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

**FINAL REPORT
VOL.2 MASTER PLAN**

JULY 1995

STITUTE OF JAPAN (OCDI)

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THE STUDY

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

FINAL REPORT

Volume 2

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

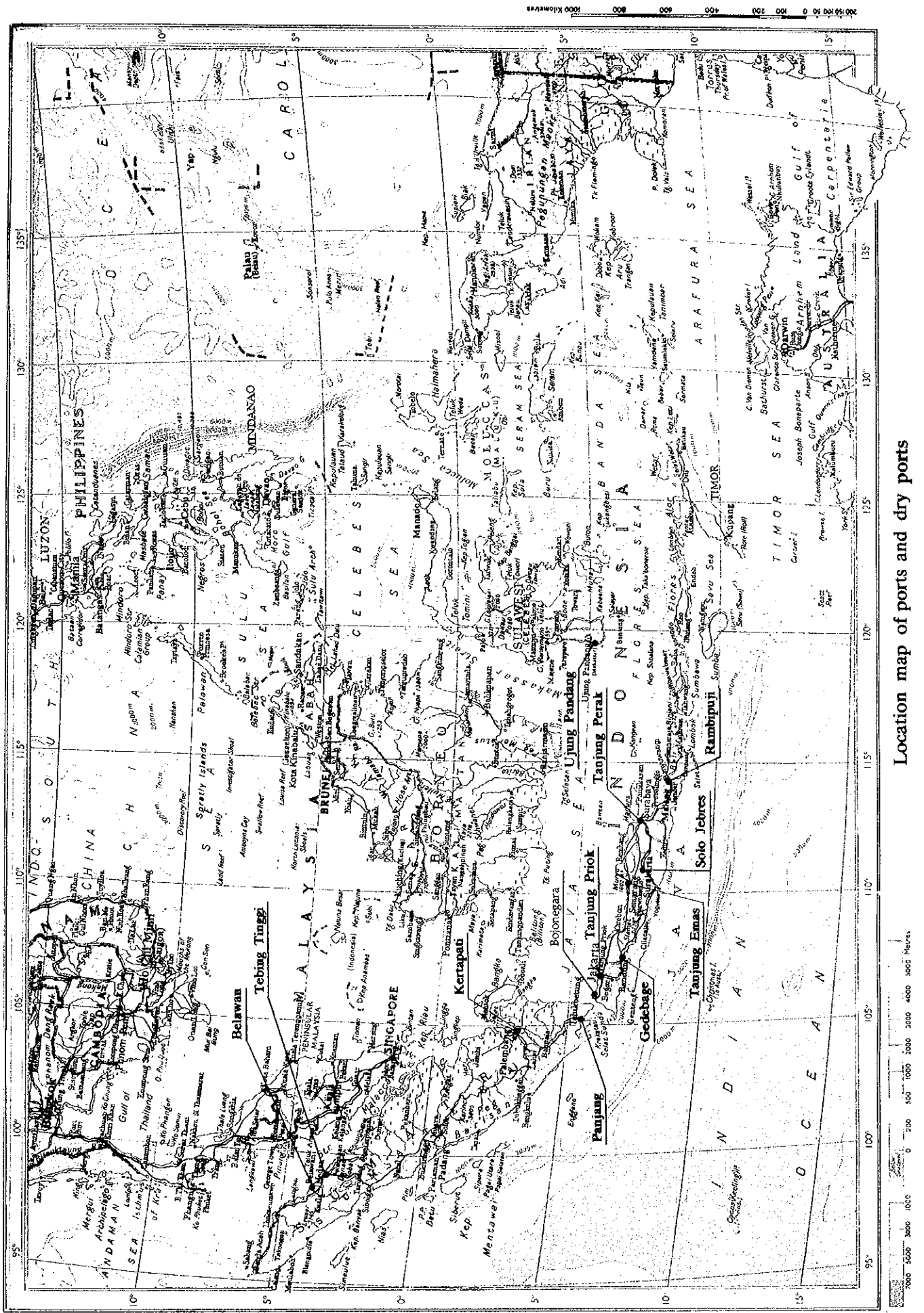
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The Overseas Coastal Area Development Institute of Japan (OCDI)
Japan Railway Technical Service (JARTS)
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Location map of ports and dry ports

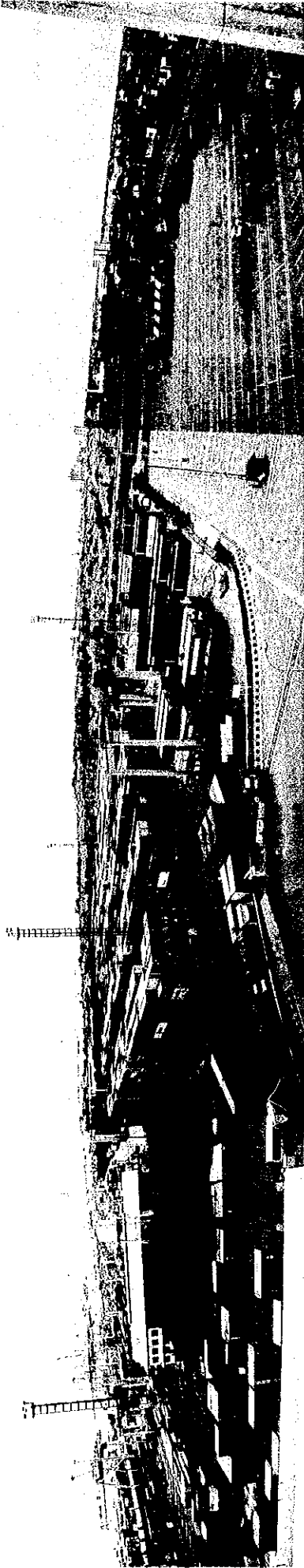
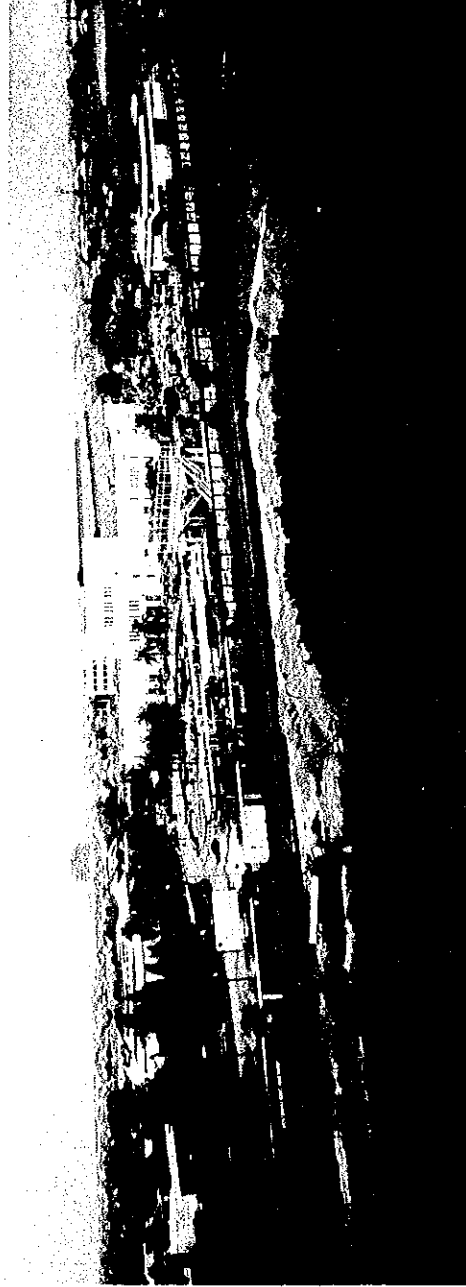


Photo. taken: April, 1994

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



Pasoso Terminal and Tanjung Priok Station, Jakarta

Note:
All Photographs
are taken by
JICA Study Team

Photo. taken: May, 1994



Photo. taken: April, 1994

Gedebage Dry Port, Bandung, West Java

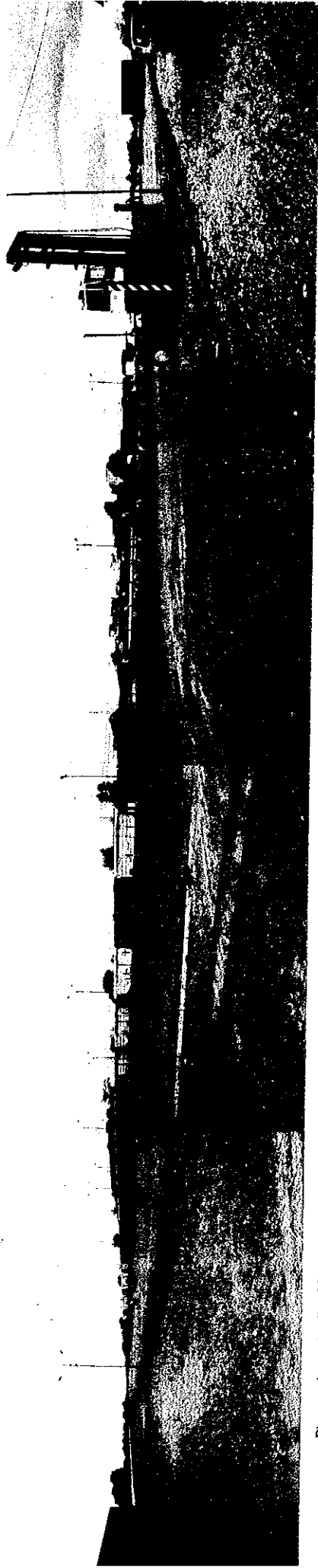


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Kiaracondong, Bandung

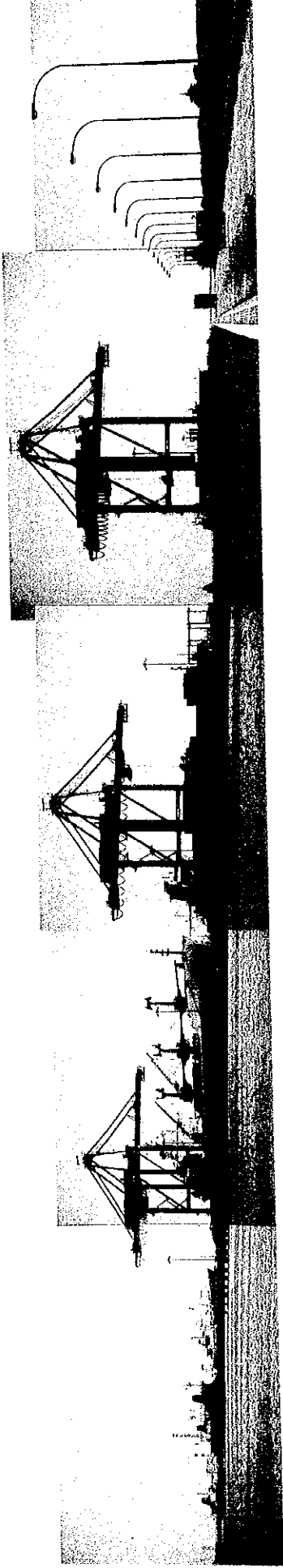


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Whole View of International Container Terminal (ICT) Jetty, Port of Tanjung Perak, Surabaya, East Java

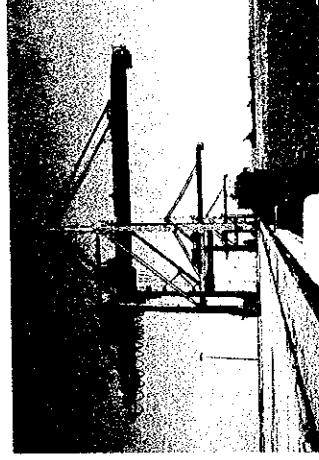


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Gantry Cranes and Rubber Fenders of ICT Jetty, Port of Tanjung Perak, Surabaya

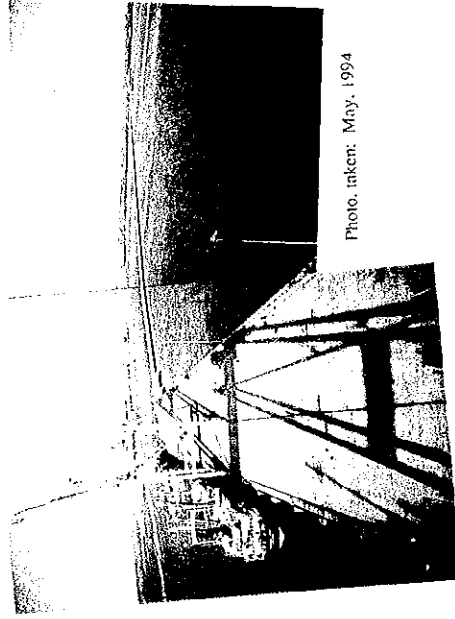
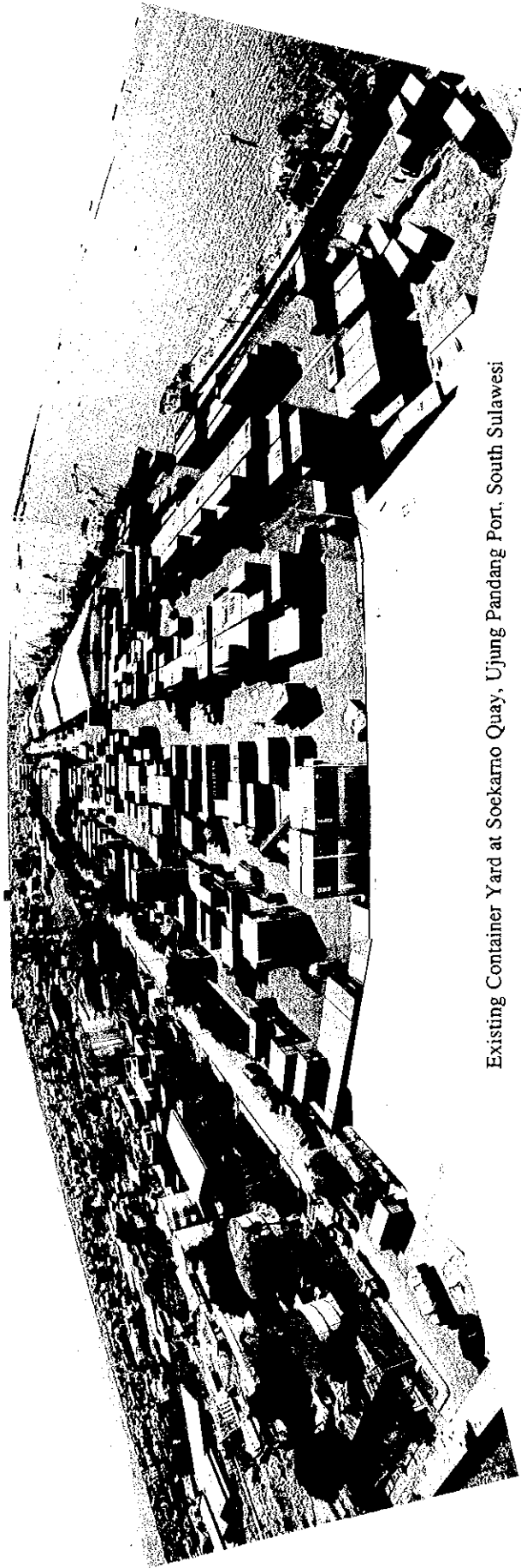


