

**ECONOMIC AND SOCIAL COMMISSION FOR
ASIA AND THE PACIFIC**

TRANSPORT AND COMMUNICATIONS DIVISION

**STUDY ON REHABILITATION AND
RELOCATION OF PORTS**



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FOREWORD

This report was prepared at the request of ESCAP and financed by the French Government. The study was carried out by C. Jamati, Port Consultant.

The author wishes to express his gratitude to the ESCAP secretariat, particularly the Transport and Communications Division, port officials that provided detailed information during on site missions in India, Malaysia, Pakistan and Thailand and to the port authorities in Australia, Denmark, France, Sweden, the United Kingdom of Great Britain and Northern Ireland and the United States of America which provided valuable assistance during the period of assignment.

This report was presented at the seventh session of the Meeting of Chief Executives of Port Authorities, on 26 and 27 May 1988 at Fremantle, Australia. The participants showed a great interest in the problems of rehabilitation and relocation of ports.

The views expressed in this document are those of the author and do not necessarily reflect those of the United Nations.

TERMS OF REFERENCE

Project Objectives: The project objectives are to:

Identify planning problems associated with the adoption of new technologies and upgrading port facilities;

Provide guidelines on the rehabilitation and relocation of port facilities;

Propose alternative uses for redundant port facilities.

Justification: Trends toward deeper draughted ships and space-intensive technologies such as containerization have created a need for the relocation of existing port facilities to provide easier ship access and adequate land areas away from city centres. This phenomenon has already been observed in European ports such as Bordeaux, Dunkerque and Le Havre, where new port facilities are being constructed with direct sea access and older river berths with shallower draught are becoming redundant.

More recently, many of the same factors favouring relocation have become apparent at some ESCAP regional ports and new initiatives are already beginning to reshape the facilities in many countries. Examples of this include the development of satellite ports at Qasim - Pakistan, Haldia - India and the planning of facilities on the Shanghai Estuary, China and Laem Chabang, Thailand among others. One implication of such developments is that some of the present facilities may fall into disuse before the end of century. Whether or not they become redundant as ports, these facilities have considerable intrinsic value located as they often are near city centres. This means that some assessment of the opportunity costs of alternate uses of port facilities should be part of a port's long-term planning process, particularly when port use is declining. Alternative uses include providing new opportunities for the development of light industry, recreational facilities and housing projects among others. To assist member countries in evaluating these possibilities, ESCAP has commissioned this study of the processes involved including:

- (i) A brief review of the developments which have created the pressure on ports to relocate.
- (ii) An inventory of the problems faced including operational, institutional, administrative and labour aspects.
- (iii) An illustrative listing of possible alternative uses of redundant facilities illustrated by case studies.

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SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

i) To a greater or lesser extent, all ports are faced with the need to remain competitive and fulfil their important role in their country's economy. In recent times these competitive pressures have meant ports being called on to provide deeper berths, easy access from sea routes, large back-up areas and access for hinterland transport systems. These pressures have been particularly marked in the case of river ports which, largely for historical reasons, have problems meeting these new demands. As a result some countries have decided to build new facilities at locations remote from the existing port, drawing traffic away and leaving existing facilities underutilized or redundant (figure 1).

ii) From the surveys undertaken in preparing the present study, it was observed that ports of developed countries are considering using, or are already using, their obsolete facilities for other activities, either by selling or leasing them to other entities such as municipal authorities or private investors (see annex I). It is noted that these obsolete facilities were often close to city centres and this made them prime candidates for redevelopment. The main alternative uses include recreation and leisure facilities, commerce and offices, residential development and light industry. These projects generally take many years to implement since they involve various bodies such as cities, states, ports and private investors and they have political and social implications. The valuable real estate owned by the port has thus been put to good use and this has had a favourable impact on the ports' image and has provided a valuable source of revenue with which to fund the ports' relocation.

iii) Developing countries, particularly in the ESCAP region, have a number of relocation projects in progress (see annex II). The implementation of such projects tends to take more time in developing countries since there is often a shortage of funds for port investment and foreign loans are difficult to obtain. It would be profitable for ESCAP ports, like ports in many developed countries, to consider over the coming years alternative uses for their old facilities as part of their long term planning process.

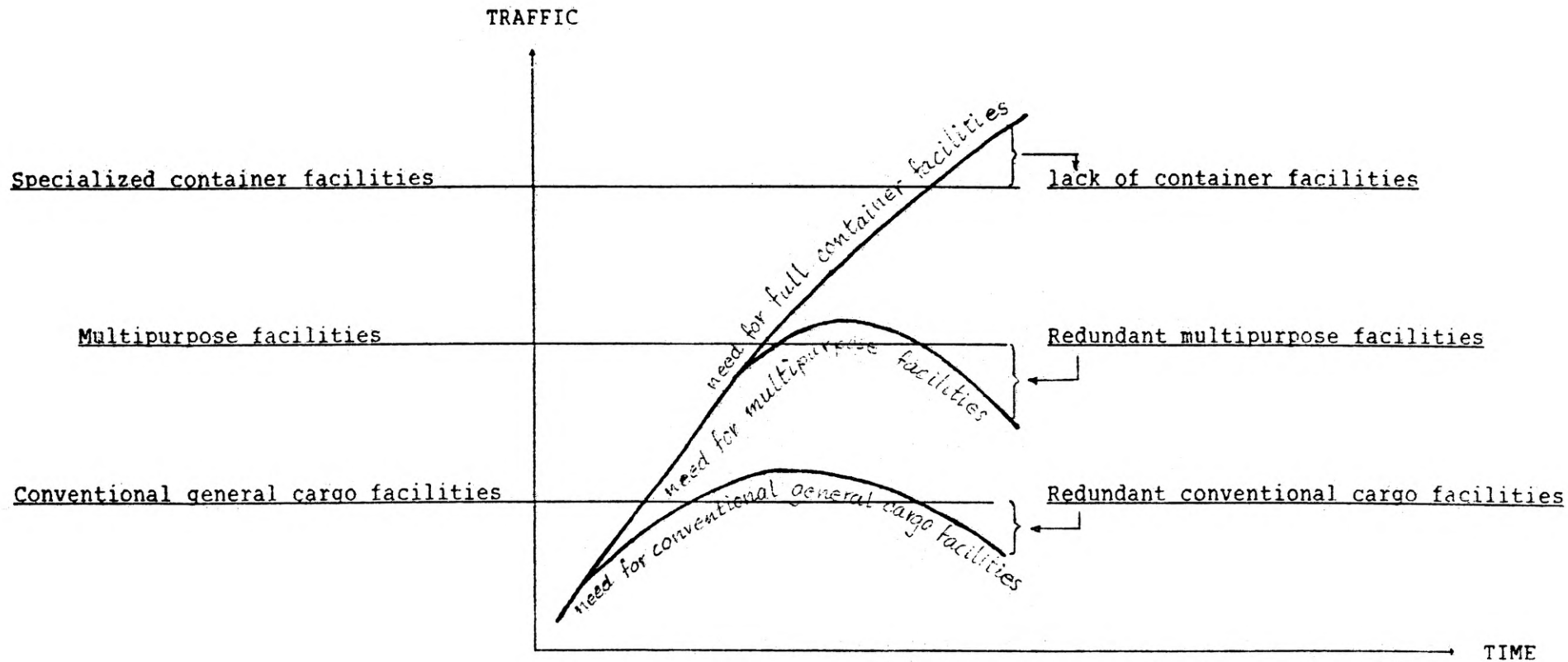


FIGURE : TREND IN NEEDS FOR VARIOUS TYPES OF PORT FACILITIES

(iv) In considering alternative uses of port facilities, priorities may not be the same for all ports or countries in the region. Light industries and other commercial activities will probably come before residential, recreation and leisure uses. However, with both imagination and a pragmatic approach, interesting solutions can and should be worked out for the benefit of ports and their communities. The key requirement is planning and this should take place as early as possible and could lead to the realization of large capital sums which may be deployed in the development on new port facilities.

(v) ESCAP ports can gain considerable benefit by looking at the relocation experiences of ports in developed countries. 17 case studies are provided in this report. Nevertheless, it is recommended that further work be done to quantify the potential gains of this element of the port planning process.

PART ONE : TRENDS IN PORT LOCATION

I. WHY PORTS ARE LOCATED WHERE THEY ARE

In the past, ports were located at strategic geographic points, along the coast, at the mouth of a river, or more commonly some distance upstream because natural inland waterways were the most convenient cargo corridors. The sites for ports were also selected to provide a haven for ships and therefore ports were placed in naturally sheltered areas.

