailand. Accordingly, a pricing structure
should be as simple as possible. In other words, there should not be many charges and basis applied.

Therefore, it is proposed to apply the existing charging system to the newly developed coastal ports. But, the level of charges to be imposed on each service should be revised.

Moreover, some types of charges, such as channel dues are considered to be added and levied on ocean vessels and domestic coastal vessels using private wharves for the use of the dredged channel. In other words, a charging system of coastal ports should include the following main types:
<table>
<thead>
<tr>
<th>Main Types of Charges</th>
<th>Nature of Charge</th>
<th>Charging Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Charges on Ship:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wharfage</td>
<td>For using port facilities and services.</td>
<td>Size of ship-GRT basis</td>
</tr>
<tr>
<td>Pilotage *</td>
<td>For piloting the ship.</td>
<td>Size of ship</td>
</tr>
<tr>
<td>Towage *</td>
<td>For towing the ship.</td>
<td>Size of ship</td>
</tr>
<tr>
<td>Mooring *</td>
<td>For mooring the ship.</td>
<td>Size of ship</td>
</tr>
<tr>
<td>Channel Dues **</td>
<td>For using the navigation channel.</td>
<td>Size of ship</td>
</tr>
<tr>
<td>Other Charges</td>
<td>Use of port services and facilities.</td>
<td>Size of ship</td>
</tr>
<tr>
<td><strong>Charges on Cargo:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage Charge</td>
<td>Use of transit sheds.</td>
<td>Weight or m²/day week</td>
</tr>
<tr>
<td>Warehousing</td>
<td>Use of warehouse</td>
<td>Weight or m²/day week</td>
</tr>
<tr>
<td>Cargo Handling</td>
<td>Delivery cargo from shed to ship or vice versa.</td>
<td>Weight by types of cargo</td>
</tr>
<tr>
<td>Other Charges</td>
<td>Use of port services and facilities.</td>
<td>Depend on types of services</td>
</tr>
</tbody>
</table>

Notes:  
* Apply to foreign vessels only.  
** Apply to foreign and coastal vessels using private wharves.
6.11 Impact of New Proposed Charges on the Total Revenues of the Port

By imposing the new proposed charges at the level of 65 Baht per ton, for all services and facilities used by the port users, respectively 13 and 15 Baht per ton levied on ship and cargo, it is estimated that the total revenues of the port will increase by 35%. In other words, it will increase from 16 to 21.7 million Baht, in the year 2000. It can be seen that these new charges enable the port to earn revenues which recover its category "B" costs and some 9% of its category "A". Besides, if the category "A" costs are fully subsidized, the surplus revenues would facilitate the port to be more independent in its financial viability.

6.12 Conclusion

From the discussion, it can be concluded that no simple scheme can be applied to all port charges. Costs, in the sense in which it has been simply defined in the case study, provided only the ground on which a charge should be established.

In case of political reasons rather than the economical reasons is based upon which the charges are set, the basic principle of costs can provide direction and an objective for designing new charges revised from the existing ones only.

These are meant to conclude that, technically, costs and cost-based charges could not be determined from the costs side alone. There are many other factors which must be taken into consideration, such as demand for the port facilities, competition, and legal, etc. These are factors which, however, could not cope with in this study, due to the limitation of time and lack of required information.
ANNEX
ANNEX 1

THE TRANSLATION OF

THA THONG PORT TARIFFS AND OTHER CHARGES

The Surat Thani Provincial Administration has, on the 15th of June 1983, authorized the following tariffs for Tha Thong Port:

1. Wharfage:

The charges against the vessel berthing at the port are as follows:

a. Cargo vessels berthing at the port to load cargoes being stored within the port area or warehouses, or to discharge cargoes to be stored within the port area or warehouse are to be charged at 2000 Baht/24 hours.

b. Cargo vessels berthing at the port without discharging or loading cargo, or with loading cargo being stored or with discharging cargo to be stored outside the port area or warehouses, are to be charged at 3500 Baht/24 hours.

c. Cargo vessels berthing at the port to load or discharge overside cargo to or from the lighters are to be charged at 3500 Baht/24 hours.

d. Lighters berthing at the port, whether or not to load or discharge cargoes are to be charged at 500 Baht/24 hours.