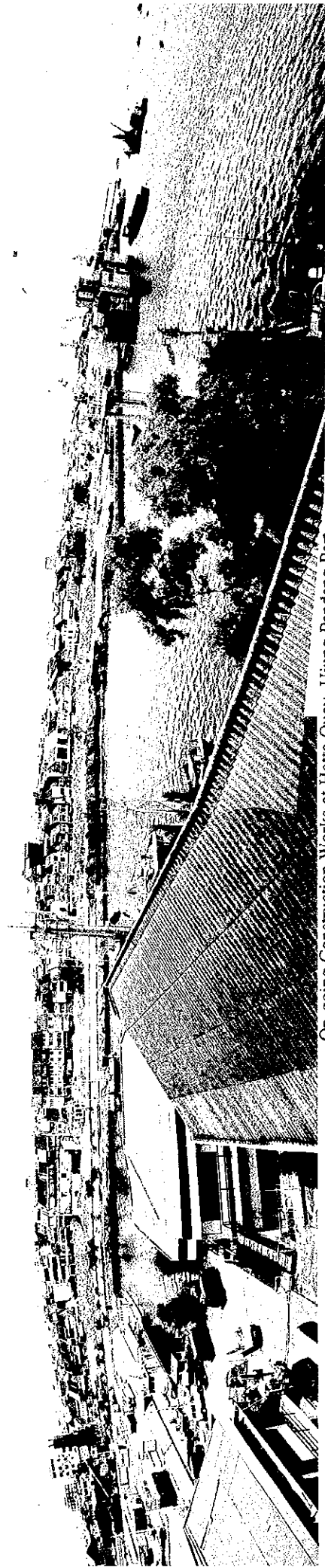
Photo. taken: May, 1994

ICT Jetty and Trestle, Port of Tanjung Perak, Surabaya



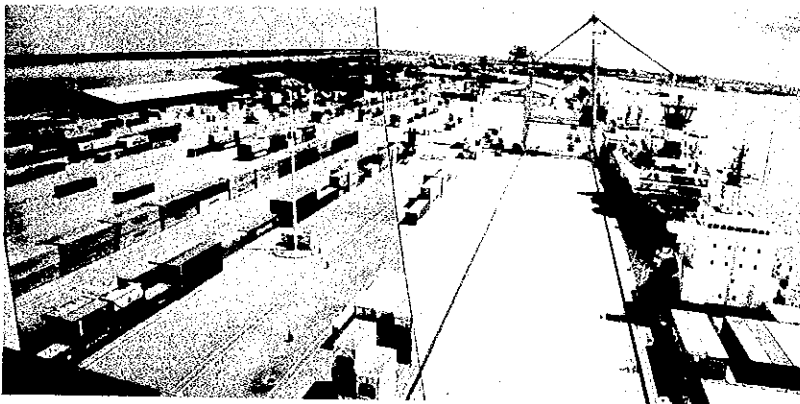
Existing Container Yard at Sockarno Quay, Ujung Pandang Port, South Sulawesi

Photo. taken: Dec., 1994

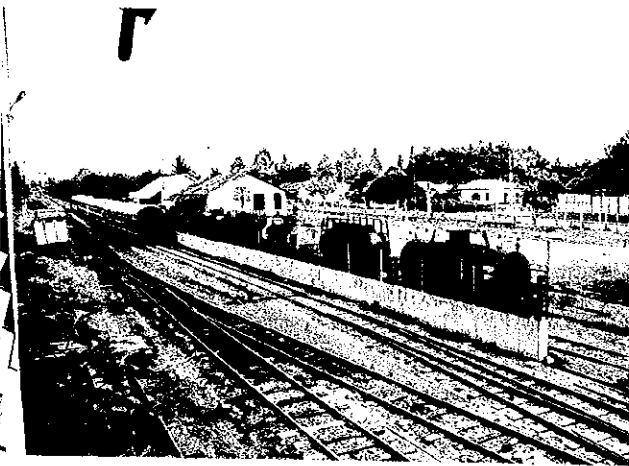


On-going Construction Works at Hatta Quay, Ujung Pandang Port

Photo. taken: Dec., 1994



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



Tebingtinggi Dry Port,
North Sumatra

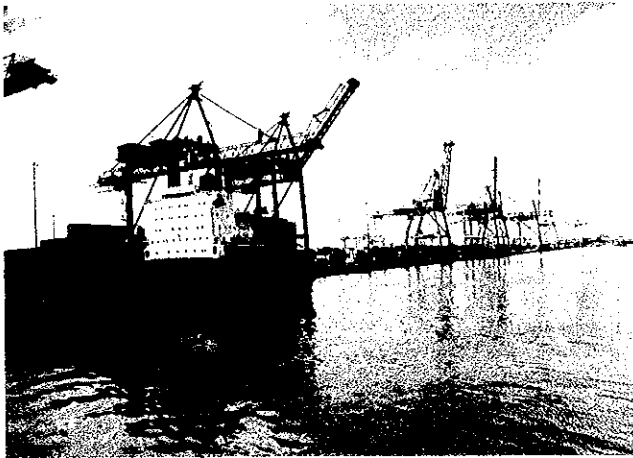


Wharf DII of Port of Panjang,
Bandar Lampung

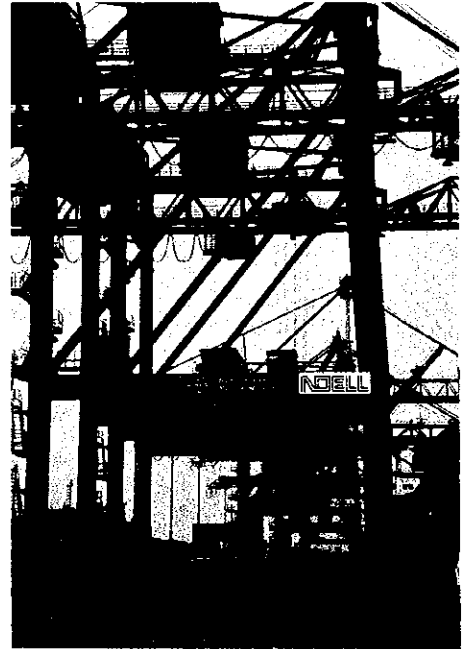


Kertapati Dry Port
along Musi River.
Palembang Port is
located opposite side
of the River.
(South Sumatra)

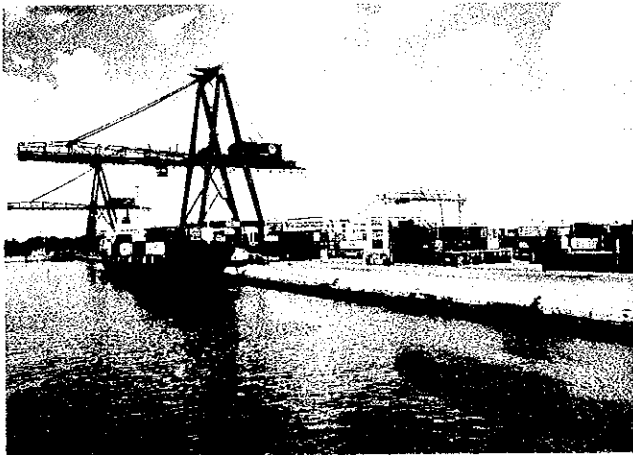
Note: Photos. 10 to 13
were taken in May, 1994.



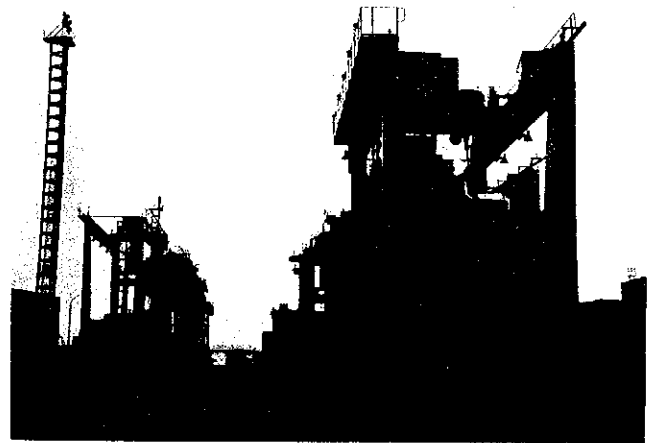
Container Wharf of CTI, Port of Tanjung Priok, Jakarta



Gantry Cranes of CTI, Port of Tg. Priok

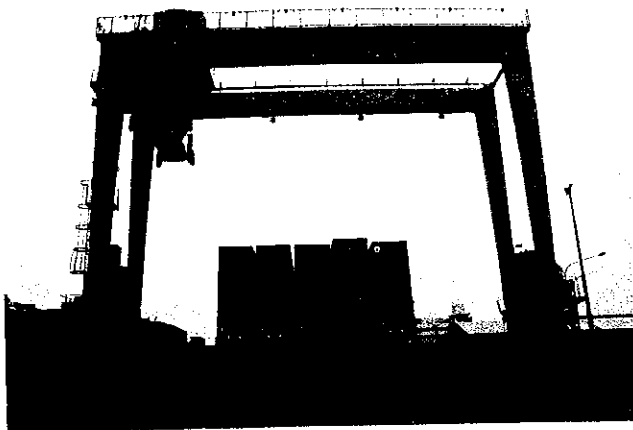


Container Wharf of CT II, Tg. Priok



Transtainers of CT I Tg. Priok

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



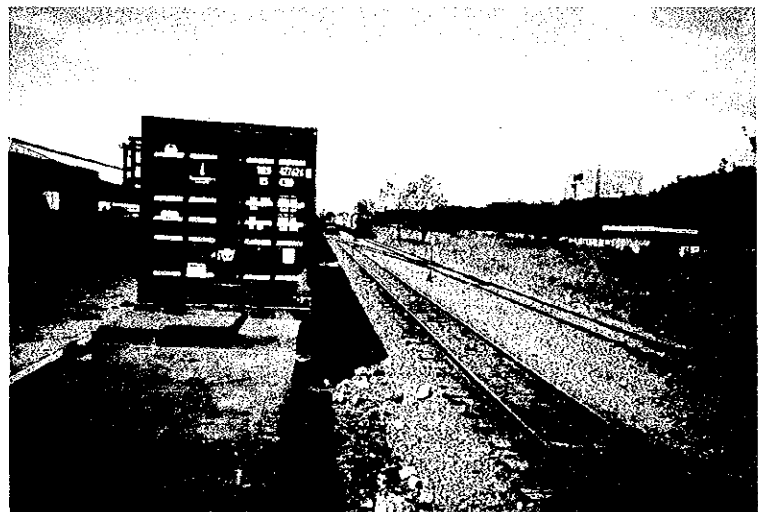
Transtainer at CTI, Tg. Priok



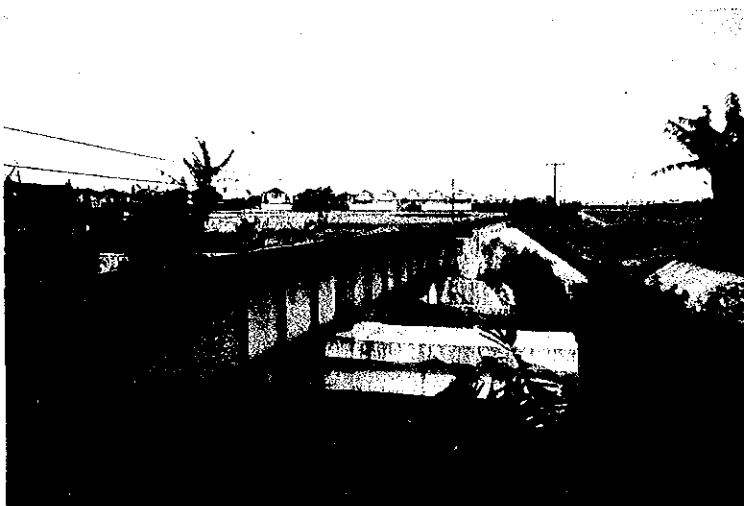
Whole View of Proposed Port Site of Bojonegara, West Java



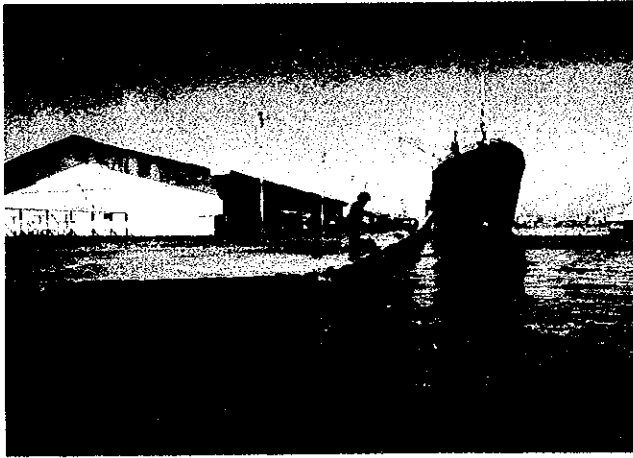
Land space expected for arrival and departure tracks at Gedebage



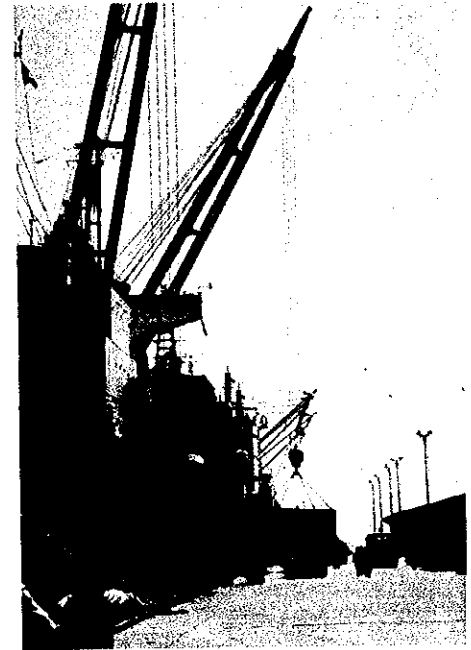
Land space expected for tracks at Pasoso container terminal



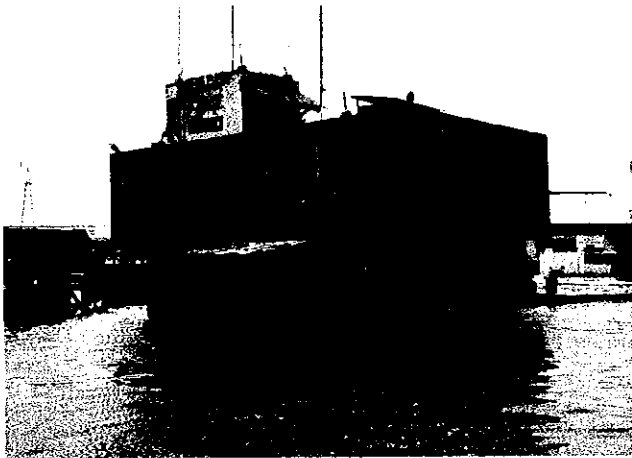
The bridge on the doubling track section between Gedebage and Kiaracandong