Ports provide sites which are suitable for the transfer of cargoes from ships to land and vice versa. Centres of production and consumption therefore grew around them. For these reasons, ports were closely related to cities and they tended to develop together. Very often the cities surrounding the port provided the consumers, producers and port workers. Ports provided the junction between maritime lanes and land transport: firstly rivers, then roads and later still, railways.

In the early days of maritime transport, port traffic flows consisted of rather small quantities of general cargo to and from a port's immediate hinterland. The rate of loading and unloading from the ships was slow, often allowing direct transfer to land transport. Space requirements on the quayside were limited and the port generally consisted of a narrow fringe of land along the waterfront in a sheltered area with shallow water. Originally, there was no need for deep water but as ship characteristics changed slowly from shallow-draughted sailing cargo boats to self-propelled cargo ships this changed. In the transition process, the initial beaching areas were often converted to berthing structures, flooding docks then moles and basins, and subsequently linear berths. The handling of cargo characteristically used a large labour force as most of the work was performed manually.

While this picture is deliberately schematic and simple, nevertheless it is profitable briefly to recall the basic factors which were responsible for the location of many existing ports. Many of these reasons for the selection of port locations are still applicable for the selection of new port sites especially the need for a sheltered area located at the junction between maritime lanes and land transport. However, with modern technology many of the traditional reasons for choosing a port's location have been superseded.

II. CRITERIA FOR MODERN PORT LOCATION

The function of ports has not changed but the port has become one link in an integrated, international transportation system, connecting maritime shipping to the various modes of inland transportation. The criteria determining optimum port location are now, and have been for several decades, somewhat different from the criteria used for the original planning of many port facilities. To survive as economic entities, ports have had to adapt their facilities and their operation to the new demands of technological development.

In the 20th century major changes have occurred in mode of carriage and cargo handling. In the first half of this century, bulk handling and transport systems were developed, while in the second half the container revolution has had a major impact on nearly all ports of the world. While global seaborne traffic has been declining since 1979 it has increased in many of the developing countries of the ESCAP region. The ESCAP region now accounts for more than two billion tonnes (about one third of the world total), and much of the general cargo element is rapidly becoming containerized.

Bulk Cargo

Bulk shipping experienced exceptional growth in the 1970s. At that time large industrial port complexes were created to match the changing element of new super ships carrying bulk commodities. This traffic has been sharply declining since 1982 (especially for oil

products) and there is now a clear overtonnaging of the fleet. Future changes in bulk traffic will probably consist of refining the various elements of the transportation process (ships, handling and storage methods) rather than any major change in technology or operating concepts.

Bulk loading and unloading facilities are often independent of general cargo ports. The location of bulk facilities is dictated by producing areas or processing facilities, and their labour requirements are usually low. Loading and unloading bulk commodities are rational operations with handling capacities measured in thousands of tonnes per hour. The location of bulk facilities needs to be examined on a case-by-case approach.

Containerization

With the growing industrialization of countries in the ESCAP region general cargo traffic and particularly containerized cargo has grown rapidly. For example, the share of containerized general cargo traffic through ASEAN ports rose from 6 per cent of liner cargoes (200,000 TEUs) in 1973 to 44 per cent in 1983 (2,500,000 TEUs); before the year 2000 this number may rise further by a factor of 4 with about 80 per cent of all ASEAN general cargoes carried in containers.

Trends in various types of container vessels between 1977 and 1987.

	Number of vessels			Total capacity (TEUs)		
	1977	1987	on order 1987	1977	1987	on order 1987
Fully cellular	305	1,103	76	354,656	1,296,485	161,420
Converted cellular	105	151	-	77,158	119,625	-
Semi container	232	1,786	44	101,538	596,480	17,100
Container/Ro-Ro and Ro-Ro*	93	664	22	66,832	346,434	11,475
Barge carrier	9	28	-	5,445	19,157	-
Bulk/container	N/A	317	4	N/A	304,446	8,276

Note: World container carrying fleet

* Not all vessels included in 1977 figures

N/A Not available

Source: Containerization International Yearbooks 1978 and 1988.

One of the most important requirement for container operations is the container yard stacking/storage area behind the berth. Unlike conventional operations which rely on transit sheds to store cargo, containers provide safe and secure environments for their cargo. Thus the port requirement for cargo handling has changed drastically over recent years from berths with covered storage and an area of only 4 hectares to open continuous facilities over seven times this size. Unfortunately, because of the historical reasons for port development, such container land areas are not available at many ports and this is probably one of the main factors as to why ports may relocate.

III. WHY SOME PORTS HAVE TO BE RELOCATED

Ports are links in the transport chain and they are also a focal point of commercial and industrial development. One consequence of this for port location is the necessity for qualified labour, land, energy and services to be available. Ports then become real centres of interest in themselves and have their own life which can be independent from a city.

Ports which were located and designed according to the old criteria have to adapt in order to survive and to fulfil their basic functions in a country's economy. For this there are only two solutions: rehabilitation or relocation. Rehabilitation is the transformation of old facilities to modern facilities. It is often the most economical solution. For instance, if it is possible to:

Dredge access channels and berths to the depth required by new technology ships

Provide large open stacking areas by demolishing old sheds and buildings and expanding the existing port area or creating inland port facilities well served from the port

Obtain adequate strength of structures and soils to support equipment loads

Organize efficient connections to the inland transport system
Upgrade management and navigating systems
Improve productivity from the existing infrastructure

then it is not necessary to relocate port facilities.

To provide a truly efficient service, however, it is often necessary to relocate ports so as to provide better service to maritime trade and the national economy. This decision can only be made as the result of a complete technical, economic and financial feasibility study taking into account:

Possible improvements in the operation of existing facilities;

A comparative study between possible rehabilitation programmes and alternative relocation projects including institutional and environmental analysis, and an evaluation of investment and operational costs;

Evaluation of the impact of future changes in shipping and cargo handling technologies;

Traffic projections by type of cargo mode, trading partner requirements, shipping company demands, and other port users' needs;

Determination of market and competition trend projections;

Site potential.

From experience, it has been observed that the main needs for relocation occur in the case of river ports which developed inside large cities. The development of these ports was often the cause of the city growth which, ironically, later prevented the port from adapting to changing demands (lack of space, congestion of urban traffic between the port and hinterland areas, environmental aspects).

PART TWO : RELOCATION OF PORTS AND USE OF REDUNDANT FACILITIES

I. PROBLEMS RAISED BY REHABILITATION AND RELOCATION

There is need for ports to continually adapt to new technologies either by rehabilitation or relocation. The process of change, however, can open up new opportunities for the use of redundant facilities.

When ports need to be relocated several operational problems may arise related to the following:

- Administrative: There tend to be two main problems in relation to institutional arrangements when a port is relocated:
 - whether to have one or two port authorities
 - how to adapt administration to the operation of two sites
- Institutional: Provision of institutional services such as customs and police may be problematic in cases of relocation. The choice of the port by shipping companies depends largely on the efficiency of institutions' procedures. Delays which lead to potentially long inland container turnaround time and container dwell time in a port, are factors which detract from a port's competitiveness. Moving to new sites may of course provide the opportunity to implement new systems.
- Labour: From being a labour intensive activity, port operations are rapidly becoming capital-intensive. New techniques, such as bulk handling and containerization require a smaller, more highly skilled labour force than conventional cargo handling^{1/}.

^{1/} A 1986 ILO publication entitled New Cargo Handling Techniques: Implications for Port Employment and Skills shows that at 44 selected ports (or groups of ports) around the world the number of cargo handling workers had declined by 30 per cent.

Availability of a skilled labour force in the vicinity of a newly relocated port facility, is essential as problems of daily transportation, from dwelling areas to new working areas are to be avoided.

II. HOW SOME PORTS HAVE SOLVED RELOCATION PROBLEMS

In order to give ESCAP ports practical information on how European and other ports have solved the problems raised by the need to adapt their facilities to new trends in maritime and port technologies, particularly in relation to the use of their redundant facilities, a questionnaire was sent to ports which were known to have faced a relocation problem. (See annex III). From this survey of selected ports and a review of recent publications it is possible to give an outline of some of the solutions adopted.

In addition to these inquiries, five representative ESCAP ports were visited: Bombay (India), Port Kelang (Malaysia), Karachi and Port Qasim (Pakistan) and Bangkok (Thailand).

