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THE REPUBLIC OF INDONESIA

THE STUDY ON THE MASTER PLAN OF CONTAINER CARGO HANDOLING PORTS, DRY PORTS AND CONNECTING RAILWAYS IN THE REPUBLIC OF INDONESIA

FINAL REPORT
VOL.2 MASTER PLAN

JULY 1995

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May, 1994

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

THE STUDY

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IN THE REPUBLIC OF INDONESIA

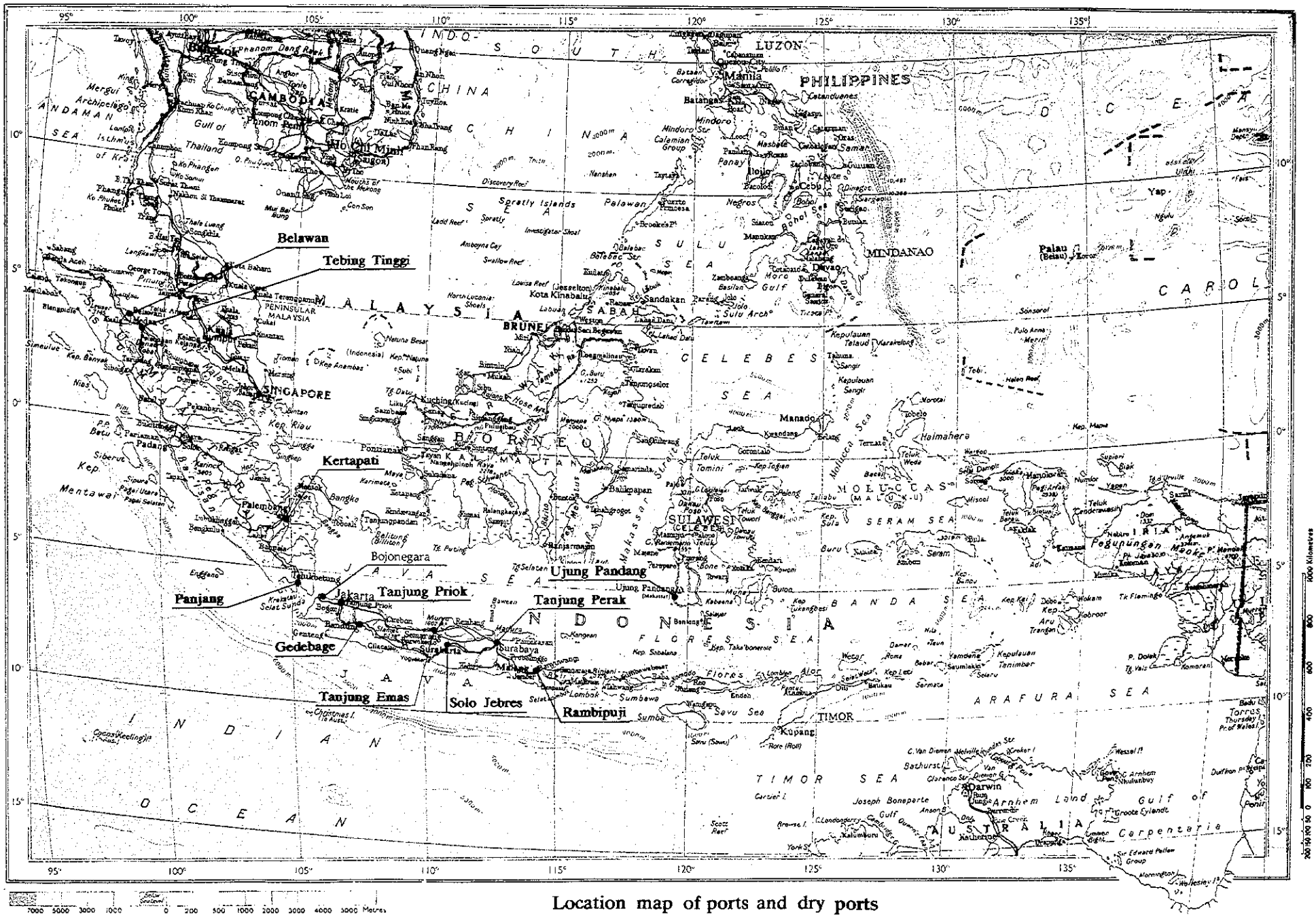
FINAL REPORT

Volume 2

Master Plan of Container Cargo Handling Ports, Dry Ports and Connecting Railways

JULY, 1995

The Overseas Coastal Area Development Institute of Japan (OCDI)
Japan Railway Technical Service (JARTS)
Pacific Consultants International (PCI)


Belawan
Tebing Tinggi
Kertapati
Palembang
Panjang
Bojonegara
Jakarta
Tanjung Priok
Gedebage
Tanjung Emas
Solo Jebres
Rambipuji
Ujung Pandang
Tanjung Perak
SINGAPORE
MALAYSIA
BRUNEI
SABAH
MINDANAO
PHILIPPINES
LUZON
CAMBODIA
Ho Chi Minh
Bangkok
Manila
Darwin
Kupang
TIMOR
INDONESIA
AUSTRALIA
Location map of ports and dry ports

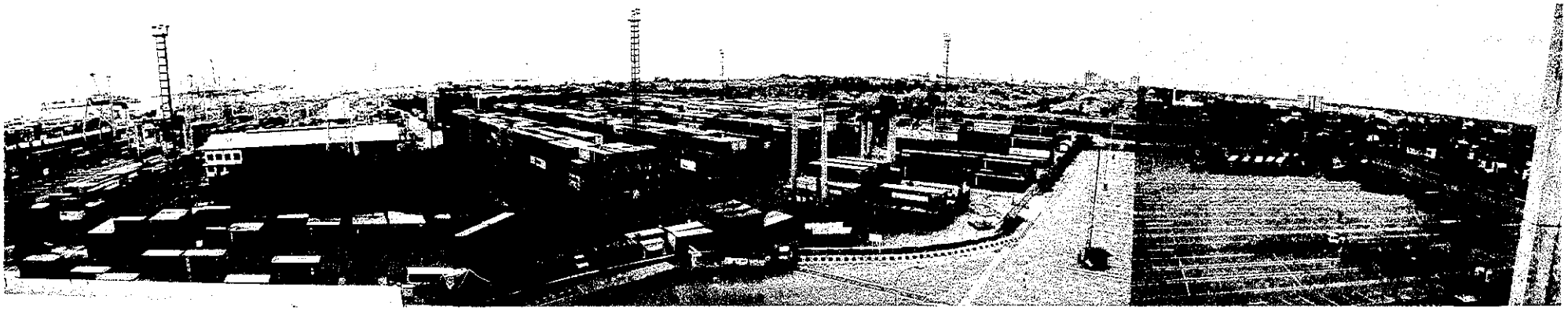
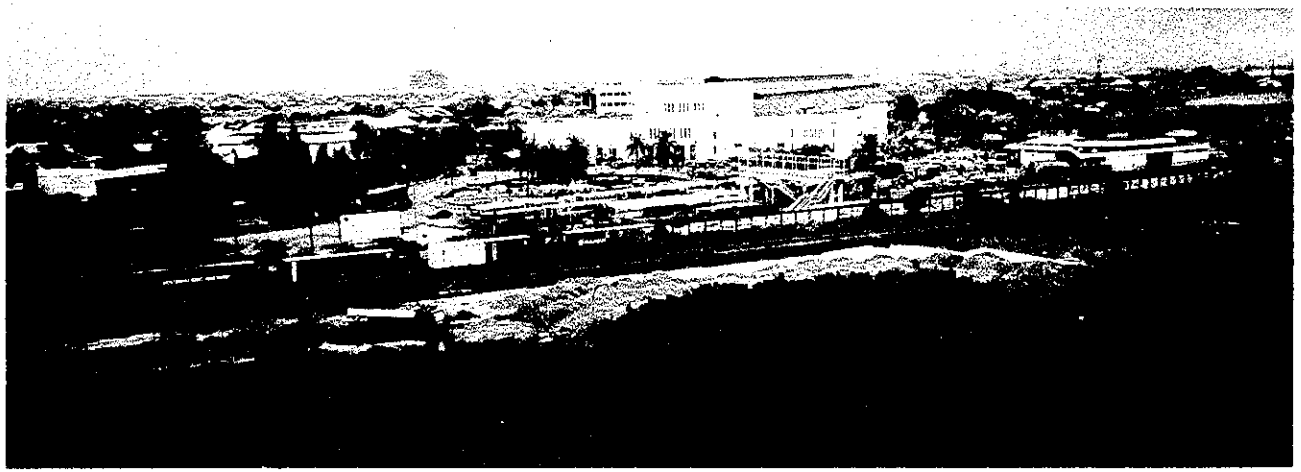


Photo. taken: April, 1994

Container Yard of Container Terminal I (CTI), Port of Tanjung Priok, Jakarta



Note:
All Photographs
are taken by
JICA Study Team

Photo. taken: May, 1994

Pasoso Terminal and Tanjung Priok Station, Jakarta

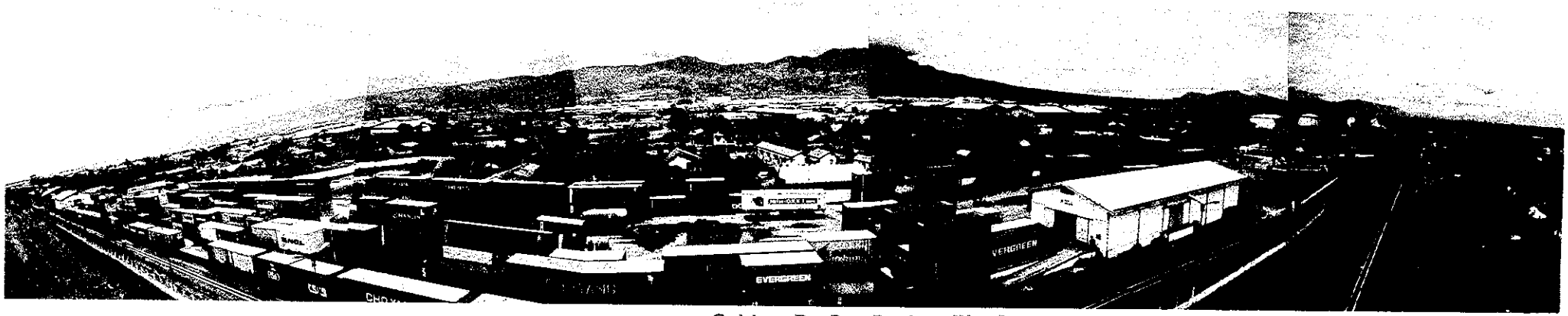


Photo. taken: April, 1994

Gedebage Dry Port, Bandung, West Java

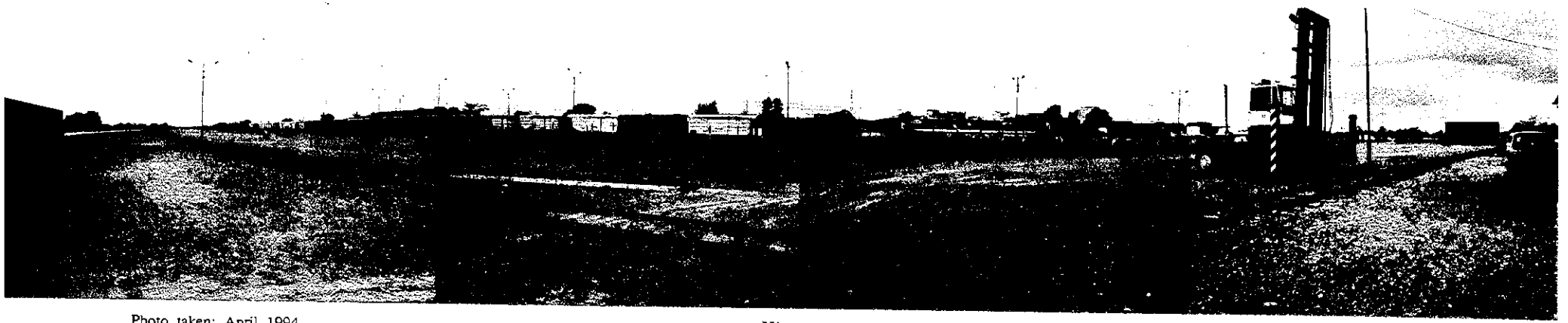


Photo. taken: April, 1994

Kiaracondong, Bandung

Photo. taken: May, 1994

Whole View of International Container Terminal (ICT) Jetty, Port of Tanjung Perak, Surabaya, East Java

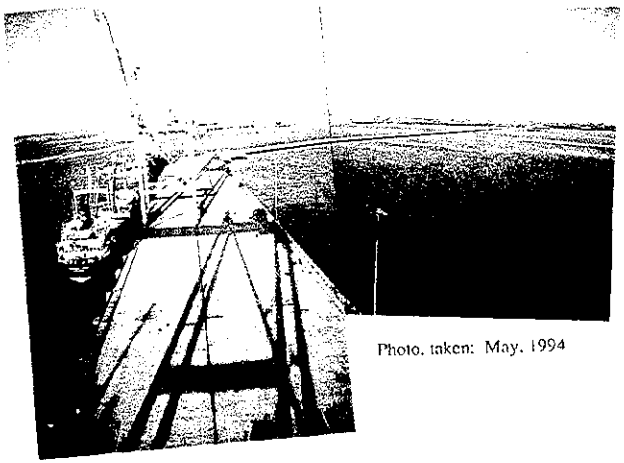


Photo. taken: May, 1994

ICT Jetty and Trestle,
Port of Tanjung Perak, Surabaya

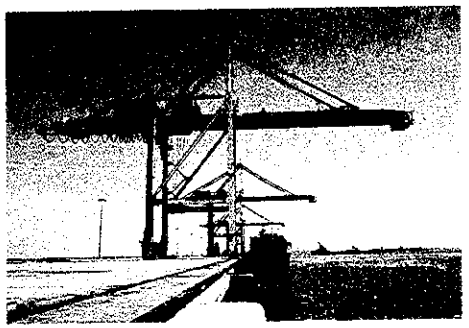
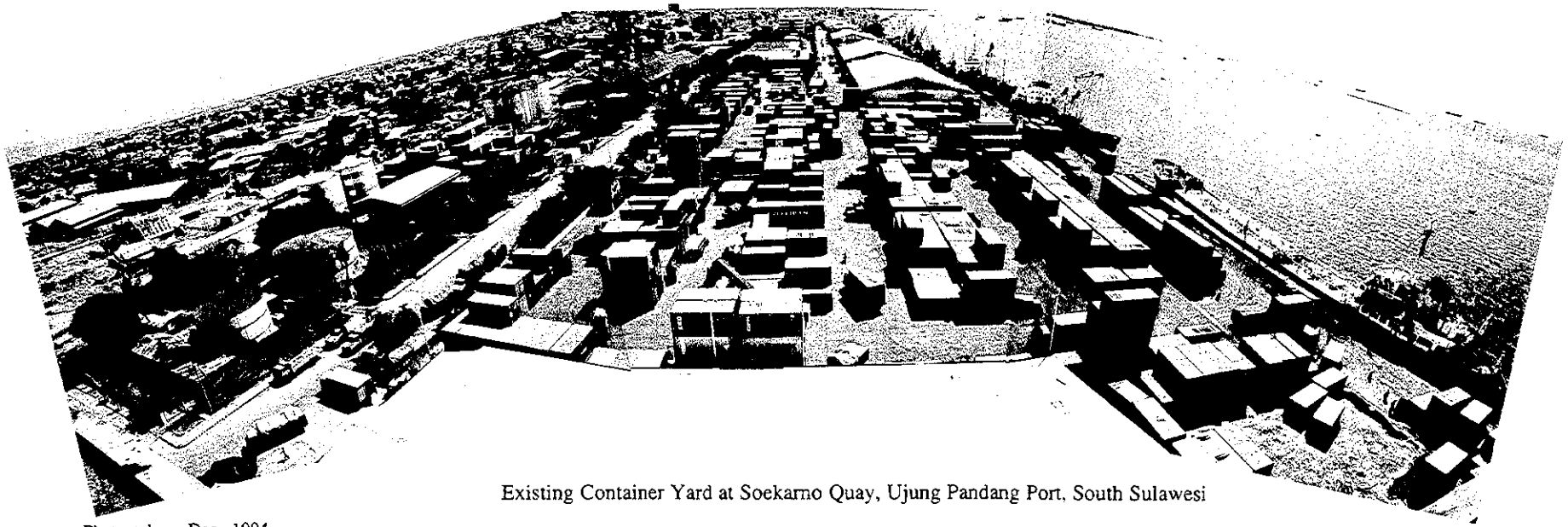


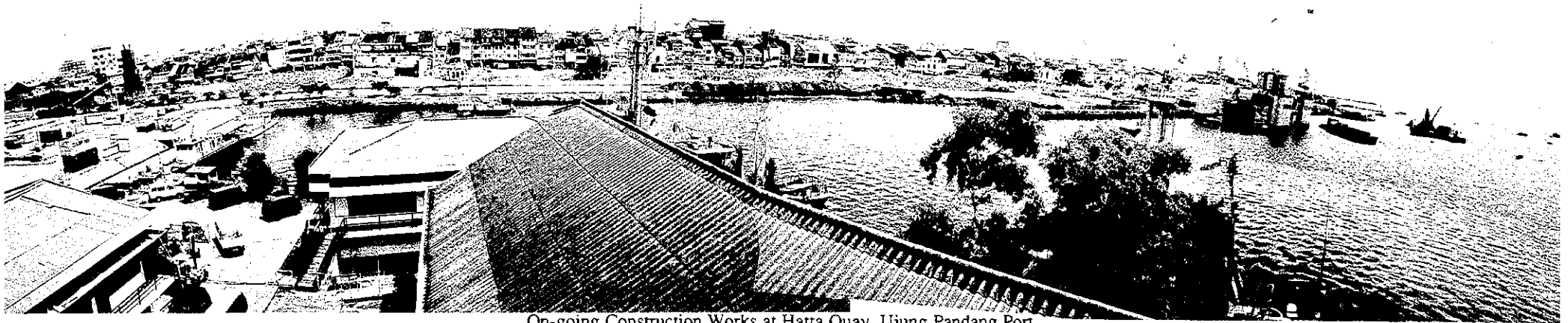
Photo. taken: May, 1994

Gantry Cranes and Rubber Fenders
of ICT Jetty, Port of Tanjung Perak, Surabaya



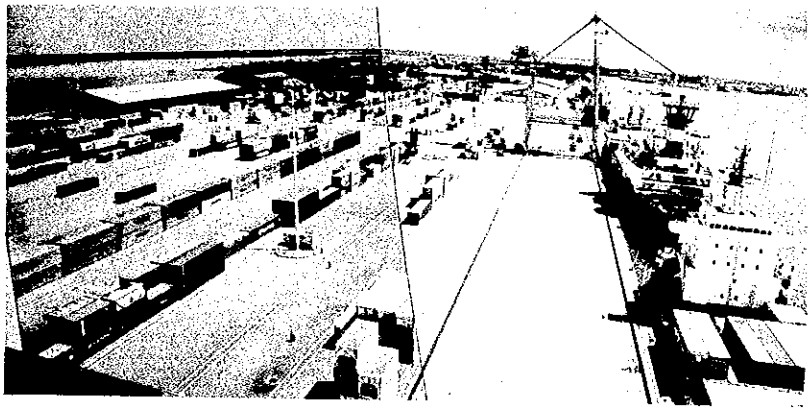
Existing Container Yard at Soekarno Quay, Ujung Pandang Port, South Sulawesi