The above-mentioned (a - d) wharfages are charged on 24 hours basis. If the vessels stay over 24 hours, the other additional wharfages for the beyond hours to be charged as follows:

- If the beyond hour is more than 12 hours but not exceeding 24 hours, to be charged on 24 hours basis (full rate additional).
If the beyond hour is less than 12 hours, to be charged at half rate of 24 hours basis (half rate additional).

2. Mooring Charges:

It is charged against foreign cargo vessel or coaster using mooring bouys infront of the port at the rate of 800 Baht/vessel.

3. Pilot Fees:

It is charged against foreign cargo vessel to be piloted to and from the port at the rate of 6000 Baht for each call.

4. Towage Fees:

It is charged against foreign cargo vessel or large coaster using the service of tug boat, at the rate of 1500 Baht/hour.

5. Charges on Cargoes:

It is charged against the cargoes loading and discharging at the port.

<table>
<thead>
<tr>
<th>Cargoes</th>
<th>Baht/Unit</th>
<th>Charges</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catles</td>
<td>/Head</td>
<td>25</td>
<td>Plus 1000 Baht for cleaning</td>
</tr>
<tr>
<td>Pig</td>
<td></td>
<td>15</td>
<td>plus 500 Baht for cleaning</td>
</tr>
<tr>
<td>Veneer, sawn-timber, logs and ore (bulky)</td>
<td>/Ton</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Rubber, fish-milled, poultry fish-canned</td>
<td>/Ton</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Cement, sulphur, plastic fertilizer</td>
<td>/Ton</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Cargoes</td>
<td>Baht/Unit</td>
<td>Charges</td>
<td>Remarks</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Cotton, jute, kapok, topioca, pelleto</td>
<td>/Ton</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Sugar, rice, maize, beans</td>
<td>/Ton</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Ore (ingots, bag), lead (ingots)</td>
<td>/Ton</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Aluminium (ingots) rolled iron</td>
<td>/Ton</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Scrapped-paper (bales)</td>
<td>/Ton</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Scrapped-iron</td>
<td>/Ton</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Construction iron</td>
<td>/Ton</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Stone, sand, brick, construction materials</td>
<td>/Ton</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Spare parts</td>
<td>/Ton</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Frozen Food</td>
<td>/Ton</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Car</td>
<td>/Unit</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>Dump truck</td>
<td>/Unit</td>
<td>350</td>
<td></td>
</tr>
<tr>
<td>Tractor</td>
<td>/Unit</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>Truck</td>
<td>/Unit</td>
<td>350</td>
<td></td>
</tr>
<tr>
<td>Forklift truck</td>
<td>/Unit</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Mobile cranes and heavy truck</td>
<td>/Unit</td>
<td>400</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: For the cargoes other than the above mentioned which could not be weighed in ton unit, the rate for through cargo will be charged per truck, i.e.:

- 4-wheel truck  25 Baht/truck
- 6-wheel truck  50 Baht/truck
- 10-wheel truck 100 Baht/truck
6. **Storage Charges for Cargoes Stored Inside Warehouse:**

<table>
<thead>
<tr>
<th>Cargoes</th>
<th>Baht/Unit</th>
<th>Charges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rubber, rice, maize, sugar, fertilizers</td>
<td>/Ton</td>
<td>40</td>
</tr>
<tr>
<td>Canned stuff</td>
<td>/Ton</td>
<td>50</td>
</tr>
<tr>
<td>Tin and ore</td>
<td>/Ton</td>
<td>60</td>
</tr>
<tr>
<td>Fishmilled, poultry</td>
<td>/Ton</td>
<td>50</td>
</tr>
<tr>
<td>Scrapped paper, cotton, jute, tapioca, pellete</td>
<td>/Ton</td>
<td>45</td>
</tr>
<tr>
<td>Cement, sulphur, plastic</td>
<td>/Ton</td>
<td>40</td>
</tr>
<tr>
<td>Construction materials</td>
<td>/Ton</td>
<td>45</td>
</tr>
<tr>
<td>Valuable goods</td>
<td>/Ton</td>
<td>60</td>
</tr>
<tr>
<td>Unpacked goods (bulky)</td>
<td>/Ton</td>
<td>60</td>
</tr>
<tr>
<td>Miscellaneous goods</td>
<td>/m²</td>
<td>60</td>
</tr>
</tbody>
</table>