Table 1: USE OF OLD PORT FACILITIES AND CORRESPONDING REDUNDANT AREAS

	Light industries	Office buildings	Hotels	Marinas	Apartments	Museums	Commercial areas	Recreation centres	Conference centres	Others
EUROPE										
<u>UNITED KINGDOM</u>										
London	X	X	X	X	X	X	X	X	X	Printing
Bristol	X	X	X	X	X	X	X		X	
Gloucester	X	X	X	X	X	X		X		Gymnasium and dance studios Workshops
Hull	X		X	X	X		X			Parking area
Swansea			X	X	X	X	X	X		
Cardiff		X		X			X	X		Workshops, floating restaurant
<u>FRANCE</u>										
Dunkerque		X			X	X	X	X		
Le Havre						X	X	X		
Rouen						X	X	X		Urban expressway - storage
Nantes-St Nazaire		X		X			X	X		Urban traffic improvement Bus terminals
Bordeaux						X		X		
<u>DENMARK</u>										
Copenhagen	X	X	X		X					Public parks
<u>SWEDEN</u>										
Gothenburg		X		X		X	X			
<u>UNITED STATES</u>										
New York					X					Truck terminal - warehouse Distribution centre
Baltimore	X			X	X					
<u>AUSTRALIA</u>										
Melbourne								X	X	

Summary/overview of comments given in port questionnaires on the use of redundant facilities

BRITISH PORTS

London, Hull, Bristol, Cardiff, Gloucester and Swansea differ widely in size, characteristics of maritime traffic, and institutional control. Some general features, nevertheless, can be highlighted:

- While approaches to solving relocation-related problems differed, the concept of special development corporations appears to have been a common feature which probably contributed to the success of most projects.
- Public entities and private partners have worked together.
- Quality of environment was always a major objective. It is no longer considered a preserve of higher social groups.
- Searching for a local identity, keeping the maritime character and developing leisure and cultural activities were common components of most of the projects.

FRENCH PORTS

French ports and maritime cities like Le Havre, Rouen, Dunkerque, Nantes, St. Nazaire, Bordeaux and Marseilles are now interested in working together to examine ways of using obsolete port facilities for the benefit of ports and cities. The general situation can be summarized as follows:

- Possible uses of redundant port facilities have been considered at all recent national meetings which gathered port and city planners in 1986 and 1987 in Fecamp, Nantes and le Havre.

- The main components of the projects which have been considered are: integration of the port into urban life, development of cultural and leisure activities, improvement of environmental conditions, projects oriented towards commerce and services, with only a small number of residential programmes.

OTHER PORTS

In Copenhagen, about 20 per cent of the port area has been sold to the private sector for various activities, mainly related to commerce, housing and recreation.

In Gothenburg, the same type of activities have been implemented in obsolete port areas but most of them are still under the operation of the Port.

In Baltimore, private port facilities have been sold to other private investors for the implementation of non-port-related activities.

New York's redundant port facilities were turned over to local community for private development.

In Melbourne, obsolete port facilities are now used by the City and private companies.

III. COMMENTS AND SUGGESTIONS

Comments

The 17 ports of various sizes in developed countries of Europe, the United States and the ESCAP region offer a wide range of examples of the alternative uses to which redundant port areas can be put. They may be grouped under the following five categories:

- a) Environment, culture and leisure:
Museums, parks, walkways, hotels, restaurants, exhibition centres, recreation centres, marinas, sailing training centres, cultural centres etc.
- b) Residential accommodation:
Apartment buildings, hotels, condominiums etc.
- c) Commercial areas:
Department stores, shops, distribution centres etc.
- d) Light industries:
Storage, workshops etc.
- e) Urban road traffic:
Parking areas, urban road traffic, truck terminals, bus terminal

The various steps leading to the decision to relocate and the management issues are presented in the following figure and in table 2:

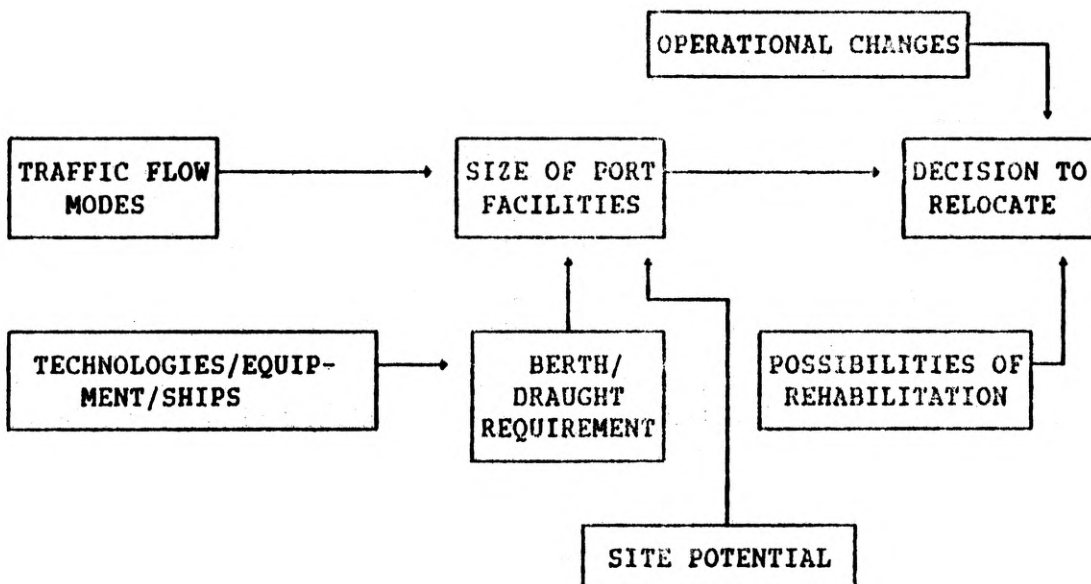


Figure 2: VARIOUS STEPS BEFORE DECIDING ON RELOCATION

Table 2: SUMMARY OF MAIN MANAGEMENT ISSUES RAISED BY PORT RELOCATION

	AREAS	PROBLEMS
New Facilities	Institution	<ul style="list-style-type: none"> - One or two authorities? - What should be public and private? - Co-ordination between authorities
	Operation	<ul style="list-style-type: none"> - Co-operation with port users - Duplication of functions - Communication between sites - Division between public and private - Tariff levels and structures - Connections with land transport
	Labour	<ul style="list-style-type: none"> - How to convert existing labour force - Dislocation problems - New qualifications - Transportation
	Administration	<ul style="list-style-type: none"> - Duplication of administrative services
Redundant Facilities	POSSIBLE USES	ACTIONS
	Light industries	<ul style="list-style-type: none"> - Determination of areas to be used - Open discussion with other parties
	Commercial	<ul style="list-style-type: none"> - cities - ministries - investors - Identification of markets
	Residential	<ul style="list-style-type: none"> - Identification of value costs - Evaluation of uses
	Recreational	<ul style="list-style-type: none"> - Pricing - lease or sale - Advertising

Conclusio

The growth of international traffic through the ESCAP ports will continue over the coming years. This and the adoption of new technologies will create a demand for new port facilities with deeper draught access and greater land availability than is available at many existing port sites.

With the construction of new facilities it is likely that over a period of time a number of ports of this region will experience the same developmental phenomena already observed in the industrialized ports of the world where old facilities, particularly at up-river locations, have become redundant and are now being used for other activities than cargo handling.

While it is understandable that ports do not want to abandon valuable assets in which considerable sums have already been invested in ship reception and cargo handling facilities, eventually a point may be reached when this is the most economic alternative.

Many ports are fortunate in that historically they have been the nucleus for major city development, for example Bangkok, Bombay and Karachi. The land owned by these ports and others like them is in the centre of the metropolis and represents an extremely valuable asset both for the port and its community.

Soon the time will come when ESCAP regional ports will begin to turn over redundant facilities to other uses. This practice, which is already quite common in the industrialized countries of the region, can be extremely beneficial to the port itself for several reasons including:

- (i) substantial revenues or capital sums can be generated from the lease or sale of redundant land. This money can be effectively used in the development of new facilities more appropriately located for modern port operations;

- (ii) a common use of redundant port facilities is the development of light industry complexes and parks which would provide additional traffic to the port;
- (iii) through an integrated redevelopment of the port and its city surroundings greater public access and awareness of waterfront activities give an enhanced image to the port accentuating its importance.