Photo. taken: Dec., 1994



On-going Construction Works at Hatta Quay, Ujung Pandang Port

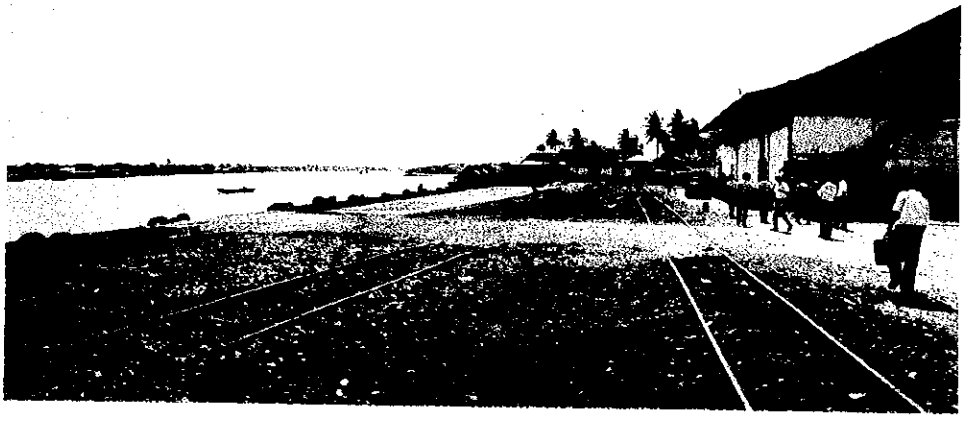
Photo. taken: Dec., 1994



Container Terminal at Gabion Base, Port of Belawan, North Sumatra

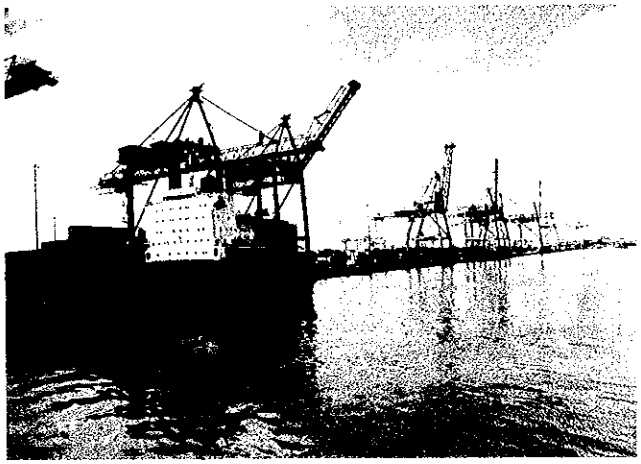
Tebingtinggi Dry Port, North Sumatra

Wharf DII of Port of Panjang, Bandar Lampung



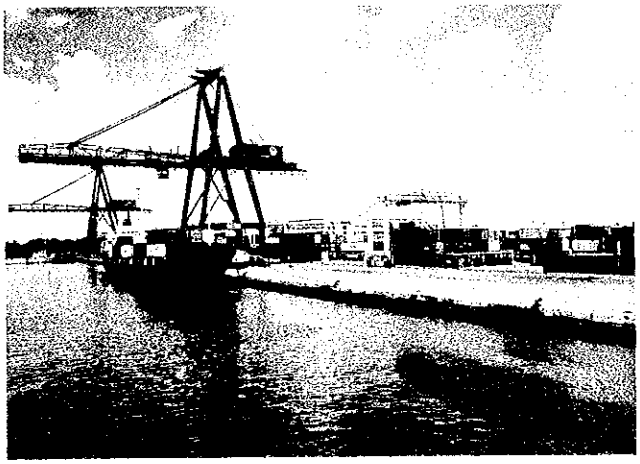
Kertapati Dry Port along Musi River. Palembang Port is located opposite side of the River. (South Sumatra)

Note: Photos. 10 to 13 were taken in May, 1994.

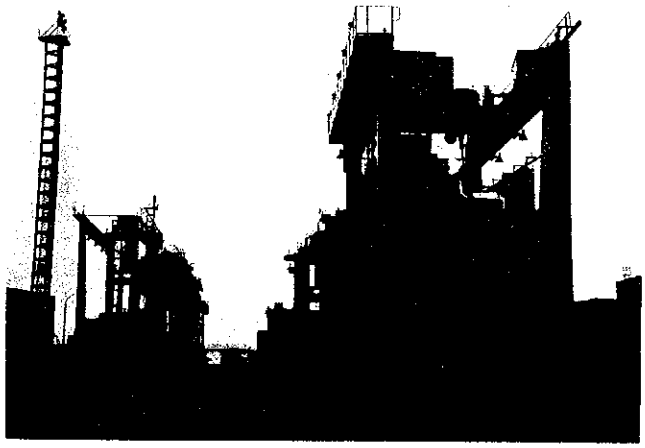


Container Wharf of CTI, Port of Tanjung Priok, Jakarta

Gantry Cranes of CTI, Port of Tg. Priok



Container Wharf of CT II, Tg. Priok



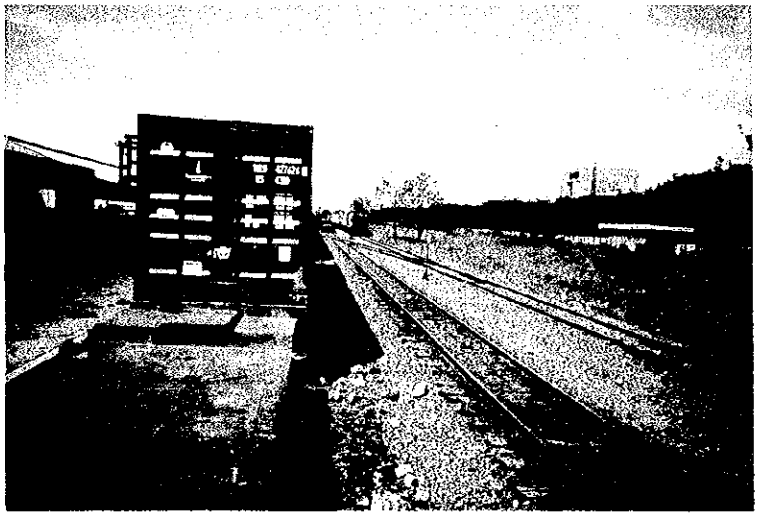
Transtainers of CT I Tg. Priok

Note: Photos. 14 to 19 were taken in April 1994

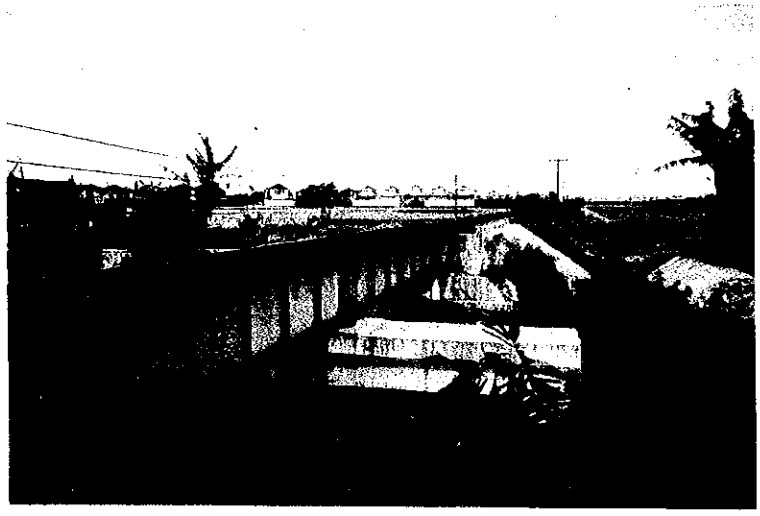
Transtainer at CTI, Tg. Priok

Whole View of Proposed Port Site of Bojonegara, West Java

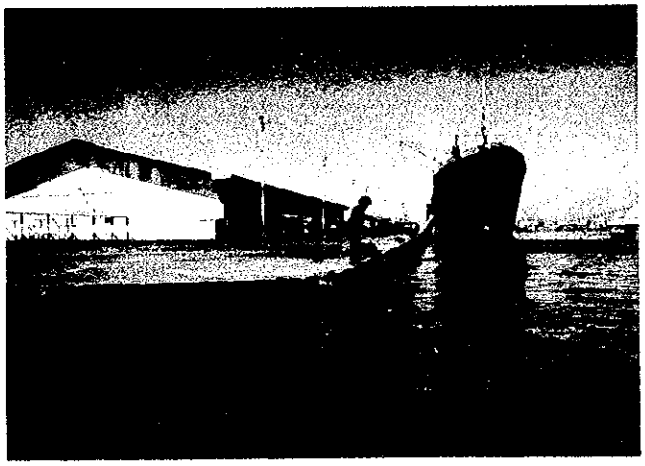
Land space expected for arrival and departure tracks at Gedebage



Land space expected for tracks at Pasoso container terminal

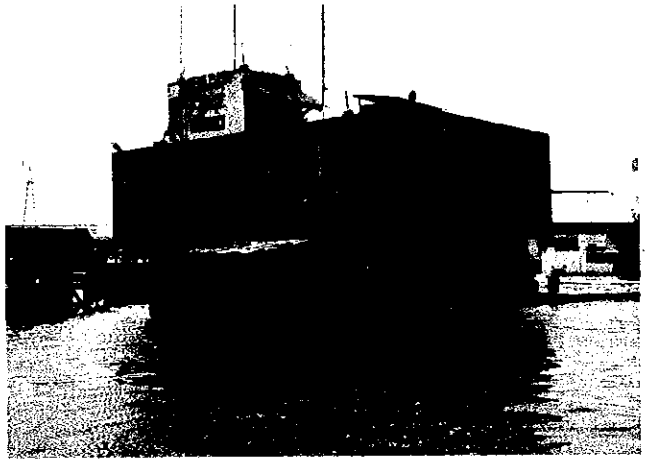


The bridge on the doubling track section between Gedebage and Kiaracondong



Samudera Wharf (International Wharf) of Port of Tanjung Emas, Semarang, Central Java

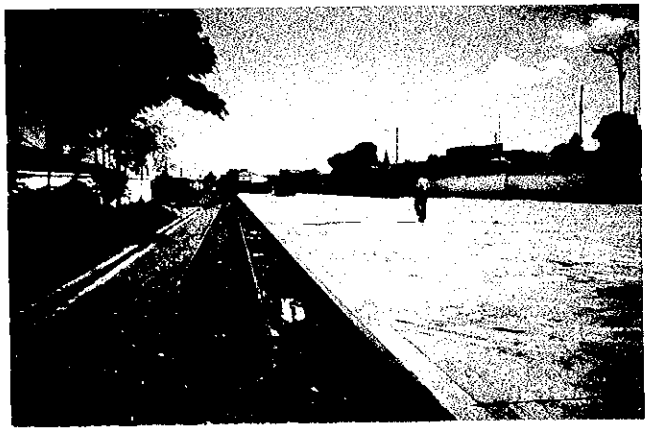
Samudera Wharf, Port of Tg. Emas



The ground floor of the Pilot Office is submerged due to sinking ground, Port of Tg. Emas

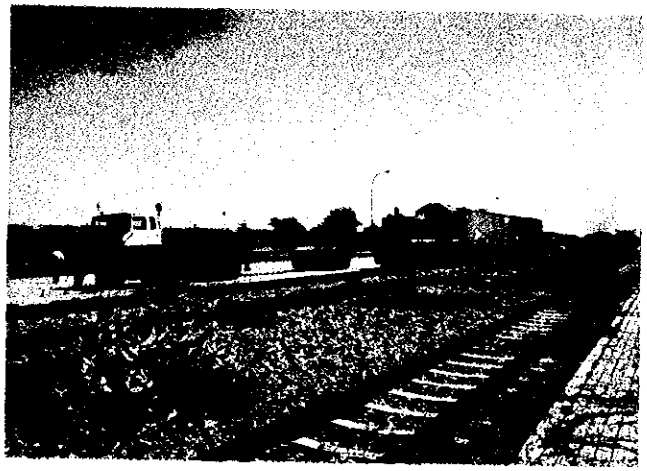
Railway Tracks at the back of the Samudera Wharf, Port of Tg. Emas

Note: Photos. 20 to 24 were taken in May 1994

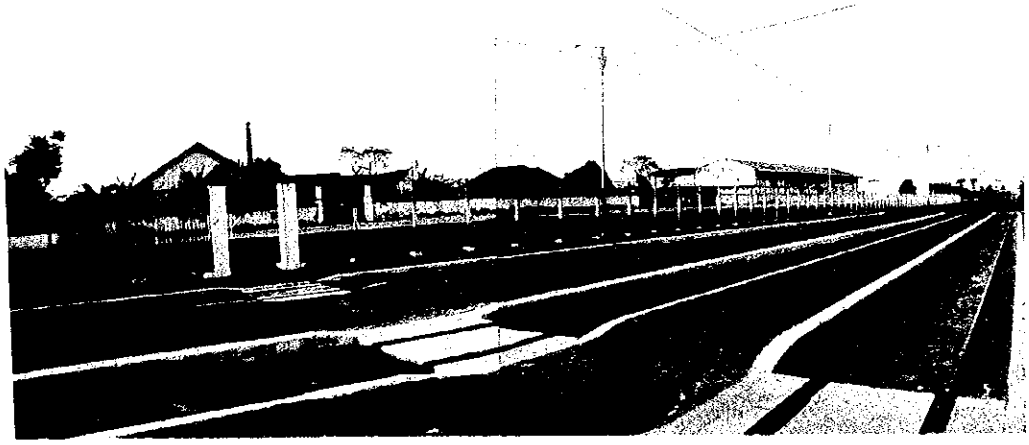


Container Yard of Solo Jebres Dry Port, Surakarta, Central Java

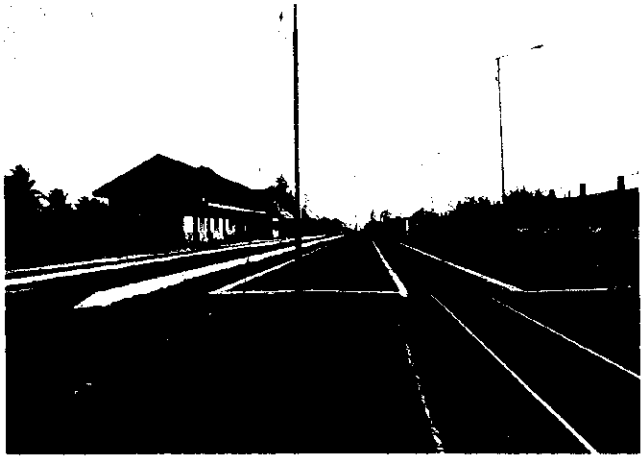
Container Yard of ICT, Port of Tanjung Perak, Surabaya



Railroad Container Yard at ICT, Port of Tg. Perak

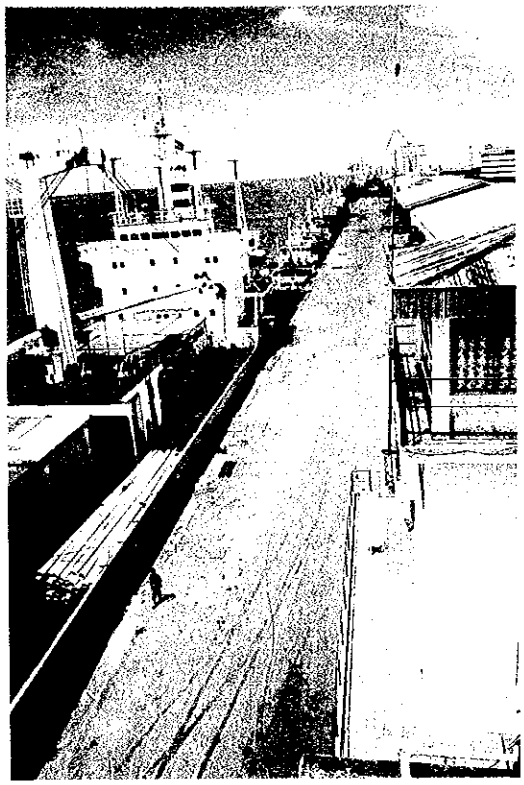


Rambipuji Dry Port, Jember, East Java



Rambipuji Dry Port

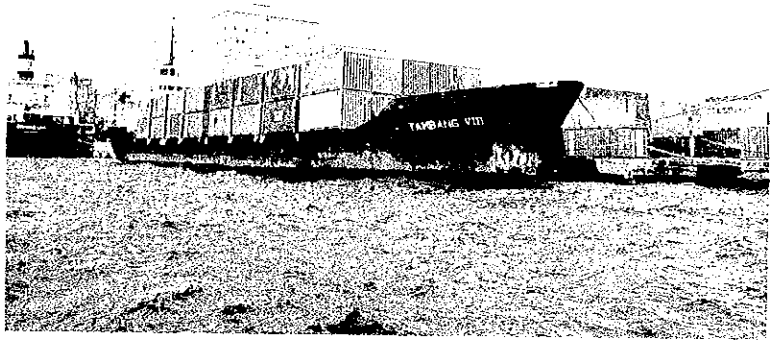
Note: Photos. 25 to 28 were taken in May, 1994



Sockarno Quay of
Ujung Pandang Port,
South Sulawesi

Devanning at Sockarno Quay,
Uj. Pandang Port

Container Ship
along Sockarno Quay,
Uj. Pandang Port



Note: Photos. 29 to 32
were taken in Dec., 1994

Proposed Inland Container
Terminal Site, Kel. Tallo,
Ujung Pandang City

ABBREVIATION

AMDAL	:	Environmental Assessment Committee (Indonesian)
ANDAL	:	Environmental Impact Analysis (Indonesian)
CFC	:	Conversion Factor for Consumption
CFL	:	Conversion Factor for Labor
CIF	:	Cost Insurance and Freight
CFS	:	Container Freight Station
CT	:	Container Terminal
CY	:	Container Yard
DGLT	:	Directorate General of Land Transportation and Inland Waterways
DGSC	:	Directorate General of Sea Communication
DWT	:	Dead Weight Tonnage
EIA	:	Environmental Impact Assessment
EIRR	:	Economic Internal Rate of Return
EL	:	Elevation
FIRR	:	Financial Internal Rate of Return
FOB	:	Free on Board
F/S	:	Feasibility Study
GDP	:	Gross Domestic Products
GRDP	:	Gross Regional Domestic Products
GT	:	Gross Tonnage
HP	:	Horse Power
ICD	:	Inland Container Depot
ICT	:	International Container Terminal
IEE	:	Initial Environmental Examination
IKI	:	Indonesian Ship Industry PT. Industri Kapal Indonesia

