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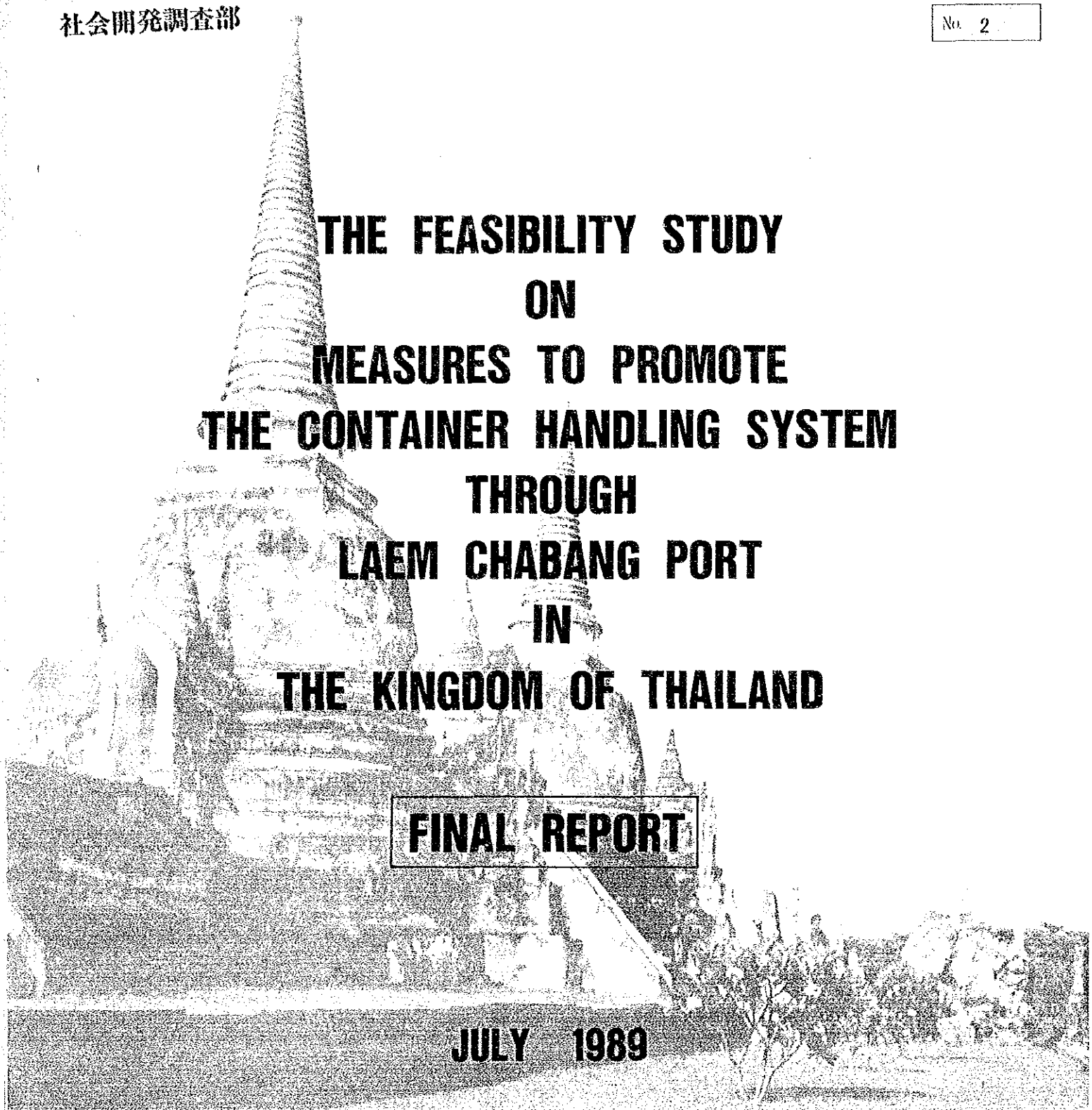


THE FEASIBILITY STUDY ON MEASURES TO PROMOTE THE CONTAINER HANDLING SYSTEM THROUGH LAEM CHABANG PORT IN THE KINGDOM OF THAILAND

FINAL REPORT

JULY 1989

JAPAN INTERNATIONAL COOPERATION AGENCY

THE FEASIBILITY STUDY
ON
MEASURES TO PROMOTE
THE CONTAINER HANDLING SYSTEM
THROUGH
LAEM CHABANG PORT
IN
THE KINGDOM OF THAILAND

FINAL REPORT

JULY 1989

PREFACE

In response to a request from the Government of the Kingdom of Thailand, the Japanese Government decided to conduct a feasibility study on Measures to Promote Container Handling System through the Laem Chabang Port and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Thailand a survey team headed by Mr. Keiichi Miyota, composed of members from the Overseas Coastal Area Development Institute of Japan and Pacific Consultant International Co., Ltd. on three occasions : during the period from April 1988 to October 1988, in January 1989 and again in March 1989.

The team held discussions with concerned officials of the Government of the Kingdom of Thailand, and conducted field surveys. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincerest appreciation to the officials concerned of the Government of the Kingdom of Thailand for their close cooperation extended to the team.

July, 1989

Kensuke Yanagiya

President

Japan International Cooperation Agency

LETTER OF TRANSMITTAL

July 1989

Mr. Kensuke Yanagiya
President
Japan International Cooperation Agency

Dear Mr. Yanagiya:

It is my great pleasure to submit herewith a report for the Feasibility Study on Measures to Promote the Container Handling System through Laem Chabang Port in the Kingdom of Thailand.

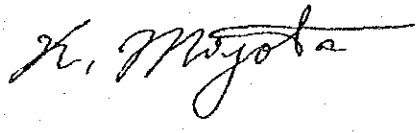
This report is the result of studies carried out by the Overseas Coastal Area Development Institute of Japan (OCDI) and Pacific Consultants International (PCI) at the request of the Japan International Cooperation Agency (JICA). The study team conducted the first field survey from April to July 1988 to collect a variety of data. The survey was followed by three other field surveys.

This findings of these surveys were discussed to formulate an efficient container transport system for Laem Chabang Port and to study the feasibility of the project, and were then compiled into this report. The study shows that the formulation of an effective management and operation system at Laem Chabang Port and the construction of the Inland Container Depot (ICD) are extremely important for the national economy of Thailand and the implementation of the ICD project is feasible both economically and financially. We, therefore, earnestly hope that measures will be taken to implement this project as soon as possible.

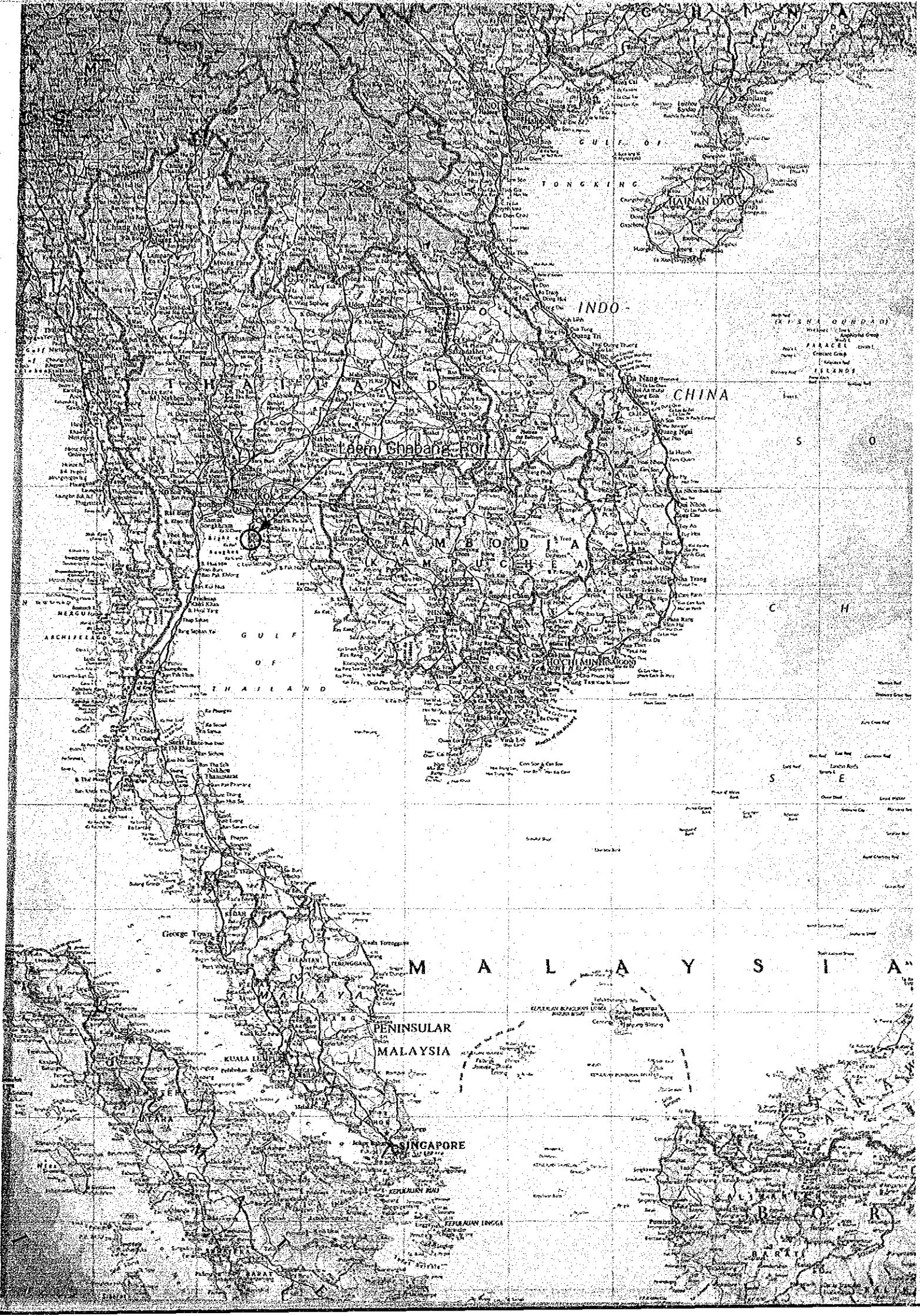
On behalf of the study team, let me express my heartfelt thanks to the Government of the Kingdom of Thailand and to the various organizations concerned with the Study for the generous cooperation, assistance and warm hospitality which were extended to the study team during their stay in Thailand.