Appropriate redevelopment of port facilities takes imagination and initiative and the co-operation of several government agencies possibly with the involvement of the private sector. The process can be a long and complicated one but experience has shown that major benefits can accrue to the port.

ANNEX I: USE OF REDUNDANT FACILITIES IN DEVELOPED COUNTRIES

AUSTRALIA

MELBOURNE

The Port of Melbourne is the most important port in Australia. Its total traffic amounts to approximately 10 million tonnes and the container traffic was around 560,000 TEUs in 1986.

Conversion of port facilities

Some port facilities with an average berth length of 158 m. and an average draught of 8.8 m. have been converted for landscaping and public access, storage and other miscellaneous uses. The redundant berths were too shallow, had insufficient back-up area and low wharf load capacity and therefore they became obsolete.

Relocation and future port facilities

Containerization was a gradual trend recognized by the Port of Melbourne Authority and it required the PMA to change to a long term investment policy.

The PMA has experienced a relocation of berths within the confines of the existing port area and not to natural deeper waters. Therefore labour dislocation problems did not occur. The relocation was a direct result of containerization and the establishment of container berths.

DENMARK

COPENHAGEN

The Port of Copenhagen is the main port of Denmark. It handles around 8 million tonnes of cargo per year and in 1986 its container traffic was 70,000 TEUs. It suffers from a serious disadvantage in that it is in the heart of a capital city, which makes it very difficult to establish adequate road and rail access links without adverse environmental effects. Moreover, the Port has efficient competitors in its Northern European market (mainly Denmark and Southern Sweden).

Conversion of port facilities

The Port has recently experienced the conversion of redundant facilities which can be described as follows and compared with the total port area):

	Former port use	Total port
Area	approximately 100 ha	Approximately 500 ha
Berthing length	" 20 km.	" 40 km.
Draught	4 - 9 m.	4 - 12 m.

These areas were sold to private sector interest which had rented the premises from the Port Authority. They are mainly used by light industry, office buildings, hotel apartment buildings and public parks.

Port revenues have improved, and one of the reasons for selling old port areas is that the Port wants to improve the efficiency of port activities.

Selling old port areas to private investors has not improved the image of the Port Authority, which is a self-supporting organization under public supervision.

So far, the total revenue which has been generated is approximately 60 million US dollars.

Present and future port facilities

The Port Authority is now concentrating port activities in the northern and eastern sections of the existing port. Labour dislocation problems do not therefore exist at present. Funds for new investment are available from the sale of old port areas.

But in the years ahead, Scandinavian freight routes will be subjected to a series of major changes. Proposals for bridges and tunnels - domestic Danish links, a Danish-Continental link and a Denmark-Sweden link - are now closer to realization than at any stage during decades of study and discussion of the various solutions.

These fixed links will allow road and rail carriers easy access to the continent, and thus to major continental ports - a bleak prospect for existing Oresund ports.

The freight and cargo business will inevitably become fiercely competitive, and only the best located ports with truly competitive facilities and charges can hope to survive.

With its location in the heart of the city, the Port of Copenhagen is looking for an alternative site; the Oresund Port.

An entirely new major port can be built in the Sound, in conjunction with the new Oresund Bridge, and with direct links to the inter-Scandinavian road and rail network. The Sound can provide several suitable sites for the port and comparison studies are already available. The final decision will of course be based on environmental, technical and economic criteria.

A new port will remove heavy duty freight traffic from Copenhagen's city centre. 10-14 million tonnes of freight will be directly transferred to the motorway network and rail - away from narrow city streets, already suffering from excessive loads and away from residential districts.

Completion of the fixed bridge/tunnel links - domestic and international - is expected to lead to economic growth in the Sealand-South Sweden region, and thus to movement of greater volumes of freight. In the absence of a more accurate indicator, this growth-based extra volume is estimated at 1 million tonnes per annum.

The aggregate cargo turnover could thus be estimated as follows:

Transferred from Port of Copenhagen	5 - 6 million tonnes		
From other ports	3 - 4	"	"
Oresund cargo	2 - 3	"	"
Growth-based additional cargo	1	"	"

Total (estimated)	10 - 14	"	"

The figures indicate a reasonable level of cargo turnover, capable of providing a basis for economically feasible port operations.

A port with a cargo turnover of some 14 million tonnes is estimated to generate a turnover of some DKK 500 million (approx. \$US 70 million).

An estimated surplus of 10 per cent would be adequate to cover interest and depreciation costs on building costs of some DKK 500 million.

Another factor to be considered is that the ports relocating to the new site will later have land areas and buildings available for other purposes.

The Port of Copenhagen's land areas today amount to about 4 million m², most of which could be made available for other purposes. It is assumed that about half of the area can be sold and that the revenue thus obtained would amount to some DKK 1,000 million (approx. \$US 140 million).

FRANCE

BORDEAUX

The Port of Bordeaux, like other ports, has had to face changes in international maritime trade. The Bordeaux location has been used as a port for many centuries and port facilities were built first in the city itself, then farther downstream at Bassens (during the Second World War), then at Ambes, Blaye and Pauillac. In the 1960s new modern port facilities were constructed at le Verdon near the Garonne estuary and close to natural deep waters. The city of Bordeaux is about 100 km from the sea.

Conversion of old port facilities

A large portion of port facilities inside the City of Bordeaux became obsolete for port operations with a width varying from 80 to 150 m. They still belong to the Port of Bordeaux but many projects have been studied and discussed concerning the possible use of these areas for other activities. In the 1960s, build a large urban expressway at this location was planned, but in the 1970s, this project was rejected.

The project now under way will take account of the need to preserve the exceptional environmental characteristics of the area, especially the historical and architectural interest of the neighbouring urban area. It might include a museum, walkways and parks. The planning of the area will be part of the city master plan.

Relocation of port facilities

The new site of Le Verdon was initially developed in 1933 to accommodate passenger ships. Port facilities started operation only in 1967 (oil terminal) and 1976 (container terminal and Ro-Ro facilities).

DUNKERQUE

The Port of Dunkerque is a major mineral ore port and the third most important French port for general cargo traffic. It has developed modern activities in a new port area with deeper waters and large land areas at about 15 km from the city.

Conversion of port facilities

The strategic location of redundant old port facilities near the city centre led local authorities (city and regional) and private investors to consider various types of projects. Most of them include housing programmes with marinas, leisure and sport activities, and commercial areas. Taking into account the large number of entities (state, region, city, port etc.) already interested in the area, together with the large number of potentially interested private investors it was decided to create a special Development Agency in charge of planning and co-ordinating the projects.

LE HAVRE

Le Havre is a major world port handling total traffic of about 50 million tonnes per year. It is approximately 200 km from Paris by rail and road and 350 km by river. It is the premier container port in France with a total yearly container traffic of approximately 600,000 TEU in 1986. The port has an outstanding geographical situation on the busiest sea route in the world. It is the sea outlet for the most active economic region in France and about 30 per cent of the population of the country lives within a 200 km radius of Le Havre. The Seine Valley is one of the most industrialized areas in Europe.

Conversion of port facilities

The port facilities which have been upgraded are located between the city (population of 300,000 inhabitants) and the present port. They are mainly docks which can no longer handle modern port needs. The names and characteristics of the redundant port facilities are listed below:

	Area (m ²)	Length (m)	Draught (m)
1. Anse Notre Dame	6,000	308	3.75
2. Bassin du Roy	11,000	400	1.10
3. Bassin du Commerce	52,500	1,230	0.6 to 2.10
4. Bassin de la Barre	36,200	965	3.1 to 3.60
5. Bassin Vauban	83,300	1,750	3.6 to 4.1
6. Bassin de la Citadelle	60,000	1,185	3.6 to 4.5

Bassin de la Barre was partly filled for the construction of an hotel and of the Centre Havrais de Commerce International (Le Havre World Trade Centre) which include 9,000 m² of office area and 7,000 m² of service area (information service, community exchange, international trading assistance, congress centre etc.)

In the Central docks (Bassin du Commerce, Bassin du Roy and Anse Notre Dame) a project is under way to improve the integration of these historic facilities in the City: welcoming of prestigious ships and tall ships, walkways, etc.

The "Bassin du Commerce" is now used by a sailing training centre and a leisure fishing base. It also includes an old ship which is used as a restaurant.

Along the "Vauban Dock", an old port warehouse will be rehabilitated for technological activities.

In the "Citadelle Dock", an area will be used for the construction of the Le Havre cultural centre.

Frequent discussions are held between the port and regional and municipal authorities for the conversion of other port facilities.