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

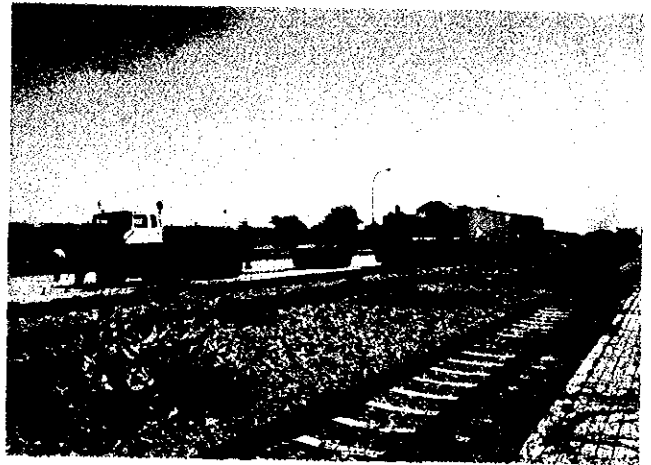


Container Yard of Solo Jebres Dry Port, Surakarta, Central Java

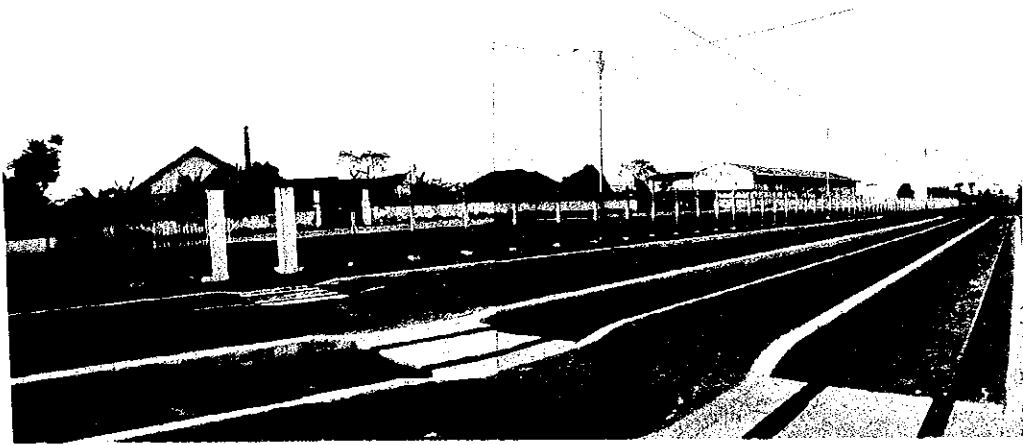
Note: Photos. 20 to 24 were taken in May 1994



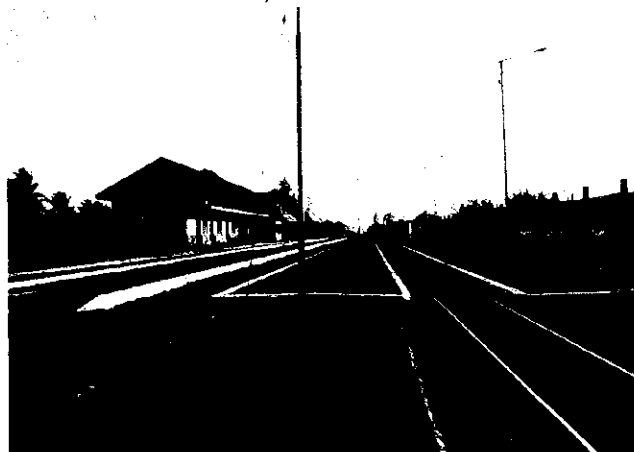
Container Yard of ICT, Port of
Tanjung Perak, Surabaya



Railroad Container Yard
at ICT, Port of Tg. Perak

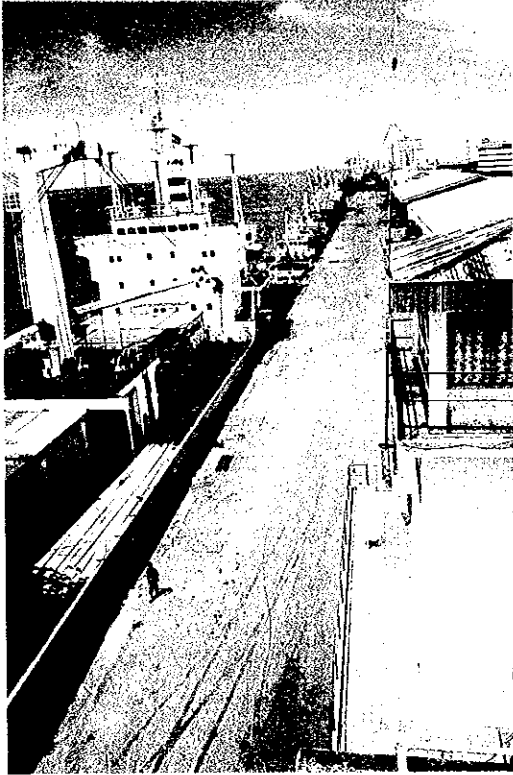


Rambipuji Dry Port,
Jember, East Java



Rambipuji Dry Port

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

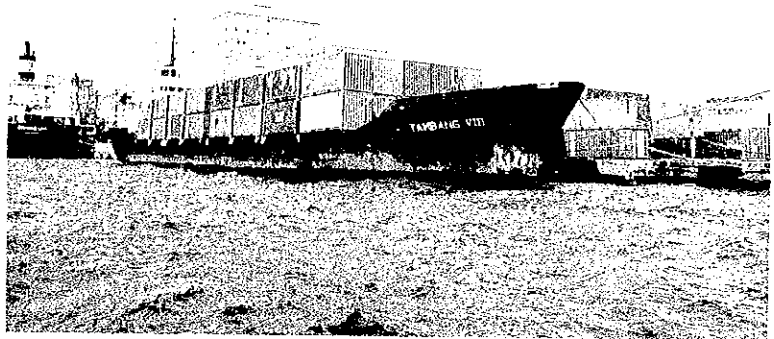


Sockarno Quay of
Ujung Pandang Port,
South Sulawesi



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

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

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

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

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	:	Indonesia 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

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

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	:	Kiaracandong
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

Table of Contents

1. Introduction	1
1.1 Background of the Study	1
1.1.1 Background	1
1.1.2 Scope of Work	2
1.2 Methodology of Master Plan	4
1.2.1 Master Plan Container Handling Ports	4
1.2.2 Mastr Plan for Dry Ports and Connecting Railways	5
2. Brief Review of the Existing Situation	7
2.1 Natural Condition	7
2.2 Socoeconomic Situation	13
2.3 Situation of Container Transportation	19
2.3.1 Trend and Environment of the Grobal Container Cargo Traffic ...	19
2.3.2 Trend and Environment of the Domestic Container Cargo Traffic	39
2.4 Organization of Ports and Railways	41
2.4.1 Ports	41
2.4.2 Dry Ports and Connecting Railways	45
2.5 Container Cargo Traffic in Indonesia	57
2.5.1 International Container Traffic in Port Sector	57
2.5.2 Domestic Container Traffic in Port Sector	57
2.5.3 Container Traffic by Railways	57
2.6 Situation of Existing Container Handling port Facilities and On-going Project	63
2.6.1 Port of Belawan	63
2.6.2 Port of Panjang	66
2.6.3 Port of Tanjung Priok dan Bojonegara	68
2.6.4 Tanjung Emas Port [Semarang]	73
2.6.5 Tanjung Perak	75
2.6.6 Ujung Pandang	78
2.6.7 Development Works at Batam Island	81
2.7 Situation of the Existing Container Dry Ports and Connecting Railways and On-going Projects	89
2.7.1 Tebing Tinggi Dry Port and Connecting Railways	89

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

2.7.2	Kertapati Dry Port	95
2.7.3	Gedebage Dry Port and Connecting Railway	103
2.7.4	Solo Jebres Dry Port and Connecting Railway	129
2.7.5	Rambupuji Dry Port and Connecting Raolway	141
3.	Macro Forcast of Container Caro Traffic in 2010	164
3.1	Socioeconomic Framework in 2010	164
3.1.1	Population	164
3.1.2	Economic Framework	164
3.2	Macro Forecast of Total Container Cargo Traffic of the Port Sector in 2010	170
3.2.1	Macro Forecast of International Container Cargo Traffic in 2010 ..	170
3.2.2	Macro Forecast of Container Cargo Traffic by Major Origin and Destination in 2010	171
3.2.3	Macro Forecast of Inter-island Container Cargo Traccif in 2010	182
3.3	Macro Forecast of Container Cargo Traffic for the Six Major ports in 2010	185
3.3.1	Ports of Belawan	185
3.3.2	Ports of Panjang	188
3.3.3	Ports of Tanjung Priok	202
3.3.4	Ports of Tanjung Emas	210
3.3.5	Ports of Tanjung Perak	218
3.3.6	Ports of Ujung Pandang	226
3.4	Examination of Locations and hinterlands of dry Ports	235
3.4.1	Conditions of Examination	235
3.4.2	Examination of the Location of Dry Ports by Transportation Cost	235
3.4.3	Examination of hinterland Areas by Transportation Cost	243
3.4.4	Examination of dry ports and Hinterland by Transportation Time	245
3.5	Macro Forecast of container Cargo Traffic through Dry Ports in 2010 ..	247
3.5.1	Macro forecast of Container Cargo Traffic through Tebin Tinggi dry Port in 2010	247
3.5.2	Macro Forecast of Container Cargo Traffic Through Kertapati Dry Port in 2010	252
3.5.3	Macro forecast of Container Cargo Traffic Through Gedebage	

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

Dry Port in 2010	252
3.5.4 Macro forecast of Container Cargo Traffic through Solo Jebres	
Dry Port in 2010	265
3.5.5 Macro Forecast for Container Cargo Traffic through Rambipuji	
Dry Port in 2010	271
4. Formulation of the Development Strategy of Container Cargo	
Transportation	278
4.1 General	278
4.1.1 Container Cargo Service Network Expected in the Future	279
4.1.2 The roles of Major Ports in Indonesia Foreign and Domestic Trade	281
4.1.3 Assumptions and Conditions Intorduced	283
4.2 Development Strategy for the National Network of Container Cargo Handling Ports	293
4.2.1 National Network	293
4.2.2 Container Handling Facilities of Individual Ports	293
4.3 Development Strategy of Container Cargo Handling Facilities of Dry Ports and Connecting Railways	294
4.3.1 General	294
4.3.2 Individual Dry Ports and Connecting Railways	295
5. Long-term Development Plan of Ports	298
5.1 Criteria for Container Cargo Handling Port Faciolities	298
5.1.1 Standard Models of Container Terminals	298
5.1.2 Berth	300
5.1.3 Container Yard	304
5.1.4 Container Freight Station [CFS]	308
5.1.5 Inland Container Depots	309
5.1.6 Container Handling Equipment	310
5.1.7 Container Handling Capacity of Existing Container Terminals at the Six Main Ports	313
5.2 Long-term Improvement Plan of the Port Facilities	329
5.2.1 Criteria of Berth and Terminal	329
5.2.2 Number of Berth and Container Yard Required in 2010	330
5.2.3 Construdtion Schedule	339

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

5.3	Long Term Improvement plan of Management and Operation of Container Cargo Handling Ports	345
5.3.1	Modernization of Management and Operation in Ports	345
5.3.2	About for Privatization in Management and Operation of Container Terminal	359
5.3.3	Long-term Improvement Plan of Management and Operation of Container Terminal	377
5.4	Preliminary Design and Cost Estimate	386
5.4.1	General	386
5.4.2	Design Condition	390
5.4.3	Quay Construction Plan	393
5.4.4	Port Basin and Navigation Channel	406
5.4.5	Container Yard and Facilities	415
5.4.6	Container Handling Equipment Plan	417
5.4.7	Cost Estimation of the Master Plan	420
5.5	Initial Environmental Examination	435
5.5.1	General	435
5.5.2	IEE for Each Project Sites	440
5.6	Over-all Evaluation of the Plan	452
5.6.1	Belawan	452
5.6.2	Panjang	452
5.6.3	Tanjung Priok	453
5.6.4	Tanjung Emas	455
5.6.5	Tanjung Perak	455
5.6.6	Ujung Pandang	456
6.	Long-term Development Plan of Dry Ports and Connecting Railways	457
6.1	General	457
6.2	Development Plan of Individual Dry Ports and Connecting Railways ..	458
6.2.1	Tebing Tinggi Dry Port and Connecting Railway	458
6.2.2	Kertapati Dry Port	460
6.2.3	Gedebage dry Port and Connecting Railway	460
6.2.4	Solo Jebres Dry Port and Connecting Railway	465
6.2.5	Rambipuji Dry Port and Connecting Railway	468
6.3	Long-term Improvement Plan of Management and Operaiton of Dry Port	474

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

6.4	Preliminary Design and Cost Estimate	475
6.4.1	Tebing Tinggi Dry Port and Connecting Railway	475
6.4.2	Kertapati Dry Port	475
6.4.3	Gedebage dry Port and Connecting Railway	475
6.4.4	Solo Jebres Dry Port and Connecting Railway	477
6.4.5	Rambipuji Dry Port and Connecting Railway	477
6.5	Initial environmental Examination	482
6.5.1	General	482
6.5.2	IEE for Each Project Sites	487
6.6	Over-all Evaluation of the Plans	492
6.6.1	Tebing Tinggi Dry Port and Connecting Railway	492
6.6.2	Kertapati Dry Port	492
6.6.3	Gedebage dry Port and Connecting Railway	493
6.6.4	Solo Jebres Dry Port and Connecting Railway	493
6.6.5	Rambipuji Dry Port and Connecting Railway	494
7.	Conclusions and Rekomendations	496
7.1	Port Development	496
7.2	Dry Port and Railway Development	508
7.2.1	Conclusions	508
7.2.2	Recommendation	508
7.2.3	Basic Policy for F/S Concerning Dry Port and Connecting Railway	510
8.	Urgent Implementation Plan	513
8.1	Capacity Improvement of Dry Port Gedebage and Connecting Railway	513
8.1.1	Transportation plan	513
8.1.2	Issues	520
8.1.3	Urgent countermeasure	529
8.1.4	Description of the Works	537
8.1.5	Cost estimate and construction schedule	546
8.2	Operational Improvement Plan for the Container Terminal at Tanjung Priok Port	552

APPENDIX

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

List of Tables

Table 2.2(1)	Climate of the Ports and Dry Ports	9
Table 2.2(1)'	Climate of the Ports and Dry Ports	10
Table 2.2(2)	Tide, Current and Wave of the Ports	11
Table 2.12	Population and GRDP Share of Each Island	18
Table 2.13	Trends of Container Cargo Handling Volume in the World	21
Table 2.14	Trends of Container Cargo Handling Volume by Region and Country	22
Table 2.15	Trends of Container Cargo Handling Volume in Asian Mother Ports	28
Table 2.16	Trends of Container Cargo Handling Volume in Asian Feeder Ports	29
Table 2.17	Trend of Arrangement of Container Cargo Handling Facilities in Mother-Ports	30
Table 2.18	Trend of Arrangement of Container Cargo Handling Facilities in Feeder-Ports	30
Table 2.19	Direct Service to Far East, Australia & New Zealand, and Middle East	32
Table 2.20	Shipping Lines Who Operate Full Container Ships US-Far East-Europe and Inter Asia	33
Table 2.21	Shipping Lines Who Operate Full Container Ships Inter Asia Route	34
Table 2.22	Managing Branch, Port and Area of Port Corporations	44
Table 2.23	Dry Port and Connecting Ports	45
Table 2.24	PERUMKA's Transport Revenue	47
Table 2.25	PERUMKA's Work Related Budgets (1993)	49
Table 2.26	Railway Track Length	50
Table 2.27	Current State of PERUMKA's Rolling Stock	52
Table 2.28	Container Cargo Traffic in Indonesia	58
Table 2.29	Transitions in Railway Passenger Traffic	59
Table 2.30	Transitions in Railway Freight Traffic	59
Table 2.31	Transport Share by Mode (pass-kms, Ton-kms) 1984	60
Table 2.32	Share of Container Cargo in Railway Freight Traffic by Item	60
Table 2.33	Container Transport Volume by Dry Port	61
Table 2.34	Transitions in Marine Container Handling Volume	62