ISO	:	International Organization for Standardization
INCT, ITC	:	Inland Container Terminal
JICA	:	Japan International Cooperation Agency
JR	:	Japanese Railways
KIMA	:	Makassar Industrial Estate
LOA	:	Length Overall
L.S	:	Lump Sum
LWS	:	Low Water Spring
MGA	:	Meteorological and Geophysical Agency
MOC	:	Ministry of Communications
MOT	:	Ministry of Trade
MOF	:	Ministry of Finance
M/P	:	Master Plan
MSL	:	Mean Sea Level
O/D	:	Origin destination (Survey)
PERUMKA	:	Indinesia Railway Public Corporation (PERUSSAHAAN UMUM KERETA API)
PELABINDO	:	Indonesia Port Public Corporation (P.T. Pelabuhan Indonesia)
PDAM	:	Water Supply Enterprise
PLN	:	National Electric Company
PLTU	:	Thermal Power Plant
REPELITA	:	Five Year Development Plan
RTG	:	Rubber Tired Gantry Crane
SCF	:	Standard Conversion Factor
St.	:	Station
S/W	:	Scope of Work

TEU	:	Twenty Feet Equivalent Unit
TCT	:	Tanjung Priok Container Terminal
TCT III	:	Tanjung Priok Container Terminal III
TOR	:	Terms of Reference
TPU	:	Public Waste Incineration
TRCT	:	Through Container Train
VAT	:	Value Added Tax

Abbriviation of the names of ports and railway stations

Tg. Emas	Tanjung Emas
Tg. Perak	Tanjung Perak
Tg. Priok	Tanjung Priok Port
Uj. Pandang	Ujung Pandang

Bd	:	Bandung
Bks	:	Bekasi
Ckp	:	Cikampek
Gdb	:	Gedebage
Jak	:	Jakarta Kota
Jng	:	Jatinegara
Kac	:	Kiaracondong
Kpb	:	Kampung bandan
Mri	:	Manggarai
Pdl	:	Padalarang
Pwk	:	Purwakarta
Thb	:	Tanahabang
Tpk	:	Tanjung Priok
Tg. Priok	:	Tanjung Priok
Prp	:	Parugpanjang

THE STUDY ON THE MASTER PLAN OF CONTAINER CARGO HANDLING PORTS, DRY PORTS AND CONNECTING RAILWAYS IN THE REPUBLIC OF INDONESIA
Vol.2, MASTER PLAN OF CONTAINER CARGO HANDLING PORTS, DRY PORTS AND CONNECTING RAILWAYS

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1. INTRODUCTION

1.1 BACKGROUND OF THE STUDY

1.1.1 Background

1. For the past few years, the containerization in overseas and domestic trade of Indonesia has been overwhelming in the maritime transportation. The rapid growth of the industry is one of the major reasons as well as the global trend of the containerization.

2. Being the outlets of the industrial products to foreign markets, the ports shoulder the responsibilities to handle the container cargoes in an efficient manner to promote the socioeconomic activities of the country. Nevertheless, at present, only three ports, namely, Belawan (Medan), Tanjung Priok (Jakarta) and Tanjung Perak (Surabaya), among 43 major commercial sea ports have fully equipped container handling facilities. All other ports want container handling facilities and equipments, though the construction of full container facilities are going on in some ports: Panjang Port (South Sumatra), Tanjung Emas (Semarang) and Makassar (Ujung Pandang).

3. How to cope with the growing container traffic is not only an issue with sea ports, but also with access roads to the ports. In addition to upgrading highways in the hinterlands of the ports, the government of Indonesia has been making efforts to make much use of the existing railway facilities for the container transportation which serve as access to the ports from expanding industrial estates which are the major origins of the container cargos. Several inland container depots, i.e. Dry Ports, were established in line with this policy.

4. In April 1994, the government of Indonesia started its "Long-term Development Plan II" and "Repelita VI (The Sixth Five Year Development Plan)", both of which prescribe the government policy of the economic development in coming years. The ministry of Communications also published the long-term and five year development plan which provide a framework and guideline of the development in transportation sector.

5. Among various sectors within the field of transportation, the promotion of

efficient container transportation is given an emphasis. Agencies concerned to the transportation are finalizing the implementation plan on the basis of the Long-term and the Five Year Development Plans.

6. In the light of above, the government of Republic Indonesia requested the government of Japan to conduct a master plan study on the container cargo handling ports, dry ports and connecting railways, with an aim to formulate development strategies to realize the most efficient nationwide network of the container handling ports coupled with railway services.

7. The Scope of Work of this study was arranged in June, 1993, between the Ministry of Communication and the Japan International Cooperation Agency.

1.1.2 Scope of work

8. The Scope of Work of the Study prescribe as follows:

(1) Objectives of the study

The objectives of the Study are:

a. to formulate a master plan which shall be prepared for the year of 2010 for development of nationwide container cargo handling ports, dry ports and connecting railways,

b. to conduct a feasibility study which shall be prepared for the year of 2003 on a selected project within the framework of the master plan, and

c. to conduct technology transfer to the Indonesian counterpart personnel in the course of the Study.

(2) The study area

The Study area will cover the nationwide container cargo handling ports, dry ports and connecting railways. locations of the commercial ports and dry ports are shown in **Fig. 1.1**. The ports where substantial container cargos are presently handled are:

Belawan(Medan, North Sumatra), Panjang(Lampung, South Sumatra), Tanjung Priok(Jakarta, West Java), Tanjung Emas (Semarang, Central Java), Tanjung Perak (Surabaya, East Java) and Ujung Pandang (South Sulawesi).

The dry ports to be studied are:

Tebing Tinggi(connected to Belawan), Kertapati(Panjang), Gedebage(Tanjung Priok), Solo Jebres (Tanjung Emas) and Rambipuji (Tanjung Perak).

These major container cargo handling ports and dry ports are denoted with underlines in the figure.

(3) Scope of the study

This study covers the following tasks:

a. Evaluation of existing situation (Phase I Study);
   - i) Collection and analysis of available data and information relevant to the study,
   - ii) Field surveys,
   - iii) Analysis of present container freight volume, flow and network,
   - iv) Evaluation of existing facilities, and
   - v) Identification of existing problems.

b. Formulation of master plan (Phase II Study)

A master plan shall be prepared for the target year of 2010;
   - i) Setting up of socioeconomic framework,
   - ii) Forecast of the future container freight demand,
   - iii) Formulation of long-term development strategy,
   - iv) Analysis of facilities requirements,
   - v) Examination of development plan,
   - vi) Initial environmental examination (IEE), and
   - vii) Preliminary cost estimates.

c. Feasibility Study

The feasibility study shall be conducted for short-term development plan for the target year of 2003;
   - i) Engineering Survey on natural conditions,
   - ii) Container freight demand forecast,
   - iii) Formulation of short-term development plan,
   - iv) Preliminary design,
   - v) Implementation program,
   - vi) Formulation of operation and management plan,
   - vii) Environmental impact assessment (EIA),

viii) Cost Estimates,
ix) Economic and financial analysis, and
x) Project evaluation and recommendation.

(4) The interim Report

This Interim Report is intended to present the results of Formulation of master plan (b., Phase II Study), and when necessary, the results of Evaluation of existing situation (a., Phase I Study) are referred and cited.

1.2 METHODOLOGY OF THE MASTER PLAN

1.2.1 Master Plan of Container Handling Port

9. (1) Objective of the master plan

The primary objective of the master plan is to formulate a strategy for the realization of the national network of container handling facilities at ports and dry ports and to provide a long-term development plan of the priority ports and railways in the light of the strategy for the realization of the national network.

10. (2) Methodology of master plan

The formulation of master plan is performed following the work steps stated in 1.1.2 (3) above, and the work flow is shown in **Fig. 1.1**

In the master plan, attention is given to the work items denoted with double lines, and the work item "Hierarchy and Function of ports" is intended to propose the Development Strategy for National Container Port Network in Indonesia.

In the stage of the long-term development plan, due considerations are given to the existing plan and the reports of the historical studies were carefully reviewed as well as existing situations of the ports.

The outputs of the master plan are:

i) Development Strategy for National Container Port Network
ii) Facilities required to meet the traffic demand in 2010
iii) Layout plan for the major container ports
iv) Constraction schedule
v) Overall evaluation

1.2.2 Master Plan for Dry Port and Connecting Railways

11. The policy of the government is as follows;

The government is anxious about increase of the traffic congestion, environmental trouble and traffic accident due to increase of container transportation by trailer, from view point of the present traffic situation.

And the government was thinking about the shift from road to railway for the container transportation, as a national policy, in order to cover the strength problem of the road and bridge, to reduce the increase of maintenance cost and to increase the transportation efficiency. The government regulates already the container transportation on some roads. In order to promote the above modal - shift, the government tried to arrange the Dry Ports and connecting railways for some main regions and is promoting the shift from road to railway for the container transportation.

12. The Master Plan presented in this report is not new construction plan, but an improvement plan for existing facilities, and the study for each route should subsequently follow the order listed below.

i) Assessing present facility and the utilization condition
ii) Studying problems and the priorities
iii) Devising countermeasures to prepare for the future.

The Master Plan attempts to contemplate the necessity for investment spanning to the year 2010. Therefore, priorities for investment will be synthetically decided by considering not only container and individual dry port characteristics but also the growth in other fields of passenger and cargo transport.

Concretely speaking, survey of each route will focus on the following items. Dry ports and railways for the Feasibility Study will be selected by comparing the results of these surveys.

i) An emphasis will be given to railway demand including potential future demand, on competition problem with road transport, and on the relation with port railway facilities.
ii) The capacity of existing facilities for related railways and dry ports, and the propriety of future investment for these facilities.
iii) The scale and cost of improvement works.

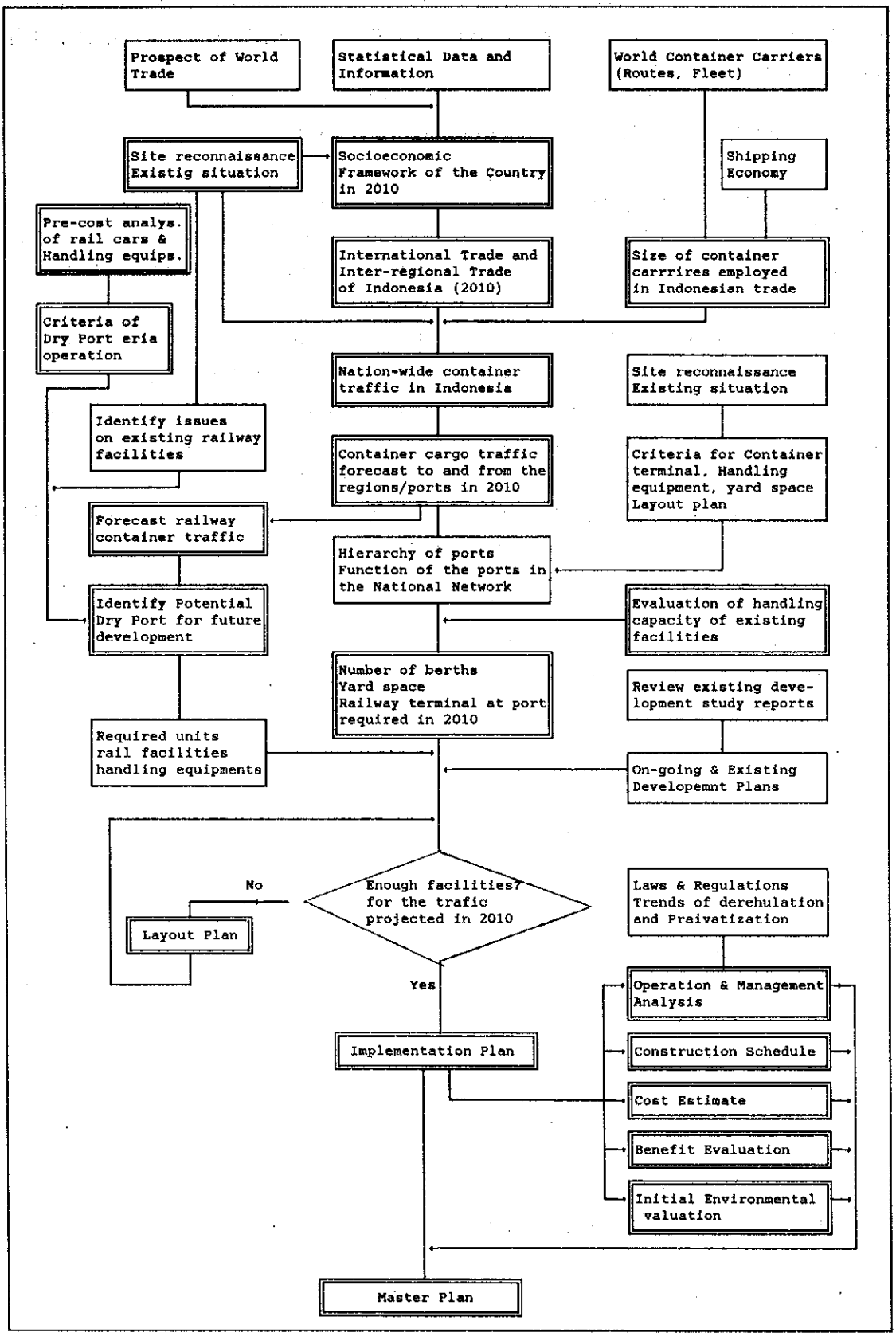

Fig. 1.1 Work Flow of Master Plan

2. BRIEF REVIEW OF THE EXISTING SITUATION

2.1 NATURAL CONDITION

(1) Geography

1. Port of Belawan is located in east coast of North Sumatra at Muara Belawan, and is passed through Belawan River. The condition around the port is sloppy and marshy. The access channel for the port is 14 miles in length, 100 m in width and 9.5 m in depth through in the river.

2. Tebing Tinggi Dry Port is located at 104 km south eastern side from Belawan, and connecting railway is along the principal road between Belawan, Medan and Tebing Tinggi.

3. Port of Panjang is located in the middle of Lampung Bay at south coast of Sumatra. The coastal condition around the port is sloppy and a natural deep water port capable of taking vessels to 12 m draft. The port occupied a natural harbor inside a coral reef on the Lampung Bay.

4. Kertapati Dry Port is located at 400 km northern side from Panjang Port, and is situated on the opposite side of Palembang port located along the Musi River.

5. Port of Tanjung Priok is located at bay of Jakarta where is in the Jakarta coastal plain of 40 km wide extending from Serang on the west to Cirebon on the east. the bay has been formed by rapid coastal accretion on the delta of the river Citarumin the east. Out of the port, the sea is shallow and large numbers of coral islands have been formed.

6. Gedebage Dry Port is located at eastern side of Bandung city where is 187 km from Tanjung Priok. The space of the dry port container terminal is approximately 15,000 m^2 with tracks for handling containers of 240 m in length and 8,000 m^2 container yard.

7. Port of Tanjung Emas is located in open sea at northern side of Semarang city in Central Java. The coastal condition is shallow and marshy.

8. Solo Jebres Dry Port in Surakarta city is located 112 km southern side of Semarang. The space of the dry port terminal yard is approximately 6,000 m^2 with tracks for handling containers of 220 m in length.

9. Port of Tanjung Perak is located in Madura Straits northern end of Surabaya city. The port has two access channel, west channel 9.5 m in depth and 50 km in length, and east channel with 4 m depth and 45 km in length. The container berth was constructed in the sea 1.8 km far from land. The berth is connected to the land side by trestle.

10. Rambipuji Dry Port is located at eastern side of Jember city, 194 km south eastern side of Tanjung Perak Port. The space of the dry port container yard is approximately 6,600 m^2 with tracks for handling containers of 280 m in length.

11. Ujing Pandang Port is located at western end of the Ujung Pandang city in west coast of South Sulawesi. The minimum water depth of the quay is 9 m and bottom of the sea is sand and mad. The port has a access channel, 2 miles in length and 12 m LWS in depth. Out of the port area, the several coral islands have been formed, natural deep access channel have passed through between the coral islands to the open sea.

(2) Geology

12. Sub-soil condition of the all ports except for Panjang, Ujung Pandang are consisted of cohesive soft layer with thickness of 40 m to 50 m in Blawan, 20 m to 35 m in Tanjung Priok, 30 m to more than 50 m in Tanjung Emas and 35 m to 55 m in Tanjung Perak. The soil condition of the on going project area in Panjang Port are consisted of medium density sandy material to -20 m from MSL, -20 m to -40 m is consisted of stiff clay and below -44 m is clay stone. Sub-soil condition of Ujung Pandang Port is consisted of soft clay to EL -20 m from ground, below -20 m is consisted of clayey stone.

13. Sub-soil condition of the dry ports area has no data of the boring investigations except for the Gedebage Dry Port. Sub-soil condition of the Gedebage Dry Port is consisted of soft clay to -20 m from ground, below -25 m is consisted of stone.