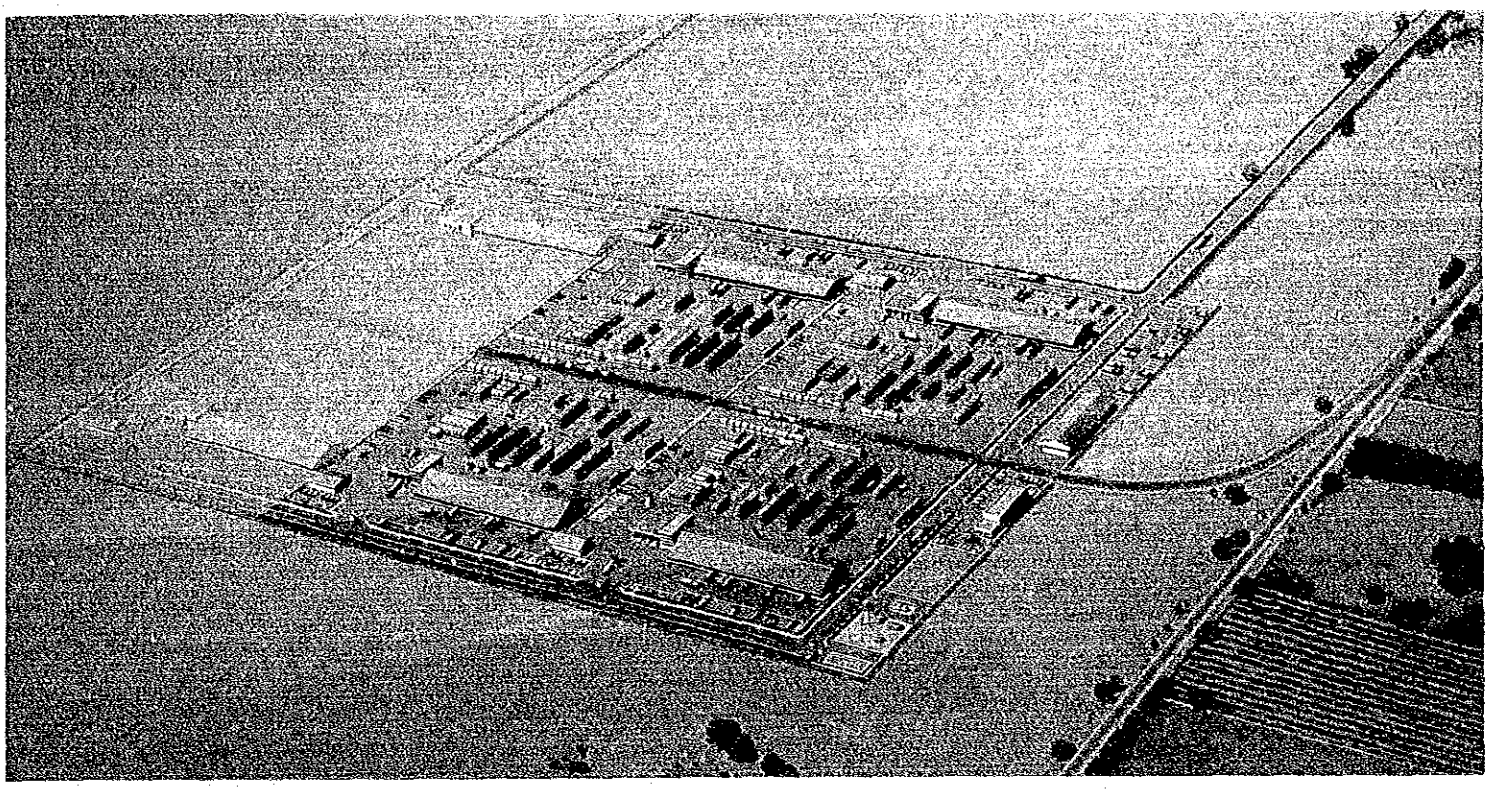
Our thanks are also due to the Japan International Cooperation Agency, the Ministry of Foreign Affairs, the Ministry of Transport and the Japanese Embassy in Thailand for their valuable advice and support during the field survey and the preparation of this report.

Yours Faithfully,



Keiichi Miyota
Head
Japanese Study Team for the Feasibility Study on Measures to Promote the Container Handling System through Laem Chabang Port in the Kingdom of Thailand
(Senior Adviser, the Overseas Coastal Area Development Institute of Japan)


THAILAND
Laem Chabang Port
BANGKOK
CAMBODIA
KAMPUCHEA
GULF OF THAILAND
GULF OF TONGKING
HAINAN DAO
INDO-CHINA
Da Nang
Quang Ngai
HO CHI MINH CITY
George Town
MALAYSIA
PENINSULAR MALAYSIA
KUALA LUMPUR
SINGAPORE
SUMATERA
KEPULAUAN RIAU
KEPULAUAN RIAU
KEPULAUAN LINGGA
BARAT
BORNEO



Foreign Exchange Rate

US$ 1 = 25.6 Baht = ¥ 133

(As of August, 1988)

ABBREVIATIONS

A/N	Arrival Notice
BEA	Bangkok Metropolitan Electricity Authority
BKK	Bangkok
B/L	Bill of Lading
BMA	Bangkok Metropolitan Area
B/N	Boat Note
BOI	The Board of Investment
CFS	Container Freight Station
CIF	Cost, Insurance and Freight
CLP	Container Load Plan
CY	Container Yard
DBT	Declaration of Bonded Transportation
D/O	Delivery Order
D/R	Dock Reciept
E/D	Export Declaration
EDO	Equipment Despatch Order
E/E	Export Entry
EIRR	Economic Internal Rate of Return
EPMOS	Study on the Effective Port Management and Operation System in the Kingdom of Thailand, JICA
E/R	Equipment Receipt
ETO	The Express Transport Organization of Thailand
FCL	Full Container Load
FIRR	Financial Internal Rate of Return
FOB	Free on Board
GDP	Gross Domestic Product
GNP	Gross National Product
HD	The Harbour Department of the Ministry of Transport and Communications
ICD	Inland Container Depot
I/D	Import Declaration
I.E.	Industrial Estate
I/E	Import Entry
IEAT	The Industrial Estate Authority of Thailand

JICA	The Japan International Cooperation Agency
LCB	Laem Chabang
LCL	Less than Container Load
M/F	Manifest
MOAC	The Ministry of Agriculture & Co-operations
MOTC	The Ministry of Transport and Communications
MSL	Mean Sea Level
NESDB	The National Economic and Social Development Board
NRT	Net Registered Tonnage
O/D	Origin and Destination
OECF	The Overseas Economic Cooperation Fund
PAT	The Port Authority of Thailand
P.M.B.	The Port Management Body of Laem Chabang Port
SRT	The State Railway of Thailand
TEU	Twenty-foot Equivalent Unit
TOT	The Telephone Organization of Thailand

CONTENTS

PART II MANAGEMENT AND OPERATION

PART III INLAND CONTAINER DEPOT PLAN

CONCLUSION AND RECOMMENDATIONS

CONCLUSION

1. Necessity of a New Management and Operation System

(1) New Management System

When we consider the management and operation of Laem Chabang Port, we should clearly distinguish between port management and port operation.

As for port management, we basically hope to establish a new Port Management Body (P.M.B.) as a public sector entity. But whatever the decision will be, the importance of separate management from Klong Toei should be recognized and given top priority.

To make up for the lack of management expertise in Thailand, it will probably be necessary to employ foreign experts, in particular during the early stage of operation.

(2) New Operation System

As for the terminal operation, the most important factor is the introduction of competition in the terminal operation market. This may result in higher efficiency than under relatively monopolistic conditions. Therefore, we recommend one operator for each terminal. Thus the terminals should be separately leased out to the private sector. And the most appropriate candidates for terminal operators are shipping companies. Direct operation by the P.M.B. workers should be avoided.

(3) ICD Management and Operation

It is desirable that both the marine terminals and the ICDs be owned and managed by the P.M.B. and leased out to terminal operators on a unified basis. Thus the operation of the ICDs should be carried out by integrated operators who also operate the marine terminals and inland transportation.

(4) New Port Management Body

It is important to maximize the efficiency and productivity of the administration and management of the P.M.B. by minimizing the cost. For this purpose, the organization of the P.M.B. should be as simple as possible and the staff members of the P.M.B. should be appointed based on the principle of the able minority. The proposed number of officers is 70.

2. Necessity of the Lat Krabang ICD

Laem Chabang Port is located about 130kms southeast of Bangkok, which is the main center of economic activities in Thailand. If there were no ICD around the Bangkok area, the shippers/consignees with LCL cargoes and those whose plants can not accommodate stuffing/unstuffing works would have to bring and pick up their cargoes to and from Laem Chabang Port CFS under their own arrangement and pay for the inland transportation to and from the port.

The basic function of the ICD for Laem Chabang Port must be as a stuffing and unstuffing station in which customs clearance is conducted to complete all procedures by shippers/consignees. This is the same basic function as at other ICDs throughout the would. After the ICD begins operations, various social benefits can be expected in addition to the benefits to consignees/shippers, such as an increase in the container handling capacity at the marine terminal and a decrease in the total traffic volume on the roads between the Bangkok area and Laem Chabang Port.

It is necessary to construct the ICD at the Lat Krabang Area considering the locations of Laem Chabang Port and of the major origins/destinations of the container cargo through the ICD, the transportation network, traffic conditions and the land use. And the ICD and Laem Chabang Port should begin operations simultaneously.

3. Container Cargo in the Future

The target year of this study is 1996 as a first stage, and 2001 as a final stage.

The future container cargo volume is estimated based on the cargo volume by commodity and the containerized ratio of each commodity. The Study Team estimates that the future container cargo volume in Thailand will be 10.6 million tons in 1991, 15.5 million tons in 1996 and 19.8 million tons in 2001, which is equivalent to 1.09 million TEUs, 1.49 million TEUs and 1.82 million TEUs in each year. Of the above volume, the cargo which would be handled at the ports in the Bangkok Zone would be 0.99 million TEUs, 1.36 million TEUs and 1.67 million TEUs in each corresponding year.

According to the Origin/Destination (O/D) survey, the share of the

exported cargo from BMA will decrease in the future, but the major destination of imported cargo will still be BMA in the future.

The container cargo volume through Laem Chabang Port is estimated at 6.8 million tons in 1996 and 10.6 million tons in 2001 and in terms of TEUs, 638 thousand TEUs and 953 thousand TEUs, respectively. Of the above volume, the container cargo through the ICD is estimated at 1.3 million tons in 1996 and 2.1 million tons in 2001, and more than 80% of this cargo would move to or from BMA.

4. Master Plan

The master plan is formulated with a target year of 2001. In order to secure efficient port operations, ICDs corresponding to each marine terminal at Laem Chabang Port will be located at the Lat Krabang ICD. From the cargo forecast and the container handling capacity per berth with the ICD, the required number of berths and ICDs will be 6 under the master plan in 2001. The ICDs should be connected to the Eastern Line of SRT with a spur line and to the existing and future road networks to secure effective container transportation between the ICD and Laem Chabang Port. The branch offices of the P.M.B., the Customs, SRT and other related agencies should be set in a main office building to operate the ICD effectively.

The total required land area is about 300 rai (48ha) for the master plan with 6 ICDs of 36 rai each and the construction cost is estimated at about 1,215 million baht (in August 1988 prices).

5. The First Stage Plan

The first stage plan is aimed at the year 1996, and covers the urgent development plan of the ICD. The first stage plan includes 4 ICDs and common facilities such as the spur line of the railway and the main office building. The required land area is about 200 rai (32ha), and the construction cost is estimated at about 831 million baht. About 256 million baht, approximately 30%, will come from foreign loans. The construction should be finished by the middle of 1991 when Laem Chabang Port begins full operations.

6. Economic and Financial Analysis of the First Stage Plan of the Lat Krabang ICD

(1) Economic Analysis

The First Stage Plan is evaluated using the Economic Internal Rate of Return (EIRR) which is calculated based on cost-benefit analysis from the viewpoint of the national economy. Benefits considered are the savings in land transportation costs and Customs procedures costs while costs are the construction, maintenance and administration and operation costs. The internal rate of return, using 31 years as the period of economic calculation, is 17.0%.

This shows that the First Stage Plan is feasible from the viewpoint of the national economy.

(2) Financial Analysis

The new P.M.B. maintains its financial viability throughout the entire project life including the construction period. It will be able to pay all expenditures and have some surplus even after appropriating funds for the repayment of foreign loans including interest.

As for the profitability of the project itself, the FIRR is estimated to be 6.5%, which exceeds the weighted average interest rate of capital (5.7%) during the project life.

And the financial soundness of the terminal operators will also be maintained during the lease period of the marine terminals and ICDs while maintaining the handling charges at a competitive level with Bangkok Port.

(3) Evaluation

Judging from the above, we conclude that the First Stage Plan with the target year of 1996 is feasible both economically and financially.

RECOMMENDATIONS

The container cargo volume in Thailand has increased rapidly in the recent past, and this increase is expected to continue. But the existing port, Bangkok Port, has become congested because of the lack of container handling capacity, and the operation of Laem Chabang Port is expected to solve the above problem. The ICD is expected to carry out an important role for the use of Laem Chabang Port.

The recommendations below concern various matters we noticed while conducting this survey and drafting the plans.

1) The ICD project should be implemented as soon as possible because the implementation schedule is very tight to cope with the scheduled commencement of operations at Laem Chabang Port.

2) The port management body (P.M.B.) should be a public sector organization because the port exclusively occupies waterfront areas which are regarded as public assets by nature, and the port is an indispensable infrastructure for the community. Services offered using port facilities should be available to all parties on a free and equal basis.

3) Operations at the marine terminals and ICDs should be privatized under lease contracts with the P.M.B. because private firms are superior to the public sector in terms of business efficiency in general. A monopoly should be strictly avoided. In other words, competition should be introduced in the terminal operation.