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

Table 2.35	Required Container Berths	71
Table 2.36	Summary of Port Facilities on Batam Island	87
Table 2.37	Volume of Goods and Production Places in 1993	90
Table 2.38	Handling Volume of Marine Containers at Tebing Tinggi	91
Table 2.39	Achievement Table in 1992	102
Table 2.40	Number of Trains at Tpk St. (Double Way)	111
Table 2.41	Volume of Container Traffic (by Year)	130
Table 2.42	Volume of Container Traffic (by Direction)	131
Table 2.43	Volume of Container Traffic by Size (ft) in 1993 (in Number of Containers)	131
Table 2.44	Volume of Container Traffic (Daily Maximum in April 1994)	131
Table 2.45	Marine Container Handled at Rambipuji Dry Port	148
Table 2.46	Container Cargo Shipping Stations and Commodities (1990-1993) ..	149
Table 2.47	Container Cargo Shipping Stations and Commodities (January-April, 1993 and January-April, 1994)	150
Table 2.48	Number of Trains Scheduled by Section Between Surabayagubeng and Banyuwangi	152
Table 3.1	Forecast Population in Indonesia	164
Table 3.2	Annual GDP Growth Rate Under Each Scenario	165
Table 3.3	Projected GDP	166
Table 3.4	Per Capita GDP	166
Table 3.5	Forecast International Container Cargo Volume	171
Table 3.6	Estimation for Container Volume of Exports by site Groups (Scenario 1)	172
Table 3.7	Estimation for Container Volume of Imports by Site Groups (Scenario 1)	173
Table 3.8	Estimation for Container Volume of Exports by Site Groups (Scenario 2)	174
Table 3.9	Estimation for Container Volume of Imports by Site Groups (Scenario 2)	175
Table 3.10	Estimation for Container Volume of Exports by Site Groups (Scenario 3)	176
Table 3.11	Estimation for Container Volume of Imports by Site Groups (Scenario 3)	177
Table 3.12	Forecast on the Basis of the Historical Cargo Flow	179
Table 3.13	OD Table for Inter-Island Cargo in 1992 (Without Oil & Coal)	180

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

Table 3.14	OD Table for Inter-Island Container Cargo in 2010	181
Table 3.15	Inter-Island Container Cargo Volume	182
Table 3.16	OD Table for Inter-Island Cargo in 1992 (Without Oil Coal)	183
Table 3.17	OD Table for Inter-Island Container Cargo in 2010	184
Table 3.18	GRDP Growth	185
Table 3.19	International Potential Container Cargo Volume	186
Table 3.20	Inter-Island Potential Container Cargo Volume	187
Table 3.21	Domestic Container Cargo Volume	188
Table 3.22	Forecast of Export Container Traffic Through the Port of Belawan	189
Table 3.23	Forecast of Import Container Traffic Through the Port of Belawan	190
Table 3.24	Forecast of Inter-Island Container Cargo Traffic at Port of Belawan	192
Table 3.25	Forecast of Inter-Island Container Cargo Traffic at Port of Belawan	193
Table 3.26	GRDP Growth	188
Table 3.27	International Potential Container Cargo Volume	194
Table 3.28	Inter-Island Potential Container Cargo Volume	195
Table 3.29	Domestic Container Cargo Volume	196
Table 3.30	Forecast of International Container Cargo Traffic at Port Panjang ..	197
Table 3.31	Forecast of International Container Cargo Traffic at Port Panjang ..	198
Table 3.32	Forecast of International Container Cargo Traffic at Port of Panjang	200
Table 3.33	Forecast of Inter-Island Container Cargo Traffic at Port of Panjang	201
Table 3.34	GRDP Growth	202
Table 3.35	International Potential Container Cargo Volume	203
Table 3.36	Inter-Island Potential Container Cargo Volume	204
Table 3.37	Domestic Container Cargo Volume	204
Table 3.38	Forecast of Container Cargo at Port of Tanjung Priok	205
Table 3.39	Forecast of Container Cargo Traffic at Port of Tanjung Priok	206
Table 3.40	Forecast of Inter-Island Container Cargo Traffic at Port of Tanjung Priok (Scenario 1)	208
Table 3.41	Forecast of Inter-Island Container Cargo Traffic at Port of Tanjung Priok (Scenario 1)	209

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

Table 3.42	GRDP Growth	210
Table 3.43	International Potential Container Cargo Volume	211
Table 3.44	Inter-Island Potential Container Cargo Volume	212
Table 3.45	Domestic Container Cargo Volume	212
Table 3.46	Forecast of Container Cargo Traffic at Port of Tanjung Emas (Scenario 1)	213
Table 3.47	Forecast of Container Cargo Traffic at Port of Tanjung Emas (Scenario 1)	214
Table 3.48	Forecast of Container Cargo Traffic at Port of Tanjung Emas (Scenario 1)	216
Table 3.49	Forecast of Container Cargo Traffic at Pott of Tanjung Emas (Scenario 1)	217
Table 3.50	GRDP Growth	218
Table 3.51	International Potential Container Cargo Volume	219
Table 3.52	Inter-Island Potential Container Cargo Volume	220
Table 3.53	Domestic Container Cargo Volume	220
Table 3.54	Forecast of Container Cargo Traffic at Port of Tanjung Perak	221
Table 3.55	Forecast of Container Cargo Traffic at Port of Tanjung Perak (Scenario 1)	222
Table 3.56	Forecast of Inter-Island Container Cargo Traffic at Port of Tanjung Perak (Scenario 1)	224
Table 3.57	Forecast of Inter-Island Container Cargo Traffic at Port of Tanjung Perak (Scenario 1)	225
Table 3.58	GRDP Growth	226
Table 3.59	International Potential Container Cargo Volume	227
Table 3.60	Inter-Island Potential Container Cargo Volume	228
Table 3.61	Domestic Container Cargo Volume	228
Table 3.62	Container Cargo Traffic	229
Table 3.63	Container Cargo Traffic	229
Table 3.64	Forecast of International Container Cargo Traffic at Port of Ujung Pandang	230
Table 3.65	Forecast of International Container Cargo Traffic at Port of Ujung Pandang	231
Table 3.66	Forecast of Inter-Island Container Cargo Traffic at Port of Ujung Pandang (Scenario 1)	233
Table 3.67	Forecast of Inter-Island Container Cargo Traffic at Port of	

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

	Ujung Pandang	234
Table 3.68	Transportation Cost Per Km Between Dry Ports	235
Table 3.69	Transportation Cost Per Km of Loaded Containers by Railway	236
Table 3.70	Transportation Cost Per Km of Empty Containers	236
Table 3.71	Average Container Transportation Cost of Both Loaded and Empty Containers	237
Table 3.72	Transportation Cost Examinations of the Location	241
Table 3.73	Necessary Minimum Distance for the Location of each Dry Port ...	241
Table 3.74	Minimum Transportation Cost by Trailer	242
Table 3.75	Extent of the Hinterlands	244
Table 3.76	Extent of Hinterland of Dry Port	244
Table 3.77	Major Commodities of Dry Port Hinterland in 1993	247
Table 3.78	Container Cargo Traffic	249
Table 3.79	Statistics for Tebing Tinggi Dry Port	250
Table 3.80	Container Cargo Forecast at Tebing Tinggi Dry Port	251
Table 3.81	Container Cargo Forecast at Kisanan Dry Port	254
Table 3.82	Growth Rate of GRP and GRDP	255
Table 3.83	Growth Rates of Container Cargo Traffic at the Dry Port	255
Table 3.84	Container Cargo Traffic of Gedebage Dry Port	256
Table 3.85	Statistics of Bandung and Gedebage Dry Port	257
Table 3.86	Estimation for Container Volume at Gedebage Dry Port (Scenario 1)	260
Table 3.87	Estimation for Container Volume at Gedebage Dry Port (Scenario 2)	261
Table 3.88	Estimation for Container Volume at Gedebage Dry Port (Scenario 3)	262
Table 3.89	Growth Rate of GRP and GRDP	266
Table 3.90	Container Cargo Traffic of Solo Jobres	266
Table 3.91	Statistics for Solo Jobres Dry Ports	267
Table 3.92	Estimation for Container Volume at Solo Jobres Dry Port (Scenario 1)	268
Table 3.93	Estimation for Container Volume at Solo Jobres Dry Port (Scenario 2)	269
Table 3.94	Estimation for Container Volume at Solo Jobres Dry Port (Scenario 3)	270
Table 3.95	Growth Rates of GDP and GRDP	272

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

Table 3.96	Container Cargo Traffic of Rambipuji Dry Port	272
Table 3.97	Estimation for Container Volume at Rambipuji Dry Port	273
Table 3.98	Estimation for Container Volume at Rambipuji Dry Port	274
Table 3.99	Tatisties for Rambipuji Dry Port	275
Table 3.100	Estimation for Container Volume at Rambipuji Dry Port	276
Table 4.1	Ship Sezes Employed in Various Sea Routes	284
Table 4.2	Classification of Indonesian Ports	284
Table 4.3	Criteria of Container Carriers	285
Table 4.4	Standard Criteria of Container Berth	285
Table 4.5	Berth Dimension	287
Table 4.6	Major Destination and Origin of the Foreign Trade of Indonesia (1992)	289
Table 4.7	Container Cargo Movement in Asia	290
Table 4.8	Allocation Ship Size to Cargos Bound for America, Europe, Africa and ASEAN are Carried by Feeder Vessel	290
Table 4.9	Cargo Share by Size of Container Carriers	291
Table 4.10	Container Carrier Operators in Intra-Asia Routs and Their Carrying Capacity	291
Table 4.11	Cargo Share by Ship Size	292
Table 4.12	Average of Cargo Share by Ship Size	292
Table 5.1	Container Terminal Standard Model	316
Table 5.2	Berth Productivity of the Standard Container Terminal	318
Table 5.3	Container Terminal and Storage Yard Area of the Standard Container Terminal	319
Table 5.4	Ratio of Land USE for Ground Slots	320
Table 5.5	Area Allocation of the Terminal	321
Table 5.6	Container Freight Station and Van Pool. Area of The Standard Container Terminal	322
Table 5.7	Necessary Container Transfer Crane Units at the Standard Container Terminal	323
Table 5.8	Necessary Side I.lfter Units at the Standard Container Terminal	324
Table 5.9	Necessary Tractor Head and Trailer Chassis Units at the Standard Container Terminal	325
Table 5.10	Container Handling Capacity of Existing Container Terminals in the Main Six Ports -Including Terminals Under Construction	326
Table 5.11	Activity of Container Terminals at Main Six Ports	327

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

Table 5.12	Activity of Container Terminals at Main Six Ports (II)	328
Table 5.13	Criteria of Yard Area and CFS	329
Table 5.14	Necessary Number of Berths, Yard and CFS Area	334
Table 5.15	Berth Requirement	335
Table 5.16	Requirement of Yard and CFS Area	336
Table 5.17	Container Cargo Traffic and Required Berths in Other Port	337
Table 5.18	Necessary Number of Berths Scenario II	338
Table 5.19	Necessary Number of Berths Scenario III	339
Table 5.20	Employee of Port Corporations by Class	347
Table 5.21	Employee of Port Corporations by Head Office & Branches	347
Table 5.22	Employee of Port Corporations by Function	348
Table 5.23	Employee of Port Corporations by School Career	348
Table 5.24	Employee of Port Corporations by Age	348
Table 5.25	Profit & Loss Statement by Port Corporations in 1993	355
Table 5.26	Profit and Loss Statement in 1993	356
Table 5.27	Profit and Loss Statement in 1993	356
Table 5.28	Profit and Loss Statement in 1993	357
Table 5.29	Profit and Loss Statement in 1993	357
Table 5.30	Profit and Loss Statement in 1993	358
Table 5.31	Degrees of Private Participation	359
Table 5.32	Practice Body of Port Services in Southeast Asian Countries	367
Table 5.33	Developing Steps of Computerization and Automatization	379
Table 5.34	Case of Container Terminal Management and Operation	385
Table 5.35	Alternatives of Container Terminal Management and Operation in Main Ports	385
Table 5.36	General Description on Proposed Port Layout Plan	386
Table 5.37	Objective Ship and Berth Dimension	390
Table 5.38	General Design Criteria	391
Table 5.39	Existing Port Facilities	392
Table 5.40	Required Berth Extension	394
Table 5.41	Width of Navigation Channel	406
Table 5.42	Standard Section of Navigation Channels	407
Table 5.43	Summary of Dredging Volume	408
Table 5.44	Procurement of Handling Equipment	418
Table 5.45	Summary of Project Cost	422
Table 5.46	Project Cost of Tanjung Priok Port (Alternative 1~4)	423

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

Table 5.47	Project Cost of Belawan Port	424
Table 5.48	Project Cost of Panjang Port	425
Table 5.49	Project Cost of Tg. Priok Port (Alternative 1)	426
Table 5.50	Project Cost of Tg. Priok Port (Alternative 2)	427
Table 5.51	Project Cost of Tg. Priok Port (Alternative 3)	428
Table 5.52	Project Cost of Tg. Priok Port (Alternative 4)	429
Table 5.53	Project Cost of Bojonegara (Alternative 3)	430
Table 5.54	Project Cost of Bojonegara (Alternative 4)	431
Table 5.55	Project Cost of Tg. Emas Port	432
Table 5.56	Project Cost of Tg. Perak Port	433
Table 5.57	Project Cost of Ujung Pandang Port	434
Table 5.58	Environmental Impact Matrix of Each Project Sites	439
Table 5.59	Environment Impacts and its Countermeasures Belawan Port	441
Table 5.60	Environmental Impacts and its Countermeasures Panjang Port	443
Table 5.61	Environmental Impacts and its Countermeasures Tanjung Priok	444
Table 5.62	Environmental Impacts and its Countermeasures Tanjung Emas	446
Table 5.63	Environmental Impacts and its Countermeasures Tanjung Perak	447
Table 5.64	Environmental Impacts and its Countermeasures Dredging Activity in Ujung Pandang Port	448
Table 5.65	Environmental Impacts and its Countermeasures Bojonegara	450
Table 6.1	Forecast of Container Cargo Traffic	458
Table 6.2	Macro Forecast of Container Cargo Traffic	465
Table 6.3	Macro Forecast of Container Cargo Traffic	466
Table 6.4	Transport Demand Forecast for Container Cargo in Jember Region	468
Table 6.5	Demand Forecast for Railway Container Transport	472
Table 6.6	Required Number of Container Trains for the Jember Region	473
Table 6.7	Total Cost Amount for M/P (Gedebage dry Port and Connecting Railway)	481
Table 6.8	Environmental Impact Matrix of Each Project Site	485
Table 6.9	Environmental Impact Matrix of Each Project Sites	486
Table 6.10	Environmental Impacts and its Countermeasures Gedebage Dry Port and Connecting Railway	489
Table 6.11	Environmental Impacts and its Countermeasures Solo Jebres Dry Port and Connecting Railway	490
Table 6.12	Environmental Impacts and its Countermeasures Rambipuji Dry	

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

	Port and Connecting Railway	491
Table 7.1	Berth Requirement	506
Table 7.2	Requirement of Yard and CFS Area	506
Table 7.3	Container Cargo Traffic and Required Berths in 2010 Other Ports	507
Table 7.4	The Forecast Comparison for Years 2003 to 2010	512
Table 8.1	Actual Result of Container Transportation Between Tpk-Gdb	514
Table 8.2	Container Transportation Demand and Necessary Train Number, Between Tg Priok and Gedebage	515
Table 8.3	Transportation Demand and Necessary Train Numbers	518
Table 8.4	The Max Staying Wagon Formation	519
Table 8.5	Number of Running Train	519
Table 8.6	Required Locomotive Numbers	533
Table 8.7	Required Wagon Numbers	534
Table 8.8	The Composition of Each Items for Land Facilities	546
Table 8.9	The Investment Amount and the Schedule	551
Table 8.10	Berth Productivity of Tg Priok Container Terminal	555
Table 8.11	Yard Productivity of Tg. Priok Container Terminal	555
Table 8.12	Berth Productivity of No 1 Container Terminal in Tg Priok	556
Table 8.13	Berth Productivity of No 2 Container Terminal in Tg Priok	556