Operation of these facilities

The World Trade Centre area was leased to private operators. The Central docks were mainly leased to the City. The impact of these new uses of former port facilities on revenues has been rather small but very important for the image of the Port.

Relocation of port facilities

Rehabilitation of old facilities was undertaken when this was not too costly. In order to face the need for more specialized facilities, new port areas have been developed to the east of the old facilities, namely 3 terminals for the growing container traffic, a multipurpose bulk centre and industrial facilities.

MARSEILLES

The Port of Marseilles is one of Europe's major ports with a total yearly traffic of almost 100 million tonnes. A large component of this is oil (approximately 75%) and Marseilles handled about 480,000 TEUs in 1986.

During the 1960s, a new site for port and industrial activities was developed at Fos so that there is about 70 km between the two extreme points of the port area, nevertheless the port of Marseilles remains very active in adapting to the new forms of traffic and considering the whole passenger traffic (1.3 million/year) and the whole shipyard activity.

The old port uses more labour than Fos (about 70% of the total port labour force) but provides 30% of the revenue. So far it may only be said that old port areas are being looked at with more and more interest by potential investors from the private sector. The port, however, still considers that the relatively small port operating area is fully needed and is adaptable to several types of port activities.

NANTES-SAINT NAZAIRE

The Port of Nantes-St Nazaire is a major French port for liquid and dry bulk. Its total traffic is about 25 million tonnes. It includes two main locations: the Nantes area with the old port and several industries is located 56 km from the sea along the Loire River and the St. Nazaire area near the Loire estuary.

Evolution of port traffic

Following the changes in maritime trade, the Port had to build, between 1970 and 1985, new port facilities at Montoir, downstream between Donges and St. Nazaire. Traffic is now concentrated in Donges and Montoir.

Consequently, the 4.3 km of berthing length (draught: approximately 8.6 m) is less utilized by commercial traffic which has moved mostly to Montoir (namely dry bulk). Only one berth (165 m) is still very busy with exporting cold products. One 250 m berth has been given over to fishing vessels.

In the same way, in Nantes on 4,570 m of berthing length, only about 2,700 m are used for commercial activities. The remaining berths quai de la Fosse, quai St Louis, quai des Antilles and a shipyard area are not used anymore for commercial activities. This has to be compared with the industrial area in Chevire (downstream of Nantes) and to the 735 ha. industrial area at Montoir (coal, food products, gas, general cargo, and containers). The Donges-Montoir complex now represents about 92 per cent of port activities. Some port activities, however, remain in Nantes (imports of wood products, fruits, fertilizer and exports of cereals) and in St. Nazaire (exports of refrigerated products) and it is necessary to keep port facilities in these two locations.

The main problems encountered in adapting to new trends in port traffic have been the level of investment needed to build new port facilities, and labour problems.

Conversion of port facilities

The relevant port authorities and local authorities have been considering the conversion of old port facilities in Nantes and in St. Nazaire for many years. Port areas have been transferred to the cities and many projects are now in preparation such as:

In St. Nazaire: Exhibition centre (62,000 m²)

Area for the Public Transportation Company
(43,500 m²)

An enterprise zone

A marina

In Nantes: New construction to ease urban road problems

Urban traffic improvement

Commercial uses

ROUEN

Rouen is an important French port located only 120 km from Paris along the Seine River. It is the most upstream among the three French river ports and comprises a port for sea ships and one for river crafts. The total yearly port traffic amounts to approximately 20 million tonnes with around 120,000 TEUs in 1986. It is the chief French port for cereals.

Conversion of port facilities

Until the beginning of the 20th century, the port was at the heart of the city. After the Second World War, during which many buildings were destroyed, new port facilities were built downstream and the Guillaume le Conquerant Bridge was constructed as a new link between two parts of the city. The old port facilities are still used, but underutilized for port activities and discussions have been held between city and port authorities to convert about 2,500 m of berth before the year 2000.

The main area concerned is located between the Guillaume le Conquerant Bridge and the future sixth bridge of the city. It includes 2.1 km on the right bank and 1.8 km on the left bank. The minimum draught there ranges from 5.5 to 7 m. Port facilities are more than 80 years old, back up areas are too narrow and are limited for expansion by the urban area. About 28,000 m² of transit sheds are involved.

Main future uses for these redundant areas are:

The construction of a museum

A recreation centre (Foire Saint Germain)

Storage and commercial uses

Underutilized warehouses and sheds have already been rented by the port for non-port-related activities thereby allowing the port to continue to collect revenue. The port traffic in these areas

represents about 10 per cent of the total port traffic. In discussions with city representatives concerning these underutilized facilities, the port is emphasizing its requirements which are:

To provide anchorage for waiting ships.

To leave enough berthing and land area to satisfy the seasonal character of the port traffic (cereals)

To provide sufficient facilities for service boats, foreign ships and non commercial ships (Navy)

To allow more river traffic. To do this, the clearance under the new bridge was fixed at 35 m.

Relocation of port facilities

New facilities have been built downstream in the 1980s for specialized traffic, such as containers, dry bulk (mainly cereals) and liquid bulk. The Port of Rouen is providing facilities all along the River Seine between the city of Rouen and the Seine estuary. Thanks to its optimization of its use of river conditions, the Port of Rouen has been able to keep an important role in French maritime trade.

SWEDEN

GOTHENBURG

The Port of Gothenburg is the main port of Sweden and also of Scandinavia. Its container traffic was more than 300,000 TEU in 1987 and it handles a total volume of cargo per year of around 20 million tonnes. The total port area has about 16,000 metres of berthing length with draughts ranging from 3 to 19 metres. Port facilities are in a variety of locations and will remain so in the future.

Conversion of port facilities

The Port Authority has converted about 1500 metres of berth with 3 to 5 metres of draught and a back-up area of 50,000 m². These facilities were formerly used for general cargo handling and are now converted into office buildings, marinas, business or commercial areas. Some of the facilities were sold to the city but most of them are operated by the Port Authority.

Relocation

New port areas in Gothenburg have been created by filling up the Gota River.

UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND

BRISTOLHistory

Since the 17th century, Bristol, which now has about half a million inhabitants, has been a large industrial centre and a major port. Bristol City Council is the owner of the Port Avonmouth (at the mouth of Avon draught), now nearly 150 years old, developed out of the need for deep draft facilities with easy access. Bristol City Docks have a long and difficult approach along the Avon and this approach has the second largest tidal range in the world. Avonmouth had been outgrown again by the 1960s and a second dock alongside the mouth of the River Avon was built in the 1970s to take larger container traffic.

Modern commercial shipping is now concentrated downstream at Avonmouth Docks and the new Royal Portbury Dock. The "Floating Harbour", although still open to commercial navigation and courtesy vessels (the Navy is a regular visitor), is almost entirely used by leisure craft and has become a premier recreation and visitor centre for the Bristol region.

Bristol City Docks

By the 1960s trade in Bristol City Docks had declined to the point where the City sought an Act of Parliament to close navigation. Extensive areas of land lay derelict and the only commercial shipping was bringing sand into the City Docks for the construction industry. Closure of navigation was never implemented and the City then had to deal with dereliction right in the centre of the city at a time of economic recession (early 1970s). As grand comprehensive schemes seemed bound to fail, an evolutionary approach was adopted. The City Council encouraged a range of new uses (residential, leisure, commercial) by publishing planning briefs for individual sites, by investing in environmental improvements to quayside areas and by developing leisure facilities. Restored confidence in the area and an improving economy eventually led to a gradual increase in the pace of development.

Strategy

The objectives of the approach were to introduce a balanced mix of employment, recreation and residential uses and to fully reintegrate the dock area into the rest of the City fabric as an economically productive element.

This strategy was designed to change the decaying, undesirable image of the port area. This was achieved by:

- (a) Removing derelict structures and carrying out environmental improvement works, particularly on prominent sites;
- (b) Improving public access to the waterfront by the construction of walkways, either directly by the City Council, or indirectly as part of development;
- (c) Organizing events and activities to draw a wide cross-section of the population, thus putting Bristol 'on the map' e.g. the Powerboat Race, Regatta and World Wine Fair;
- (d) Setting an example by carrying out pump-priming schemes e.g. Baltic Wharf Water Sports Centre, Albion dockyard nursery units, Industrial Museum etc.;
- (e) Promoting early development by issuing planning briefs on "early release sites" e.g. Bathurst Basin, Hotwell Dock;
- (f) Refurbishing old buildings and finding new uses for them e.g. hydraulic pump house (now a restaurant) at North Junction Lock;
- (g) Using the Council's considerable land ownership resources to market sites and influence development in the right direction.