4) The planned highway network connecting the Bangkok area and Laem Chabang should be constructed as soon as possible and the existing roads connecting Bangkok and Laem Chabang should also be improved. As traffic volume on Route 34, which is almost the only existing route connecting the Bangkok area and Laem Chabang, has increased up to almost its full capacity, the traffic congestion is expected to be severe in the future, and the congestion will grow worse along with the progress of the Eastern Seaboard Development Program.

5) The Thai Government should stipulate a land use plan for the area around the ICD. This would stimulate the development of various industries to support effective container handling, including export processing industries, manufacturing of container vans, warehouses, distribution of imported goods, wholesale markets, and trucking carrier services. To avoid uncontrolled sprawl, it is preferable that the public sector acquires the land and leases (or sells) it to users following an appropriate land use plan.

6) Bonded transport between the ICD and Laem Chabang Port should be allowed by the Customs Department for both exported and imported cargoes. Bonded transport for both imported and exported cargoes is absolutely necessary to realize the full merits of container transport using the ICD. Such bonded transport is commonly adopted at other ICDs throughout the world.

7) Songkhla and Phuket deep seaports should be used effectively. The two ports were recently constructed with sufficient facilities for large vessels, but they are not yet being operated fully. There are sufficient cargoes for containerization, such as raw rubber, in the hinterland of these ports. So effective usage of these ports will greatly contribute to reducing the congestion at Bangkok Port and will also contribute to the economic and social development of this region.

8) A review of the present development plan for Laem Chabang Port should be carried out on the basis of the ICD plan.

INTRODUCTION

INTRODUCTION

1. Background

The Royal Thai Government (hereinafter referred to as "the RTG") is aggressively proceeding with the implementation of the Eastern Seaboard Development Program which is expected to contribute significantly to the economic growth of the country; encouraging industrialization of the district and decentralization of industry and population away from the Bangkok metropolitan area.

Laem Chabang Port is an integral part of the Eastern Seaboard Development Program. The Port will support and promote the industrial activities of this area through offering economical international transportation. At the same time, due to the physical restrictions at Bangkok Port, Laem Chabang Port is also expected to serve as a gateway for international standard container vessels.

At present, container cargoes are handled mostly at Klong Toei Wharves in Bangkok Port. The volume of container cargoes has increased sharply in recent years because of the growth of trade with foreign countries and the wide development of containerization for many commodities.

From the national economic viewpoint, it is crucial to minimize the total transportation costs as a whole. In this sense, an appropriate container transportation system can play an important role in Thailand as in many other countries.

Even though development of new General Industrial Estates/Parks are planned outside of Bangkok, Bangkok will remain the leading international trade center and center for containerized cargo. Therefore, it is very important to ensure smooth connections between Laem Chabang Port and Bangkok as well as efficient terminal operation at Laem Chabang Port.

2. Objective of the Study

The objective of the study is to formulate an efficient container transport system for Laem Chabang Port including recommendations on an appropriate container transportation system between Bangkok and Laem Chabang Port focusing especially on formulation of a layout plan of the

Inland Container Depot and recommendations for an efficient management and operation system.

3. Circumstances

The Government of the Kingdom of Thailand requested the Government of Japan to carry out a feasibility study on measures to promote the container handling system through Laem Chabang Port. In response to the request, the Government of Japan decided to undertake the study and dispatched the Japanese Preliminary Study Team headed by Mr. Tadahiko Yagyu to the Kingdom of Thailand from 1 December to 11 December 1987.

The team had a series of discussions about the project with the authorities of the Government of Thailand. The Scope of Work for the Study was agreed upon on 8 December 1987 by Mr. Tadahiko Yagyu, Leader of the Japanese Preliminary Study Team, and Dr. Savit Bhotiwihok, Director of the Office of the Eastern Seaboard Development Committee.

Based on the Scope of Work, JICA organized a study team headed by Mr. Keiichi Miyota, Executive Director, OCDI. The study team executed the study including four field surveys from April of 1988 to March of 1989.

4. Scope of the Study

In order to achieve the objectives, the study tasks include the following items.

1) Review of Related Reports, Information and Data
2) Future Demand Forecast
3) Formulation of an Inland Container Depot (ICD) Plan
4) Formulation of a Management and Operation System
5) Evaluation of the ICD Plan and Preparation of an Implementation Schedule

5. Study Schedule

The study was conducted as follows.

1) Preparation in Japan	: Mar. - Apr. 1988
2) First Field Survey and Presentation of Inception Report	: Apr. - Jul. 1988
3) Second Field Survey and Presentation of Interim Report-I	: Jul. - Oct. 1988
4) Third Field Survey and Presentation of Interim Report-II	: Jan. 1989
5) Fourth Field Survey and Presentation of Draft Final Report	: Mar. 1989
6) Submission of Final Report	: Jul. 1989

6. Organization of the Study Team

The study team is comprised of twelve experts from OCDI and PCI, and a JICA representative. Their names and responsibilities are as follows.

Mr. Keiich Miyota	Overall Management	(OCDI)
Mr. Yutaka Sunohara	Port & Facility Planning	(OCDI)
Mr. Seiichi Kuroda	Facility Planning for Access	(OCDI)
Mr. Tetsuji Hashimoto	Demand Forecast, Economic Analysis	(OCDI)
Mr. Iwao Toyoda	Financial Analysis	(OCDI)
Mr. Hiroshi Fuseya	Port Management and Operation (I)	(OCDI)
Mr. Hideaki Mine	Port Management and Operation (II)	(OCDI)
Mr. Yukito Kida	Shipping	(OCDI)
Mr. Ryuji Sakaguchi	Structural Design	(PCI)
Mr. Toshiaki Kudo	Computer System Design	(PCI)
Mr. Shozo Kawasaki	Construction Planning, Cost Estimation	(PCI)
Mr. Osamu Nogoshi	Natural Conditions	(PCI)
Mr. Yuuichi Sasaoka	Coordinator	(JICA)

7. Members of the Steering Committee and Counterpart Personnel

The members of the steering committee and the Thai counterpart personnel are listed below.

(1) Steering Committee Members

Dr. Savit	Bhotiwihok	Director, Office of the Eastern Seaboard Development Committee (OESB)
Mr. Pathai	Metharom	Deputy Director, Office of the Eastern Seaboard Development Committee (OESB)
Mr. Prasert	Kmonwatananisa	Policy & Planning Analyst, National Economic and Social Development Board (NESDB)
Mr. Kamrob	Warachat	Director of Planning Division, Ministry of Transport Communications (MOTC)
Ms. Krishnee	Varanusupakul	Director of Economic Division, Ministry of Transport Communications (MOTC)
Mr. Pyoongkich	Chivamit	Deputy Director General, Port Authority of Thailand (PAT)
Mr. Ihhipol	Sucaromn	Marketing Manager, State Railway of Thailand (SRT)
Mr. Sanong	Jotikasthira	Chief Engineer, State Railway of Thailand (SRT)
Mr. Prakob	Tantiyapong	Director of Vehicle & Cargo Division, Customs Department
Mr. Bancha	Vadhanasindhu	Civil Engineer, Department of Highways (DOH)
Mr. J.T. Schmidt		Bangkok Shipowners and Agents Association (BSAA)
Mr. Nivat	Changariyavong	Bangkok Shipowners and Agnets Association (BSAA)
Mr. Mana	Patram	Bangkok Shipowners and Agents Association (BSAA)

(2) Counterpart Members

Mr. Kriangkrai Boonyayothin	Senior Policy & Planning Analyst, Office of the Eastern Seaboard Development Committee (OESB)
Ms. Kanchana Ubolcholket	Deputy Director of Technical Department, Port Authority of Thailand (PAT)
Mr. Surajit Retyim	Director of Project & Planning Division, Techinical Department, Port Authority of Thailand (PAT)
Ms. Rapeepan Kongdis	Chief of Project Analysis Section, Project & Planning Division, Technical Department, Port Authority of Thailand (PAT)
Mr. Chalermkeat Salakham	Chief of Project Analysis Section, Project & Planning Division, Technical Department, Port Authority of Thailand (PAT)
Mr. Voravuth Mala	Chief of Container Cargo Section, State Railway of Thailand (SRT)
Mr. Preecha Chavalittumrong	Director of Personnel Division, Customs Department
Ms. Jitjumnong Changpet	Valuation Division, Customs Department
Mr. Vanich Prachasri	Director of Policy Planning & Project Development Department, Express Transportaion Orgainization of Thailand (ETO)

PART I CONTAINER TRANSPORTATION IN THAILAND

CHAPTER 1 PRESENT SITUATION OF PORTS

1.1 Present Situation of Existing Ports

1.1.1 Present Situation of Shipping

(1) Shipping Service Network

1. Liner service on the major trading routes is rapidly being containerized using larger size ships. Although the smallest size container ship in 1987 is 736 TEU and the largest one is 3,147 TEU, currently the average size of container ships serving Far East/North America and Far East/Europe routes is 2,500 TEU to 3,000 TEU. However, still larger container ships will probably serve these routes in the future. The number of calling ports will decrease while other ports will be served by feeder ships.

2. Therefore, competition among container ports will become stronger and only those ports which can provide well-equipped facilities at low cost and quick dispatch through effective operations and also provide a sufficient volume of cargo will be able to survive as the main ports of call.

3. To cope with the larger size container ships, deeper facilities are being constructed in Thailand's neighboring countries as well as in Europe and the United States. However in Thailand, container berths at Bangkok Port are not sufficiently deep and the shallow channel to Klong Toei Wharves limits the navigation of larger size container ships. This is one of the reasons why Thai container shipping is limited to feeder routes except for the line between Bangkok and Japan.

4. Thailand is less favored in this respect considering the deviation from long distance main routes, at least while the cargo volume is insufficient. On the other hand, there is a good possibility for the continued direct call of container ships on relatively short distance routes such as the Thailand/Japan route.

5. Table I.1.1 shows the number of vessel calls at Klong Toei Wharves in 10 recent years. The number of container vessels increased from 184

vessels in 1977 to 924 vessels in 1987. In 1987, about 75% of the total container vessels are from Singapore, 15% from Hong Kong or Kaohsiung and 10% from Japan. The Singapore trade route includes feeder containers to/from Europe, the Middle East, etc. The Hong Kong and Kaohsiung trade route includes feeder cargoes to/from the U.S.A. and a substantial number of Hong Kong and Kaohsiung transhipped containers to/from Japan, reflecting the limited supply of container space by the direct service between Japan and Thailand.

Table I.1.1 Number of Vessel Calls at Klong Toei Wharves (1977-1987)

Year	In Ballast	Conventional	Combo	Container	Total
1977	9	1,044	346	184	1,583
1978	130	868	527	316	1,841
1979	117	708	581	358	1,764
1980	97	571	577	453	1,698
1981	88	560	576	495	1,717
1982	143	540	452	602	1,737
1983	102	668	469	588	1,827
1984	65	610	453	635	1,763
1985	72	538	410	758	1,778
1986	50	500	348	853	1,751
1987	46	499	396	924	1,865

Source: Technical Department, PAT

(2) Foreign Trade Cargo

6. Thailand has four major ports which are under the control of MOTC: Bangkok, Sattahip, Songkhla and Phuket. Most of the foreign trade passes through these ports.

7. Table I.1.2 and Table I.1.3 show the export and import cargo volume of Thailand in 10 recent years. Total exports increased steadily from 15 million tons in 1978 to 23 million tons in 1987, but total imports fluctuated between 15 million tons and 23 million tons during the period from 1978 through 1987.