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

List of Figure

Figure 1.1	Work Flow of Master Plan	6
Figure 2.1	Population in Each Island	15
Figure 2.2	Population Density of Each Island in 1990	16
Figure 2.3	GDP Share of Various Sectors of Whole Nation in 1992	17
Figure 2.14	Trends of Container Cargo Handling Volume in the World	21
Figure 2.15	Trends of Container Cargo Handling Volume by Country	23
Figure 2.16	Trends of Container Cargo Handling Volume by Country	23
Figure 2.17	Trends of Container Cargo Handling Volume in Asian Mother Ports	28
Figure 2.18	Trends of Container Cargo Handling Volume in Asian Feeder Ports	29
Figure 2.19	Direct Service Routes and Frequency of Service (Ship Size in TEU Capacity)	31
Figure 2.20	Mother Vessel Service With Feeder Service to Indonesia (Ship Size in TEU Capacity)	31
Figure 2.21	Feeder Service Routes for International Containers and Number and Size of Ships Deployed	40
Figure 2.22	Domestic Container Service Routes and Frequency	40
Figure 2.23	Organization of DGSC	43
Figure 2.24	Condition of Port Management and Operation	44
Figure 2.25	Ministry of Communications and PERUMUKA: Organization Chart	53
Figure 2.26	Operation RailWay Map 1994	54
Figure 2.27	Signal Equipment Network	55
Figure 2.28	Radio Microwave Network	56
Figure 2.29	Radio VHF Train Dispatching	56
Figure 2.30	Existing Container Terminal Development Plan (1): Belawan (North Sumatra)	65
Figure 2.31	Existing Container Terminal Development Plan (2): Panjang (South Sumatra)	65
Figure 2.32	Existing Container Terminal Development Plan (4): Tanjung Priok (Jakarta)	72
Figure 2.33	Existing Container Terminal Development Plan (3): Bojonegara (West Jawa)	72

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

Figure 2.34	Existing Container Terminal Development Plan (5-1): Tanjung Emas (Semarang)	76
Figure 2.35	Existing Container Terminal Development Plan (6): Tanjung Perak (Surabaya)	76
Figure 2.36	Existing Container Terminal Development Plan (7): Ujung Pandang (South Sulawesi)	80
Figure 2.37	Growth Triangle	81
Figure 2.38	BIDA Organization Chart	84
Figure 2.39	Population Growth in Batam Island	84
Figure 2.40	Industrial Estate in Batam Island	86
Figure 2.41	Location of Ports	87
Figure 2.42	Location of Asia Port Batam	88
Figure 2.43	Master Plan Container Terminal Batam	88
Figure 2.44	Tebing Tinggi and its Surrounding Area	96
Figure 2.45	Layout of Tebing Tinggi Dry Port	97
Figure 2.46	Layout of Belawan Port	98
Figure 2.47	Location Map for Coal Transportation	99
Figure 2.48	Mining Zone and Transportation Route	100
Figure 2.49	Track Layout of Kertapati	101
Figure 2.50	Container Train Diagram Five Trains Operation Single Way	116
Figure 2.51	Track Layout of Gedebage Dry Port	117
Figure 2.52	Organization Chart of Gedebage Dry Port	118
Figure 2.53	Gedebage Marshalling Yard Layout	119
Figure 2.54	Track Layout of Kiaracandong	120
Figure 2.55	Network Around Tg. Priok St. Map	121
Figure 2.56	Track Layout at Pasoso	121
Figure 2.57	Tanjung Priok Track Layout	122
Figure 2.58	General Route Map Between Pasoso and Gedebage	123
Figure 2.59	Rail Type and Track Class	124
Figure 2.60	Track Capacity Between Cikampek and Gedebage	125
Figure 2.61	Track Layout of Jabotabek Area	126
Figure 2.62	Track Layout Between Pasoso and Gedebage	127
Figure 2.63	Present Feature Between Tg. Priok and Gedebage	128
Figure 2.64	Solo Jebres-Semarang Port Railway Connection	142
Figure 2.65	Solo Jebres-Semarang Track Capacity	143
Figure 2.66	Semarang Gudang St. Track Layout	144

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

Figure 2.67	Tg. Emas Port Container Terminal Track Layout	145
Figure 2.68	Tg. Emas Port Container Terminal Track Layout Sketch	146
Figure 2.69	Solo Jebres Dry Port Track Layout Sketch	146
Figure 2.70	Solo Jebres St. Track Layout	147
Figure 2.71	The Conceptional Map Rambipuji and Surabaya Port	156
Figure 2.72	The Tanjung Perak International Container Terminal	157
Figure 2.73	Track Capacity and Planned number of Train Between Surabaya and Banyuwangi	158
Figure 2.74	Train Routes Surabaya Banyuwangi	159
Figure 2.75	Container Transportation Between Rambipuji and Perak ICT	160
Figure 2.76	Train Diagram Surabayagubeng and Banyuwangi	161
Figure 2.77	Rambipuji Dry Port: Track Layout	162
Figure 2.78	Organization Chart of Rambipuji Dry Port	163
Figure 3.1	Growth of Per Capita GDP	167
Figure 3.2	GDP Estimation Model 1	167
Figure 3.3	GDP Estimation Model 2	168
Figure 3.4	GDP Estimation Model 3	168
Figure 3.5	GDP Forecast by Three	169
Figure 3.6	Container Ratio in Indonesia	178
Figure 3.7	Forecast of International Container Traffic	178
Figure 3.8	Estimation of Export & Import Container Ratio	191
Figure 3.9	Estimation for Container Ration	191
Figure 3.10	Forecast of Container Rate at Port of Panjang	199
Figure 3.11	Estimation of Container	207
Figure 3.12	Forecast of Container Rate	207
Figure 3.13	Estimation of Container Ratio	215
Figure 3.14	Forecast of Container Rate at Tanjung Perak	223
Figure 3.15	Forecast of Container Rate at Tanjung Perak	223
Figure 3.16	Forecast of Container Rate at Port Ujung Pandang	232
Figure 3.17	Forecast of Container Rate at Ujung Pandang Port	232
Figure 3.18	Cost Components of Railway Transportation	239
Figure 3.19	Extent of Hinterland by Transportation Cost	246
Figure 3.20	Estimation for Container at Tebing Tinggi Dry Port	253
Figure 3.21	Container Cargo Traffic at Bandung & Gedebage	258
Figure 3.22	Container Increase Rate at Bandung & Gedebage	258
Figure 3.23	Container Increase Rate at Bandung	259

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

Figure 3.24	Portion of Gedebage for Bandung in Container Volume	259
Figure 3.25	Estimation for Increase Rate of Container at Bandung	263
Figure 3.26	Estimation for Container Vol. at Gedebage	263
Figure 3.27	Estimation for Share of Dry Port for Surakarta in Container	264
Figure 3.28	Estimation for Container Vol. at Solo Dry Port	264
Figure 3.29	Estimation for Share of Dry Port in Jember for Container	277
Figure 3.30	Estimation for Container Vol. Rambipuji Dry Port	277
Figure 4.1	World Container Service Net Work with Relation to Indonesian Trade and Ship Sizes Anticipated in 2010	282
Figure 4.2	The Transport Route	297
Figure 5.1	Criteria of Berth, Container Yard and Handling Equipment Used for Master Plan	331
Figure 5.2	Proposal of Container Terminal Development Plan (2010)(1) Tanjung Priok (Jakarta), Alternative 1	332
Figure 5.3	Proposal of Container Terminal Development Plan (2010) Tanjung Priok (Jakarta), Alternative 2	332
Figure 5.4	Proposal of Container Terminal Development Plan (2010)(3-1) Tanjung Priok (Jakarta), Alternative 4	333
Figure 5.5	Proposal of Container Terminal Development Plan (2010)(3-2) Bojonegara (West Jawa) in Combination with Tanjung Priok Alternative 4	333
Figure 5.6	Container Cargo Traffice and Container Wharf Construction Plan (1): Belawan	340
Figure 5.7	Container Cargo Traffice and Container Wharf Construction Plan (2): Panjang	340
Figure 5.8	Container Cargo Traffice and Container Wharf Construction Plan (3-1): Tanjung Priok	341
Figure 5.9	Container Cargo Traffice and Container Wharf Construction Plan (3-2): Tanjung Priok (Alternative 3) in combination with Bojonegara Port	341
Figure 5.10	Container Cargo Traffice and Container Wharf Construction Plan Tanjung Priok (Alternative 4) in Combination with Bojonegara Port (Domestic Berth)	342
Figure 5.11	Container Cargo Traffic and Container Wharf Construction Plan: Tanjung Priok (Alternative 4) in combination with Bojonegara Port	342

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

Figure 5.12	Container Cargo Traffic and Container Wharf Construction Plan (4): Tanjung Emas	343
Figure 5.13	Container Cargo Traffic and Container Wharf Construction Plan (5): Tanjung Perak	343
Figure 5.14	Container Cargo Traffic and Container Wharf Construction Plan (6)	344
Figure 5.15	Layout of Master Plan of Belawan Port	398
Figure 5.16	Layout of Panjang Port	399
Figure 5.17	Layout of Tanjung Priok Port (Alternative I)	400
Figure 5.18	Layout of Tanjung Priok Port (Alternative II)	400
Figure 5.19	Layout of Tanjung Priok Port (Alternative III)	401
Figure 5.20	Layout of Tanjung Priok Port (Alternative IV)	401
Figure 5.21	Layout of Bojonegara (Alternative III)	402
Figure 5.22	Layout of Bojonegara (Alternative IV)	402
Figure 5.23	Layout of Tanjung Emas Port	403
Figure 5.24	Layout of Tanjung Perak Port	404
Figure 5.25	Layout of Inland Container Terminal for Ujung Pandang Port ...	405
Figure 5.26	Dredging Access Channel and Basin of Belawan Port	409
Figure 5.27	Dredging Access Channel and Basin of Tanjung Priok Port (1, 2)	410
Figure 5.28	Dredging Access Channel and Basin of Tanjung Priok Port (3, 4)	411
Figure 5.29	Dredging Access Channel and Basin of Tanjung Emas Port	412
Figure 5.30	Dredging Access Channel and Basin of Tanjung Perak Port	413
Figure 5.31	Dredging Access Channel and Basin of Ujung Pandang Port	414
Figure 5.32	Procedure of IEE Study	437
Figure 6.1	Main Improvements for Container Transportation	463
Figure 6.2	The Classification of Transportation Form	464
Figure 6.3	Annual Container Transportation Demand and its Ability	470
Figure 6.4	Container Train Diagram: Klimas and Banyuwangi	471
Figure 6.5	Track Layout at Tg. Priok (Pasoso, TCT-III)	479
Figure 6.6	Profile C-C'	480
Figure 8.1	The Change of Track Layout at Each Step	523
Figure 8.2	Container Train Diagram Seven Trains Operation Single Way	525
Figure 8.3	Container Train Diagram Six Trains Operation Single Way	526
Figure 8.4	Track Capacity and Number of the Trains	

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

	Cikampek-Gedebage (1999)	527
Figure 8.5	The Comparison of Track Group Locations	540
Figure 8.6	Track Layout of Kiarcondong	541
Figure 8.7	The Work Schedule Diagram at Kiarcondong and Gedbage Yard	542
Figure 8.8	Track Layout of Pasoso	543
Figure 8.9	Gedebage Route Table	548
Figure 8.10	Kiarcondong Route Table	549
Figure 8.11	Outline of Signalling Improvement	550

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

THE STUDY ON THE MASTER PLAN OF CONTAINER CARGO HANDLING PORTS,
DRY PORTS AND CONNECTING RAILWAYS IN THE REPUBLIC OF INDONESIA
Vol.2, 1. INTRODUCTION

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:

THE STUDY ON THE MASTER PLAN OF CONTAINER CARGO HANDLING PORTS,
DRY PORTS AND CONNECTING RAILWAYS IN THE REPUBLIC OF INDONESIA
Vol.2, 1. INTRODUCTION

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) Construction 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.

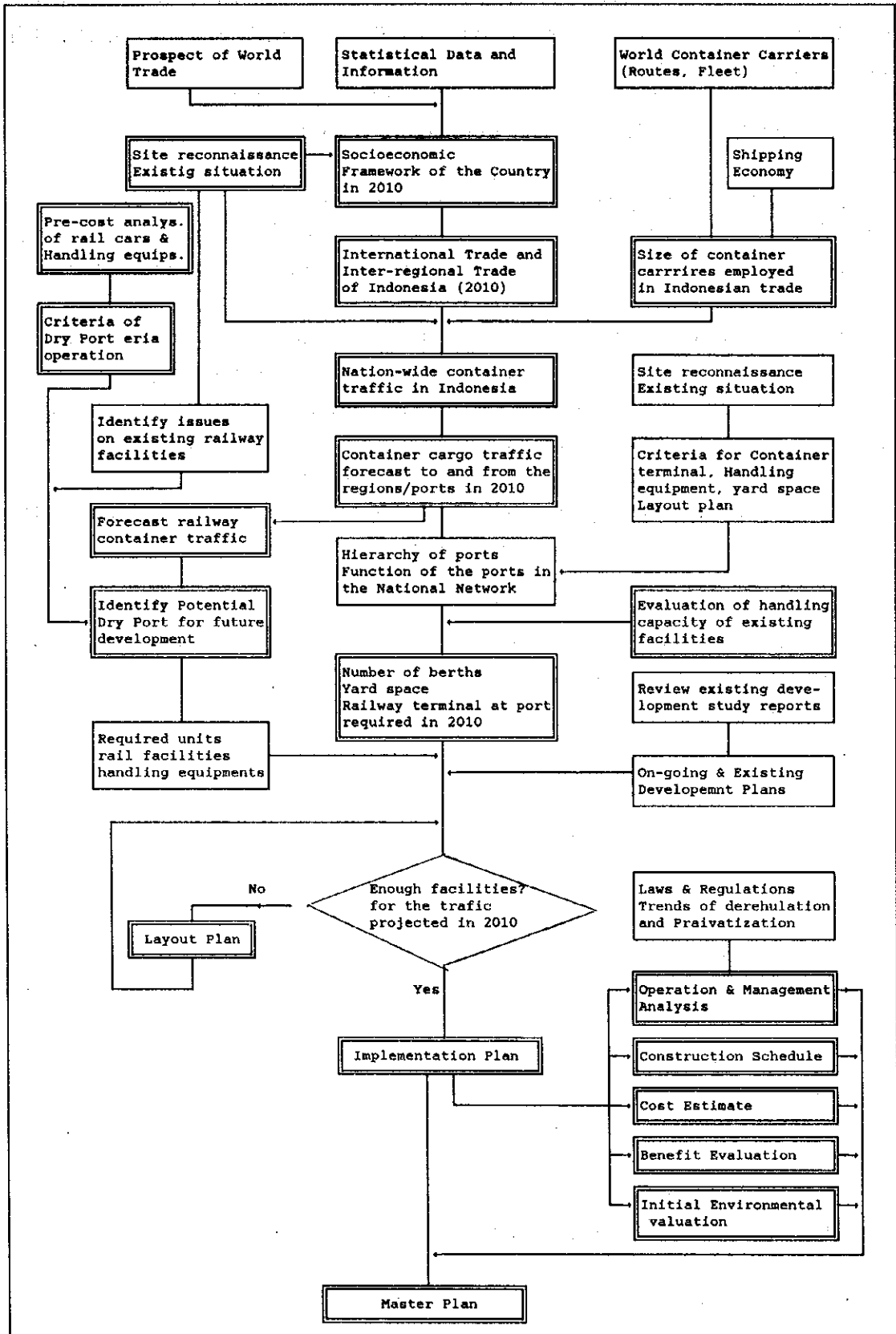


Fig. 1.1 Work Flow of Master Plan

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 m² with tracks for handling containers of 240 m in length and 8,000 m² 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.

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

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 m² 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 m² with tracks for handling containers of 280 m in length.

11. Ujung 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 mud. 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.