7. **Storage Charges for Cargoes Stored Outside Warehouse:**

7.1 Stored on the earth storage will be charged 20 Baht/m²
7.2 Stored on the concrete storage will be charged 30 Baht/m²
7.3 Stored on an apron area storage will be charged 40 Baht/m²

**NOTE:**
- a) The charges mentioned in 6 and 7 above are charged on 15 and 30 days periods basis.
- If less than 15 days will be charged for 15 days (half of the rate).
- If more than 15 days but within 30 days will be charged for 30 days (full rate).

b) For an area of 1m² inside and outside warehouse, cargoes of less than 2 ton can be stored not higher than 3.5 m., or according to the commanding of port officers.

c) Dump, forklift, tractors to be used in port area will be charged 400 Baht/day/unit.

8. Handling Charges (Including Port Labour and Facilities):

<table>
<thead>
<tr>
<th>Cargoes</th>
<th>Baht/ Unit/ Time</th>
<th>Charges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veneer &amp; sawntimber (in bale weight more than 100 ton)</td>
<td>/Ton</td>
<td>50</td>
</tr>
<tr>
<td>Veneer &amp; sawntimber (weight more than 100 ton)</td>
<td>/Ton</td>
<td>60</td>
</tr>
<tr>
<td>Logs (weight more than 100 ton)</td>
<td>/Ton</td>
<td>50</td>
</tr>
<tr>
<td>Ore, sand, brick (bulky) (Laboured)</td>
<td>/Ton</td>
<td>23</td>
</tr>
<tr>
<td>Ore, sand, brick (bulky) (Unlaboured)</td>
<td>/Ton</td>
<td>3</td>
</tr>
<tr>
<td>Rubber</td>
<td>/Ton</td>
<td>30</td>
</tr>
<tr>
<td>String-iron, tube-iron, rolled-iron, plated-iron</td>
<td>/Ton</td>
<td>60</td>
</tr>
<tr>
<td>Ore, zine, aluminium, etc.</td>
<td>/Ton</td>
<td>60</td>
</tr>
<tr>
<td>Scrapped-iron, -paper, -plastic</td>
<td>/Ton</td>
<td>70</td>
</tr>
<tr>
<td>Construction materials, spare parts</td>
<td>/Ton</td>
<td>50</td>
</tr>
<tr>
<td>Cotton, jute, kapok</td>
<td>/Ton</td>
<td>70</td>
</tr>
<tr>
<td>Goods weighed 5-10 tons per unit (more than 300 tons)</td>
<td></td>
<td>150</td>
</tr>
<tr>
<td>Goods weighed 10-15 tons per unit (more than 300 tons)</td>
<td></td>
<td>250</td>
</tr>
<tr>
<td>Cargoes</td>
<td>Baht/Unit/Time</td>
<td>Charges</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------------------</td>
<td>----------------</td>
<td>---------</td>
</tr>
<tr>
<td>Goods weighed 15-20 tons per unit (more than 300 tons)</td>
<td></td>
<td>350</td>
</tr>
<tr>
<td>Fish-milled, dried-prawn, cargoes in bags (70-80 Kg./bag)</td>
<td>/bag</td>
<td>1</td>
</tr>
<tr>
<td>Faulty, flour, cargoes in bags (25 Kg./bag)</td>
<td>/bag</td>
<td>1</td>
</tr>
<tr>
<td>Cement, fertilizers, cargoes in bags (50 Kg./bag)</td>
<td>/bag</td>
<td>1.50</td>
</tr>
<tr>
<td>Rice, maize, beans, cargoes in bags (100 Kg./bag)</td>
<td>/bag</td>
<td>2.50</td>
</tr>
<tr>
<td>Frozen food</td>
<td>/box</td>
<td>2</td>
</tr>
<tr>
<td>Canned-fish, canned stuff (48 cans/box)</td>
<td>/box</td>
<td>0.75</td>
</tr>
<tr>
<td>Beverages, liqures, soft drinks</td>
<td>/box</td>
<td>0.75</td>
</tr>
<tr>
<td>Palm Oil, other oil</td>
<td>/contr</td>
<td>15</td>
</tr>
<tr>
<td>- 200 Litres/Container</td>
<td>/contr</td>
<td>10</td>
</tr>
<tr>
<td>- 100 Litres/Container</td>
<td>/contr</td>
<td>5</td>
</tr>
<tr>
<td>- 50 Litres/Container</td>
<td>/contr</td>
<td>2</td>
</tr>
<tr>
<td>- 20 Litres/Container</td>
<td>/contr</td>
<td>2</td>
</tr>
<tr>
<td>Car</td>
<td>/unit</td>
<td>300</td>
</tr>
<tr>
<td>Dump</td>
<td>/unit</td>
<td>500</td>
</tr>
<tr>
<td>6-wheel truck</td>
<td>/unit</td>
<td>500</td>
</tr>
<tr>
<td>10-wheel truck</td>
<td>/unit</td>
<td>750</td>
</tr>
<tr>
<td>Fork lift</td>
<td>/unit</td>
<td>600</td>
</tr>
<tr>
<td>Mobile cranes</td>
<td>/unit</td>
<td>1200</td>
</tr>
<tr>
<td>Tractors</td>
<td>/unit</td>
<td>1500</td>
</tr>
<tr>
<td>Heavy tructors</td>
<td>/unit</td>
<td>1500</td>
</tr>
</tbody>
</table>