Table I.1.2 Export Cargo Volume of Thailand (1978 - 1987)

(Unit: 1,000 tons, %)

Commodity	1978		1979		1980		1981		1982		1983		1984		1985		1986		1987	
Agricultural Products																				
1. Rice	1607	11	2816	20	2802	19	3030	18	3784	17	3476	20	4618	22	4067	18	4525	19	4443	19
2. Maize	1949	13	1988	14	2175	15	2557	15	2801	13	2630	15	3117	15	2757	12	3982	16	1628	7
3. Tapioca	6291	44	3960	28	5215	36	6277	36	7833	36	5195	28	6563	30	7127	32	6316	27	6205	25
4. Sugar	1041	7	1191	8	452	3	1117	6	2207	10	1537	9	1243	6	1859	8	1962	8	2027	9
5. Molasses	742	5	533	4	246	2	435	3	927	4	727	4	775	4	897	4	831	3	483	2
6. Raw Rubber	444	3	523	4	457	3	474	3	546	2	557	3	594	3	695	3	764	3	890	4
7. Others	782	5	802	6	729	5	826	5	998	5	856	5	872	4	1118	5	943	4	848	4
Sub-Total	12856	88	11813	84	12076	83	14716	86	19096	87	14978	84	17782	84	18520	82	19323	80	16524	70
8. Wood Products	67	0	45	0	47	0	67	0	76	0	104	1	69	0	69	0	66	0	163	1
9. Marine Products	108	1	118	1	107	1	131	1	134	1	129	1	157	1	190	1	236	1	263	1
10.Mining Products	602	4	768	5	858	6	913	5	1005	5	1065	6	1459	7	1871	8	2262	9	3449	15
11.Industrial Products	1042	7	1429	10	1391	10	1413	8	1551	7	1498	8	1774	8	2029	9	2461	10	3049	13
Grand Total	14675	100	14173	100	14479	100	17240	100	21862	100	17774	100	21241	100	22679	100	24348	100	23448	100

Source: Customs Department, MOTC Statistics

Table I.1.3 Import Cargo Volume of Thailand (1978 - 1987)

(Unit: 1,000 tons, %)

	1978		1979		1980		1981		1982		1983		1984		1985		1986		1987	
1. Fuel Oil	11380	65	11175	56	11818	63	10831	63	9619	61	10384	51	11093	58	9415	52	9569	50	11658	51
2. Iron & Steel	2044	12	3106	15	1735	9	1893	11	1940	12	2732	14	2181	11	2744	15	3135	17	3558	16
3. Chemical Products	767	4	1011	5	811	4	945	5	849	5	1198	6	1115	6	1340	7	1593	8	2038	9
4. Wood Products	370	2	735	4	312	2	415	2	359	2	461	2	428	2	1032	6	236	1	518	2
5. Pulp and Paper	330	2	434	2	372	2	414	2	349	2	427	2	359	2	428	2	396	2	566	2
6. Fertilizer	757	4	861	4	695	4	771	4	920	6	1465	7	1246	7	1185	7	1318	7	1312	6
7. Industrial Materials	127	1	205	1	149	1	167	1	138	1	211	1	628	3	375	2	517	3	600	3
8. Others	1650	9	2559	13	2734	15	1752	10	1725	11	3305	16	2010	11	1709	9	2216	12	2505	11
Grand Total	17425	99	20086	100	18626	100	17188	98	15899	100	20183	99	19060	100	18228	100	18980	100	22755	100

Source: Customs Department, MOTC Statistics

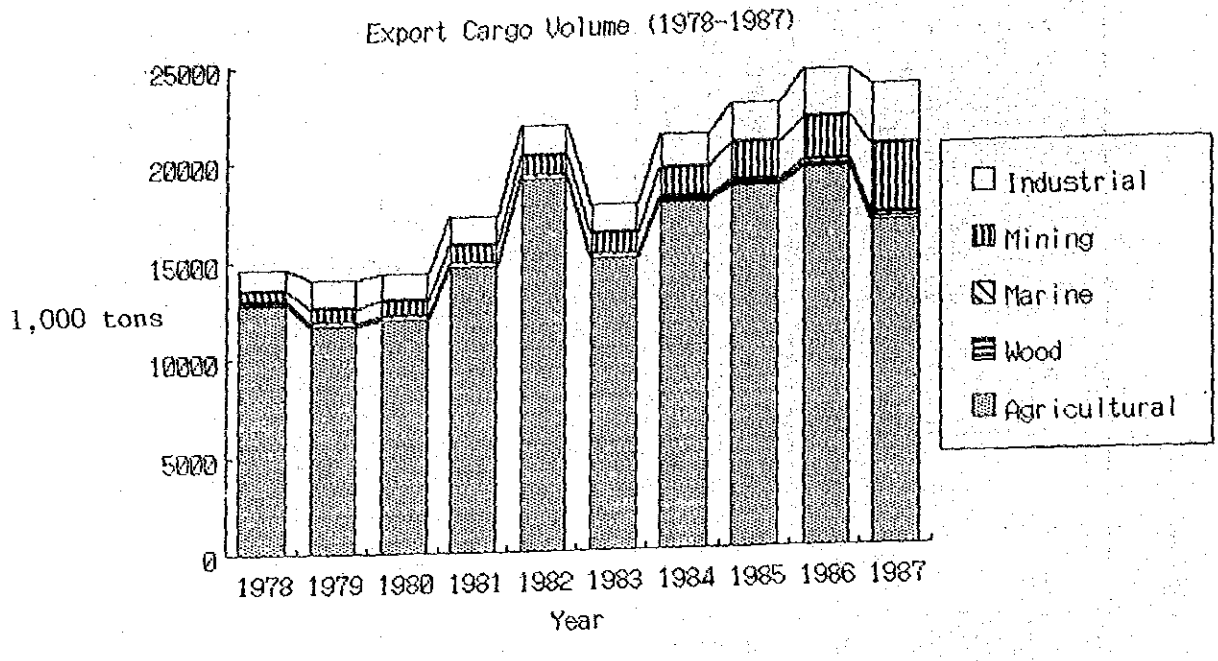


Fig. I.1.1 Export Cargo Volume of Thailand (1978 - 1987)

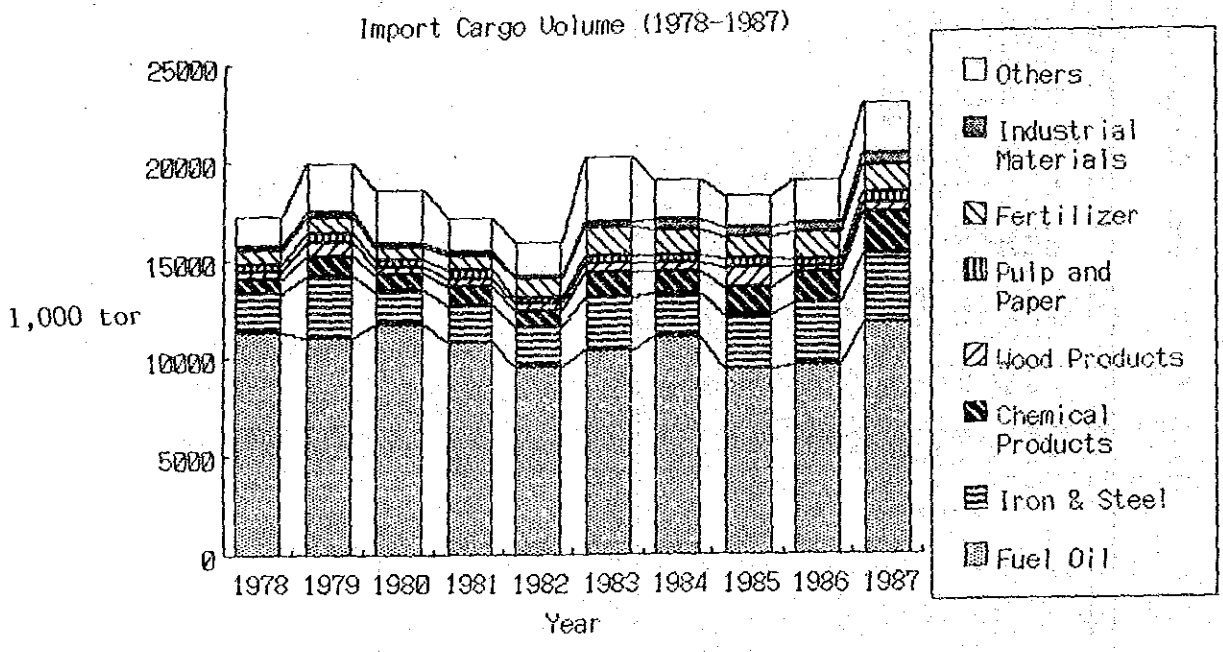


Fig. I.1.2 Import Cargo Volume of Thailand (1978 - 1987)

8. As for exports, agricultural products such as tapioca, rice, maize and sugar amount to 16.5 million tons in 1987 which is 70% of total exports. The exports of agricultural products depend on world market prices and climate, so the volume fluctuates. In recent years, however, the share of agricultural products is decreasing due to the increase of the export volume of mining and industrial products. The share of mining products increased from 4% in 1978 to 15% in 1987 and the share of industrial products increased from 7% to 13%.

9. As for imports into Thailand, fuel oil is the major commodity amounting to 11.7 million tons in 1987 followed by iron & steel (3.6 million tons) and chemical products (2.0 million tons). These three commodities comprise 76% of total imports. The share of fuel oil, however, is decreasing due to the operation of a natural gas project (1983).

10. Table I.1.4 shows export and import cargo volume by major country. The major destinations for exports are the Netherlands (21%), Japan (15%), Malaysia (7%), China (6%) and the U.S.A. (5%) and the major origins for imports are Singapore (15%), Malaysia (12%), Japan (12%) and Brunei (7%).

Table I.1.4 Export / Import Cargo Volume by Major Country (1987)

Unit: 1,000 tons

Export		Import	
No. Country	Weight	No. Country	Weight
1. Netherlands	4,807 (21%)	1. Singapore	3,483 (15%)
2. Japan	3,394 (15%)	2. Malaysia	2,725 (12%)
3. Malaysia	1,655 (7%)	3. Japan	2,650 (12%)
4. China	1,487 (6%)	4. Brunei	1,643 (7%)
5. U.S.A.	1,228 (5%)	5. Kuwait	1,047 (5%)
6. Taiwan	1,023 (4%)	6. U.A.Emirates	1,038 (5%)
7. Singapore	969 (4%)	7. China	997 (4%)
8. Korea	804 (3%)	8. U.S.A.	880 (4%)
9. Hong Kong	737 (3%)	9. Oman	867 (4%)
10. Iran	606 (3%)	10. Saudi Arabia	780 (3%)
Others	6,738 (29%)	Others	6,645 (29%)
Total	23,448 (100%)	Total	22,755 (100%)

Source: Customs Department

1.1.2 Present Situation of Bangkok Port

(1) General Background

11. Bangkok Port has been playing an important role as the main gateway of the international trade of Thailand. Bangkok Port comprises private and public wharves and is spread along some 40km of the River Chao Phraya upstream from its mouth. The main wharves, operated by the Port Authority of Thailand (PAT), are located on the left side at a distance of 26 to 29km from the mouth of the river as seen from Fig. I.1.3.

12. The depth of the river within the port area varies from 8.5m to 11m below mean sea level (MSL). So vessels entering the port are limited to a maximum length of 172m and draught of 8.2m. The channel is dredged in order to maintain the above-mentioned water depth continuously throughout the year.

(2) Administration and Management

13. PAT is one of the state enterprises under MOC, and is the only agency which manages and operates the existing international ports: Bangkok Port and Sattahip Commercial Port. According to the PAT Act, PAT was established to manage and develop ports in the interest of the State and the public and to carry out related businesses which were previously carried out by the Office of the Port of Bangkok under the Department of Transportation, MOTC.

14. PAT owns land areas including all of the Klong Toei Wharves area used for cargo handling operations by PAT. PAT has no ownership of water areas, but has legal authority and duties within its Authority Area. Almost all facilities within the Customs fence are the property of PAT, and the port operations and maintenance including longshoring are the responsibility of PAT.