As the major land owner the City Council has encouraged the above uses by disposing of its interest in property on long-term leases or freehold. In the cases of refurbishment or redevelopment, building licences must be obtained so as to ensure that development is carried on within a specified time period and in accordance with overall planning.

Recent Situation

The floating harbour comprises approximately 2.5 miles of waterway at an artificially maintained level. At the inception of the Local Plan in 1976 there were approximately 200 acres of developed land; about half has now been developed, with a national network of canals for pleasure purposes.

Image

This has changed from that of a working port to that of a focal point for tourism with museums, art galleries, exhibition centres, cafe, restaurants, shops etc. It is now also perceived as a place where people can work and live.

CARDIFF

Cardiff, the Welsh capital, was and is still an active port belonging to the Associated British Ports and handling about 4 million tonnes of cargo annually. The area around Bute East Dock is, however, now closed to maritime traffic and there are plans for the redevelopment of 2,700 acres of run-down docklands. As with Hull, the dock separates two major urban areas. The development process is similar to that of Hull. A floating restaurant, new buildings, shops, workshops, water sports and leisure centres and living space for hundreds of people are the main features which are going to be installed in the area concerned.

GLOUCESTER

At the end of the Severn Estuary, the City of Gloucester with about 100,000 inhabitants has an old port with difficult access. Today the port facilities are totally unsuitable for modern traffic conditions and it has been decided that only a very small area (approximately 10 per cent) will be retained for operational purposes and that these uses may be relocated further down the canal in time, thus leaving the whole area (about 10 hectares and 23 warehouses) free of freight or operational traffic. There are two dry docks which will be retained in any future layout and which are likely to be used more for the maintenance of pleasure craft.

All facilities are owned by the British Waterways Board (BWB). Discussions on alternative uses of the port were held between BWB and the Gloucester City Council. Conservation guidelines were established and a land use strategy was adopted. Various alternative uses were considered and adopted into the strategy, including:

- National Waterways Museum and the Robert Opie Package
- Museum in two refurbished warehouses
- Antiques store in another warehouse
- Gymnasium and dance studios
- Leisure uses, craft workshops, offices
- Construction and maintenance of tall ships
- Marina

The British Waterways Board has sold the freehold of one building to the City Council. All other disposals will be by long-term lease. The City Council and BWB recognize that investment will only take place providing a commercial return can be made. The development in progress will provide jobs and income over and above the employment enjoyed by the port alone. A minimum return of £400,000 per annum from ground leases in addition to substantial lease premium payments has to be compared with the previous situation of the unused port facilities.

HULL

History

The Port of Hull was established and built at the end of the 18th century along the Humber River. This historic city is still playing an important economic role and has an active regional port handling about 150,000 TEU per annum. The Port started to develop in 1778 with Queen's Dock which closed after 150 years of activity in 1962 (depth 4.5 m). The Prince's Dock built in 1829 between the two other docks is no longer accessible by water. In 1846, the Railway Dock was added, west of Humber Dock. Together with another land area of more than 14 ha, the total zone which is called "Town Docks" was opened to reconversion in 1982. Before this decision they had been an obstacle to communications between two central parts of the city for many years. Nevertheless the docks still constitute a vital part of the character of the city, by being its most prominent landscape or townscape feature.

Other docks were constructed but port activities are now taking place in the east, i.e. downstream of the City where Queen Elizabeth Dock and King George Dock provide a container terminal (442 m long with a depth of 10.2 m) served by 3 gantry cranes and 6 Ro-Ro berths.

Over the last 20 years, national and local authorities have worked for the reconversion project of the Town Docks. In 1964, the decision was taken by the British Docks to close navigation. After the British Transport Act in 1967, commercial development of the area was envisaged. The City Council decided to buy the Docks with the assistance of the Central Government which paid 75 per cent of the price. In exchange, however, the central government has the right to intervene in development plans and to get some return from the profits generated by the new activities. A feasibility study was prepared by the Hull Council in 1974 and the proposal for implementing marinas was accepted in 1979. Construction expenses were spread over 3 years.

In 1982 after much discussion, it was decided to add other activities in the area: a 120 room hotel, a residential area, a new food market, light industries, parking areas and some rehabilitation work on old port facilities.

LONDON

Like many upstream river ports, the former leading world port had to abandon its upstream port operations and develop deep water facilities corresponding to modern needs. The port, which was located upstream of the Tower of London during the 18th century and which was already relocated a short distance downstream in the 19th century, is now based at Tilbury near the Thames estuary 30 kms downstream from Tower Bridge.

In the development process enclosed docks were built: West India in 1802 on the Isle of Dogs, then Surrey Docks and Royal Docks. All together, they represented a chain of facilities along 12 kms of the River Thames. During World War II, this complex and the neighbouring suburbs were almost destroyed. Port facilities were rebuilt and satisfactorily operated until 1955. Then technological changes in maritime trade, competition with other European and British ports and other developments made these facilities obsolete. The Port of London decided progressively to abandon St. Katherine, West India, the Isle of Dogs and finally in 1980 the Royal Docks. Because of this change in operational location, an area of about 2,500 hectares became available for redevelopment near the centre of London. The Port Authority recognized the potential value of these redundant assets

It has to be noted that the planning process was not simple and that a great deal of political and economic activity took place before the projects were implemented. In 1965 the Greater London Council (GLC) was charged with the planning in co-operation with the Boroughs. the GLC, however, was dominated by the Conservative Party at the end of the 1960s while most of the port areas were Labour Party municipalities. By the beginning of the 1970s, GLC was dominated by the Labour Party who prepared the London Docklands Strategic Plan.

In 1980, the Conservative Government, which opposed the Strategic Plan, decided on further changes. At a national level, it created a number of Development Corporations. These are private organizations in charge of major planning operations like new cities or large ports.

Concerning the Port of London, the organization in charge is the London Docklands Development Corporation (LDDC) appointed by the central government and therefore independent from the Greater London Council and from the boroughs. The central government was also responsible for the creation of "enterprise zones" that can encourage firms to invest in the region through minimizing administrative procedures and offering the incentive of no tax before 1992. Such a zone, with an area of 200 hectares, was created in London in the centre of the Isle of Dogs.

The traditional link between maritime activity and the old city has been retained with many prestigious City "institutions" being actively involved in redevelopment plans. Organizations such as the Rubber Exchange, the Plantation House, the Mincing Lane, the Town Exchange, the London Metal Exchange, the Baltic Exchange and insurance houses such as Lloyd's all participated. In fact, it is likely that the success of many of the Port of London redevelopment projects had a lot to do with the involvement, and perhaps even the constructive confrontation, of so many elements (national government, boroughs, and representatives of the international business and maritime world). The LDDC had access to generous financing arrangements for planning and controlling the areas and stimulate the coming of corporations. The zone was divided into four independent geographical areas: Isle of Dogs, Wapping, Surrey Docks, Royal Docks.

Only two sectors will be described in further detail below: Saint Katherine in Wapping and the Isle of Dogs. But other operations are going on in Surrey Docks or Royal Docks such as the recent opening of a local airport (Stolport) at Royal Docks.

St Katherine: This was the first redevelopment operation. On a total area of 11 hectares, not far from the City, were built:

One hotel (800 rooms)

One marina (240 rings)

A ship museum

In the restored Ivory House: offices, stores and high standard flats

Offices in the World Trade Centre

One pub

400 private flats

Some houses

300 social apartments

Although this operation was very controversial, it is now generally considered to be a success by the Government. The choice of activities and use of the area has remained, however, a subject for criticism by political opponents and others.

Isle of Dogs

This was an operation managed by LDDC. A great deal of selective demolition here transformed one of the saddest urban landscapes into a pleasant waterfront. It now has been landscaped and has marinas and modern buildings of high quality. The price of land has multiplied by a factor of 10 in 5 years in the enterprise zone where in 1985 about 3,500 new jobs were created. There are still some very large projects on the drawing-board but at the moment many apartment buildings are under construction. An elevated railway has added to the attractiveness of the area. Nevertheless, the benefits to many of the local people have not yet been completely proven.