NOTE: a) The goods other than the ones mentioned under item 8 (above) will be charged per truck as follows:

- 4-wheel truck 100 Baht/Unit/Time
- 6-wheel truck 200 Baht/Unit/Time
- 10-wheel truck 300 Baht/Unit/Time
b) For the heavy cargoes to be handled it is needed to be confirmed at least three days in advance.

c) For cargoes to be in stored or to be handled from the warehouse it is needed to confirm at least one day in advance.

9. **Measurement Charges:**

9.1 4-wheel truck 10 Baht/Unit/Time

9.2 Heavy truck 20 Baht/Unit/Time

Surat Thani Provincial Administration, effective on 15 June 1983.
# ANNEX 2 - ESTIMATED DRY CARGO THROUGH PORT OF THA THONG ("000 TONS)

<table>
<thead>
<tr>
<th>Year</th>
<th>Vol. of Cargo (1)</th>
<th>No. of Vessels</th>
<th>Coastal Vessel (2)</th>
<th>Foreign Vessel (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>28</td>
<td></td>
<td>45</td>
<td>2</td>
</tr>
<tr>
<td>1984</td>
<td>39</td>
<td></td>
<td>62</td>
<td>2</td>
</tr>
<tr>
<td>1985</td>
<td>61</td>
<td></td>
<td>97</td>
<td>2</td>
</tr>
<tr>
<td>1986</td>
<td>93</td>
<td></td>
<td>148</td>
<td>2</td>
</tr>
<tr>
<td>1987</td>
<td>149</td>
<td></td>
<td>237</td>
<td>2</td>
</tr>
<tr>
<td>1988</td>
<td>157</td>
<td></td>
<td>249</td>
<td>2</td>
</tr>
<tr>
<td>1989</td>
<td>170</td>
<td></td>
<td>270</td>
<td>2</td>
</tr>
<tr>
<td>1990</td>
<td>183</td>
<td></td>
<td>290</td>
<td>2</td>
</tr>
<tr>
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Source: (1), (2) Compiled from Table A.10-52(1)  
(Ref.: Item 9 Bibliography)

(2) \( = \frac{(1)}{700 \text{ dwt} \times 90\%} \).

(3) Assuming that 2 foreign vessels occasionally enter the port to unload cargo of 1,000 ton a year.
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