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

(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
February	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)					
SOUTH SUMATRA	Temperature (c)		(mm)	(%)	Wind Speed
Month	AV		Rain fall	Humidity	(Knot)
January	26.0		345.4	84.9	11.3 N
February	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)					
WEST JAVA	Temperature (c)		(mm)	(%)	Wind Speed
Month	Min	Max	Rain fall	Humidity	(Knot)
January	23.8	30.1	369.0	83.0	3.0
February	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

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

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

CENTRAL JAVA (Semarang)					
Month	Temperature (c)		(mm)	(%)	Wind Speed
	AV		Rain fall	Humidity	(Knot)
January	26.8		400.0	84.5	5.0 W
February	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)					
Month	Temperature (c)		(mm)	(%)	Wind Speed
	AV		Rain fall	Humidity	(Knot)
January	27.4		303.5	81.0	0.4 N
February	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)					
Month	Temperature (c)		(mm)	(%)	Wind Speed
	Min	Max	Rain fall	Humidity	(Knot)
January	23.3	30.4	491.0	86.0	2.0
February	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 Perhubungan Perum Pelabuhan II.
 : Meteorology and Geophysical Agency Jakarta.
 : Directrate General of Sea Communication.
 : Surabaya Dalam Angka 1992.
 : Kotamadya Ujung Pandang Dalam Angka 1992.

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

(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	Semarang	Surabaya	Medan	Lampung	Uj. Pandang
		Tj. Priok	Tj. Emas	Tj. Perak	Belawan	Panjang	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
Characteristic		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							
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 Development Plan (Phase II) 1993.

Studi Evaluasi Lingkungan 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.

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

(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 m³/ 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 m³/ year, 150,000 m³ for Nusantara Basin, 50,000 m³ for Basin II, III and 10,000m³ 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 m³/ 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 m³ 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

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

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.

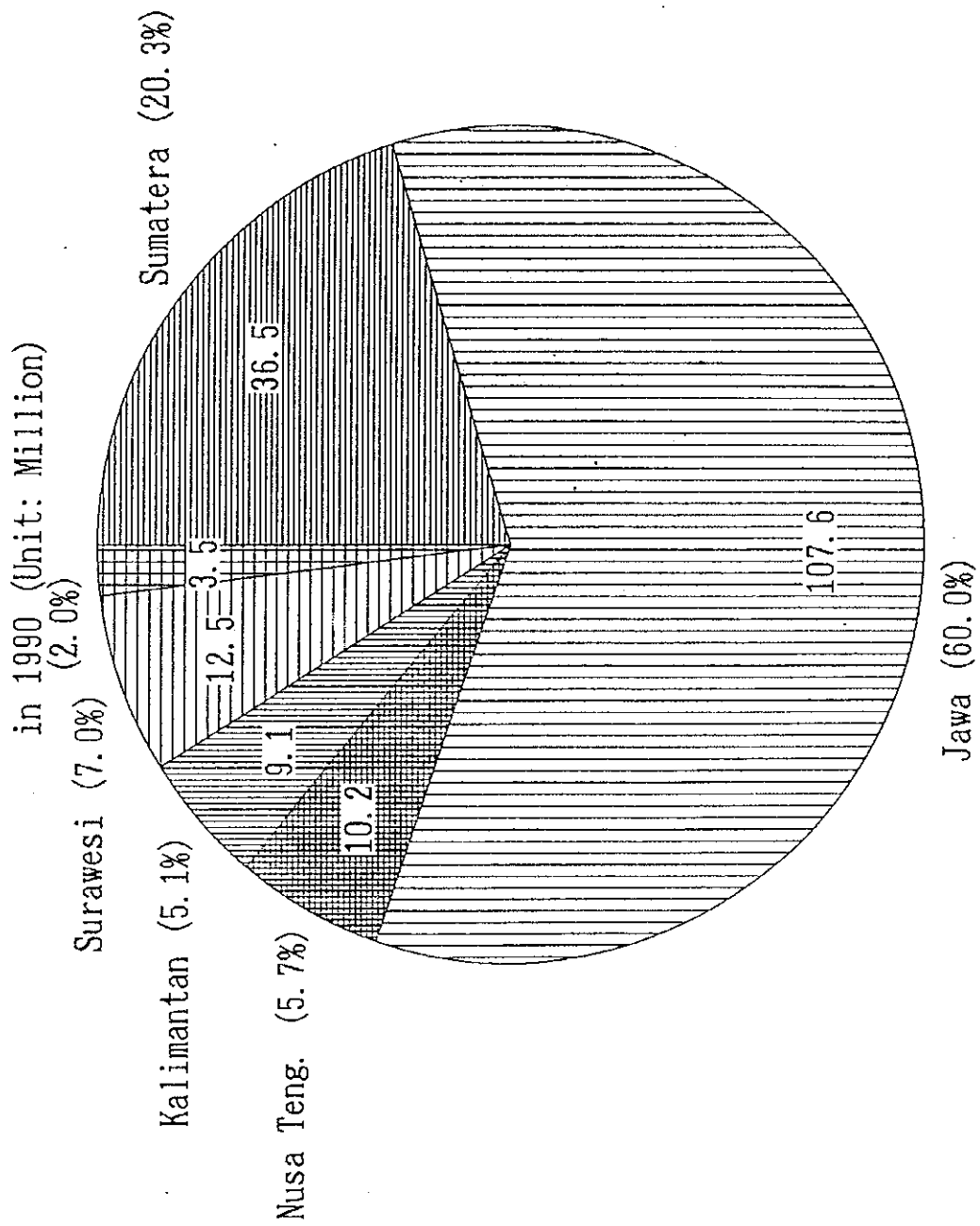


Fig. 2.1 Population in each Island

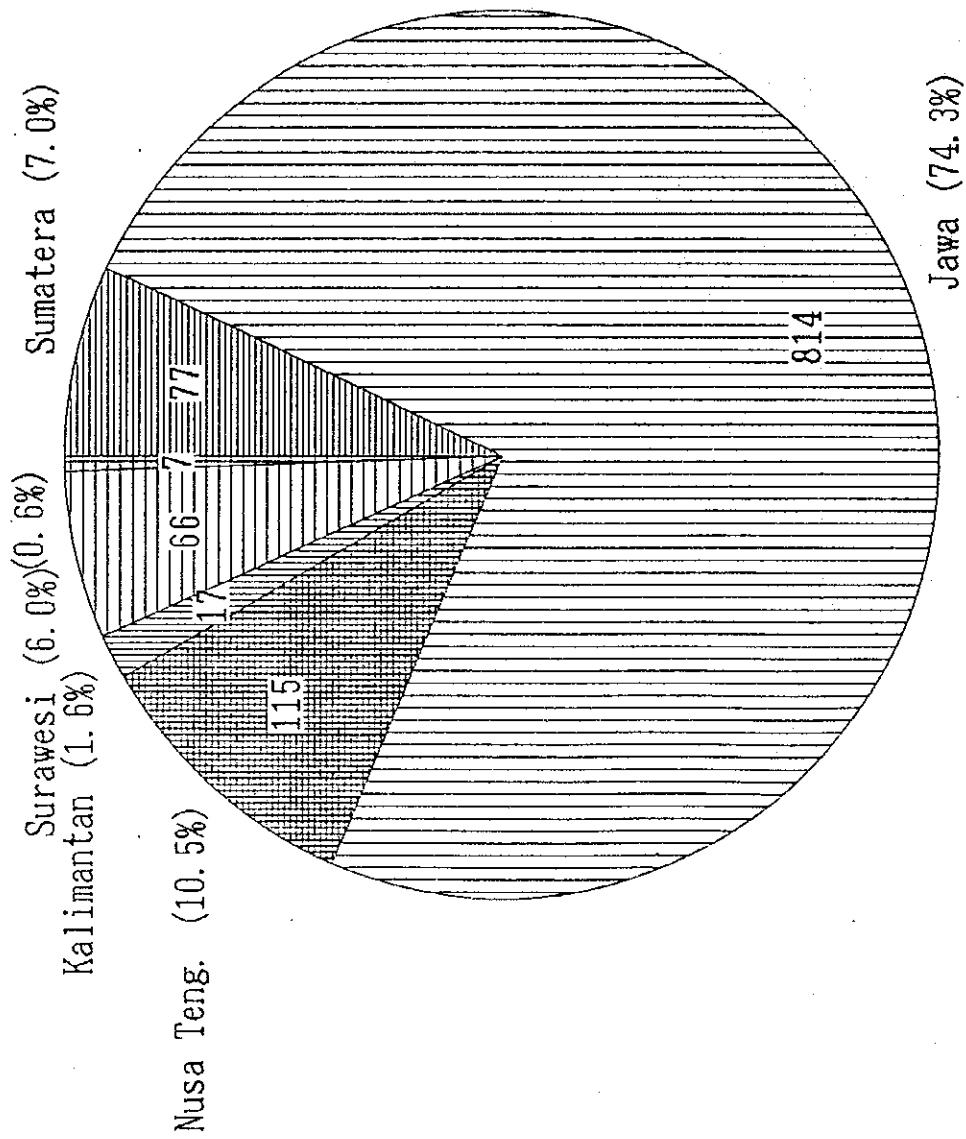


Fig. 2.2 Population Density of Each Island in 1990
(UNIT: Millon)

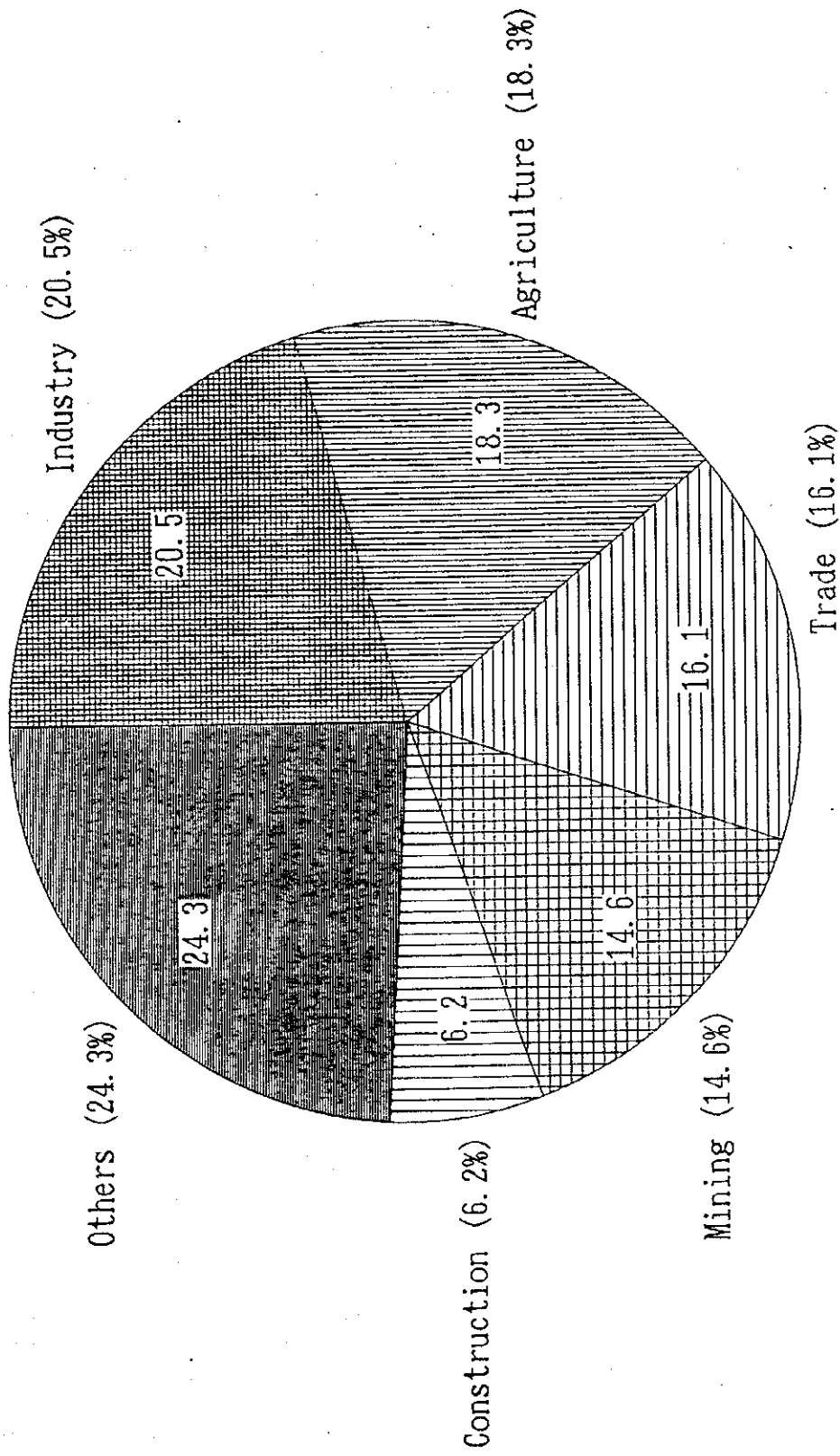


Fig 2.3 GDP share of various Sectors of Whole Nation in 1992

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

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 Sumatera.

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%) respectively. 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.O IL)
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 Aceh, 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.