SWANSEA

In 1986 Swansea has a population of 170,000 inhabitants and was still an important port and a steel producing centre. The port is located at the mouth of the River Towe. It was very active in the 16th and 17th centuries as a loading point for coal. Between 1850 and 1920 Swansea developed very quickly and many flooding docks were built during this period. Two large docks, King's Dock and Queen's Dock, were opened in 1909 and 1920. These two facilities accommodate most of the present traffic and South and North Docks were closed to navigation and partly filled after the British Transport Act in 1969.

In 1974, an action plan was issued concerning the Swansea Valley including the implementation of five "parks", every one having a specific use. At the location of the old docks, Maritime Park regenerated activities thus creating several hundreds of new jobs. The activities included:

A marina with related facilities

A residential area

A commercial area with a 120 room hotel

UNITED STATES OF AMERICA

PORT OF BALTIMORE

In Baltimore, the Maryland Port Administration (MPA) and its predecessor, the Maryland Port Authority, have owned and maintained general cargo facilities for over 30 years. The Port of Baltimore is one of the main American ports with about 530,000 TEUs in 1986 and a total traffic of more than 35 million tonnes per year.

Bulk terminals are owned and operated by private interests. Some of the older facilities for handling general as well as bulk cargoes have lain dormant for many years having succumbed to the need for more modern and efficient handling methods. In addition, activity in industries such as steelmaking and shipbuilding has declined. As revenue from these industries declined, owners looked for alternate uses for their property which will be more attractive.

Conversion of Port Facilities

None of the property of the Maryland Port Administration has been converted to a use other than handling cargo. Private facilities such as shipbuilding yards and warehouses have been sold to other private investors and have been converted to other uses such as condominiums, commerce, light industry and marinas. These conversions have taken place in older areas of the port close to the central business district which is presently experiencing a revitalization. Channel depths in these areas range from 35 to 38 feet. The longest berthing area is 1,500 feet. The overall impact of the conversion has been positive. Many of the old facilities were not being used and had fallen into disrepair. Now some have been converted into tax-generating properties that provide more jobs.

Relocation of port facilities

The Port of Baltimore is located at the upper end of the Chesapeake Bay. To allow for greater draught, the channel to Baltimore from the Atlantic Ocean is currently being deepened to 50

feet. This project will be completed in 1989 and cost over \$US200 million. Private investment in bulk facilities such as those for exporting coal have topped \$US200 million in the last several years and over \$US400 million of public money has been invested in new port facilities.

The Maryland Port Administration has no definite plans to rationalize its facilities at one location. Some degree of rationalization, however, has resulted as land has become available to the MPA due to its expansion efforts. The majority of the port's container capacity, over 80 per cent, is concentrated at two adjacent terminals on the north side of the harbour and the majority of the automobile import capacity is on the south side of the harbour. Future automobile import terminal expansion is likely to continue in the vicinity of the current facilities.

NEW YORK

The Port of New York is one of the largest in the world. It was ranked number 4 for container traffic in 1986 with a total TEU throughput of about 2.3 million.

Conversion of port facilities

Old facilities located in the core city (i.e. having little upland) were converted because of a lack of room for expansion and they were useless for container ship operations. These facilities are now occupied by apartment buildings, condominiums, truck terminals, warehouses and distribution centres.

Redundant facilities (such as Hoboken piers) were turned over to local community jurisdiction for private development. There is no port revenue involved. Each community is looking for the highest possible tax ratings before turning the area over to private investors. New York, like most ports, encountered labour dislocation.

Rehabilitation of new facilities

Completely new sea port developments have been undertaken for container shipping with deep water berths, extensive land in areas located away from the urban centre but near major road and railway arteries. A good example of such facilities is given by the Port Newark and Elizabeth Marine Terminal. On the Western shore of Newark Bay is the most intensively developed container terminal area in the world with almost 4 miles of berthing space, over 1,265 acres of container marshalling areas, 28 berths, and 24 container gantry cranes with a capacity range of 30 - 70 tonnes.

**ANNEX II: RELOCATION PROJECTS OF PORTS IN DEVELOPING
COUNTRIES OF ESCAP REGION**

INDIA

BOMBAY AND NHAVA SHEVA

Bombay is now the second city of India and a maritime, commercial, industrial and financial centre of national importance. It is the leading port of India for handling oil, general cargo and overseas passenger traffic and a main base for the Indian navy.

The present and future traffic of the port is as follows:

Bombay Traffic (in million tonnes)	1985-86	1989-90	1995-96	2000-01
Petroleum, oil and lubricants	15.6	19.0	22.0	25.0
Containerized cargo	2.0	2.2	2.4	3.0
General cargo	6.8	7.8	8.6	9.1
TOTAL	24.4	29.0	33.0	37.1

Source: The Port of Bombay = in retrospect and prospect, BPT

Bombay port has undertaken many rehabilitation and improvement works during recent years. With respect to containerized cargo, the port has implemented a specific plan including equipping Ballard Pier with gantry cranes, converting existing land in port areas into container freight stations (CFS) and constructing a Dock Expressway with fly-overs to segregate container traffic to enable smoother movement of containers between marine terminals and CFSs. Physical factors now act as the greatest constraint preventing the port from expanding its activities, despite a detailed land use plan which was undertaken to study how best to utilize the 1,800 acres of land the port owns.

In order cope with the future growth of the city, the Government has chosen the site of New Bombay on the mainland across Thana Creek. Simultaneously a new modern port has been envisaged at Nhava Sheva in the same area. The aim of this project was to duplicate Bombay's major functions, i.e. port facilities, business centre, industrial development and housing. The plan, which was formulated in the mid-1970s, is being slowly implemented. The Nhava Sheva Port Trust was constituted in 1982 for the new port. Construction has started with the present expected cost of Rs.800 crores (approx. \$US 500 million). The objective is to accommodate a bulk throughput of fertilizers of 3 to 4 million tonnes of cargo annually and 250,000 TEU per annum of containers. The financing of the project will be obtained from resources of the Bombay Port Trust and from bilateral and multi-lateral aid. The operation of the new facilities is scheduled to start by mid-1989.

Current BPT thinking for both bulk and container operations is to operate the new facilities with all the characteristics of a modern port: deep-draught access and berths, large port land areas, modern handling equipment, a more qualified and less numerous working force. The existing facilities provide employment for more than 40,000 people, while the new port will have a much reduced labour force.

After the commencement of operations at Nhava Sheva, the Bombay Port Trust is planning to look at rationalizing traffic at the currently congested old facilities. As over-occupancy and congestion are the major present day-to-day problems facing Bombay port operations, the only possible alternative use of present facilities being contemplated by port officials is the improvement of environmental conditions by the creation of parks and leisure areas in order to decongest both city and port.

MALAYSIA

PORT KELANG

Port Kelang is situated at the estuary of the Kelang River about 50 km west of Kuala Lumpur, the Federal capital of Malaysia. Initially the port functioned as a railway port terminal managed by the Malayan Railway Administration. The attraction of the site, apart from its convenience of access by rail, lay in the natural shelter provided by the offshore islands and in the fact that deep water existed close inshore due to its location on the outside of a sharp bend in a tidal waterway. Difficulties come however from the unfavourable foundation and siltation conditions. The first port facilities located in the South Port could only accommodate vessels of small draft. Although investigation and studies on a possible location of new port facilities at the North Kelang Straits site were undertaken during the 1920s, construction did not start until the 1960s.

The physical constraints in terms of land area and depth of water prevented any further port expansion at the South Port. Between 1960 and 1983, a total of 17 berths (about 3,700 m) were constructed at the North Port. The last berth constructed for handling dry bulk cargo represents the maximum limit of expansion of North Port as any further expansion northward is too expensive and restrictive in terms of land area, while southward expansion is not favourable because of insufficient depth of water.

Therefore, from 1977 a new planning process started in order to select a new site for future port expansion. The government approved the new site of Pulau Lumut in 1980. Due to the considerable investment involved and the impact of changing conditions, it was possible to postpone the project. These changing conditions can be listed as follows:

A governmental decision to privatize the Container Terminal. Most of the bidders claimed in their submission that they could increase the capacity of the Terminal without any new infrastructure.

Global economic recession in the early 1980s.

Improved productivity rates.

Port Kelang is a good example of efficient port planning in Asia. Although the port is located in a difficult site with mud and siltation, although the port is not the only one in the country (Penang and Johor are also important ports in Peninsular Malaysia), and although one of the most active ports of the world (Singapore) is located very close by, it was possible to adapt facilities and the management to modern maritime technologies with a limited amount of investment. The Port has experienced a complete range of port rehabilitation and relocation and from a coastal port has become an efficient and modern international middle-size port complex.