(3) Climate

14. The Climate of the ports and dry ports are summarized in Table 2.2 (1).

Table 2.2(1) Climate of the Ports and Dry Ports

North Sumatra (Medan)

NORTH SUMATRA	Temperature(c)		(mm)	(%)	Wind Speed
Month	Min	Max	Rain fall	Humidity	(Knot)
January	22.5	32.0	63.8	85.0	2.1 NE
Febrary	23.2	31.8	33.9	83.0	2.4 NE
March	23.4	31.5	27.1	84.0	2.6 NE
April	23.7	31.9	86.0	84.0	1.8 NE
May	23.8	32.1	134.7	83.0	1.8 NE
June	24.4	32.9	156.7	83.0	1.9 NE
July	24.5	33.0	122.7	84.0	2.2 NE
August	24.5	33.4	85.5	84.0	2.2 NE
September	23.4	31.0	268.3	85.0	2.0 NE
October	23.4	30.7	276.2	82.0	2.2 NE
November	23.3	30.1	236.6	84.0	2.2 NE
December	23.1	29.3	239.1	86.0	3.4 NE

SOUTH SUMATRA (Panjang)

	Temperature(c)		(mm)	(%)	Wind Speed
Month	AV		Rain fall	Humidity	(Knot)
January	26.0		345.4	84.9	11.3 N
Febrary	25.9		348.3	85.6	10.1 NW
March	25.9		240.5	82.6	9.9 NW
April	26.4		206.9	86.2	9.6 SE
May	26.3		156.5	85.1	8.2 E
June	26.1		96.7	85.0	7.7 E
July	25.6		76.3	81.0	8.7 SE
August	25.6		79.1	81.5	9.4 E
September	25.9		108.7	81.0	11.4 SE
October	26.1		91.8	80.5	10.8 SE
November	26.3		218.9	82.3	10.8 SW
December	26.2		278.9	84.2	8.7 S

WEST JAVA (Jakarta)

	Temperature(c)		(mm)	(%)	Wind Speed
Month	Min	Max	Rain fall	Humidity	(Knot)
January	23.8	30.1	369.0	83.0	3.0
Febrary	23.8	30.6	246.0	82.0	3.2
March	24.2	31.7	192.0	80.0	3.2
April	24.4	32.3	153.0	79.0	3.0
May	24.4	32.4	136.0	78.0	3.0
June	24.2	32.6	70.0	75.0	3.4
July	24.0	32.9	41.0	74.0	4.0
August	23.7	32.4	91.0	72.0	3.4
September	24.0	32.5	53.0	72.0	3.4
October	24.4	32.4	101.0	74.0	3.2
November	24.3	32.0	121.0	76.0	3.1
December	23.9	31.2	251.0	80.0	3.4

Table 2.2(1)' Climate of the Ports and Dry Ports

CENTRAL JAVA (Semarang)

	Temperature(c)		(mm)	(%)	Wind Speed
Month	AV		Rain fall	Humidity	(Knot)
January	26.8		400.0	84.5	5.0 W
Febrary	27.0		348.0	83.0	4.0 W
March	25.0		305.0	81.5	3.0 NW
April	27.8		115.0	79.8	4.0 N
May	28.0		151.0	79.0	4.0 SE
June	27.3		122.0	72.0	4.0 SE
July	26.5		96.0	75.0	4.0 E
August	27.3		58.0	69.8	4.0 E
September	27.5		156.0	73.4	4.0 SE
October	27.8		163.0	75.5	4.0 N
November	27.5		198.0	82.3	3.0 N
December	27.3		345.0	83.4	3.0 W

EAST JAVA (Surabaya)

	Temperature(c)		(mm)	(%)	Wind Speed
Month	AV		Rain fall	Humidity	(Knot)
January	27.4		303.5	81.0	0.4 N
Febrary	27.4		266.8	82.0	0.5 NW
March	27.5		215.8	84.0	0.4 S
April	27.9		170.5	83.0	0.5 E
May	28.8		93.3	79.0	0.4 W
June	27.8		44.3	76.0	0.5 E
July	27.3		23.5	73.0	0.6 E
August	27.7		3.8	70.0	0.4 E
September	28.6		1.8	69.0	0.5 E
October	28.8		23.3	69.0	0.4 N
November	28.1		101.3	75.0	0.4 S
December	27.3		266.3	81.0	0.4 W

SOUTH SULAWESI (Ujung Pandang)

	Temperature(c)		(mm)	(%)	Wind Speed
Month	Min	Max	Rain fall	Humidity	(Knot)
January	23.3	30.4	491.0	86.0	2.0
Febrary	23.5	30.5	316.0	87.0	1.0
March	23.8	30.6	353.0	87.0	1.0
April	23.4	31.1	165.0	86.0	1.0
May	22.7	31.9	26.0	84.0	1.0
June	22.4	31.5	162.0	84.0	1.0
July	21.4	31.8	3.0	79.0	1.0
August	19.7	32.6	2.0	72.0	1.0
September	22.3	32.4	83.0	79.0	2.0
October	22.3	33.2	32.0	75.0	3.0
November	23.2	33.2	155.0	80.0	3.0
December	23.9	29.9	347.0	84.0	3.0

Source : Kotamadya Medan Dalam Angka 1991.
: Departemen Prehubungan Perum Pelabuhan II.
: Meteorology and Geophysical Agency Jakarta.
: Directrate General of Sea Communication.
: Surabaya Dalam Angka 1992.
: Kotamadya Ujung Pandang Dalam Angka 1992.

(3) Hydrology

15. Tide, Current and Wave of the Ports are summarized in Table 2.2(2).

Table 2.2(2) Tide, Current and Wave of the Ports

Description	Unit	Jakarta Tj.Priok	Semarang Tj.Emas	Surabaya Tj.Perak	Medan Belawan	Lampung Panjang	Uj.Pandang Makassar
Tides							
HHWS	m LWS	1.7		3.2	3.3	1.8	
MHWS	m LWS	1.4	1.4	2.1	2.8	1.2	1.7
MSL	m LWS	0.9	0.6	1.5	1.9	1.0	0.9
MLWS	m LWS	0.6	0.1		0.9	0.8	0.4
LWS	m LWS	0.0	0.0	0.0	0.0	0.3	0.0
LLWS	m LWS	0.2		0.9	0.4	-0.1	
Low Water (ZO)	m MSL	-0.6	-0.6	-1.5	-1.5	-0.8	-0.9
Caracteristic		Semi-diurnal	Diurnal	Mix Semidiurnal	Diurnal	Mix Semidiurnal	Mix Diurnal
Current							
Av. Velocity	m/sec		0.047		0.55	0.14	
Max. Velocity	m/sec	0.4		1.2	1.1	0.18	0.55
Direction	(ebb)			NE	NW		SW
	(flood)			SE	NW		NE
	(Permanent)	E	NW				
Wave	Unit						
Max. Height	m	3.5	3.5	1.5	0.6	2.4	0.87
Direction		NW	NW	W	N	S	E
Max. Height	m	3.5	3.5			1.4	0.87
Direction		N	W			SW	SE
Max. Height	m	3.5					0.87
Direction		NE					W

Notes: HHWS= Highest High Water Spring.
MHWS= Mean High Water Spring.
MSL= Mean Sea Level.
MLWS= Mean Lower Water Spring.
LWS= Lower Water Spring.
LLWS= Lowest Low Water Spring.

Source: Indonesian Ports Information 1990, Feasibility Study for Proposed New Container Terminal Tanjung Priok Port Development 1991.
Presentation of Semarang Port Deveropment Plan (Phase II) 1993.
Studi Evaluasi Lingkuangan Pelabuhan Tanjung Perak 1993.
Geotechnical Analysis of Soil in the Port of Belawan.
Feasibility Study and Master Plan Review for The Port of Panjang 1992.
For Engineering Services of Ujung Pandang Port Urgent Rehabilitation Project 1989.

Wave Data of Panjang Port: No data was available on wave characteristics at Panjang. Therefore, the data of the port of Tarahan is adopted.

(4) Siltation of the Ports

16. Belawan port is passed through by Belawan River resulting sediments brought into the channel. The maintenance dredging of the channel has been therefore carried out throughout the year. The dredging volume is more than 2 million m^3/ year.

17. The Panjang port has never been carried out maintenance dredging, because the port is natural harbor inside a coral reef.

18. The major source of sediment in the Tanjung Priok port is from land. During the wet season (November to March), discharge from rivers and drains bring quantities of the fresh water and fine volcanic clay sediments into the port. The maintenance dredging has been carried out approximately 300,000 m^3/ year, 150,000 m^3 for Nusantara Basin, 50,000 m^3 for Basin II, III and 10,000m^3 for the channel.

19. The siltation of the Tanjung Emas is occurred by the current. The currents mainly flow in through the channel and diverge into the east area during flood tide. Total annual siltation is summed up to 56,000(outer) +128,000(channel) +22,000(inner)= 206,000 m^3/ year.

20. The major source of the sediment in the Tanjung Perak port is from Karimas River. During the wet season, the river flows to the port directly, which causes the channel to be shallow. The bottom of the sea is loose clay sand and soft mud. The maintenance dredging for the western channel had been carried out in average of 750,000 m^3 at intervals of once every two years, dredging for eastern channel had not been carried out.

21. The materials discharge from Jene Berang River is the major source of littoral drift around the Ujung Pandang port. However, the location of the port is northern side of the river, and the high wave comes from north to west. Therefore, the volume of the sediment is small, and the maintenance dredging for basin has carried out only a time until today.

2.2 SOCIOECONOMIC SITUATION

(1) Population

22. The population of Indonesia was 119.49 million persons in 1971 and 147.49 million persons in 1980. According to REPELITA VI, the national population reached 179.379 million in 1990 and 189.1 million in 1993. The annual population growth rate was 2.394% from 1971 to 1980 and 1.997% from 1980 to 1990.

23. The distribution of population of each island in 1990 is as follows :

- Sumatra	:	36.507 million
- Jawa	:	107.581 million
- Nusa Tenggara	:	10.165 million
- Kalimantan	:	9.100 million
- Sulawesi	:	12.521 million
- Maluku and Irianjaya	:	3.505 million

24. Analyzing the population distribution over the provinces, in 1990, West Jawa had the largest population 35.507 million, followed by East Jawa (32.504 million), Central Jawa (28.521 million) and North Sumatra (10.256 million).

25. From 1971 to 1980, the national population increased by 28.282 million. During this period the populations of West Jawa, East Jawa, Central Jawa, Lampung, North Sumatra, South Sumatra and of the Special Capital District of Jakarta all increased by more than one million persons. Those statistics suggest that population was concentrated in Jawa Island and a part of Sumatera Island. However, the provincial population increase rates were not proportionate to the absolute increase, because the base population was different in each province. The provinces which recorded high growth rates during this period were Lampung (5.83%), East Kalimantan (5.79%), Bungkulu (4.45%), Jambi (4.11%).

26. From 1980 to 1990 the population in Indonesia increased 31.889 million. Once again West Jawa, East Jawa, Central Jawa, Lampung, North Sumatra, South Sumatra, Riau and the Special Capital District of Jakarta all saw their populations grow by more than one million. This suggested that population was still concentrating in Jawa Island

and part of Sumatera Island. The provinces which recorded high growth rates in this period were East Kalimantan (4.42%), Bungkulu (4.38%), Riau (4.30%).

27. As of 1990, 60 percent of the total population is concentrated in Jawa Island (which represents only 6.89% of national land area), while in 1971 the rate was sixty-three percent. This suggests that only a slow improvement can be expected in rectifying the imbalance in the distribution of national population.

28. The population density of each island at 1990 is as follows:

- Sumatra : 77 / Km^2
- Jawa : 814 / Km^2
- Nusa Tenggara : 115 / Km^2
- Kalimantan : 17 / Km^2
- Sulawesi : 66 / Km^2
- Maluku and Irianjaya : 7 / Km^2

(2) Gross Domestic Products (GDP)

a. Gross Domestic Products

29. According to REPELITA VI, Indonesia's GDP was estimated at 139.934 trillion rupiahs in 1993. In 1992 it was 130.909 trillion rupiahs, which represented an increase of 1.69 times over the 1983 figure.

30. In 1985 the value of export decreased sharply because oil prices fell in the world market and because the repayment of overseas loans increased due to the depreciation of the US dollar. Accordingly, the GDP growth rate decreased to 2.5% in 1985, but policies to devalue the rupiah and to reduce government expenditures enabled the growth rate to recover to over 7% in 1989 and 1990. The average annual growth rate between 1983 and 1993 was 5.37% and the growth rate excluding oil and petroleum products was 6.59%, suggesting that the Indonesian economy is breaking away from its dependence on oil and become more diversified.

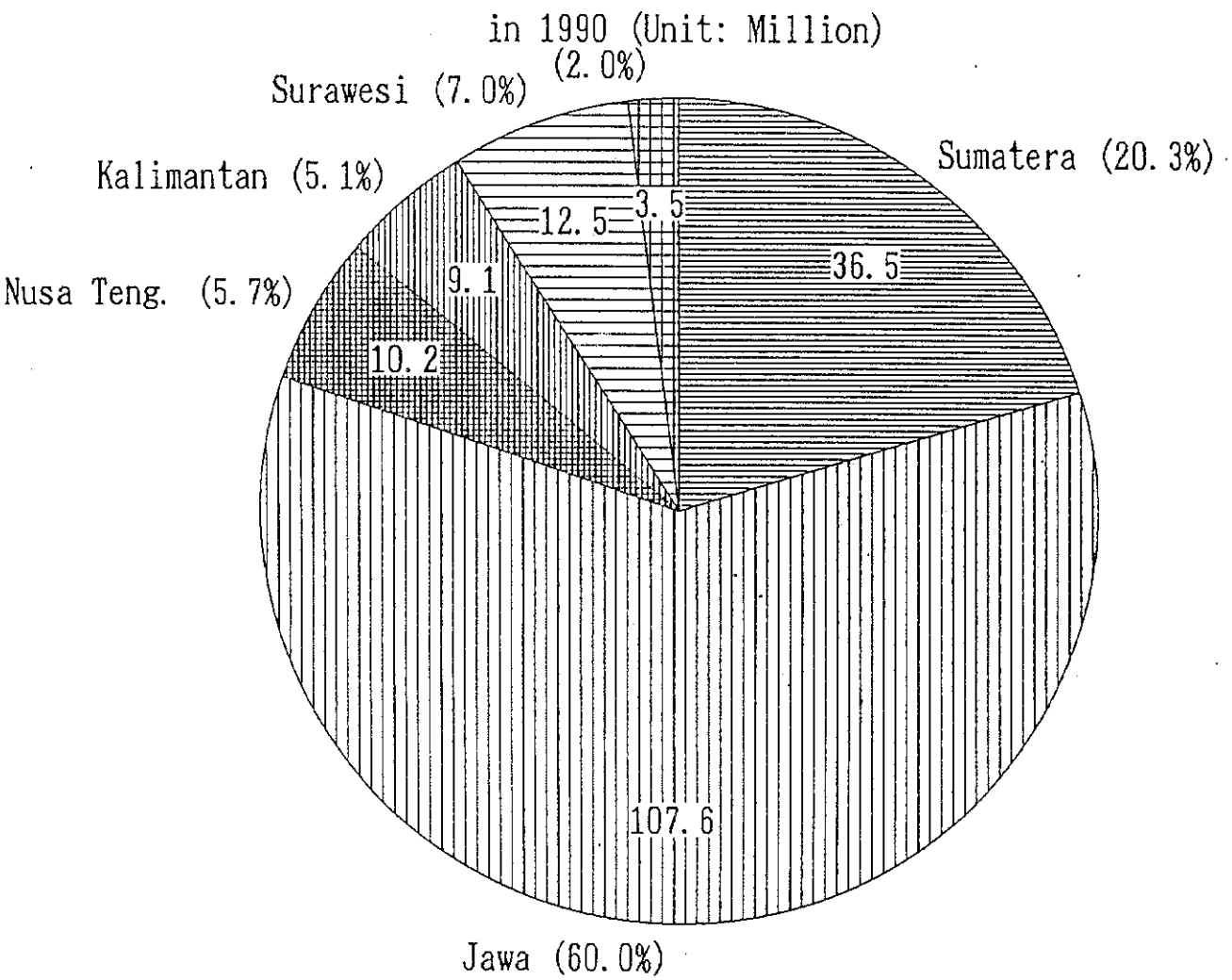

Fig. 2.1 Population in each Island

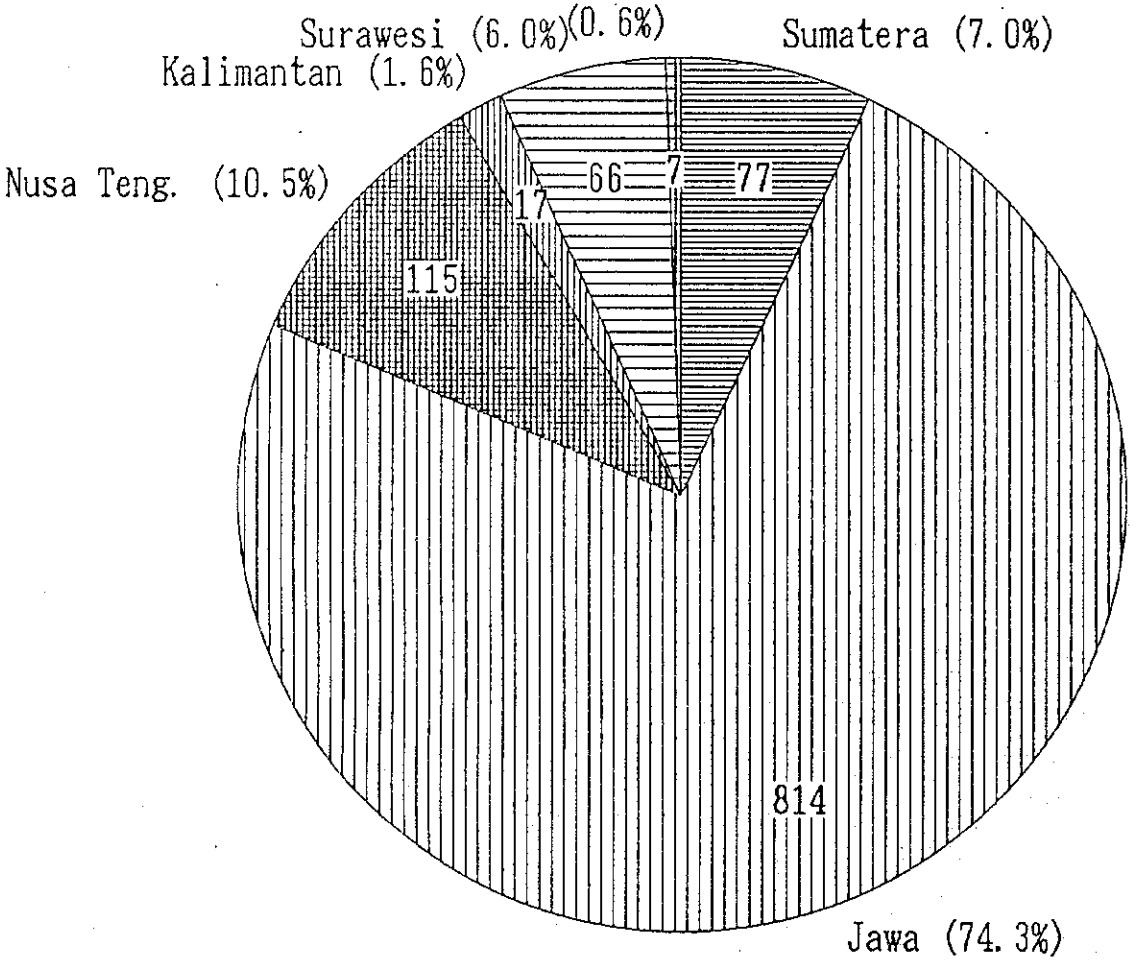

Fig. 2.2 Population Density of Each Island in 1990

(UNIT: Millon)