15. PAT is managed by a Board of Commissioners consisting of a Chairman and ten members including the Director General of PAT. The Director General of PAT, assisted by three Deputy Director Generals and the Directors of the various service and operational departments, is respon-

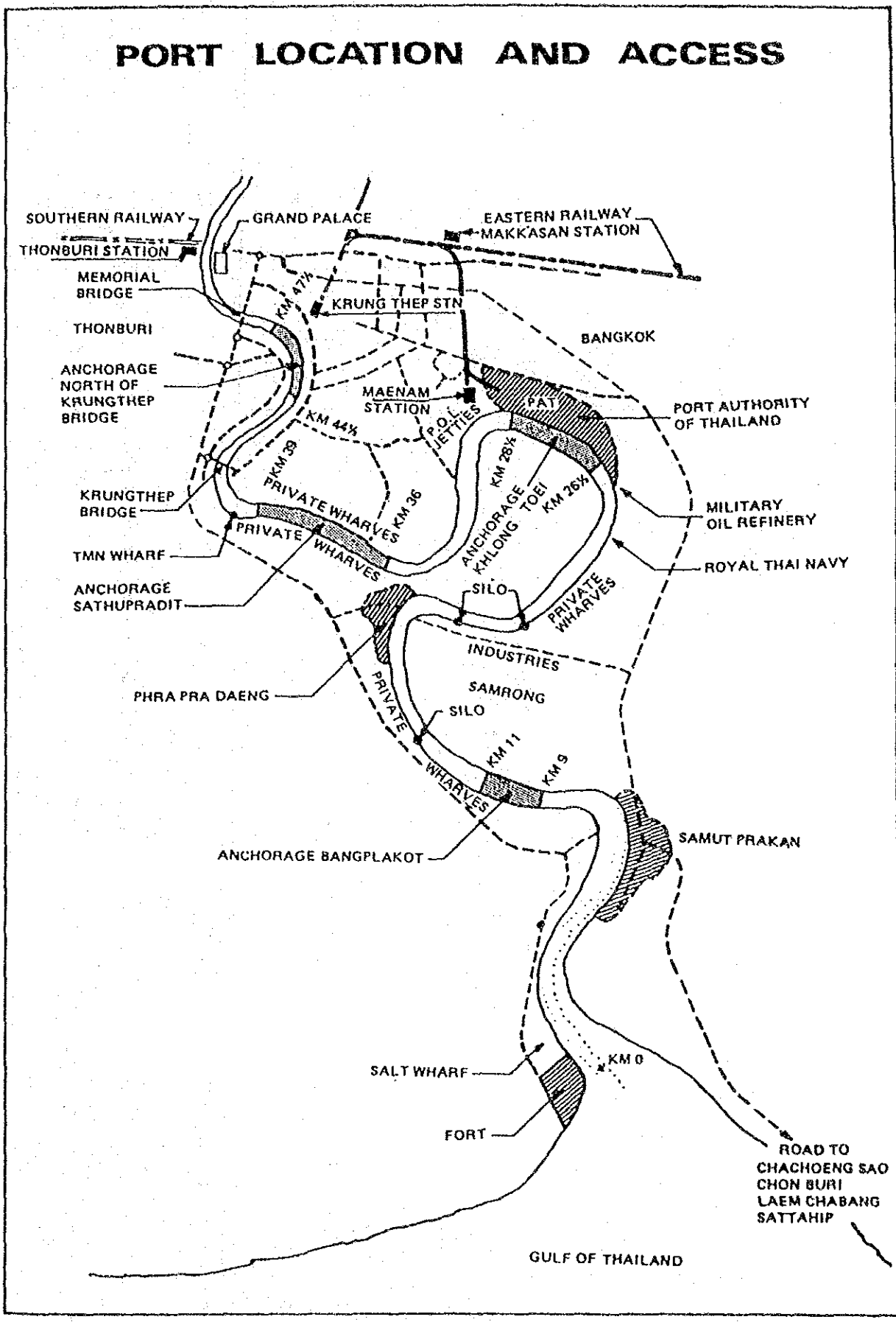
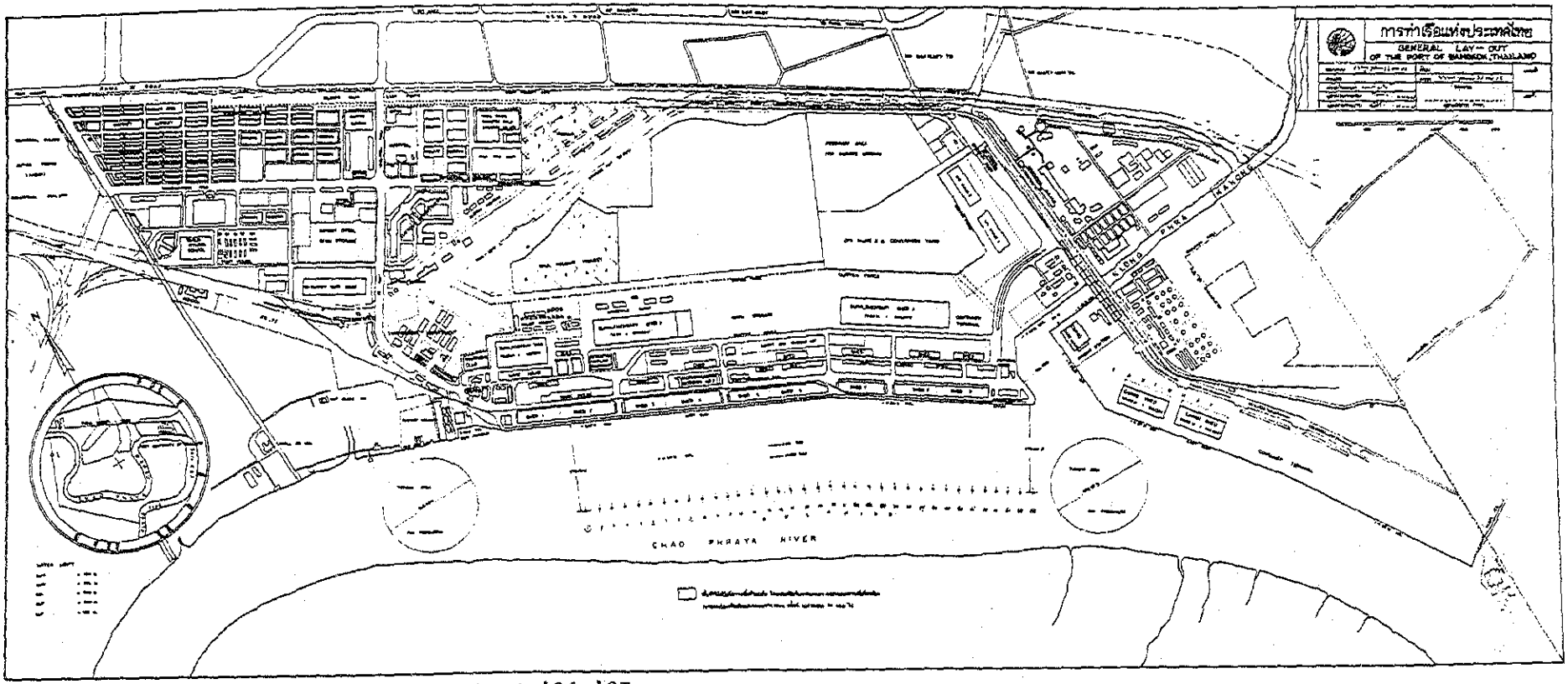


Fig. I.1.3 Port Location and Access



Source: The Port Authority of Thailand '86-'87

Fig. I.1.4 General Layout of Bangkok Port

sible for day to day management and operations. The major departments include the Port Operations (Bangkok Port and Sattahip Commercial Port), Marine, Engineering, Technical, Personnel and Comptroller's departments. Permanent employees total about 6,000.

(3) Existing Port Facilities and Equipment

16. The port facilities as far as infrastructure is concerned could be divided into berthing and storage facilities as shown Table I.1.5 and Table I.1.6. Table I.1.7 is a list of the major cargo handling equipment.

17. Presently, the berthing facilities are composed of 10 berths at the West Quay, 15 at midstream dolphins and 6 at buoys for conventional ships and 6 berths for container ships at the East Quay.

Table I.1.5 Berthing Facilities at Bangkok Port

Berth	Length (m)	No. of Berths	Limited Length/draught of Vessels (m)	Capacity (million tons/year)
1. West Quay	1,660	10	172/8.2	2.7
2. East Quay				
- Quay for container vessels	1,240	6	172/8.2	3
- Quay for lighters	288	2	/4.8	-
3. 61 dolphins	-	15	172/8.2	2
4. 6 buoys	-	6	135/ -	0.5

Source: The Port Authority of Thailand '86-'87

Table I.1.6 Storage Facilities at Bangkok Port

	Unit	Total area sq. m.	Storage area sq. m.	Capacity (tons)
West Quay				
1. Transit shed	9	52,950	37,566	98,349
2. Supplementary transit shed	14	76,720	60,830	145,160
3. Warehouse	9	25,269	20,416	34,152
4. Open storage area	-	236,980	189,512	446,316
East Quay				
1. Transit shed	3	23,468	18,090	54,270
2. Supplementary shed	1	5,468	3,690	11,070
3. Warehouse	1	5,200	3,640	10,920
4. Open storage area		201,003	128,392	385,176
5. Transit shed and open storage area under construction	1	138,350	110,680	332,040

Source: The Port Authority of Thailand '86-'87

Table 1.1.7 Cargo Handling Equipment at Bangkok Port

Item	Capacity	Unit
1. Semi Portal Crane	3 - 5 t.	12
2. Mobile Crane	5 - 165 t.	28
3. Side Loader	35 t.	2
4. Container Shifter	30 t.	4
5. Forklift Truck	5,000 lbs - 10 t.	430
6. Top Loader	16 - 35 t.	5
7. Towing Tractor	8,000 - 12,000 lbs.	39
8. Trailer	5 - 30 t.	51
9. Chassis for Container	30 t.	78
10. Tractor for Trailer	30 t.	7
11. Tractor for Chassis	30 t.	25
12. Fifth Weel	-	7
13. Motor Trucks	5 - 7 t.	144
14. Rubber Tyred Gantry Crane	30 t.	6
15. Terminal Tractor	45 t.	20
16. Pallet		66,500

Source: The Port Authority of Thailand '86-'87

(4) Cargo Throughput

18. Table I.1.8 shows the annual cargo throughput at Klong Toei Wharves in 10 recent years. Total exports increased rapidly from 0.5 million tons in 1977 to 3.9 million tons in 1987 due to the increase of container cargo. On the other hand, total imports fluctuated between 3.3 million tons and 4.9 million tons during the period from 1977 through 1987.

19. The containerization ratio of the total cargo handled at Klong Toei Wharves increased steadily from 47.0% in 1977 to 99.9% in 1987 for exports and 10.2% in 1977 to 47.3% in 1987 for imports.

20. Table I.1.9 shows the annual container handling number at Klong Toei Wharves in 10 recent years. Both exports and imports have been increasing rapidly. The total handling number in 1987 is about 650 thousand TEUs, 320 thousand TEUs for exports and 330 thousand TEUs for imports, and is estimated to have increased to 780 thousand TEUs in 1988. The rapid increase of container cargo in the past couple of years has caused severe congestion at Bangkok Port.

Table I.1.8 Cargo Throughput at Klong Toei Wharves (1977-1987)

Unit: tons

Year	Export Cargo				Import Cargo			
	Conventional	Container	%	Total	Conventional	Container	%	Total
1977	251,547	223,195	47.0	474,742	3,113,722	354,427	10.2	3,468,149
1978	255,191	467,884	64.7	723,075	2,814,115	581,179	17.1	3,395,294
1979	180,883	675,799	78.9	856,682	2,952,783	776,172	20.8	3,728,955
1980	121,720	895,174	88.0	1,016,894	2,746,992	839,050	23.4	3,586,042
1981	172,105	1,058,775	86.0	1,230,880	2,607,790	1,126,407	30.2	3,734,197
1982	282,606	1,155,565	80.3	1,438,171	2,270,486	1,107,361	32.8	3,377,847
1983	249,220	1,330,444	84.2	1,579,664	2,867,699	1,495,795	34.3	4,363,494
1984	149,533	1,825,065	92.4	1,974,598	2,613,943	1,537,103	37.0	4,151,046
1985	5,135	2,332,221	99.8	2,337,356	2,473,960	1,549,312	38.5	4,023,272
1986	5,212	3,069,538	99.8	3,074,750	2,197,352	1,724,265	44.0	3,921,617
1987	2,574	3,898,636	99.9	3,901,210	2,585,640	2,318,720	47.3	4,904,360

Source: Statistical Sect. Technical Department, PAT.