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

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

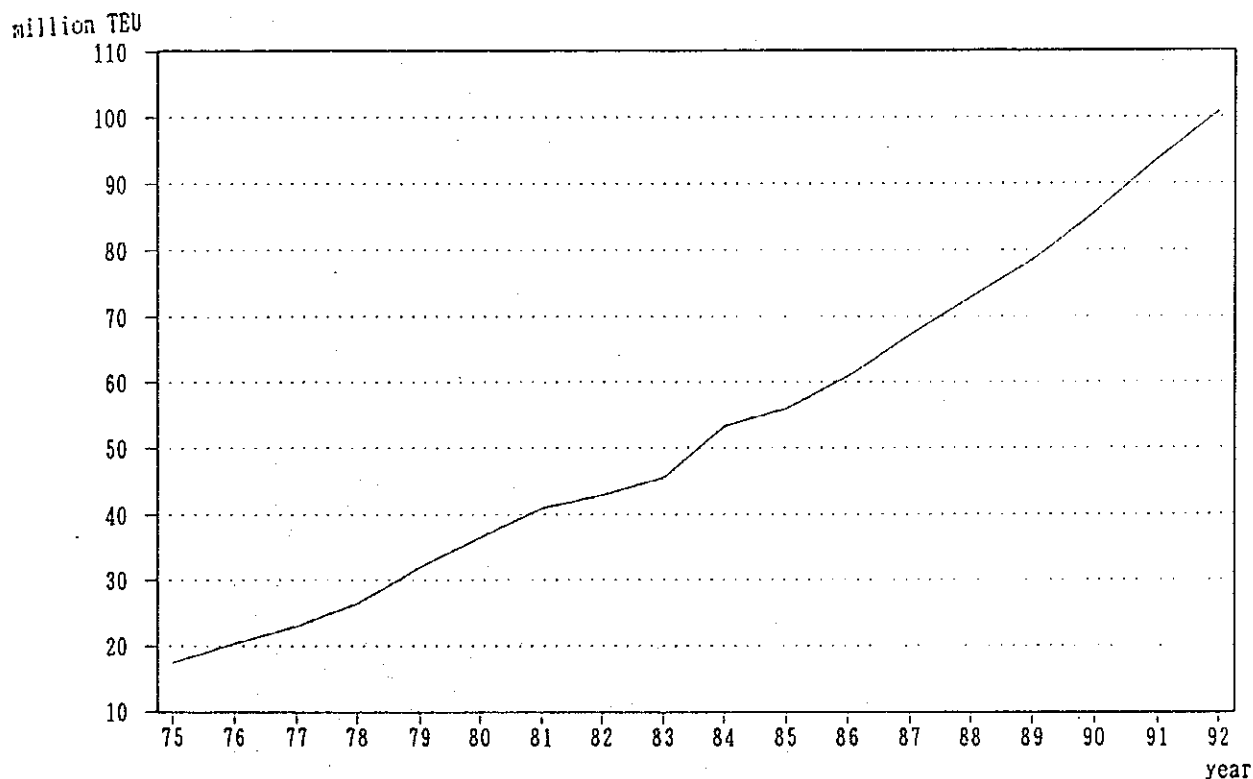


Fig. 2.14 Trends of Container Cargo Handling Volume in the World

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

Region	Country	81	82	83	84	85	86	87	88	89	90	91	92	Increase Rate(%)	
Far East	Japan	3,737	3,754	4,114	5,031	5,517	5,615	6,210	6,909	7,352	7,556	8,782	8,935	8.2	
	South East	1,788	1,802	2,439	3,227	3,075	4,105	4,772	4,889	5,278	5,451	6,130	6,179	1.9	
	Taiwan	1,560	1,560	1,837	2,109	2,289	2,774	3,357	4,033	4,494	5,101	5,152	7,972	6.0	
	Hong Kong	1,085	1,116	1,340	1,552	1,699	2,203	2,835	3,375	3,654	5,224	6,354	7,560	19.5	
	Singapore	803	862	928	1,178	1,246	1,533	1,949	2,065	2,159	2,348	2,571	2,751	11.8	
	South Korea	553	585	735	658	638	1,344	1,097	1,408	1,441	1,180	1,441	1,158	6.8	
	Philippines	242	259	305	341	400	511	314	1,795	1,939	1,078	1,172	1,313	16.6	
	Thailand	205	234	288	362	389	402	489	589	740	868	1,074	1,218	17.6	
	Malaysia	205	234	288	362	389	402	489	589	740	868	1,074	1,218	17.6	
	PRC	91	143	182	273	446	487	407	794	1,241	1,506	1,506	1,241	26.8	
India	Indonesia	135	158	233	219	228	364	393	588	785	1,153	1,153	1,329	23.1	
	Sub Total	10,199	10,773	12,458	14,752	15,828	18,748	21,876	25,134	28,183	31,592	36,345	39,656	13.2	
	Sri Lanka	58	103	128	181	216	341	429	621	544	584	689	676	25.0	
	India	208	216	235	296	393	486	516	550	718	687	699	761	12.5	
	Sub Total	266	319	393	477	609	827	945	1,171	1,262	1,271	1,388	1,437	16.6	
	Central & South	842	935	911	918	882	931	1,034	1,284	1,289	1,391	1,615	1,613	6.1	
	Brazil	223	265	359	531	612	691	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	
	America	914	1,049	1,187	1,476	1,947	2,824	3,300	3,823	4,253	4,759	5,289	5,771	15.4	
	Middle East	440	411	503	598	712	926	958	1,043	1,281	1,563	2,073	2,506	17.1	
Africa	Sub Total	1,354	1,460	1,690	1,774	1,659	1,750	1,888	1,866	2,040	2,332	3,144	3,660	9.5	
	South Africa	734	661	652	748	633	617	658	758	772	778	881	889	1.8	
	Sub Total	234	261	262	262	262	262	262	262	262	262	262	262	1.8	
	USA	8,263	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	9,100	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	2,744	2,919	2,885	3,011	3,377	3,870	3,710	4,032	4,088	4,179	6.1
	Netherlands	2,240	2,302	2,410	2,666	2,769	2,973	2,949	3,383	3,712	3,742	3,782	3,856	3.9	
	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	1,772	1,241	1,389	1,614	1,525	1,376	1,580	1,572	1,610	1,610	1,803	1,891	1.7	
Belgium	1,034	1,028	1,240	1,457	1,470	1,395	1,671	1,724	1,780	1,901	2,090	2,399	8.0		
France	1,280	1,215	1,185	1,290	1,485	1,350	1,341	1,435	1,607	1,565	1,594	1,302	0.2		
Spain	864	1,073	1,075	1,401	1,508	1,477	1,666	1,762	1,768	1,900	2,270	2,247	9.1		
Sweden	346	422	394	453	471	477	467	499	454	454	481	517	3.7		
Greece	195	211	201	166	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	1,339	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	1,716	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	81,506	89,699	8.8		
World 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

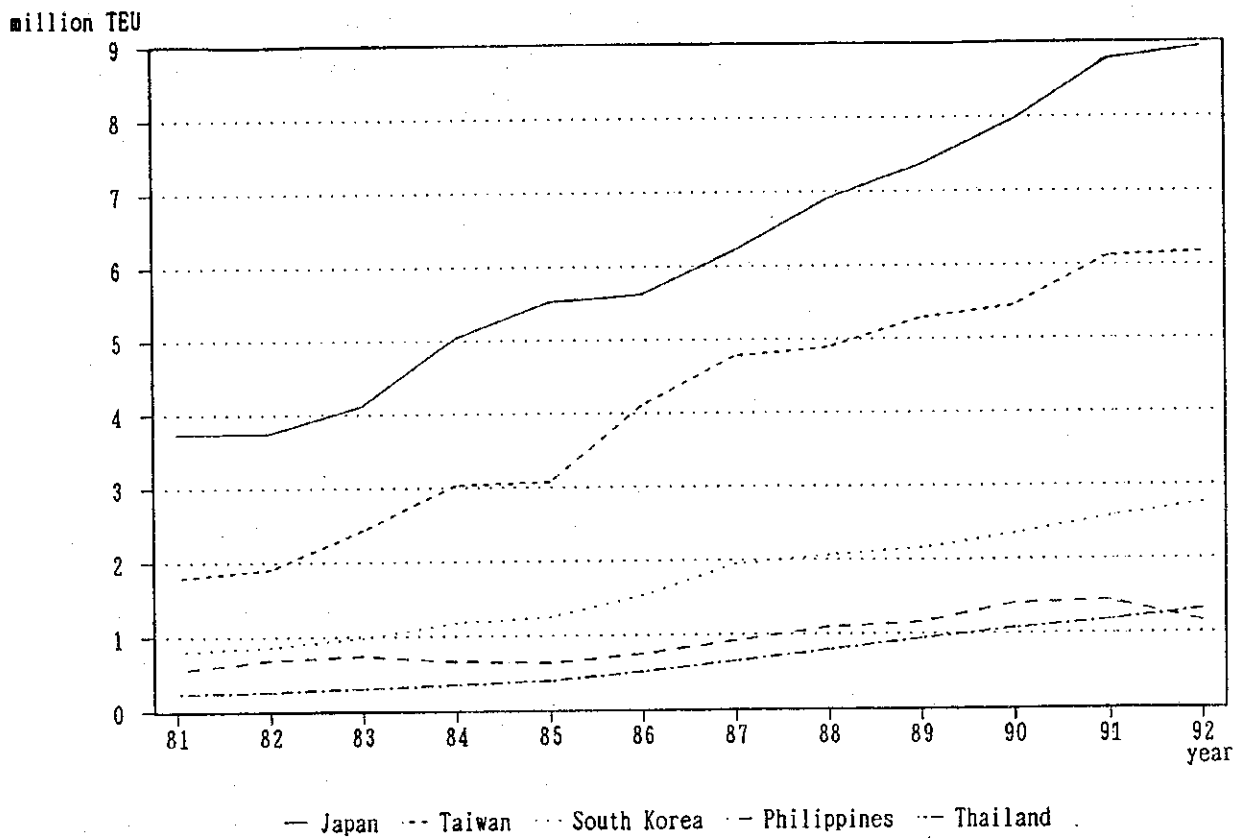


Fig. 2.15 Trends of Container Cargo Handling Volume by Country

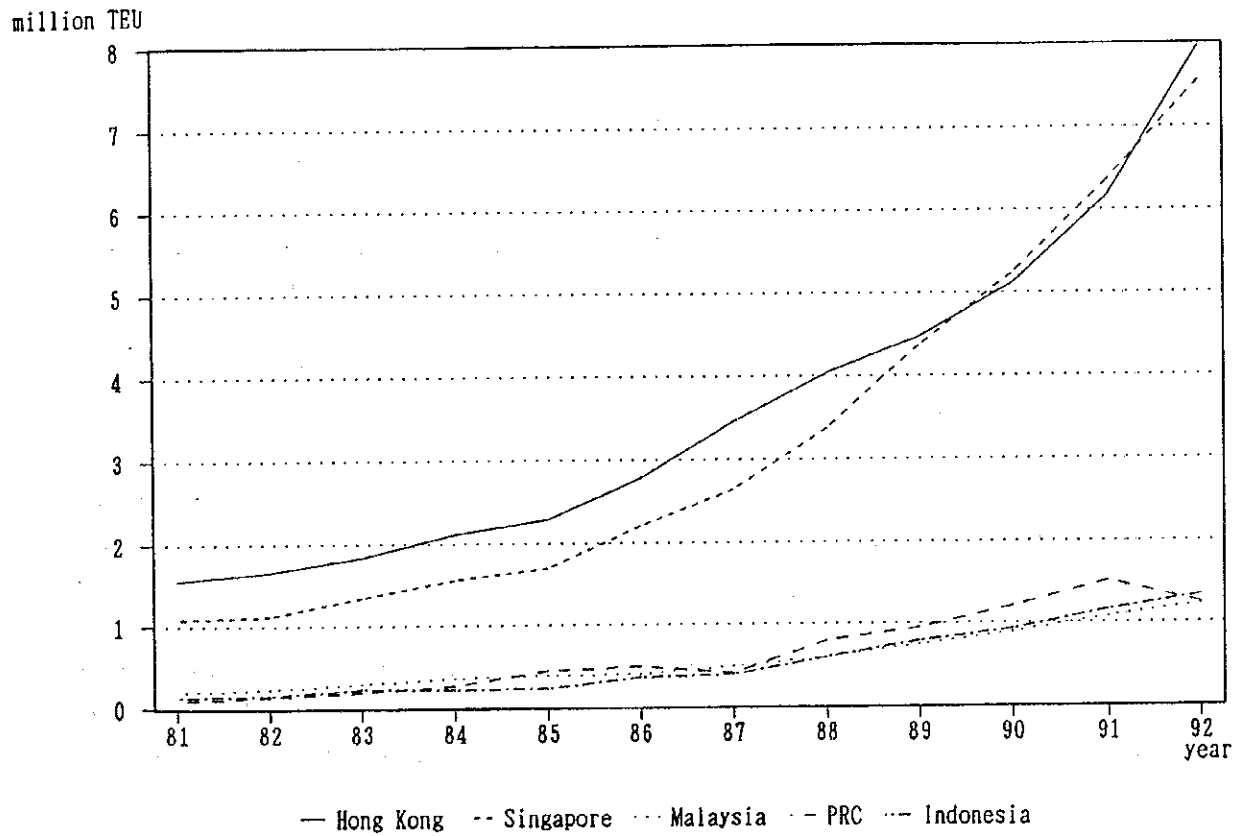


Fig. 2.16 Trends of Container Cargo Handling Volume by Country

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

- 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

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

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

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

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, transshipment, and etc. were collected from various literatures: International Container Year Book, International Container Transportation Handbook, World container carrier fleet, and Indonesian Maritime Gazette,

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

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 transshipment, 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

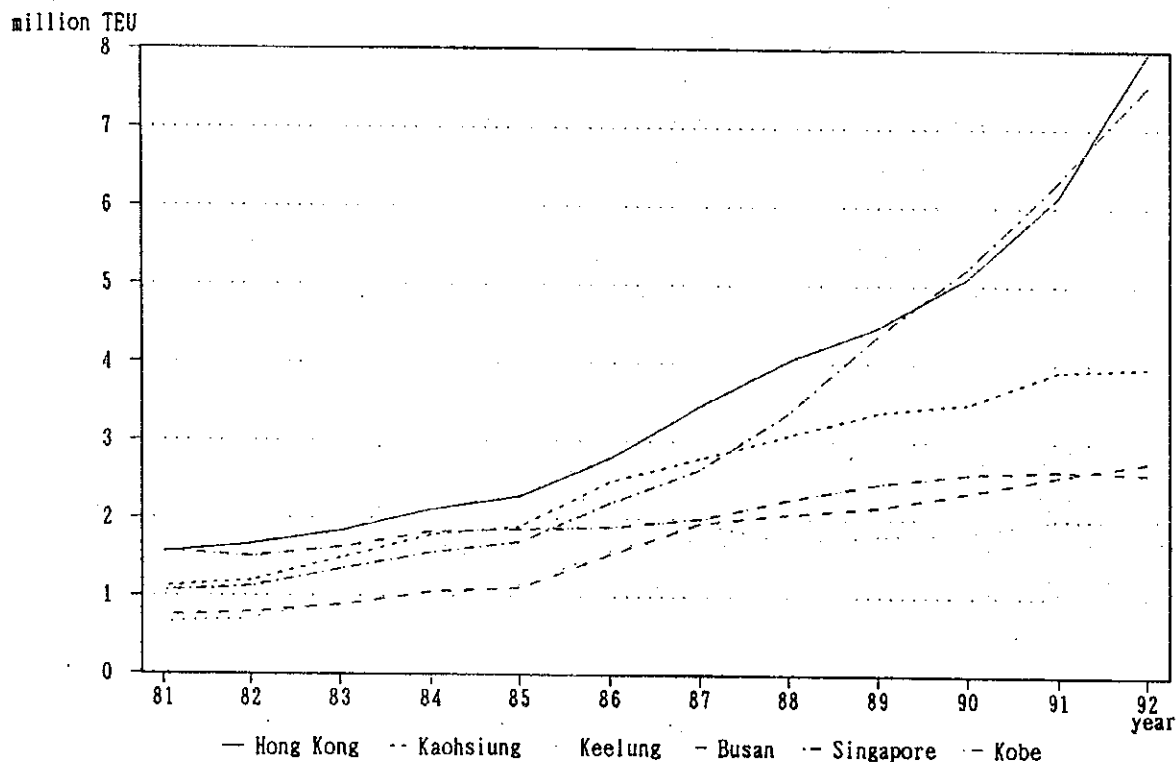


Fig. 2.17 Trends of Container Cargo Handling Volume in Asian Mother Ports

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
(Growth Rate of GNP)	100	114	122	106	104	117	149	164	205	222	224	248
Jakarta	97	120	183	206	213	265	274	416	560	644	736	868
(Growth Rate of GNP)	100	124	189	212	220	273	282	429	577	664	759	895
Port Kelang	148	157	193	241	245	242	276	326	399	497	608	678
(Growth Rate of GNP)	100	106	130	163	166	164	186	220	270	336	411	458
Bangkok	242	259	305	341	400	511	650	792	924	1,018	1,171	1,303
(Growth Rate of GNP)	100	107	126	141	165	211	269	327	382	421	484	538
Shanghai	49	66	83	110	202	204	224	313	354	456	576	673
(Growth Rate of GNP)	100	135	169	224	412	416	457	639	722	931	1176	265