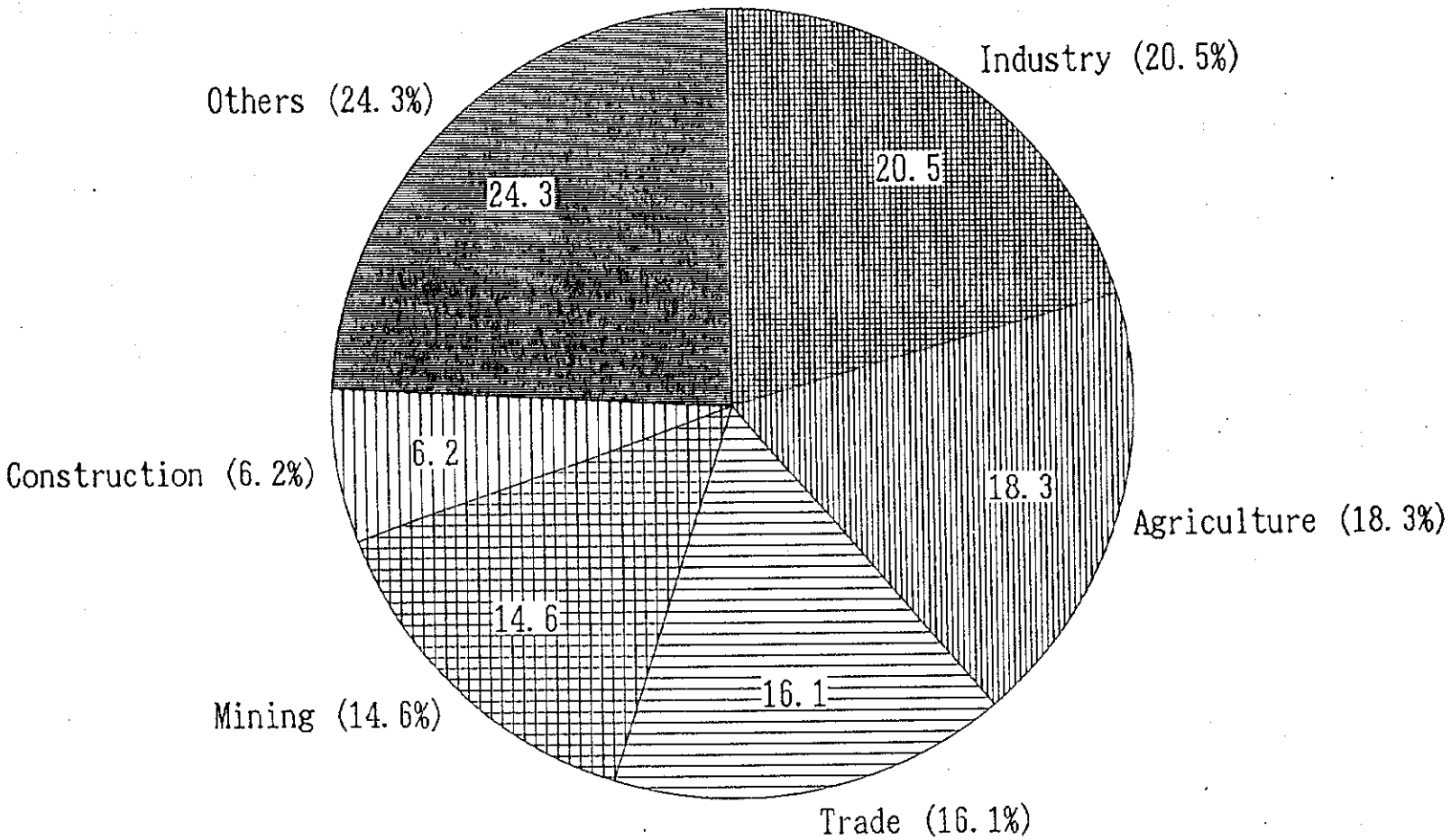

Fig 2.3 GDP share of various Sectors of Whole Nation in 1992

b. Growth Domestic Products of each province

31. In 1991, GRDPs of West Jawa, East Jawa, Central Jawa and of the Special Capital District of Jakarta were over 10.000 trillion rupiah. GRDPs of Ache, North Sumatera, Riau, South Sumatera and East Kalimantan was over 5.000 trillion Rupiah. It should be noted that GRDP of these provinces are mainly comprised of oil and its products, with the exception of South Sumatra.

32. The largest growth rate was recorded in Central Sulawesi province, which recorded a 203 % increase in GRDP between 1983 and 1991. During the same period, the smallest growth rates were recorded in Riau and East Kalimantan provinces (142% and 143%) respectedly. These figures suggest that those provinces which do not depend heavily on oil and petroleum products will see their economies grow at a faster rate than those that do. Nevertheless, it should be noted that while growth rates of the oil-dependent provinces were relatively small, but increase amount itself was greater for the provinces recorded smaller growth rates than these achieved high growth rate provinces.

c. The Gross Domestic Products of each Island

33. The population and GRDP shares of each island are as follows.

Table 2.12 Population and GRDP Share of Each Island

Unit:%

Island	Area	Population	GRDP	GRDP(Ex.OIL)
Sumatra	24.67	20.35	26.65	19.44
Jawa	6.89	59.97	55.53	63.17
Nusa Tenggara	4.61	5.67	2.96	3.57
Kalimantan	28.11	5.07	8.56	6.55
Sulawesi	9.86	6.98	4.49	5.41
Maluku, Irianjaya	25.87	1.95	1.80	1.85
Total	100.00	100.00	100.00	100.00

d. Per Capita GDP

34. In 1991, the per capita GDP in Indonesia was 655,000 rupiah in constant 1983 prices. The annual growth rate from 1984 to 1991 generally fluctuated between 4% and 6%. The rate fell to 2.24% in 1985 but soon recovered.

35. Per capita GRDP of Ache, Riau, East Kalimantan and Special Capital District of Jakarta was over one million rupiah in 1991. However, excepting oil and petroleum products, only East Kalimantan and the Special Capital District of Jakarta had a per capita GRDP of over one million rupiah.

e. GDP by Industrial Origin

36. In 1992, industry accounted for the greatest share of GDP, followed by agriculture. The sectoral composition of GDP was as follows: industry (20.5%), agriculture (18.3%), trade (16.1%), mining (14.6%), construction (6.2%) and others (24.3%).

2.3 SITUATION OF CONTAINER TRANSPORTATION

2.3.1 **Trend and environment of the global container cargo traffic**

(1) Trends in container freight volumes

1) Shifts in worldwide container freight volumes

37. Reflecting the recent trend towards containerization, worldwide container freight volumes have been steadily increasing year by year. The features of this growth, shown in **Table 2.13** and **Figure 2.14**, can be summarized as follows.

a) Worldwide container freight volume has grown about 5.8 times from 17.4 million TEU in 1975 to 100 million TEU in 1992, an average annual increase of 10.3%.

b) The annual increase in volume has reached the millions TEU, with the year 1990 to 1991 showing an increase of 8.0 million TEU, the largest in this 18-year period.

c) On a five-year basis, the greatest increase was for the period 1975 through 1982, in which container freight volumes rose at a rate of 16%. The rate of increase fell to 8.8% for the period from 1981 through 1986, but rose again to 9.4% for 1982 through 1987, and 9.9% for 1986 through 1992. These figures indicate that there was a sudden shift in 1984.

2) Shifts in container freight volumes in the Far East and Southeast Asia

38. **Table 2.14** and **Figure 2.15 and 2.16** show shifts in container freight volumes by region and by country for the top 30 countries in the world. According to these, the features of container freight volume in the Far East and Southeast Asia can be summarized as follows.

a) The combined container freight volumes in the three regions of Far East-Southeast Asia, North America and Europe make up about 80% of the world volume. This share has remained more or less constant for more than 10 years.

b) The average annual rate of increase for container freight volumes for the Southeast Asia region between 1981 and 1992 was 13.2%, higher than the world average of 8.6%. Ten of the top 30 countries were situated in this region.

c) Not only is the Southeast Asia region as a whole experiencing a sudden increase in container freight volumes, but the region contains a large number of countries with very high volumes. Accordingly, this region in particular is feeling the effects of the worldwide trend towards containerization.

4) Shifts in container freight volumes in the major ports of the Far East and Southeast Asia

39. According to Containerization International figures for 1994, 32 of the world's 200 busiest ports in 1992 were located in the Far East-Southeast Asia region. Organized by country, these were as follows. (Figures show world rankings, with the figures in brackets ( ) indicating the ranking of each within the region.)

a) Indonesia : Tanjung Priok 25 (12), Tanjung Per 66 (16), Belawan 128 (25)

Table 2.13 Trends of Container Cargo Handling Volume in the World

Year	Total TEUs ('000TEU)	Addition ('000TEU)	Growth Rate(%)	5-Year G.R. (%)
75	17,410			
76	20,263	2,853	16.4	
77	22,992	2,729	13.5	16.0
78	26,470	3,478	15.1	15.1
79	31,986	5,516	20.8	13.2
80	36,510	4,524	14.1	11.5
81	40,851	4,341	11.9	10.8
82	42,825	1,974	4.8	8.9
83	45,570	2,745	6.4	8.3
84	53,321	7,751	17.0	9.4
85	55,903	2,582	4.8	9.9
86	60,877	4,974	8.9	8.3
87	67,257	6,380	10.5	9.4
88	72,928	5,671	8.4	9.9
89	78,471	5,543	7.6	8.0
90	85,597	7,126	9.1	8.9
91	93,646	8,049	9.4	9.0
92	100,855	7,209	7.7	8.4

Source : Containerization International Year Book

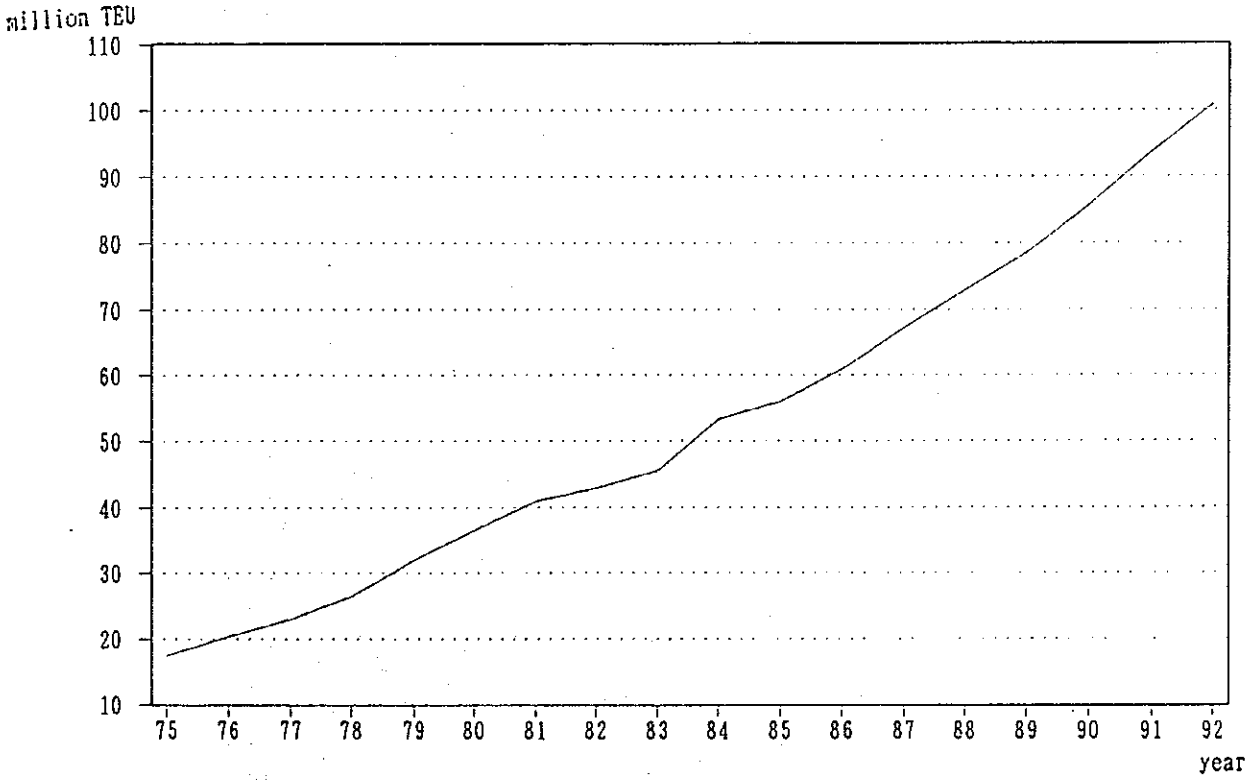

Fig. 2.14 Trends of Container Cargo Handling Volume in the World

Table 2.14 Trends of Container Cargo Handling Volume by Region and Country

(Unit : '000TEU)

Region	Country	81	82	83	84	85	86	87	88	89	90	91	92	Increase Rate(%)
Far East & South East	Japan	3,737	3,754	4,114	5,033	5,517	5,615	6,210	6,909	7,352	7,956	8,782	8,935	8.2
	Taiwan	1,788	1,902	2,429	3,027	3,075	4,105	4,772	4,889	5,278	5,451	6,130	6,179	11.9
	Hong Kong	1,560	1,660	1,837	2,109	2,289	2,774	3,457	4,033	4,464	5,101	6,162	7,972	16.0
	Singapore	1,085	1,116	1,340	1,552	1,699	2,203	2,635	3,375	4,364	5,224	6,354	7,560	19.5
	South Korea	803	862	978	1,178	1,246	1,533	1,949	2,065	2,159	2,348	2,571	2,751	11.8
	Philippines	553	685	735	658	638	754	914	1,097	1,160	1,408	1,441	1,158	6.9
	Thailand	242	259	305	341	400	511	650	795	939	1,078	1,172	1,313	16.6
	Malaysia	205	234	293	362	389	402	489	589	740	888	1,074	1,218	17.6
	PRC	91	143	192	273	446	487	407	794	942	1,204	1,506	1,241	26.8
	Indonesia	135	158	233	219	229	364	393	588	785	924	1,153	1,329	23.1
	Sub Total	10,199	10,773	12,456	14,752	15,928	18,748	21,876	25,134	28,183	31,582	36,345	39,656	13.2
India	Srilanka	58	103	128	181	216	341	429	621	544	584	669	676	25.0
	India	208	216	235	296	393	486	516	550	718	687	699	761	12.5
	Sub Total	266	319	363	477	609	827	945	1,171	1,262	1,271	1,368	1,437	16.6
Centra & South America	Puerto Rico	842	935	911	918	882	991	1,034	1,284	1,289	1,381	1,615	1,613	6.1
	Brazil	223	265	359	531	612	595	666	811	761	691	679	739	11.5
	Sub Total	1,065	1,200	1,270	1,449	1,494	1,586	1,700	2,095	2,050	2,072	2,294	2,352	7.5
Middle East	Saudi Arabia	914	1,049	1,187	1,176	947	824	830	823	759	789	1,071	1,154	2.1
	UAE	440	411	503	598	712	926	958	1,043	1,281	1,563	2,073	2,506	17.1
	Sub Total	1,354	1,460	1,690	1,774	1,659	1,750	1,788	1,866	2,040	2,352	3,144	3,660	9.5
Africa	South Africa	734	661	652	748	633	617	658	758	772	776	881	889	1.8
	Sub Total	734	661	652	748	633	617	658	758	772	776	881	889	1.8
North America	USA	8,363	8,730	9,559	10,902	11,533	12,393	13,258	13,968	14,440	15,245	15,546	16,742	6.5
	Canada	836	767	838	1,001	1,068	1,155	1,288	1,403	1,433	1,507	1,434	1,391	4.7
	Sub Total	9,199	9,497	10,397	11,903	12,601	13,548	14,546	15,371	15,873	16,752	16,980	18,133	6.4
Europe	UK	2,283	2,575	2,724	2,919	2,886	3,011	3,337	3,870	3,710	4,042	4,088	4,379	6.1
	Netherland	2,240	2,302	2,410	2,666	2,769	2,973	2,949	3,383	3,712	3,762	3,856	4,201	5.9
	Germany	1,725	1,690	1,759	2,056	2,152	2,254	2,562	2,817	3,041	3,267	3,512	3,602	6.9
	Italy	1,272	1,241	1,369	1,614	1,525	1,476	1,560	1,632	1,619	1,803	1,870	1,891	3.7
	Belgium	1,034	1,028	1,240	1,457	1,470	1,535	1,671	1,724	1,788	1,901	2,090	2,399	8.0
	France	1,280	1,215	1,165	1,290	1,485	1,350	1,341	1,435	1,607	1,565	1,594	1,302	0.2
	Spain	864	1,075	1,075	1,401	1,508	1,477	1,686	1,762	1,768	1,930	2,270	2,247	9.1
	Sweden	346	422	394	453	471	467	501	499	454	472	481	517	3.7
	Greece	195	211	201	186	208	353	289	371	419	480	549	645	11.5
	Sub Total	11,239	11,759	12,337	14,042	14,474	14,896	15,896	17,493	18,118	19,222	20,310	21,183	5.9
Oceania	Australia	1,254	1,267	1,203	1,399	1,413	1,337	1,433	1,289	1,379	1,637	1,672	1,834	3.5
	New Zealand	291	328	321	347	405	390	412	407	471	471	512	555	6.0
	Sub Total	1,545	1,595	1,524	1,746	1,818	1,727	1,845	1,696	1,850	2,108	2,184	2,389	4.0
Total		35,601	37,264	40,689	46,891	49,216	53,699	59,254	65,584	70,148	76,135	83,506	89,699	8.8
Word Total		40,851	42,845	45,570	53,321	55,903	60,877	67,257	73,810	78,471	85,597	93,646	100,855	8.6