Table I.1.9 Container Cargo Throughput at Klong Toei Wharves (1977-1987)

Year	Inward								Outward							
	Loaded						Empty-T.E.U.	Total T.E.U.	Loaded						Empty-T.E.U.	Total T.E.U.
	20'	35'	40'	45'	Box	T.E.U.			20'	35'	40'	45'	Box	T.E.U.		
1977	13,490	5,575	7,099	-	26,164	37,445	433	37,878	8,569	5,164	6,306	-	20,039	30,218	4,778	34,996
1978	25,794	6,774	10,279	-	42,847	58,206	4,577	62,783	18,610	6,513	9,374	-	34,497	48,756	8,627	57,383
1979	31,623	8,857	14,684	-	55,164	76,491	6,467	82,958	28,760	7,776	13,786	-	50,322	69,940	11,347	81,287
1980	36,025	7,869	15,892	-	59,786	81,580	14,612	96,192	37,593	7,205	16,772	-	61,570	83,746	9,489	93,235
1981	51,527	5,403	22,580	-	79,510	106,142	13,760	119,902	53,466	4,563	21,732	-	79,761	104,915	16,679	121,594
1982	56,155	3,149	20,755	-	80,059	103,176	28,657	131,833	64,048	4,496	23,607	-	92,151	119,130	8,461	127,591
1983	70,608	4,362	28,191	-	103,176	134,624	17,566	152,190	74,603	3,859	26,924	-	105,386	135,204	17,130	152,334
1984	74,432	3,133	30,179	-	107,744	140,273	30,781	171,054	87,282	3,189	33,653	-	124,124	160,169	9,798	169,967
1985	72,708	1,221	29,282	-	103,211	133,408	65,915	199,323	105,979	1,395	43,034	-	150,408	194,489	6,607	201,096
1986	77,773	165	35,404	-	113,342	148,870	107,692	256,562	137,323	421	56,351	-	194,095	250,761	3,941	254,702
1987	105,987	45	49,107	75	155,214	204,449	122,386	326,835	169,508	38	74,187	15	243,748	317,982	4,713	322,695

Remarks: T.E.U. = Twenty Foot Equivalent Unit
Source : Statistical Sect. Technical Department, PAT

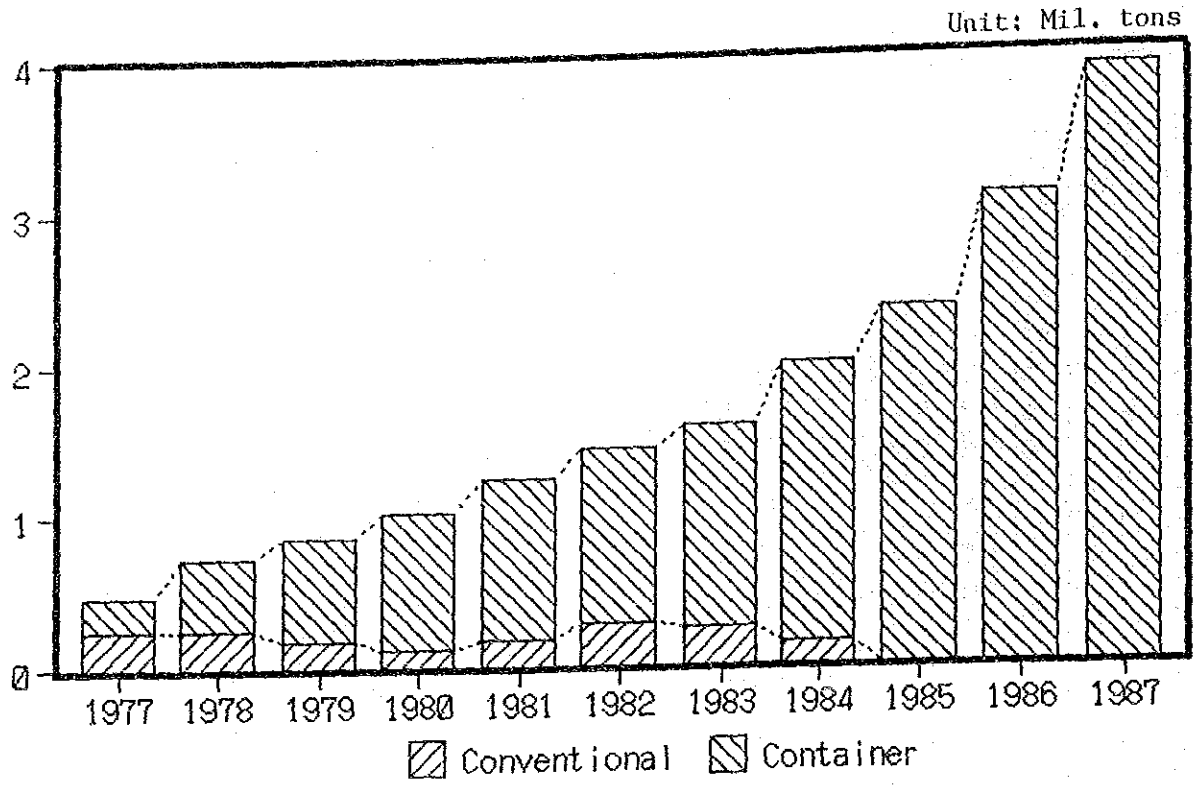


Fig. I.1.5 Export Cargo Volume at Klong Toei

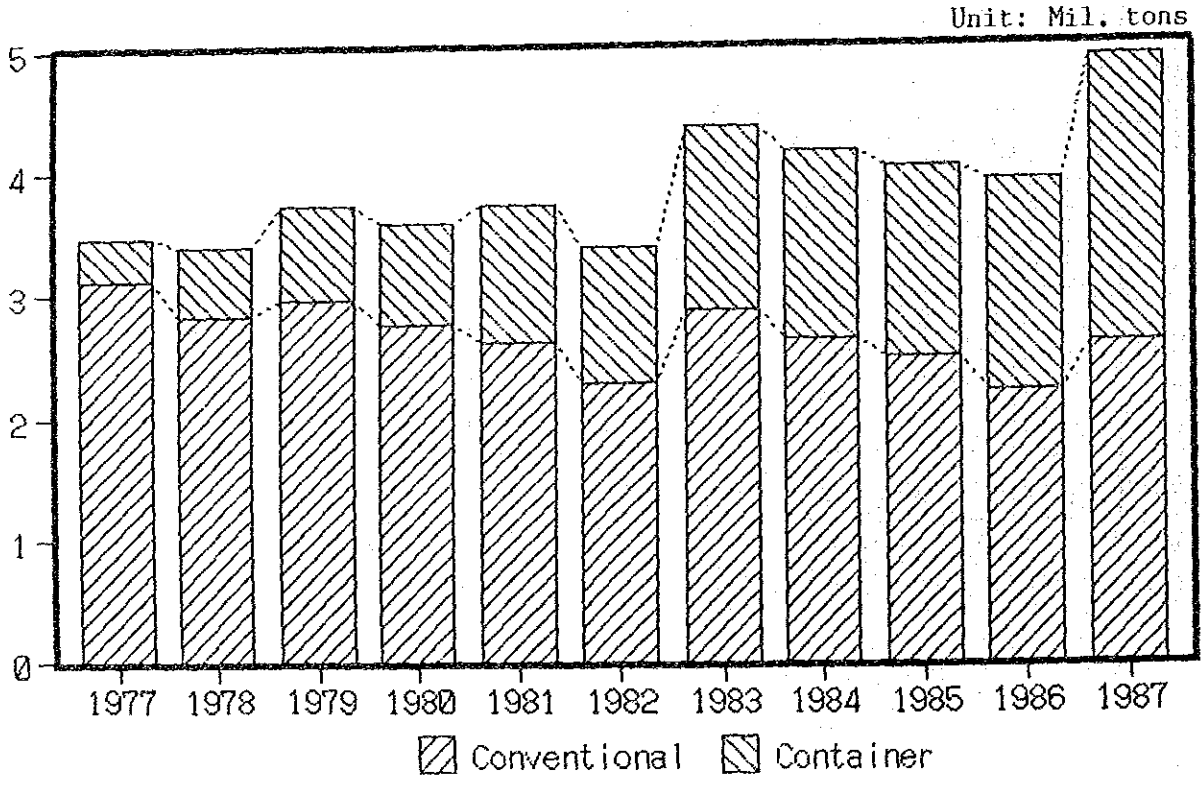


Fig. I.1.6 Import Cargo Volume at Klong Toei

1.1.3 Present Situation of Other Ports

21. The other ports, Sattahip Commercial Port, Songkhla Port and Phuket Port, are being provided to accommodate increased international trade in the future. Songkhla Port and Phuket Port are under construction at present. The facilities of these three ports are listed in Table I.1.10.

22. Sattahip Commercial Port has 5 berths (890m length, 10.5m depth), Phuket Port has 2 berths (360m length, 10m depth, with a total of 6 berths planned in the Master Plan), and Songkhla Port has 3 berths (510m length, 9m depth). The annual cargo volume through Sattahip Commercial Port is shown in Table I.1.11.

Table I.1.10 Port Facilities

Name of Port	Number of Berths	Length of Berths (m)	Water Depth (m)	Remarks
Sattahip Commercial Port	5			
West Quay	3	540	10.5	
North Quay	2	350	10.5	
Phuket Port				
Thaisarco Pier	1	60.1	6.0 (4,000DWT)	2 mooring buoys Pipeline for oil
Buoy Berths	2			
Klong Tachin	1	50	4.0	For lighters
New Berths (Under Construction)	2	360	10.0	--- excluding oil Master Plan -- 6 Berths
Songkhla Port				
Ferry Jetties, H.D. Pier, etc.	1	Pontoon 5		All located in Songkhla Lake
	4	Berths 100 20x3		
	1	Jetty 30		
New Facilities (Under Construciton)	3	510	9.0	1 Container Berth 2 Conventional Berths

Source: MOTC

Table I.1.11 Cargo Handled at Sattahip Commercial Port 1980-1987

tons

Year		1980	1981	1982	1983	1984	1985	1986	1987
Inward Cargo									
Pipe line		153,497	27,767	8,480	21,794	26,325	22,365	7,663	3,609
Steel bars, rails, pipes, rods, etc.		137,192	7,420	-	8,150	-	1,513	-	6,239
Electrical machinery and equipment		4,706	11,906	12,920	10,386	4,295	-	2	5,057
Machinery and equipment for factories		1,750	3,949	461	22,318	18,323	10,824	2,387	20,921
Chemical products		4,256	4,958	957	6,303	4,460	2,091	1,369	4,047
Machinery and equipment for oil exploration work		44	6,545	6,236	7,322	676	555	152	3,341
Military equipment		5,277	492	15	-	-	-	-	-
Petroleum equipment		8,065	6,436	15,496	17,228	21,212	5,648	391	-
Miscellaneous		15,057	330	221	7,056	2,610	-	2,063	2,128
Total		329,844	69,803	44,876	106,883	77,901	42,996	14,027	45,342
Outward Cargo	- Tapioca	170,866	234,502	263,413	232,259	162,940	207,346	103,597	34,770
	- Miscellaneous	-	791	-	-	8,901	11,385	12,872	19,840
Total		170,866	235,293	263,413	232,259	171,841	218,731	116,469	54,610
Domestic Transit Cargo	- Pipe	-	65,633	17,236	26,831	29,728	23,852	5,657	6,049
	- Minerals	-	4,400	5,763	19,854	21,879	17,651	3,243	2,230
	- Oil	-	13,600	4,956	686	105	278	731	4,149
	- Chemical Products	-	8,686	12,102	29,349	27,794	20,879	5,095	3,290
	- Cement	-	5,278	10,587	16,437	16,027	9,505	3,026	3,270
	- Foodstuffs	-	446	-	15	705	1,505	1,108	8,702
	- Miscellaneous	448,900	895	2,704	5,215	8,103	4,149	3,832	10,366
Total		448,900	98,939	53,348	98,387	104,343	77,819	22,692	38,056

Source: Sattahip Commercial Port

1.2 Laem Chabang Commercial Port Development

1.2.1 Overview of the Eastern Seaboard Development Program

(1) Objectives of the Program

23. The major objectives are to:

- Accelerate the already robust industrial growth rate of the country.
- Offer an alternative for industrial expansion out of the Bangkok area, and promote regional growth.
- Develop infrastructure to enhance the international competitiveness of the Thai economy, to promote new industries and to attract foreign investment.
- Provide jobs and facilities that will encourage urban development away from Bangkok.