PAKISTAN

KARACHI AND PORT QASIM

The Port of Karachi lies in one of the finest natural harbours in the world. It has been developed under four successive periodic plans, from a capacity of one million tonnes per annum in 1947, to approximately 20 million tonnes today.

Traffic handled and forecasts for port traffic in Pakistan are shown below (in million tonnes).

Year	Grand Total	IMPORTS					EXPORTS				
		Total	Liquid	Dry bulk	Container	Others	Total	Liquid	Dry bulk	Container	Others
1983-1984	17.7	13.6	7.4	3.4	0.8	2.0	4.1	0.7	1.3	0.5	1.6
1985-1986	20.1	15.5	7.3	5	1.0	2.2	4.6	0.9	1.3	1.2	1.2
1992-1993	35.7	27.8	16.8	7.4	2.0	1.6	7.9	1.0	3.2	2.7	1.0
1999-2000	51.9	41.9	26.0	11.9	2.8	1.2	10.0	1.2	4.0	3.8	1.0

Source: Planning Division, Government of Pakistan

Container traffic is expected to more than double between 1988 and the year 2000.

A master plan has been prepared to demonstrate and provide guidelines for systematic development of the port in future years. This plan establishes that the west bay of the harbour has the capacity for developing another 100 shipping berths, with related supporting and infrastructure facilities. To accomplish this unhampered in the years to come, the port master plan is dovetailed with the super highway and the coastal highway, skirting and by-passing the city of Karachi, to eliminate problems of interference with urban traffic which is currently hampering access to the port area. Similarly, effective rail links have been provided with the railway system, with right of way reservations for compatible expansion. Such an approach enables the advantageous utilization of a \$US3 billion commercial infrastructure already developed for and

serving the port. Furthermore, the port can handle vessels of up to 75,000 dwt without additional dredging and it can cater for forecast needs for the next 20 years. Hydraulic studies which have been carried out have shown that the channel can be economically dredged for vessels of 150,000 dwt, but this need will not arise in the foreseeable future.

The present and fifth stage of development comprises:

- a) Construction of a modern marine oil products terminal;
- b) Construction of a twin-berth modern integrated container terminal (so far the port does not have a specialized terminal);
- c) Replacement of craft and equipment.

This will meet the forecast needs of the port till the end of this century.

There are some problems for a country like Pakistan in having only one port, even if the port is well dimensioned and has good potential for further development like the Port of Karachi. Questions of national security are given great importance. Pakistan started to explore the possibility of another port on the Arabian coast as far back as the 1960s. The opportunity of the effective implementation of a new port came in 1970 when it was decided to build a steel mill about 50 kilometres east of Karachi. The main philosophy behind this was that it would handle bulk cargo. The new port was closer to the Indian border but also closer to the Pakistan up-country hinterland by the existing land transport system and closer to the river system. The Port Qasim Authority was established in 1973 to take responsibility for the operation from planning to operation. The port, costing about 4.7 billion Rupees, started operation in 1980 with an iron ore and coal berth and seven multipurpose berths. Access was possible through a 45 km channel with only one difficult portion at the entrance which has to be continuously dredged.

The problems raised by the operation of the two ports are numerous. Firstly, two different authorities are managing the port operation with co-ordination by the Ministry of Communications which is responsible for both ports. The financial situations of Karachi and Port Qasim are different. Karachi is an old port which adapted continuously to the traffic conditions with an efficient management and is well integrated in the maritime professional world. It is making a profit. Port Qasim is still a newcomer. Its construction was financed by several foreign loans and its operation is costly due to its dredging requirements (about 2.5 million m³/year). It needs government support because its traffic is not sufficient.

Some improvement in Pakistan's existing facilities appears likely, especially in Port Qasim. There are plans to operate three of the multipurpose berths as a first container terminal, the second being implemented later on in Karachi, as indicated above.

These problems in the ports of Pakistan are rather typical of problems raised by rehabilitation and relocation of ports. They can be summarized as follows:

Allocation of traffic

Tariffs. Until recently, they were higher in Port Qasim in order to pay the loan interests.

Institutional problems (2 authorities co-ordinated by the Ministry)

Duplication of functions (statistics, hydrography, dredging ...)

Information of users

In order to optimize the use of existing structures, co-ordination between the two institutions and the Ministry concerned should take place regularly. Both ports should act as complementary organizations as they are both basic elements in the country's economy.

THAILAND

BANGKOK AND LAEM CHABANG

The Port Authority of Thailand was established in 1951, consisting of 1,660 metres wharf with limitation in draught of 27 feet and a ship length of 565 feet.

Bangkok's port facilities comprise public facilities, but also private wharves located along the river between the Gulf of Thailand and Bangkok which represents a distance of about 45 kms. A large majority of exported cargoes (around 15 million tons) is handled by the private facilities. A great proportion of imported cargoes is handled at the public berths. It must be mentioned that a temporary commercial deep water port exists at 184 kms from Bangkok at Sattahip with small traffic. From more than 600,000 TEUs in 1987, the container traffic is conservatively expected to reach 1.5 million TEUs before the year 2000.

Bangkok is an example of a river port close to saturation. No more space exists for further development at the present site and cargo has to cross the highly congested city. Therefore, having considered several new sites and ordered several studies, the government has decided to start construction of a new deep sea port at Laem Chabang at 125 km from Bangkok. There are no space or draught problems at Laem Chabang and there are good rail and road connections but, as observed elsewhere in similar areas, the new port has not yet been completely accepted by port users and the shipping professions who fear that the extra costs of construction and operation of the new facilities will not be counterbalanced by the advantages expected. The first berth of the new port should start operation by the end of 1990.

How the traffic will be divided between Bangkok and Laem Chabang and how the existing facilities, which are not very old (about 30 years) will be used are still open questions. The fact that a great part of the present and future port traffic is and will continue

to be handled through private facilities is minimizing the problem. Current thinking is that the domestic port traffic will be concentrated in Bangkok, which is the largest industrial, commercial and consuming area in the country (population of the Bangkok area is around 6 million, the second city has only about 150,000 inhabitants). Laem Chabang will be developed mainly for international traffic. So far there is no intention of converting existing port facilities for other uses to provide higher revenues to the port in order to lower the cost of the Laem Chabang project. Although the price of land in the city is very high, it is believed that the existing port area will not be used for anything else than port functions within the coming years. The efficiency of container operations at existing facilities could be improved by using inland container terminals in the Bangkok area.

In conclusion, the only suggestion that could be made is that some formal consultations take place which gather city planners, shipping and port-related companies, and private investors under the guidance of government agencies concerned with the Port Authority of Thailand, in order to define the best use of the existing public port facilities when Laem Chabang comes into effective operation. Port operations will still take place at both locations and at private wharves for many years. The fact that PAT has the authority over all Bangkok port facilities should facilitate the question of co-ordination and planning of the future sites.

ANNEX III : QUESTIONNAIRE

1. How do you use your old port facilities and the corresponding redundant areas?

	Yes	No
a. Light industry	<input type="checkbox"/>	<input type="checkbox"/>
b. Office buildings	<input type="checkbox"/>	<input type="checkbox"/>
c. Hotel	<input type="checkbox"/>	<input type="checkbox"/>
d. Marinas	<input type="checkbox"/>	<input type="checkbox"/>
e. Apartment buildings	<input type="checkbox"/>	<input type="checkbox"/>
f. Museums	<input type="checkbox"/>	<input type="checkbox"/>
g. Department stores	<input type="checkbox"/>	<input type="checkbox"/>
h. Recreation centres	<input type="checkbox"/>	<input type="checkbox"/>
i. Other (please describe)	<input type="checkbox"/>	<input type="checkbox"/>

2. Can you briefly describe the characteristics of the corresponding facilities (former port use, area, berthing length, draft) in comparison with the total port.

3. Can you briefly describe the method you adopted to convert these redundant facilities:

. Sale to : City: _____

Private sector: _____

Other: _____

. Rent/lease to: _____

. Operation by Port Authority: _____

4. Do you still operate port facilities in other locations?

Yes No

5. If yes, do you plan further rationalization of your port facilities at a unique location? Please elaborate briefly.

6. Can you briefly describe the problems encountered in the case of your port concerning rehabilitation and relocation particularly relating to long-term investment policy, labour dislocation.

7. What has been the impact of your decision to utilize redundant facilities for other uses on port revenue, efficiency, and image? If possible indicate revenues generated by the selling or renting of old facilities.