Source : Containerization International Year Book

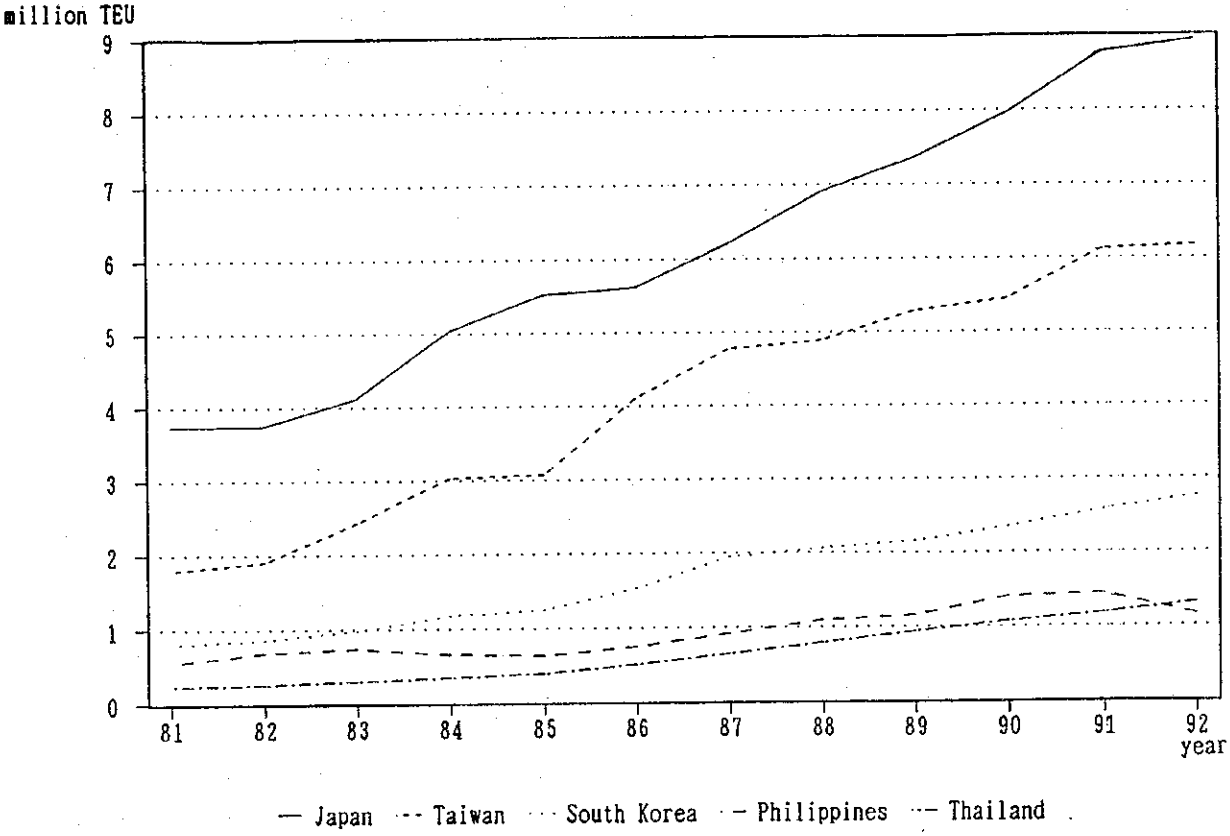

Fig. 2.15 Trends of Container Cargo Handling Volume by Country

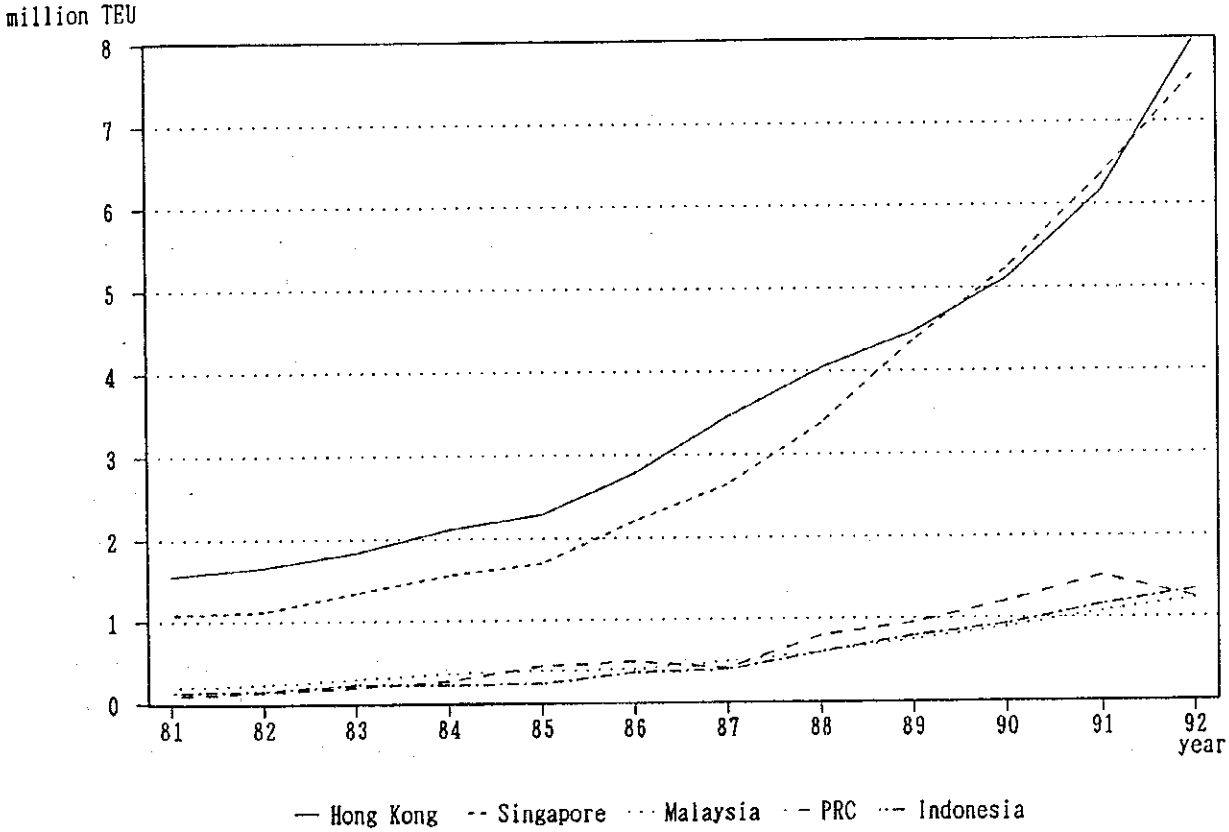

Fig. 2.16 Trends of Container Cargo Handling Volume by Country

b) Singapore : Singapore 2 (2)
c) Malaysia : Port Kelang 31 (13), Penang 68 (17)
d) Thailand : Bangkok 19 (9)
e) Philippines : Manila 21 (10)
f) Taiwan : Kaohsiung 4 (3), Keelung 10 (6)
g) Hong Kong : Hong Kong 1 (1)
h) South Korea : Pusan 5 (4)
i) China (PRC) : Shanghai 65 (15)
j) Japan : Kobe 6 (5), Yokohama 11 (8), Tokyo 14 (9), Nagoya 24 (11)

40. **Table 2.15** and ,**Figure 2.17** show the shifts in container freight volumes for six ports representative of the Far East-Southeast Asia region: Hong Kong, Kaohsiung and Keelung in Taiwan, Pusan in South Korea, Singapore, and Kobe in Japan.

41. All these ports rank highly among world ports and are important as "mother ports" servicing mother ships plying the major trade lanes between North America, the Far East, Europe and the Mediterranean. The features of container freight volume in these ports can be summarized as follows.

a) With the exception of Kobe, all of these ports registered fourfold to sevenfold increases in freight volume in the 12-year period from 1981 through 1992, reflecting the rapid increase in freight concentration seen in recent years.

b) Freight volume increases in Singapore were particularly striking. Taking 1981 as 100, the rise in freight volume in 1992 was more than treble the rise in this country's GNP. Increases in container freight volume outstretched those of any other port, with the intensification of container freight traffic including freight from surrounding countries as well.

c) Reflecting positive efforts to expand harbor facilities in recent years, container freight traffic in Hong Kong has intensified, with the port overtaking Singapore to become the world's number one port.

42. **Table 2.16** and **Figure 2.18** show the shifts in container freight volumes for five ports serving capital cities of major Southeast Asian countries: Tanjung Priok (Jakarta), Manila, Bangkok, Port Kelang, and Shanghai. The areas surrounding these ports are all

experiencing strong economic growth, with container freight volumes also increasing in recent years.

43. However, these ports are all "feeder ports" away from the major shipping lanes plied by mother ships. The features of container freight volume at these ports can be summarized as follows.

a) Of the five ports, Bangkok and Manila have the largest container freight volumes, although Bangkok has shown the higher rate of increase, with a rise in volume of 5.4 times in the 12-year period from 1981 through 1992. Freight volume is still on the increase, having risen an average of 18.6% - an extremely high figure - in the last eight-year period from 1985 through 1992.

b) Although the total container freight volume at Tanjung Priok (Jakarta) is still low, it has increased nearly nine times in the last 12 years.

c) There has been no sudden change in container freight volume at Port Kelang in the last 12 years, with the growth rate remaining a steady 13% or so.

d) Growth at Shanghai in the five-year period from 1981 through 1985 was considerable, an average of 42.1%, although recently it has fallen off.

e) Overall, container freight volumes at these five ports are small compared to those at "mother ports," with average volumes at Tanjung Priok (Jakarta), Manila, Bangkok and Port Kelang being about 100 TEU, one-fifth the volume at the six "mother ports" surveyed.

5) Changing trends in container freight volume at major ports

44. **Tables** 2.17 and 2.18 give outline the shifts in container freight volumes at the six "mother ports" and five "feeder ports" mentioned in 4) above. The features of container freight volume at these ports can be summarized as follows.

a) With the exception of Pusan, facilities in all of these "mother ports" are expanding. This growth has been particularly noticeable in Hong Kong, where wharf extensions and container terminal expansion have increased capacity

fourfold in the last five years.

b) Singapore, Hong Kong and Kaohsiung are all pushing ahead with facility expansion. These ports already have 14-meter deep berths and are capable of handling large container ships.

c) Construction of giant 15-meter berths is proceeding at "mother ports" around the world. Of the ports covered in this survey, Singapore is planning to complete two such berths in 1995, while Pusan, Kaohsiung, Hong Kong and Kobe all have plans for, or are in the process of constructing, 15-meter berths due for completion in or around the year 2000.

d) Compared to the six "mother ports," container freight volumes at the five "feeder ports" are small. Mooring facilities extend around 1000 meters at each of these ports, each of which has less than ten gantry cranes.

e) Manila and Port Kelang have wharves with berths over twelve meters deep and extensive container yards, and are both capable of handling large mother ships.

f) Tanjung Priok (Jakarta) and Bangkok have wharves with relatively shallow berths of nine and eleven meters, and small container yards measuring less than 20 hectares.

(2) World Container carrier fleet and routes

45. It is of great importance to take a brief look at the present status of the Indonesian ports in the midst of the world container transportation, for the Master Plan of this study aims at yielding a plan which will fulfill the demand by the clients/users of the ports.

46. For the analysis of the present situation of the container carrier fleet which has the relation with Indonesian trade, basic information regarding sea routes, operators, container carriers (name, size, etc.), calling ports, transhipment, and etc. were collected from various literatures: International Container Year Book, International Container Transportation Handbook, World container carrier fleet, and Indonesian Maritime Gazette,

and etc. (see Appendix 2.3.1). This section is the observations in the analysis of these information and data.

a. Sea routes of direct service to Indonesia

47. First of all, it might be interesting to review the container carrier fleet which call on the Indonesian Ports. **Figure 2.19** shows the sea routes where full container liners are calling on Indonesian ports. In practice, a ship plying along a sea route calls on various ports in the course of its journey. For the Indonesia-Japan route, for instance, almost all the ships employed stop by Kaohsiung, Hong kong and Singapore before they call on Indonesian ports for their final leg. For the purpose of examine which are the destinations where the containers can be transported from Indonesia without transhipment, the container service routes are classified on the basis of the origins of their voyage.

48. In the figure, the frequency of the services per week for each routes is shown by the thickness of the lines (and the numbers in the parentheses) and the sizes of the vessels in terms of TEU capacities are also exhibited. In addition to the schedules full container services, there are scheduled conventional cargo ship services which also carry container cargos, discussions will be made on only full container services, because the greater portion of the container traffic is shared by full container services.

49. The following items are observed in the figure:

i) Indonesian ports are interconnected to all the major trade regions of the world via direct container services,

ii) in intra-asia routes, namely, Japan/Korea route, Taiwan/Hong kong route and Singapore route, and Australia/New Zealand route, frequent service are provided, and

iii) the sizes of the ships deployed vary from 250 TEU to 1500 TEU.

50. The Indonesian ports where the ships stop by are shown in **Table 2.13**. Belawan Port is called on by the ships plying in Middle East-Singapore route. Jakarta (Tanjung Priok Port) and Surabaya (Tanjung Perak) are called on by the ships of all the routes mentioned above. Semarang (Tanjung Emas) receives the ships employed in Far East-Singapore route.

Table 2.15 Trends of Container Cargo Handling Volume in Asian Mother Ports

(Unit: '000TEU)

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Hong Kong	1,560	1,660	1,837	2,109	2,289	2,774	3,457	4,033	4,464	5,101	6,162	7,972
	100	106	118	135	147	178	222	259	286	327	395	511
(Growth Rate of GNP)	100											192
Kaohsiung	1,125	1,194	1,479	1,785	1,901	2,482	2,779	3,083	3,383	3,495	3,913	3,961
	100	106	131	159	169	221	247	274	301	311	348	352
Keelung	655	703	943	1,234	1,158	1,587	1,940	1,710	1,787	1,828	2,008	1,941
	100	107	144	188	177	242	296	261	273	279	307	296
(Growth Rate of GNP)	100											226
Busan	744	787	884	1,054	1,115	1,533	1,949	2,065	2,159	2,348	2,571	2,751
	100	106	119	142	150	206	262	278	290	316	346	370
(Growth Rate of GNP)	100											259
Singapore	1,065	1,116	1,340	1,552	1,699	2,203	2,635	3,375	4,364	5,224	6,354	7,560
	100	105	126	146	160	207	247	317	410	491	597	710
(Growth Rate of GNP)	100											204
Kobe	1,577	1,504	1,623	1,826	1,857	1,885	1,997	2,263	2,459	2,596	2,635	2,608
	100	95	103	116	118	120	127	144	156	165	167	165
(Growth Rate of GNP)	100											152

Source : Containerization International Year Book

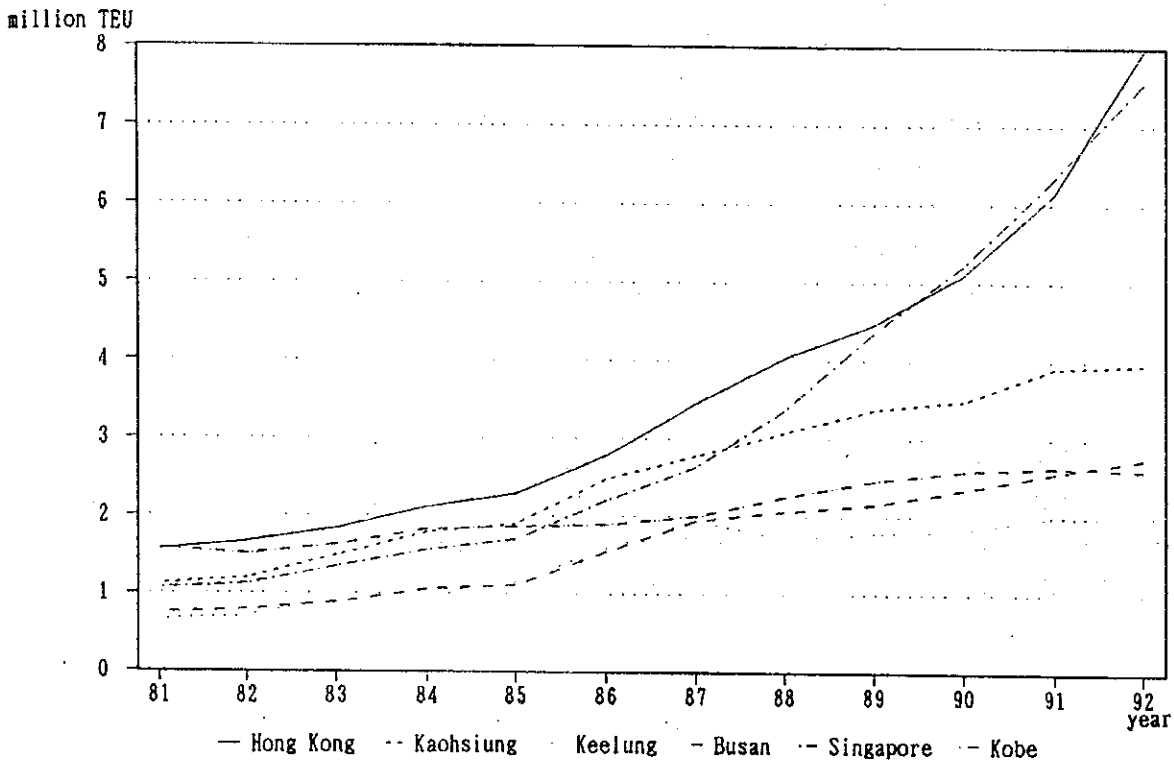

Fig. 2.17 Trends of Container Cargo Handling Volume in Asian Mother Ports

Table 2.16 Trends of Container Cargo Handling Volume in Asian Feeder Ports

(Unit: '000TEU)

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Manila	467	533	569	493	484	546	695	767	958	1,039	1,048	1,158
	100	114	122	106	104	117	149	164	205	222	224	248
(Growth Rate of GNP)	100											113
Jakarta	97	120	183	206	213	265	274	416	560	644	736	868
	100	124	189	212	220	273	282	429	577	664	759	895
(Growth Rate of GNP)	100											182
Port Kelang	148	157	193	241	245	242	276	326	399	497	608	678
	100	106	130	163	166	164	186	220	270	336	411	458
(Growth Rate of GNP)	100											196
Bankok	242	259	305	341	400	511	650	792	924	1,018	1,171	1,303
	100	107	126	141	165	211	269	327	382	421	484	538
(Growth Rate of GNP)	100											236
Shanghai	49	66	83	110	202	204	224	313	354	456	576	330
	100	135	169	224	412	416	457	639	722	931	1176	673
(Growth Rate of GNP)	100											265