(2) Outline of the Program

24. The Eastern Seaboard area consists of three Changwats (provinces), namely, Chachoengsao, Chonburi and Rayong, with a total area of about 13,215 square kilometers and a total population of about 2 million people. Initially two main locations are going to be promoted for industrial activities:

- Laem Chabang (Chonburi Province), only 125kms east of Bangkok, is designed for light and labour-intensive industries, back to back with the major container deep seaport of Thailand.
- Map Ta Phut (Rayong Province) is being developed as a major heavy industrial pole with gas-related industries for the first stage, supported by an industrial port.

25. In addition, the City of Pattaya is to become the center for trade and services for the region, backed by the provincial capitals of Chonburi, a thriving business center, and Rayong, which is to become a base for education and technological research.

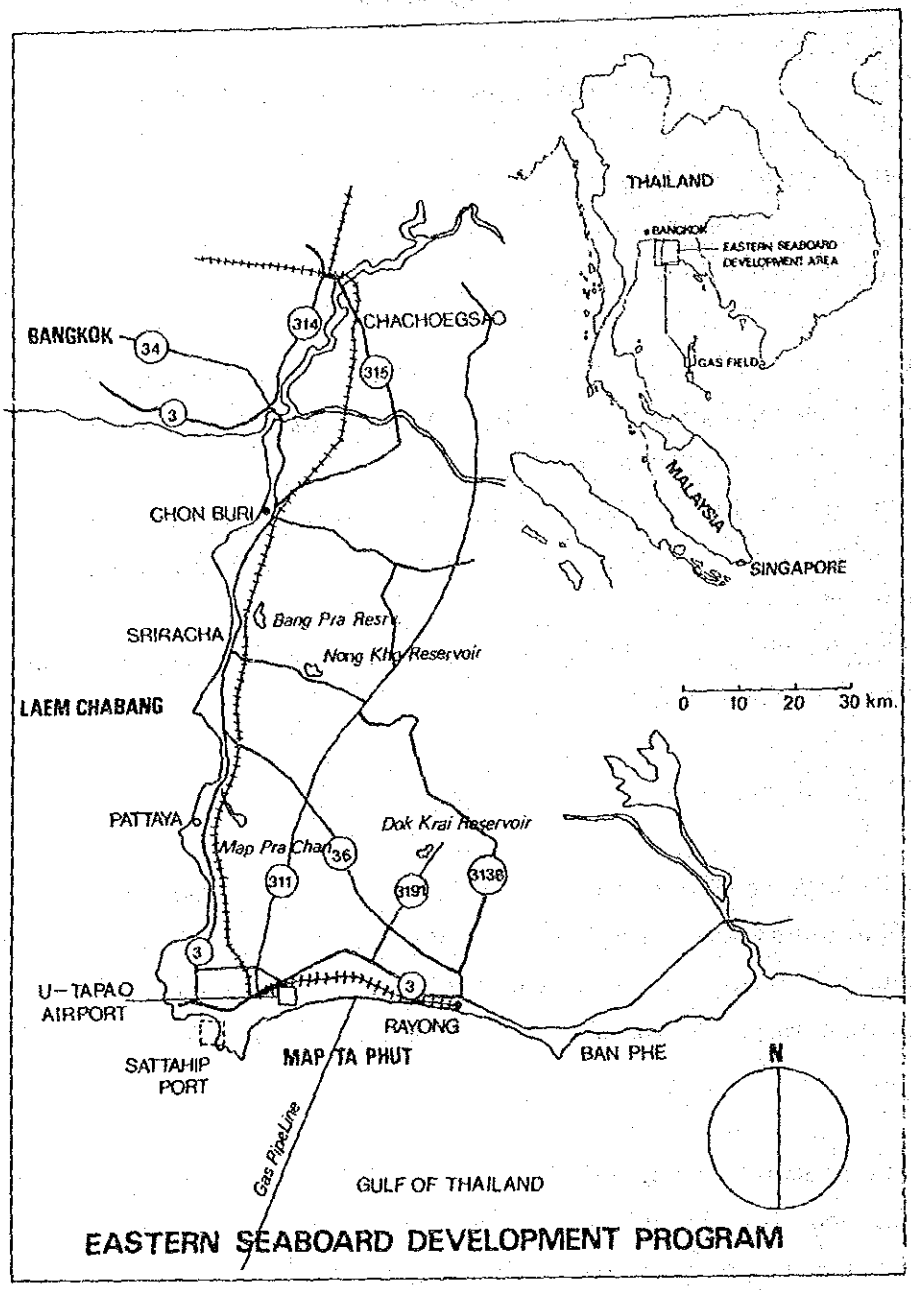


Fig. I.1.7 Eastern Seaboad Development Program

26. The existing Sattahip port and U Tapao airport will be part of a prime transportation network, including upgraded road and railway connections that will spread the effects of the programme well beyond the target areas and stimulate economic activity in the Eastern and Northeastern regions.

(3) Financial Sources for Development

27. Financing requirements for the major components are given in the following:

Estimated Investment Costs (Million Baht)

a) Infrastructure: 15,300

LAEM CHABANG		MAP TA PHUT	
Total	8,000	Total	7,300
- Port Construction (Stage 1)	2,500	- Port (Stage 1)	1,800
- Port Equipment	2,100		
- Other/incl. Social Services	3,400	- Others - Social Services	3,900 1,600

b) Industry: 118,200

LAEM CHABANG		MAP TA PHUT	
Total	22,500	Total	95,700
		Estimated Industrial Investment Cost	
		- Petrochem -1	18,000
		- Petrochem -2	46,400
		- Others	31,300

28. The anticipated proportion and magnitude of each of the sources of financing is indicated in the following:

a) Industry

State Enterprise Equity	---	2%
Govt. to Govt. Loans	---	3%
Private Equity (Local)	---	9%
Private Equity (Foreign)	---	8%
Private Loans (Local)	---	7%
Private Loans (Foreign)	---	71%

b) Infrastructure

RTG Budget, SE Equity	---	47%
Govt. to Govt. Loans	---	44%
Private Equity (Foreign)	---	3%
Private Loans (Local)	---	3%
Private Loans (Foreign)	---	3%

1.2.2 Laem Chabang Commercial Port Development

(1) Profile of the Laem Chabang Area

29. Situated halfway down the eastern gulf coast, only 125kms. southeast of Bangkok and 15kms. north of the international resort city of Pattaya, the Laem Chabang complex will have a commercial containerized deep seaport, an industrial estate and an export processing zone backed up by a completely new urban community and essential infrastructure. The Thai Government is actively preparing these facilities. Improvements to the already substantial communications network will provide first class infrastructure and efficient links for port cargo and industrial raw materials through new highway and railway networks. The planned industries in Laem Chabang will be primarily small-scale, labour-intensive and non-polluting. Connections to the hinterlands will ensure easy supply of the raw materials for agro-industrial activities.

(2) Laem Chabang Commercial Port

30. Laem Chabang Commercial Port will be a primary gateway for containerized cargo which has been increasing sharply in recent years and is now handled mainly at only Bangkok Port (Klong Toei Wharves). The new port will be able to handle up to 3,000 TEU container vessels and 120,000 DWT agricarriers. The first stage development includes two container berths, one break-bulk berth and deep water sites for agri-bulk loading facilities. There is ample space available for private investment in distribution and storage facilities, ship repair yards, etc.

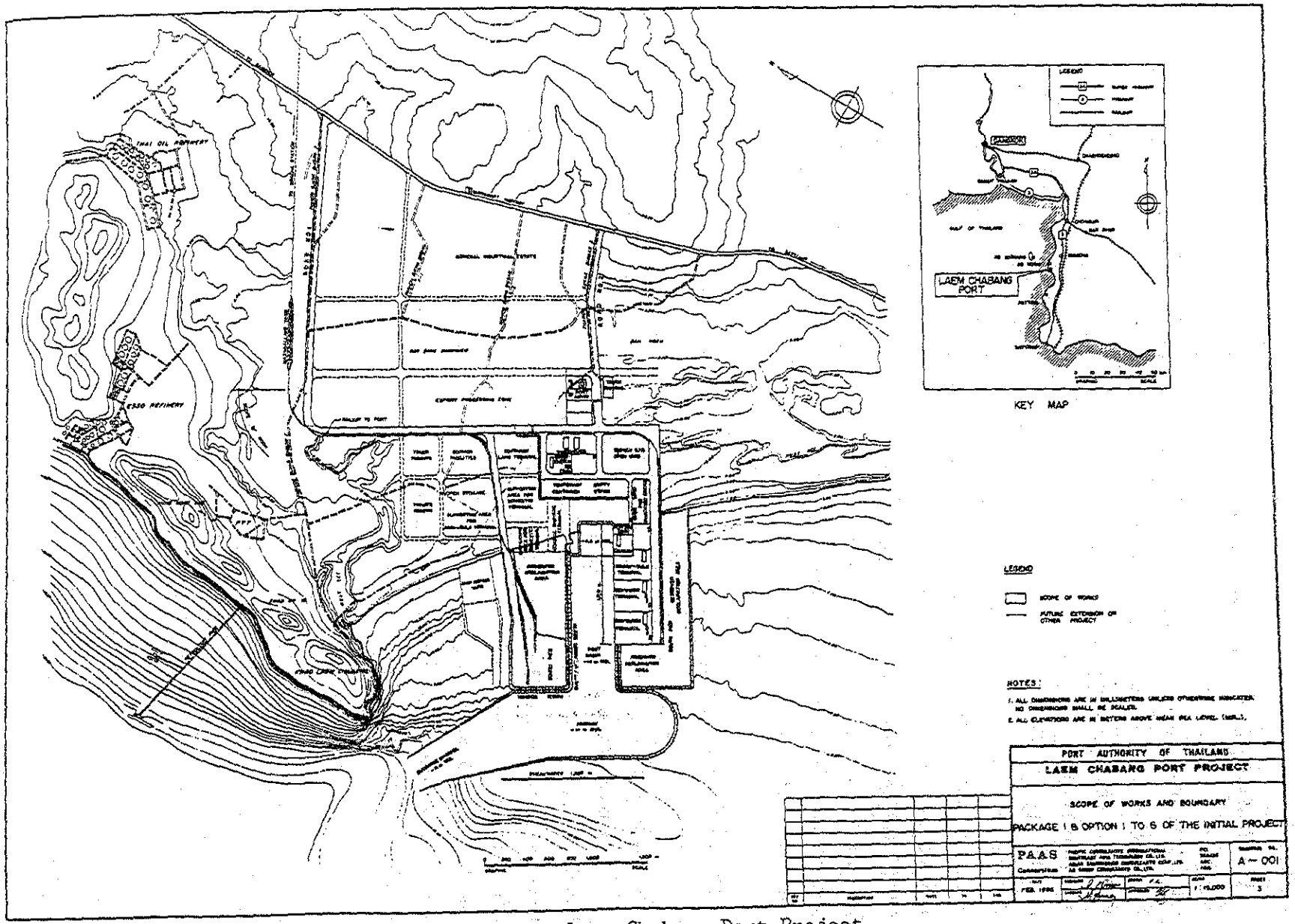


Fig. I.1.8 Laem Chabang Port Project

CHAPTER 2 CONTAINER TRANSPORTATION

2.1 The Development of Container Transportation

2.1.1 Brief History of Containerization

1. Container transportation was initiated by a railway company, not by the shipping industry. New York Central Railway Co. developed the world's first container with the characteristics of interchangeability and adaptability to all kinds of transportation modes. In March 1921, the company made containers 6 feet in width, 7.5 feet in height and 9 feet in length and started consolidation services for small lots of cargo in containers between Cleveland and Chicago. The container on a trailer was loaded onto railway flatcars. This method was called the "piggy-back" system and developed into door to door delivery service. This container transportation system was adopted by other railway companies in Europe within a few years.

2. During World War II, several types of containers were used for military goods transportation. Later on, the efficiency of this mode was examined on a commercial basis. International foreign trade by marine containers started in the 1960s. In April 1966, Sea-Land Service, Inc. started full container vessel service for trans-Atlantic trade. The first vessel was the "Fairland" with a loading capacity of 226 units of 35 foot containers. Matson Navigation Co., which operated domestic container service between Oakland and Hawaii since 1958, started trans-Pacific full container service using 24 foot containers in 1968.