Source : Containerization International Year Book

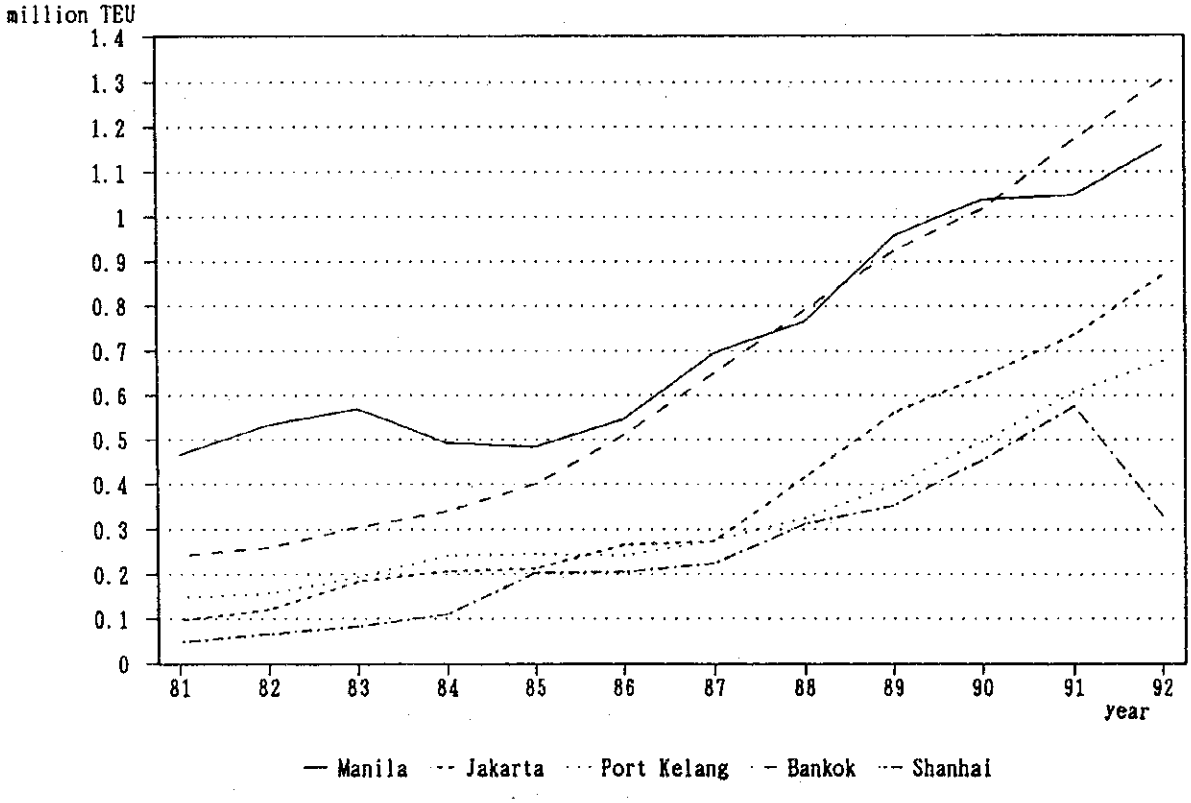

Fig. 2.18 Trends of Container Cargo Handling Volume in Asian Feeder Ports

Table 2.17 Trend of Arrangement of Container Cargo Handling Facilities in "Mother-Ports"

Port	Year	Berth (m)	Water Depth (m)	Terminal Area (ha)	Gantry Crane (No)
Hong Kong	1986	1,210	-12.2	41.5	20
	1987	2,573	-12.2	87.2	20
	1988	3,528	-12.2	126.1	28
	1989	3,528	-12.2	125.1	30
	1990	4,679	-12.2,-14	157.7	39
Kaosiung	1986	3,312	-10.5,-14	118.9	17
	1987	3,632	-10.5,-14	129.2	23
	1988	3,632	-10.5,-14	129.2	26
	1989	4,272	-10.5,-14	149.6	29
	1990	4,272	-10.5,-14	149.6	29
Keelung	1986	1,635	-12	24.7	8
	1987	2,150	-12	24.7	12
	1988	2,371	-12	24.7	13
	1989	2,951	-12	24.7	17
	1990	3,072	-12	24.7	19
Busan	1986	1,262	-12.5	63.0	8
	1987	1,262	-12.5	63.0	8
	1988	1,262	-12.5	63.0	8
	1989	1,262	-12.5	63.0	8
	1990	1,262	-12.5	63.0	9
Singapore	1986	2,672	-9,-13.2	115.0	18
	1987	2,907	-10,-13.4	115.0	18
	1988	3,060	-10,-14	121.0	22
	1989	3,060	-10,-14	121.0	27
	1990	3,060	-10,-14	121.0	27
Kobe	1986	6,172	-10,-14	178.1	37
	1987	6,522	-10,-14	189.7	40
	1988	7,557	-10,-14	188.7	43
	1989	7,627	-10,-14	188.2	47
	1990	7,665	-10,-14	199.0	47

Source: Containerisation International Yearbook

Table 2.18 Trend of Arrangement of Container Cargo Handling Facilities in "Feader-Ports"

Port	Year	Berth (m)	Water Depth (m)	Terminal Area (ha)	Gantry Crane (No)
Manila	1986	988	-12	21.5	2
	1987	988	-12	21.5	2
	1988	988	-12	21.5	2
	1989	988	-12	70.0	3
	1990	900	-12	94.0	3
Tg. Priok	1986	400	-10.5	18.4	3
	1987	400	-10.5	18.4	3
	1988	400	-10.5	18.4	3
	1989	650	-11	18.4	4
	1990	820	-11	18.4	4
Port Kelang	1986	853	-11,-13.5	24.2	4
	1987	853	-11,-13.5	24.2	4
	1988	853	-11,-13.5	24.2	5
	1989	853	-11,-13.5	48.0	5
	1990	853	-11,-13.5	48.0	5
Bangkok	1986	1,240	-8.2	16.0	-
	1987	1,240	-8.2	16.0	-
	1988	1,240	-8.2	16.0	6
	1989	1,240	-9	16.0	6
	1990	1,262	-9	16.0	9
Shanghai	1986	809	-10.5	35.6	6
	1987	809	-10.5	35.6	6
	1988	966	-10.5	41.3	6
	1989	966	-10.5	41.3	6
	1990	966	-10.5	41.3	6

Source: Containerisation International Yearbook

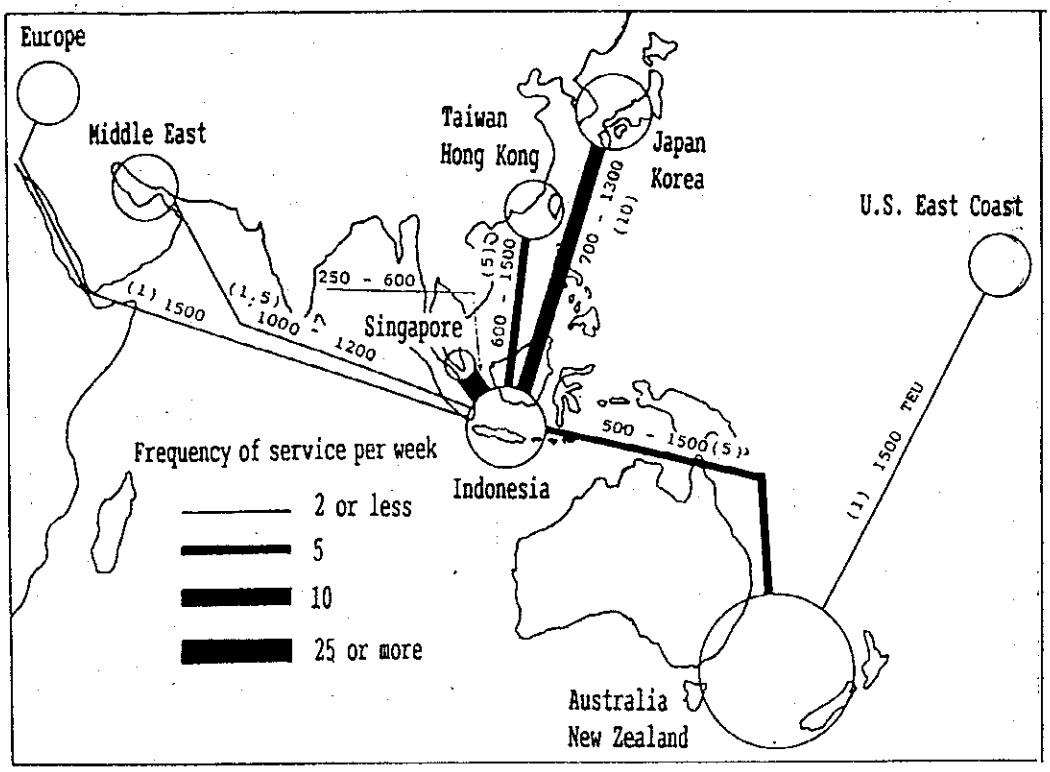

Fig. 2.19 Direct service routes and frequency of service (Ship size in TEU capacity)

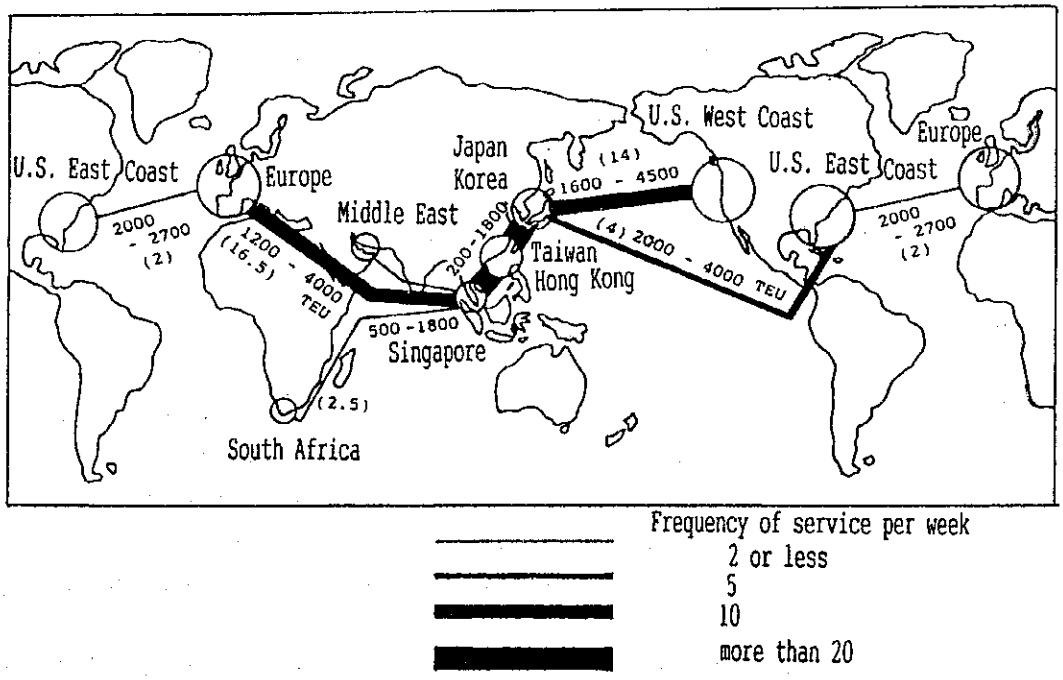

Fig. 2.20 Mother vessel service with feeder service to Indonesia (Ship size in TEU capacity)

Table 2.19 Direct Service to Far East, Australia & New Zealand, and Middle East

Middle East	BLW	SIN	JKT	SMA	SBY	HK KAO Keel Ja.	AUST. NZ	Frequency Capacity
		0	0	0	0	0		0.5/w 720
		0	0		0	0		5/w 400-1200
		0	0			0		4.5/w 1150-1500
			0			0	0	0.5/w 500
		0	0				0	3/w 750-1500
		0	0		0		0	1/w 1500
0	0	0						1.5/w 1000
0		0	0		0	0		0.5/w 1200

b. Sea routes providing feeder service to Indonesia

51. In addition to the direct container service to Indonesia, many container carrier operators provide feeder service to Indonesian port from Singapore, Hong Kong, Kaohsiung or Keelung. **Figure** 2.20 shows the sea routes and frequency of services which are interconnected to the feeder services. The size of the container carriers deployed in each sea routes also shown with the numbers appear beside the routes.

52. It is seen in this figure that in the Far East-North America routes (both West Coast and East Coast) and the Far East-Europe route, the size of the container carriers

are large in comparison with the intra-asia routes. It should b noted that in Far East-West Coast of North America some shipping lines have introduced so-called Post-Panamax, or the fourth generation, container carriers which have the carrying capacity of 4,500 TEUs, and that some other shipping lines are still operating medium size container carriers in the same long distance sea routes.

53. The shipping lines which operate full container carriers both Europe- Far East-North America and Intra Asia routes are listed in **Table 2.20** together with their fleet composition. The numbers given as additional ships in this table denote the container carriers on order which are expected to be in service in 1995 or 1996. It is seen that all the shipping lines listed in the table intend to deploy larger size carriers in their service routes in the coming years.

54. In the same manner, **Table 2.21** shows the shipping lines operating their fleet in the Intra-Asia sea routes.

Table 2.20 Shipping Lines who operate full container ships both US-Far East-Europe and Inter Asia

Shipping Line	Container Ships Operated by the Shipping Line (by Ship Size TEUs)									
	4000 over	4000-3500	3500-3000	3000-2500	2500-2000	2000-1500	1500-1000	1000-500	500-200	Total
ACE Group (KL/NOL/OOCL)	+8		9	2	5					16+8
APL	5+6			9	4	3	3	3	4	31+6
COSCO (Chaina Ocean S.)		+6		6		5	12	7	8	38+6
Cho Yang				9	1	1	1	1	3	16
Hanjing	3+2			18		2	7	2		32+2
Hyundai	5+4			6	1			1	2	15+4
NYK	+3	6	5	10	6	15+4	3	9	2	56+7
Maersk	12		9	2	7		10	5	3	48
MOL/KL MOL KL	+ 5	 4 8		 13+2 7	 4 7	 8 4	 2 6	 2 5	 2 11	 35+7 48
Nedlloyd			6	7	2	6	11	3	4	39
OOCL	+6		9	6	4	7	3	3	3	35+6
Sea-Land	+4		12		16	4	12	17	1	62+4
Yang Ming		+4	3	8		11			2	24+4
Total	25+38	18+10	53	103+2	57	66+4	70	58	45	495+54
Share (1996)	11.4%	5.0	9.7	19.1	10.4	12.9	12.8	10.5	8.2	100%

Note: Numbers shown as additional ships denote new buildings in 1995/96.
(Source: Containerization International year book, 1994, Nationnal Magazine Co. Ltd)

Table 2.21 Shipping Lines who operate full container ships in Inter Asia Route

Shipping Line	Container Ships Operated by the Shipping Line (by Ship Size TEUs)									
	3000-2500	2500-2000	2000-1500	1500-1000	1000-800	800-500	500-300	300-100	100-ess	Total
ANRO (Aus-SIN)				6	2					8
Cheng Lie (Chuwa)				2	4	2	2			10
Djakarta Lloyd (PIL)				3		2	1	1		7
Hueng-A				1	1		5	12	4	23
Nantai				0 + 1		3				3
TSK				8			3	1		12
Uniglory				3 + 1	13	3	1			20
Wan Hai, MAIN G				5		8	3			16

c. Feeder services from Indonesian ports to transhipment ports

55. At present, there are many container carriers plying among Indonesian ports and three transhipment ports in Asia, namely Singapore, Hong Kong, and Kaohsiung/Keelung. In practice, most of the container carriers does not provide non-stop services between the origin and the destination, but stop by several ports both in Indonesia and the transhipment ports. However, in order to delineate the container service network, i.e., how the Indonesian ports are interconnected with these three destinations in Asia without transhipment, the presently available routes are drawn with straight lines in **Fig. 2.21.**

56. In this figure, the thickness of the line exhibit the number of the container carriers employed in the respective feeder service routes, and the sizes of the ships are also shown in terms of the range of TEU capacities.

57. The following are observed in the figure:

i) All the major ports of Indonesia are interconnected with Singapore, and very frequent container service is available in this route,

ii) In addition to the feeder service to Singapore, Tanjung Priok port and Tanjung Perak (Surabaya) are also interconnected with Hong Kong and Kaohsiung/Keelung with weekly services,

iii) Though the frequency is low, there are container services from Belawan and Tanjung Emas (Semarang) to Hong Kong/Kaohsiung/Keelung.

58. It is also recognized that Tanjung Priok and Tanjung Perak Port are the two largest ports where numbers of feeder ships are calling. However, as far as international container traffic, these two ports do not seem to function as hub-ports for other major ports: Belawan, Panjang, Tanjung Emas, which are also directly interconnected with the transhipment ports outside of Indonesia. Thus, even though there exist some difference in the scale of container cargo volume among the major ports of Indonesia, all these ports equally have the function as the gateway of respective regions.

59. Regarding the ship size of feeder vessels, medium size container carriers with carrying capacity from 1000 to 1500 are seen in some feeder routes: Belawan-Hong Kong/Taiwan, Tanjung Priok-Singapore/Hong Kong, while smaller size vessels are plying in other routes. This is because the container carriers employed in intra-asia routes also serve as feeder vessels for Far East-North America and Far East-Europe routs.

(3) Railway Container Transport

a. Asia

i) Japan

60. JR Cargo joined the field of marine container transport in April 1989, when the company began a 58 km transit route between Honmoku Pier in Yokohama and the Oi Pier Cargo Terminal in Tokyo. Presently, a train carrying twenty containers makes one round trip every day.
Although the marine container division has just been initiated, they say that JR Cargo has the policy to promote marine container transport through the development and the adoption of new type cars with lower deck.

61. The following issues need to be solved in the future:
* It is said Railway transport of marine containers has an advantage over road transport in case the distance exceeds 130 to 280 km. Moreover, many industrial zones are located near main ports on the long coast line of Japan. The distance across the main island of Japan is only 300 km, with a dividing ridge running through the center.

Therefore, 90 % of all container cargo travels a distance of less than 100 km.

* An inland depot needs huge investment, which in spite of the insufficient demand volume, so that it would get unprofitable.

Handling small quantities of containers is inefficient since stations require large facilities to correspond to weekly fluctuation caused by shipping term.

* Container transport is affected by insufficient track capacity on trunk lines.
* Deregulation for the trucking industry will probably invite the increase of long distance trailer transport.
* Marine container boxes with high cube and high length (40 ft) are difficult to transport.

ii) China

62. China, which is characterized by an enormous inland landmass, controls vehicle container transport within 200 km distance from ports, and the regulations require that railway transport should be applied for distances exceeding this vehicle transport limit. Therefore, railways carry 80 % of all export and import containers (1.5 million TEUs in 1991) in China. Consequently, this explains the reason why Chinese ports have adopted the direct handling method between ships and wagons.

63. The other reasons for utilizing railway transport are as follows:

* Vehicle transport is too costly.
* Highway lines are affected by weak bridge beams and road surface intensity.

64. On the other hand, railway transport has disadvantages stated below.

* CFS and ICD have not been adopted nationwide yet.
* Facilities and computer technology for multiple transport are still underdeveloped.

65. Although China is promoting land bridge transportation to Europe and Iran via Siberia (10 thousand TEUs as of 1986), most of these land bridge routes stop in Russia. China is currently developing a domestic transport network for the four major ports of Dairien, Tianjin, Shanghai and Guangzhou. This network will primarily develop railways and encourage CFS or ICD construction in inland regions.

iii) Other areas including Southeast Asia

66. Significant development concerning railway transport for containers is not found.

b. United States

67. 80 % of marine cargo from Japan and the Far East arrives on the West Coast. 60 % of this marine cargo is destined for inland regions. Each major ports on the West Coast of the United States and Canada established the cooperation system with ship, railways and trucks called "gate ports" .
It is not an exaggeration to say that railways in the United States have been originally for cargo transport only.