3. Since then, almost all shipping companies in the world hastened to deploy container vessels on main liner service routes. The containerization of liner service to/from Japan and Far East countries was started as follows:

August	1968:	California (PSW)
October	1969:	East Australia
May	1970:	Seattle, Vancouver (PNW)
December	1971:	Europe
August	1972:	New York, Atlantic

October 1972: Mediterranean
October 1976: New Zealand
February 1978: West Australia
November 1979: Persian Gulf

2.1.2 Merits of Containerization

4. The essential characteristics of containerization are summarized in three points as follows:

(1) Shape of boxes (with walls),
(2) Standardization of box size, and
(3) Handling as unit loads.

These make it possible to adopt a module system of handling equipment, to effectively use ship holds and container yards, to use container boxes as exchangeable packages, to place them close together in clear order by stacking and to reduce the risk of damage and theft of cargo by reducing cargo handling and through the protection of the box walls.

5. Containers also permit handling and transportation in all weather, and consequently the stability of transportation schedules can increase. The simplification of preparing and exchanging documents is also considered as an important effect of containerization. The reefer container is another factor allowing low-cost food transportation in small lots, etc. Confirmation of cargo flow is easier by using container numbers and shipping companies can offer such information to consignees and shippers.

6. For shipping companies, containerization contributes to savings and rationalization of cargo handling charges in ports, and easier land transport. By shortening discharging/loading hours in ports, port dwell time is reduced, allowing an increased number of voyages per year. In order to increase container handling efficiency, container terminals with gantry cranes have been developed by governments, port authorities and private companies.

7. Land transporters such as railways and trucking companies also enjoy

the quickness of loading and unloading containers to and from rail flat-cars and truck trailers as compared with the slower handling of break-bulk cargo.

8. For customers, the following merits can be listed:

1) to save packing costs
2) to lower FOB prices by simple packing of goods
3) to shorten the transit time of goods
4) to reduce marine cargo insurance fees
5) to lessen cargo damage during transportation
6) to prevent cargo contamination
7) to decrease cargo claims such as shortage and pilferage
8) to reduce the inventory cost of goods
9) to save working capital
10) to ease and simplify customs clearance
11) to save the volume of documentation and cargo marking fees
12) to expedite consolidation of LCL cargo

9. Considering the essential requirements of the customs office, it is quite natural that conventional cargo is first brought into sheds inside a port fence by the port management body and inspected by the customs. For container cargo, container boxes can be handled as units of cargo and regarded as a kind of movable shed from the viewpoint of customs security. This concept is widely accepted throughout the world and regarded as one of the major factors to promote international trade, because it is unquestionably convenient for shippers and consignees. If this concept fails to gain acceptance within a country, most of the advantages of containerization are lost. It is necessary to move packed containers whenever possible, and for this purpose all measures should be pursued including changes of customs policy, and improvement inefficient terminal operations and inland transportation systems.

2.1.3 Size and Type of Containers

10. The standardization of container size is necessary in order to promote international containerization. By the mechanical limitation of railway flatcars, 8 feet in width and 8 feet in height are generally

common for all types of containers. However, as to the length of containers, there are several kinds. In 1963, in order to promote interchangeability of containers, the International Organization for Standardization (ISO) set a standard container size. The width was 8 feet, the height was 8 feet and the lengths were 40 feet, 30 feet, 20 feet, 10 feet, 6 2/3 feet and 5 feet. However, Sea-Land started using 35 feet in length and Matson 24 feet in length because of the maximum length permitted in the eastern and western regions of the U.S.A. Other shipping lines mainly used 20 feet and 40 feet by the early 1980s. In these years, larger size containers 9' - 6" in height and 45' in length have started to be used in order to pursue scale merit.

11. Types of containers by cargo

The following container types are summarized by type of cargo.

Cargo Nature		Type of Container
.General Cargo	.Clean cargo	.Dry container
	.Dirty cargo	.Ventilated container
	.Delicate cargo	.Insulated container
		.Open-top container
		.Side-open container
		.Hide container
	.Perishable cargo	.Reefer container
	.Refrigerated cargo	.Insulated container
		.Ventilated container
	.Livestock and plants	.Animal container
		.Ventilated container
		.Pen container
.Special Cargo	.Heavy cargo	.Open top container
		.Flat rack container
		.Platform container
	.Valuable cargo	.Dry container
	.Dangerous cargo	.Dry container, Others
	.Bulky cargo	.Tank container

	.Bulk container
	.Hopper container
.Awkard cargo	.Flat rack container
	.Flat bed container
.Unpacked cargo	.Others

2.1.4 Container Vessels

12. In the 1960s, roll-on, roll-off (RO-RO) type container vessels were mainly used for container transportation in short-distance trade in order to promote door to door service. Also, semi-container vessels were used by reconstructing conventional vessels.

13. In the 1980s, major shipping lines are deploying lift-on lift-off (LO-LO) type full container vessels with cell guides so that they can maximize the use of hold space. Furthermore, mass transportation has been encouraged. In 1988, two major shipping companies started to deploy post-Panamax (more than 32.2 m in width) size vessels as fourth generation vessels.

Generation	Length	Carrying Capacity
.First (1960 -)	140 - 200 m	200 - 1,000 TEU
.Second(1970 -)	210 - 250 m	1,500 - 2,500 TEU
.Third (1980 -)	230 - 270 m	2,500 - 3,500 TEU
.Fourth(1988 -)	280 - 300 m	4,000 - 5,000 TEU

2.1.5 Current Situation

14. As of the end of 1987, more than 800 full container vessels with a capacity of 1,600 thousand TEU in total are navigating all over the world. Major shipping lines are mainly using third generation vessels on trunk routes. However, some of them are intending to replace their fleets using fourth generation vessels so that they can pursue volume scale merit.

2.2 Container Transportation and Documentation

2.2.1 Present System at Bangkok Port

(1) Container Cargo Handling

15. The Port Authority of Thailand (PAT) as a port management body and shipping agents as substitutive yard operators play major roles, at present, in the container cargo handling at Klong Toei Wharves. Although it is understood that all the shoreside cargo operations in the PAT Port area are in principle to be executed by equipment and laborers owned or employed by PAT, shipping agents (yard operators), due to a lack of resources at PAT, sometimes have to procure equipment and laborers by themselves with PAT's permission.

16. Containerization at Klong Toei Wharves has rapidly proceeded, especially in exports. PAT has not yet successfully caught up with this remarkably rapid containerization in such aspects as systems, laborers, facilities and equipment. At Klong Toei Wharves, shipping agents take charge of terminal operations and they entrust physical cargo handling to PAT and stevedoring companies. The sharing of responsibility for the necessary tasks is, in principle, as follows:

Shipping Agents ..... Various planning including ship and yard stowage, arrangement and inventory works, documentation, etc.
Stevedores ..... Cargo handling on board
PAT ..... Shoreside cargo handling

(2) Flow of Container Cargoes and Documents

17. The present flows of container cargoes and documents are shown in Appendix 2.

(3) Customs Procedures in Thailand

18. The primary missions of the Thai Customs Department are the collection

of import and export duties as well as various customs fees, the prevention and suppression of duty evasion and contraband and the promotion of export trade. Its responsibilities also include the amendments of tariffs in conformity with the government's policy and the compilation and publication of trade statistics. In addition, the Customs Department is authorized to collect other taxes, such as excise, business and municipal taxes on behalf of the Excise Department, the Revenue Department and the Bangkok Metropolitan Administration respectively.

19. Customs formalities both for import and export are shown in Appendix 2. The system itself in Thailand is as simple as in other countries.

1) Customs Formalities for Containers Themselves

20. Customs Traffic Decree B.E. 2503(1960) as amended exempts containers themselves from custom duties. The rules require that for an exemption from duties container owners or administrators must guarantee by posting cash or a bank guarantee that the containers will be re-exported within three months from the time of importation. Extension of the period of re-export maybe approved on a monthly basis up to a maximum of three times. These rules are detailed in Customs Notification Nos. 9/2514, 4/2521 and 9/2522 following the Customs Convention on Containers, 1956, which has not been ratified by the Royal Thai Government.

2) Bonded Warehouse

21. The importer can store his imported goods for up to one year in a specially authorized warehouse without having to pay import duty first, provided that the import entry is filed within 10 days after the goods arrive and the goods are moved to the warehouse within 15 days after the entry is approved. This warehouse is called a bonded warehouse and most goods can be kept there except duty-paid goods, goods on which security deposits have already been made, or goods which such a warehouse is not authorized to keep. At present, there is only one such warehouse in Thailand: Bonded Warehouse No.1 located at Klong Toei Wharves.

22. As for the bonded warehouses of manufacturing plants, the plan and the

capacity of the plant must be submitted for approval first, a certain amount of bank guarantee is required, a certain fee is paid each year, and formulas for mixing, assembling, or manufacturing the product of the factory must be given to the Director General for the purpose of assessing the portion of tax exempted. In practice, the Customs Department may send a customs officer to keep control over the raw materials imported and the finished products at the bonded factory.

23. The customs branch office in the export processing zone of Lat Krabang Industrial Estate is the first and only one, as such, in Thailand. Twenty-four customs officers are stationed at this office, where the customs clearance of import and export cargoes can be executed along with customs inspection. As for loaded containers, once both customs and shipping company seals are affixed to the containers, they can be transported in bond to/from the port area, where only the seals are checked without any customs inspection. This system, which is appropriate for the advance of containerization, has recently progressed, being based on the concept of bonded manufacturing warehouses as mentioned above.

2.2.2 Popular Container Transportation in the World

(1) Standard System of Container Transportation

24. The optimum flow of containerized cargoes and documents has been established and pushed forward mainly by shipping companies and their affiliated container terminals, and this flow seems to be popular at major ports in the world except for some countries where peculiar circumstances exist.

25. The flow of container cargoes and documents which center on the container terminal is shown in Appendix 2.

(2) Customs Procedures and Bonded Area System

26. Customs procedures in container transportation involve the customs clearance of containers themselves and of the cargoes contained in them. Containers themselves are different from ordinary cargo in light of their

special usage for transportation, so the customs clearance of containers themselves must be different from and more simplified than that of ordinary cargoes. As for cargo contained in containers, that is to say, containerized cargo, the customs clearance is almost the same as that of ordinary cargo. However, it has been recognized that containerized cargo which is kept contained in containers is allowed to pass through import/export customs clearance without a strict actual inspection in the marine container terminal in order to promote door to door transportation.

27. The purpose of the bonded area system is to ensure the correct procedures for customs clearance of import or export cargoes as well as to contribute to convenient and smooth transactions of import cargoes and to promote the development of transit and the processing trade. The bonded area system may roughly be divided into the system of the bonded area and that of the bonded transportation.

1) Types and Functions of Bonded Areas

28. In any bonded area, the loading or unloading, conveyance, storage, manufacture or exhibition of foreign goods may be conducted in bond. To assure the collection of customs duties and enforce legitimate control, the foreign goods and other items stored in bonded areas are placed under the supervision of the customs. There are, in general, five types of bonded areas, which are designated as bonded areas, bonded sheds, bonded warehouses, bonded manufacturing warehouses and bonded display areas.

2) Bringing-in and Taking-out of Goods and Self-control System

29. If any person desires to bring foreign or domestic goods into or take them out from a bonded area, he has to make a report in advance to the customs concerned and, as a rule, has to be accompanied by a customs officer when actually transporting goods. However, the customs, taking account of the various relevant factors, can designate a bonded area as being suitable for self-control. In this case, the owner of such an area is set free from making the above mentioned report on the condition that he controls and records by himself the flow of goods into or out of the area. This system is what is called a "self-control system".

3) Bonded Transportation

30. Any foreign goods may be transportation in bond so long as they are transported among open ports, customs airports, bonded areas and customs offices. The approval of the Customs must be obtained to transport any foreign goods in bond. Foreign goods may be transported by land, sea, air or any combination thereof.

2.2.3 Comparison between Bangkok Port System and Standard System

31. As examined in 2.2.1 and 2.2.2 in this Chapter, there are many characteristic and unusual points found in the present container transportation and documentation. The comparison between the Bangkok Port system and the standard system is summarized in Appendix 2.