68. As container ships are sailing across the Pacific under frequent pace, the container enterprise combined with land, sea and air operations is in the era of international multiple transportation now named INTERMODAL. In the United States, the doublestack train (DST: a train able to carry two stacks of containers), was created to support the marine transport industry by ensuring prompt cargo arrival at inland regions on determined dates, and it symbolize the fierce competition to strengthen and rationalize transport services.

69. In North America, The inland cargo transport from the West Coast to Midwest and East Coast regions, is considerably increasing. In addition, the amount of cargo unloaded in the Pacific Southwest region, where possesses the largest consumer districts on the West Coast, is conspicuously larger than in the Pacific Northwest region.
Benefiting from the improved logistics and other factors, more cargo will probably avoid direct unloading at the East Coast, and instead be delivered by multiple transportation complex via the West Coast in the future.

70. Already, American shipping companies are substituting the total system for international multiple transport called the American Land Bridge for the travel through the Panama or Suez canals. In this system, cargo from Japan is carried by ship to Seattle, then by railway to New York, and finally by ship to Europe. Other major ports on the West Coast connected with railways for this system include the each ports of Portland, Los Angeles and Long Beach.

c. Europe

71. In Europe, production and consumption centers are located not only on the coast line, but in deep inland regions such as Austria and Switzerland as well. Therefore, railway transport with large quantity and long distance plays a significant role in this continent.
Since transport by inland waterways is inferior on time consuming, most containers are transported by railways along with trucks.

72. In December 1967, the railway company consisted of 11 European nations called Intercontainer, was established for adopting a large scale container (Transcontainer) with ISO standards developed around 1965.
Still more 12 countries have joined this organization as the years passed, and 23 national railways in total are now members of Intercontainer. Since business agreements have been made with national railways in Turkey and Romania, it can be said that Intercontainer operations substantially cover the entire European continent, with the exception of Albania and the CIS.
National railway members in Intercontainer gain the right to become "Common Commercial Agencies" authorized to sell international railway transport services for mass containers to customers (ie. shipping companies, forwarders, manufacturers). Railway members or subsidiaries authorized as agencies comprehend customer needs through daily operations or voluntary market surveys, and then respond to these needs by organically combining routes or terminals owned by each member. Since the Intercontainer company only possesses container cars, it depends entirely on railway members to provide transport means.

73. Intercontainer is currently pouring almost of its resources into the operation called the block train, which is gaining popularity in the European market. This block trains enables quick and economic transport of mass cargo by eliminating the need for unloading and transfer within terminals. Intercontainer regularly runs rapid container trains known as the TECE (Trans Europe Container Express) across the European continent. Thanks to the block train, the TECE can now travel directly among terminals without having to transfer freight to other cars.

74. Intercontainer also operates specified block trains for passengers. European railways utilize individual networks, adding to the TECE, such as the national railway

for general merchandise (TEEM) or the Intermodal railway (TEC), but cargo transported by these networks must be classified according to destination at marshalling yards. Marine containers account for a considerable 53.6 % of all containers handled by Intercontainer. However, the actual rate of marine containers is probably falling annually because this volume has been kept as it was for a while.

75. Intercontainer is competing with trucks and barges in the field of marine container transport, the latter gaining power in recent years. It has introduced the Marine Container Network (MCN), for gaining an edge over competition currently being implemented for marine container transport from the ports of Hamburg and Antwerp to inland regions in Germany. This system features competitive prices set in accordance with the specified districts instead of carrying distance.
Intercontainer is also enthusiastically venturing into the Iberia peninsula.

2.3.2 Trend and environment of the domestic container cargo traffic

76. At present, large portion of the domestic cargos are transported in the form of general cargo, and the share of the container cargos still remain low. However, domestic containers are handled in many ports and domestic liner services are available in various domestic sea routes. As an example, **Fig. 2.22** is drawn to exhibit the container service routes operated by a shipping line. It is seen that weekly container services bound for Tanjung Priok are available at Pontianak, Banjarmasin, Semarang, Surabaya, Bitung and Ujung Pandang. bound for Tanjung Priok. Between Surabaya and Ujung Pandang, a weekly container service is available. Thus, it can be recognized that Tanjung Priok Port and Tg. Perak Port serve as hub-ports for the ports in Karimantan, Sulawesi, and other ports in eastern part of Indonesia.

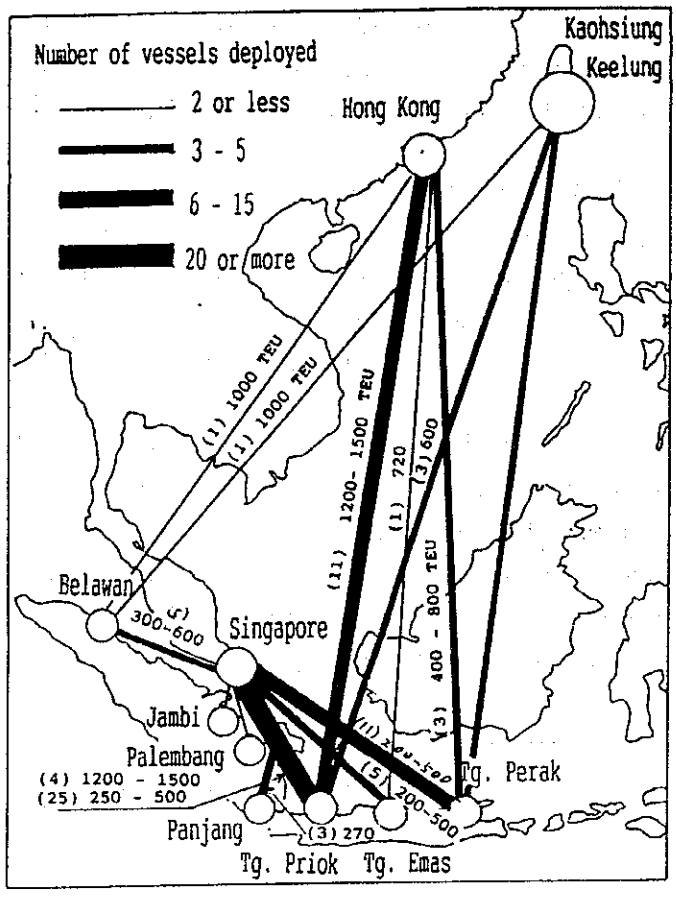

Fig. 2.21 Feeder service routes for International containers and number and size of ships deployed

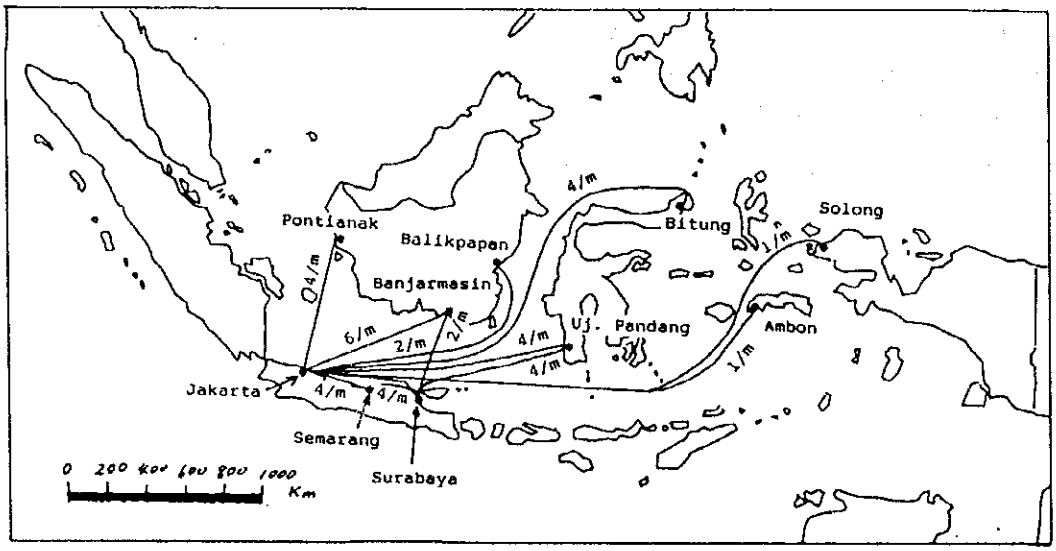

Fig. 2.22 Domestic container service routes and frequency

2.4 ORGANIZATION OF PORTS AND RAILWAYS

2.4.1 Ports

(1) Port system in Indonesia

a) Public ports

77. The Public ports in Indonesia are classified into two categories. One is named the commercial ports which are managed by Port Corporations, and the other is named the non-commercial ports which are directly managed by the governmental offices at Various locations (KANPEL). Apart from these public ports, there are about 600 fishing ports which are administrated by the Ministry of Agriculture.

78. The commercial ports, handling international and major domestic trades, and totals to 110. They are grouped into four on a geographical basis and four Indonesia Port Corporations were established to manage and operate these four groups of the commercial ports. These are commercial ports are further divided into five classes according to the cargo handling volume and the scale of facilities.

79. The non-commercial ports handle local commodities for local industries and residents in their relatively small hinterlands. The non-commercial ports are also further divided into two categories: namely the mother ports and the working units. At present, there are about 550 non-commercial ports and most of them are located in isolated areas and small islands.

b) Special port and Special berths which constructed and operated by such sectors as

80. In Indonesia, there are some private ports and wharves, which are constructed and operated by such sectors as agriculture mining, manufacturing Industry, forestry and tourism under the permission of the Ministry of Communication (MOC). These ports and wharves are exclusively used to handle specific commodities such as oil, fertilizer, flouer, timber, coal, and so on (raw materials and their products). It should be noted that the new Maritime Act prohibits to use the special ports for public use except in special circumstances such as natural disasters, in which case the government may grant

permission.

c) International ports

81. As a part of the Presidential Instruction 4/1985 (INPRES 85), which called for a set of measures for deregulation reform, the so-called Four Gateway System policy was replaced by a new policy which opened 117 ports to international trades on the basis of the decrees of MOC, Ministry of Trade and Finance, (MOFT), Ministry of Finance (MOF), as of 1994, there total of 129 international ports, comprising 80 public ports and 49 special ports.

(2) Organization and management

82. The directorate General of Sea Communication (DGSC), which is the one of the extra-ministerial bureau of the MOC, takes charge of service for public ports in Indonesia. The DGSC has the secretariat and six branches (see **Fig.2.23**, and is responsible for the whole shipping administration such as management, operation, development, and practice. The DGSC also has six affiliated corporations and company: four Port Corporations, one Dredging Corporation, and 1 Shipping Company.

83. These government affiliated corporations and company run port and shipping business. The condition of port management and operation in Indonesia is shown in **Fig.2.24**. As for the commercial ports, profitable services such as pilotage, loading and unloading and facility are performed by the Port Corporation.

84. The profitable services like maintenance for navigation route, the MOC directly manages them with their implementing agency, the Port administrator's offices (PAO) at the highest class ports. The other commercial ports are managed with the port administrators (ADPEL) by the regional transport offices which are the branch offices of the MOC in every province. Non commercial ports are managed by the port offices under the district transport offices. The PAO has powerful authority to iniciate arbitrate conflicts among not only ports but also port-related organizations (the customs, quarantine section, the immigration office).

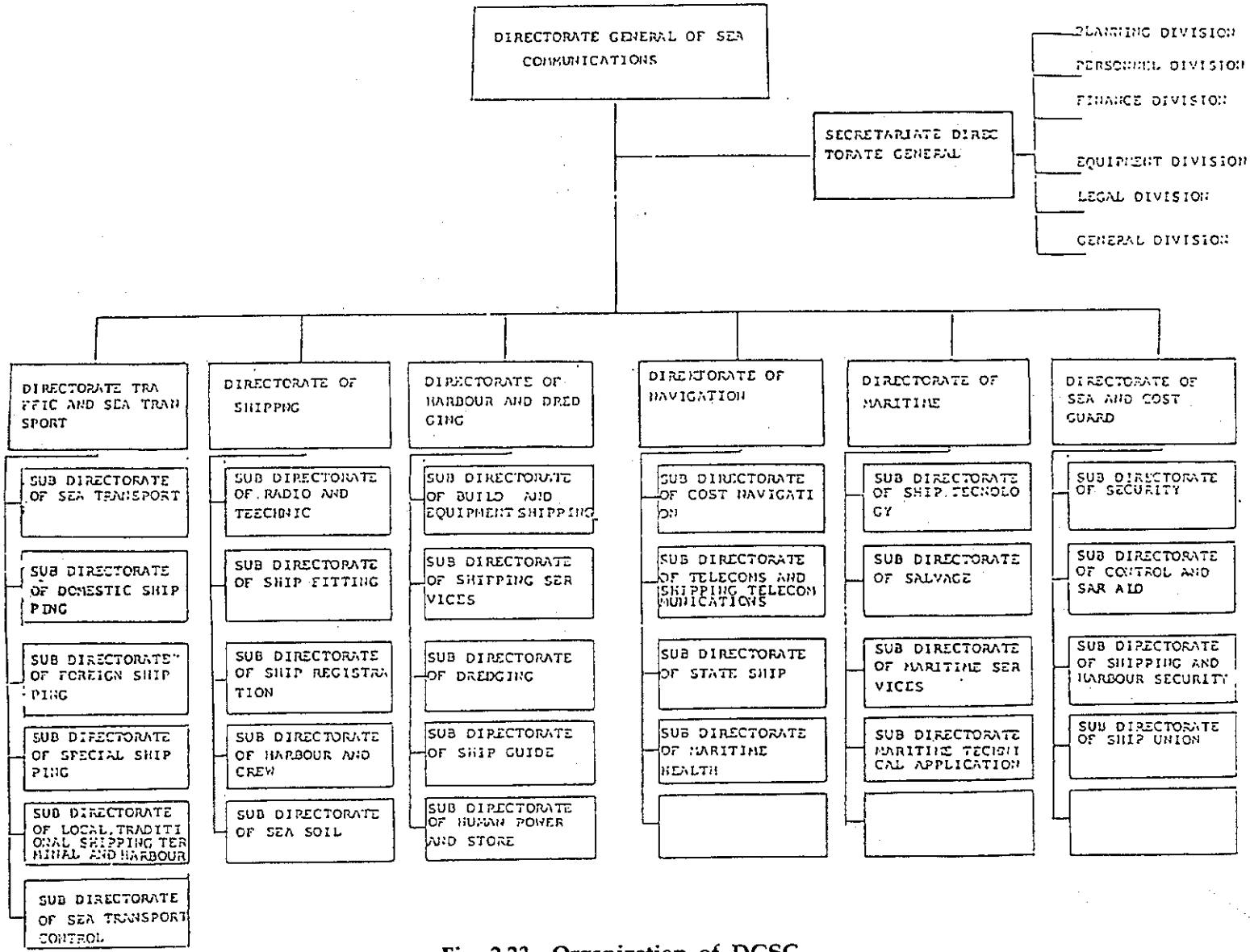

Fig. 2.23 Organization of DGSC

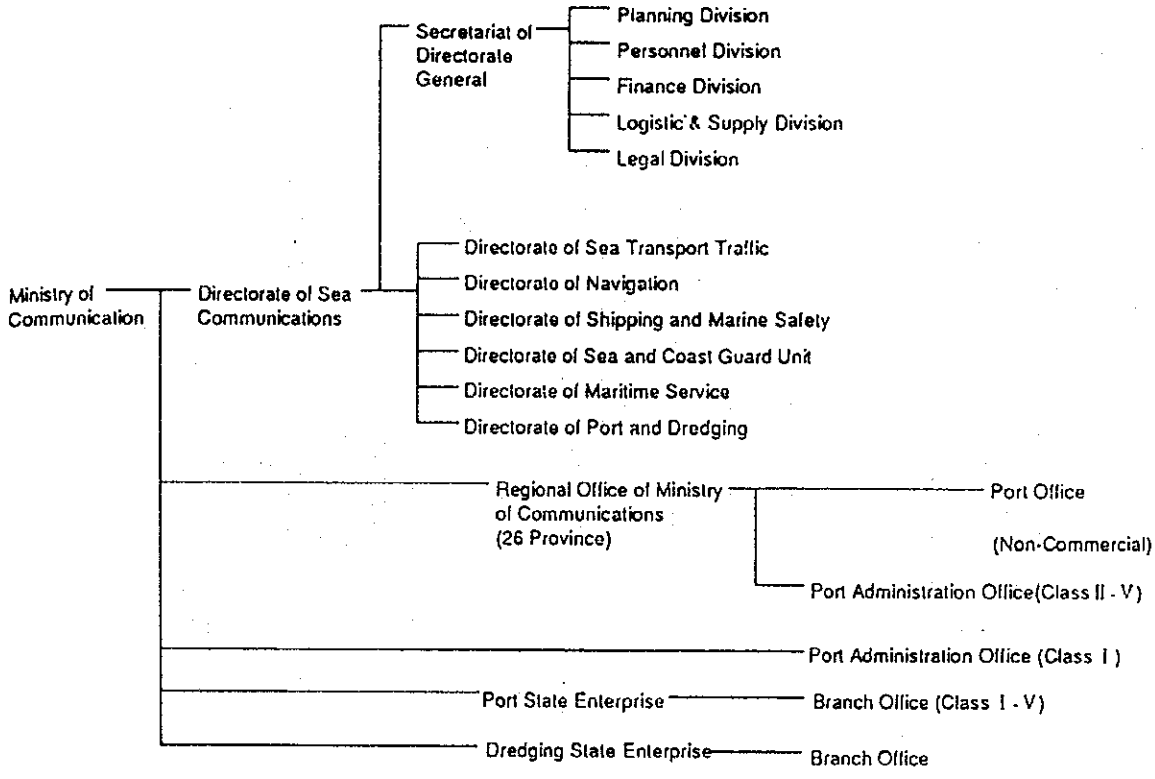

Fig. 2.24 Condition of Port Management and Operation

Table 2.22 Managing Branch, Port and Area of Port Corporations

Corporation	I	II	III	IV	Total
Head office	Medan North Sumatra	D. K. I. Jakarta	Surabaya East Java	Ujung Pndang South Sulawesi	
Branch					
Highest class	1	1	1	1	4
I class	2	5	3	5	15
II class	2	4	8	5	19
III class	1	2	4	4	11
IV class	9	1	10	2	22
Total	15	13	26	17	71
Port	24	29	33	24	110
Province	3 D. I. Aceh North Sumatra Riau	8 West Java Jambi South Sumatra Benkulu Lampung West Java D. K. I. Jakarta West Kalimantan	9 Central Java East Java Bali East Timor West Nusa Tenggara East Nusa tenggara Central Kalimantan South kalimantan D. k. I. Yogyakarta	7 East Kalimantan South Sulawesi Central Sulawesi Southeast Sulawesi North Sulwesi Maluku Irian Jaya	27