Source : Containerization International Year Book

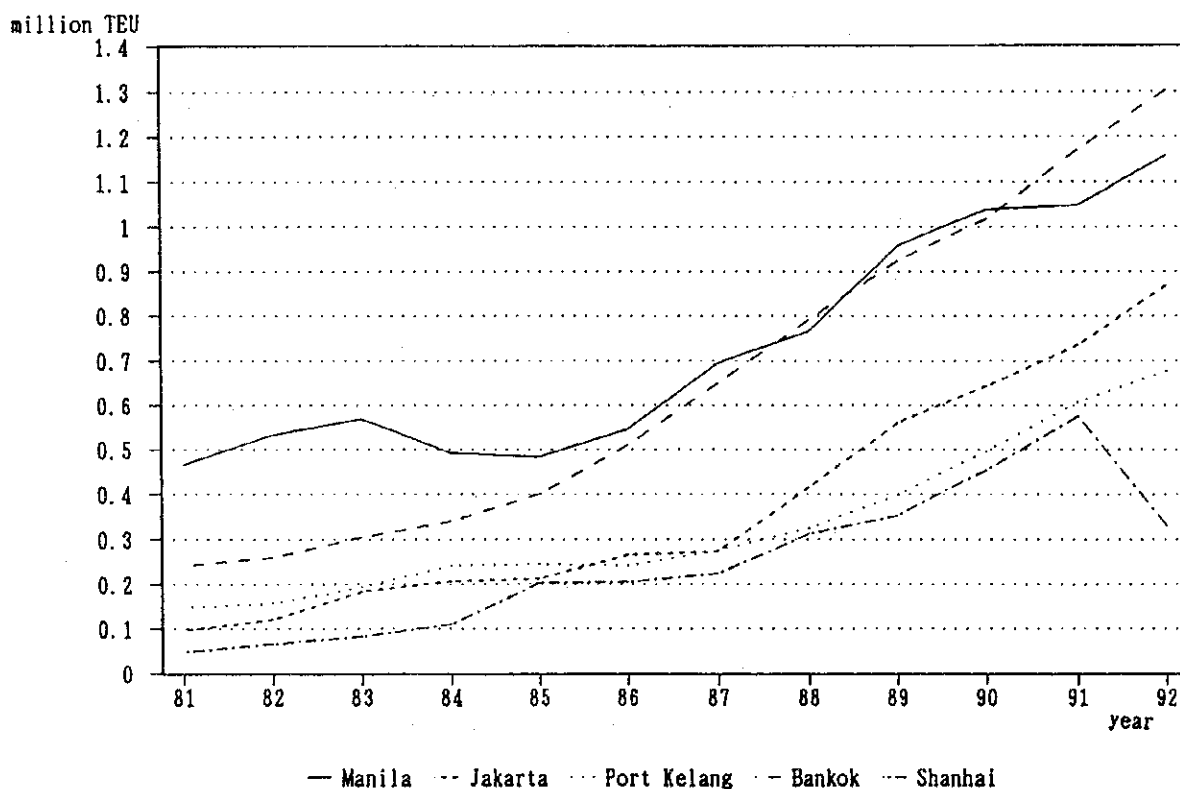


Fig. 2.18 Trends of Container Cargo Handling Volume in Asian Feeder Ports

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 "Feeder-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	8
	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

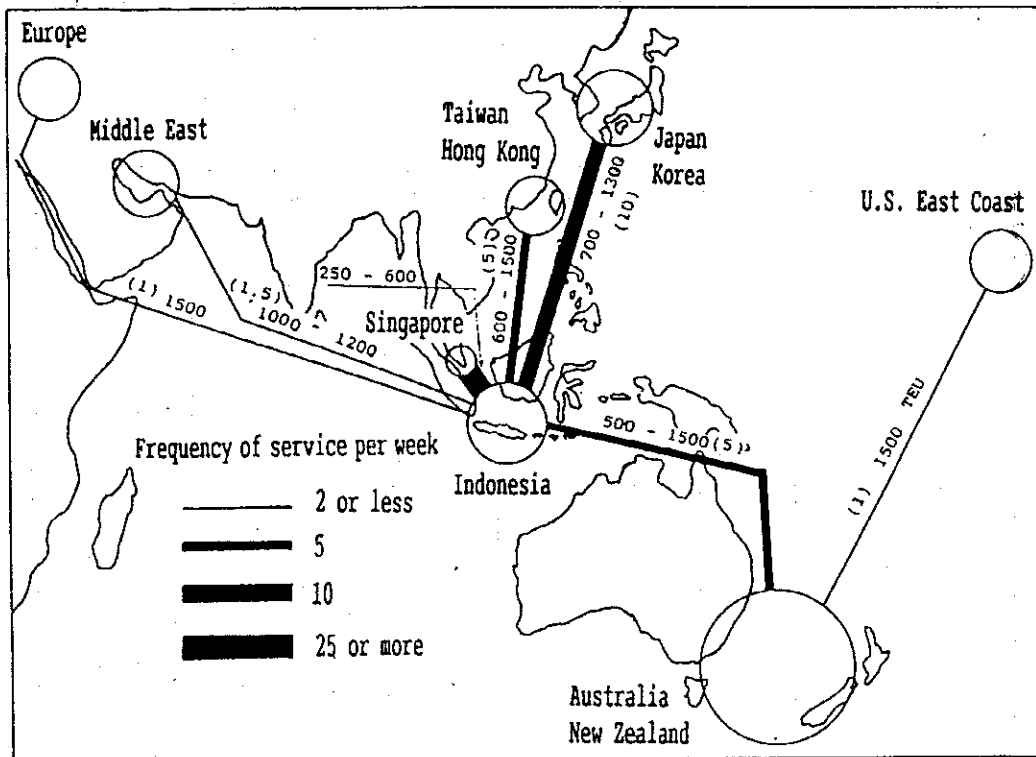


Fig. 2.19 Direct service routes and frequency of service (Ship size in TEU capacity)

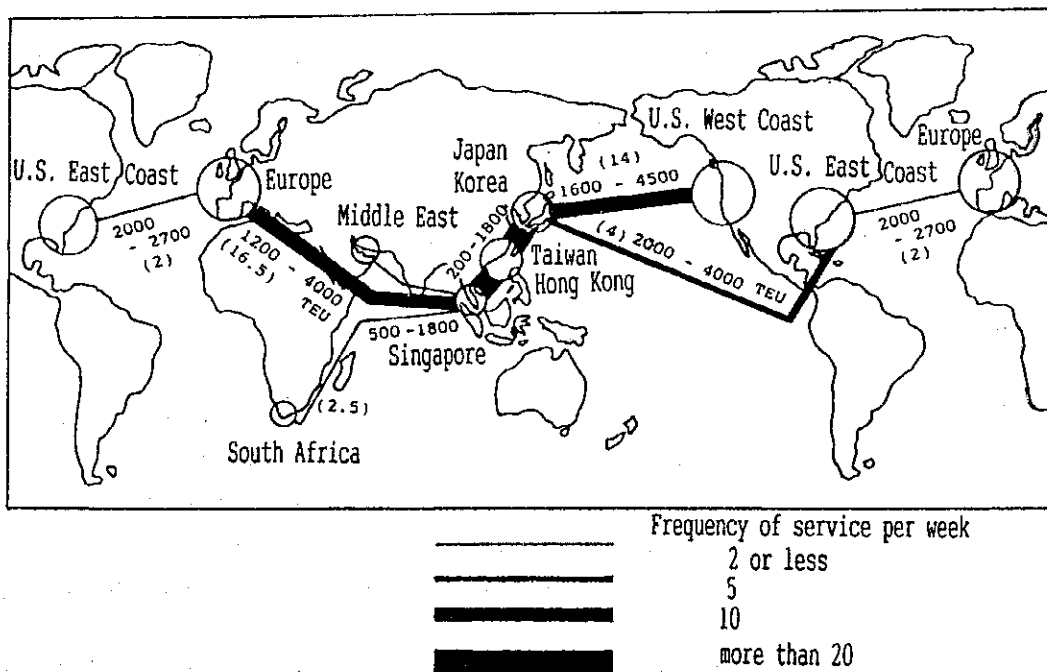


Fig. 2.20 Mother vessel service with feeder service to Indonesia (Ship size in TEU capacity)

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

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

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

are large in comparison with the intra-asia routes. It should be 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 (China 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+5 4
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, National Magazine Co. Ltd)

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

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)									Total
	3000-2500	2500-2000	2000-1500	1500-1000	1000-800	800-500	500-300	300-100	100-ess	
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 transshipment ports

55. At present, there are many container carriers plying among Indonesian ports and three transshipment 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 transshipment 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 transshipment, 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,

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

- 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 transshipment 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 routes.

(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.

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

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.

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

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.

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

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

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

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 Kalimantan, Sulawesi, and other ports in eastern part of Indonesia.

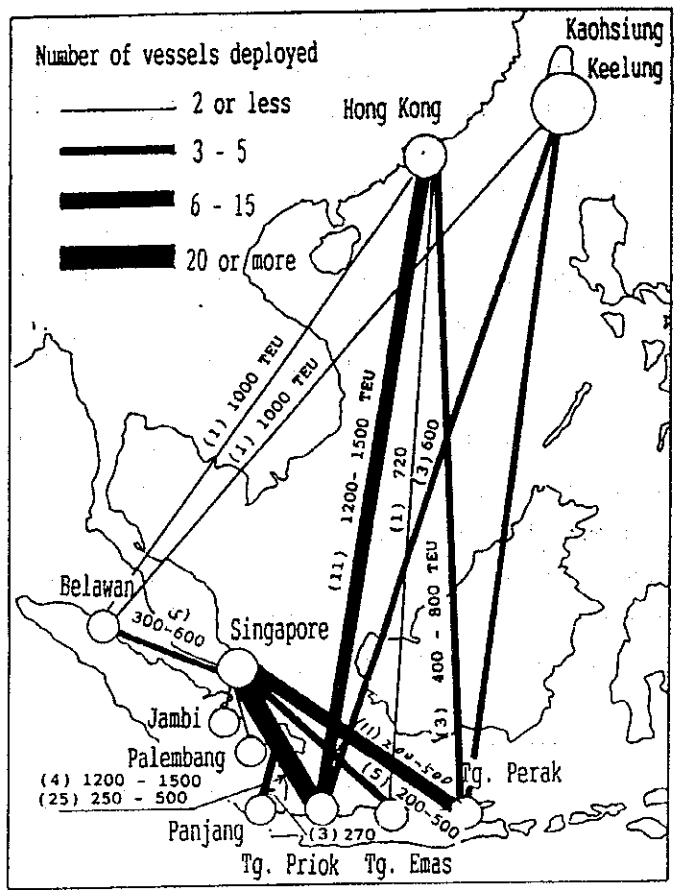


Fig. 2.21 Feeder service routes for International containers and number and size of ships deployed

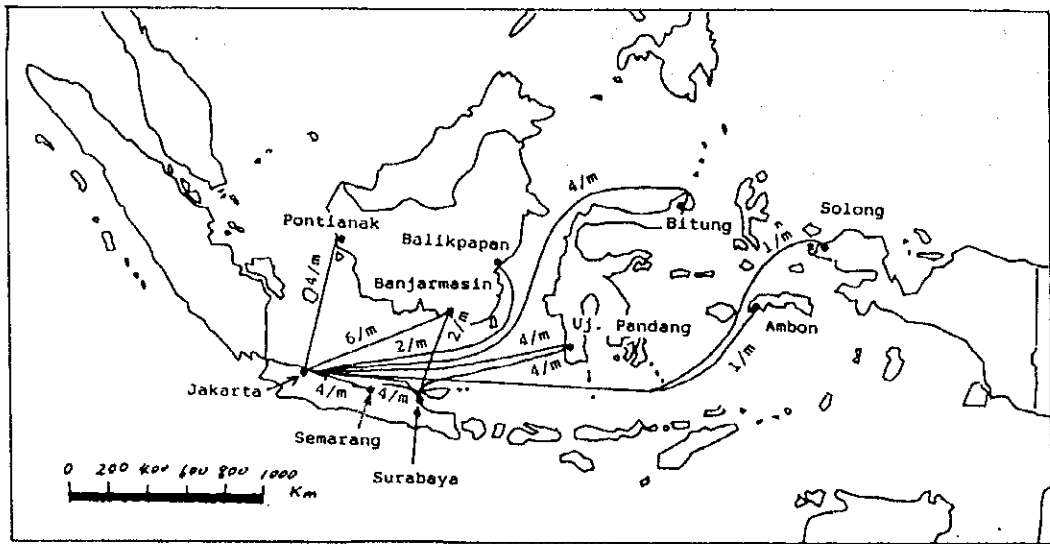


Fig. 2.22 Domestic container service routes and frequency

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 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, flour, 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

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

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 initiate arbitrate conflicts among not only ports but also port-related organizations (the customs, quarantine section, the immigration office).

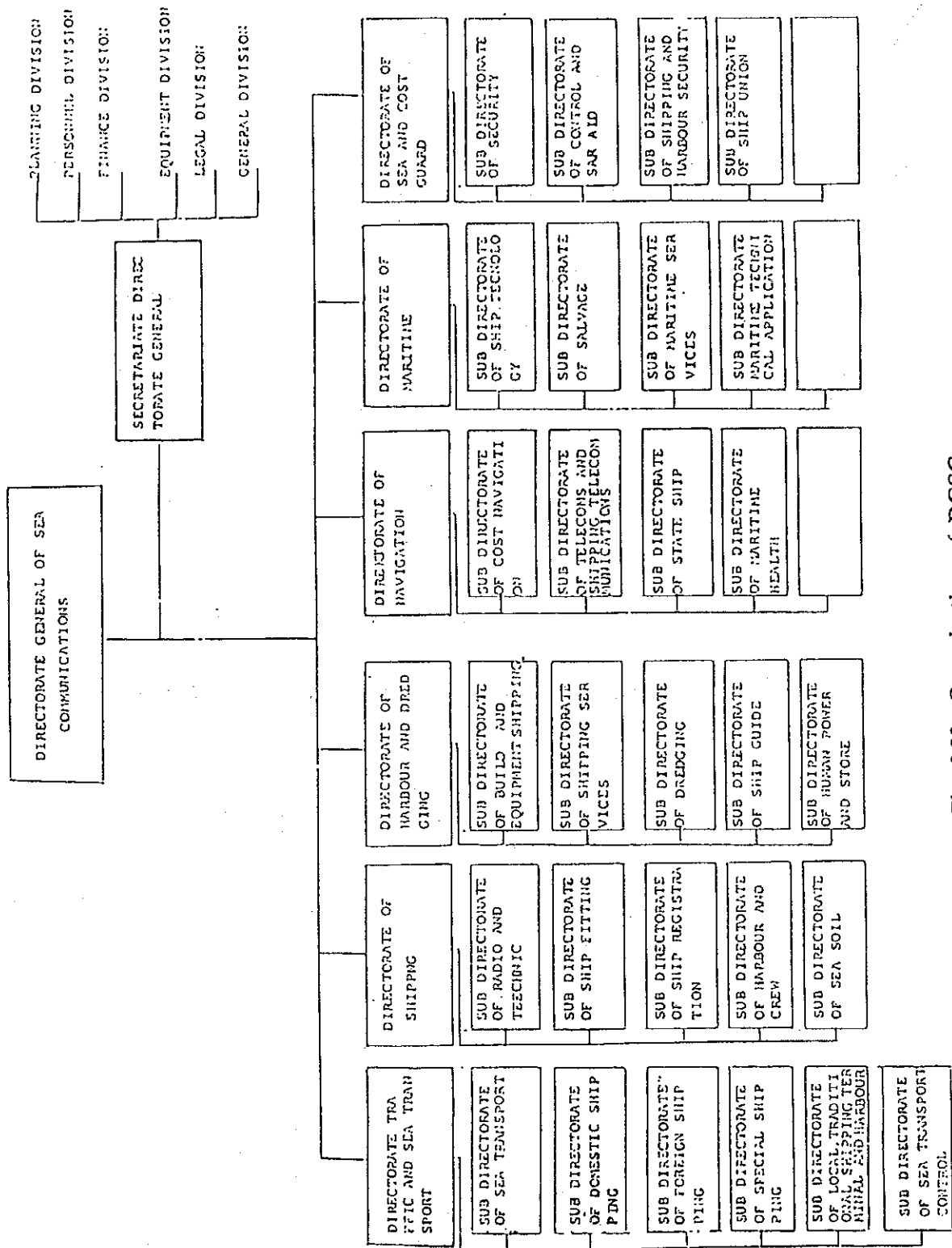


Fig. 2.23 Organization of DGSC

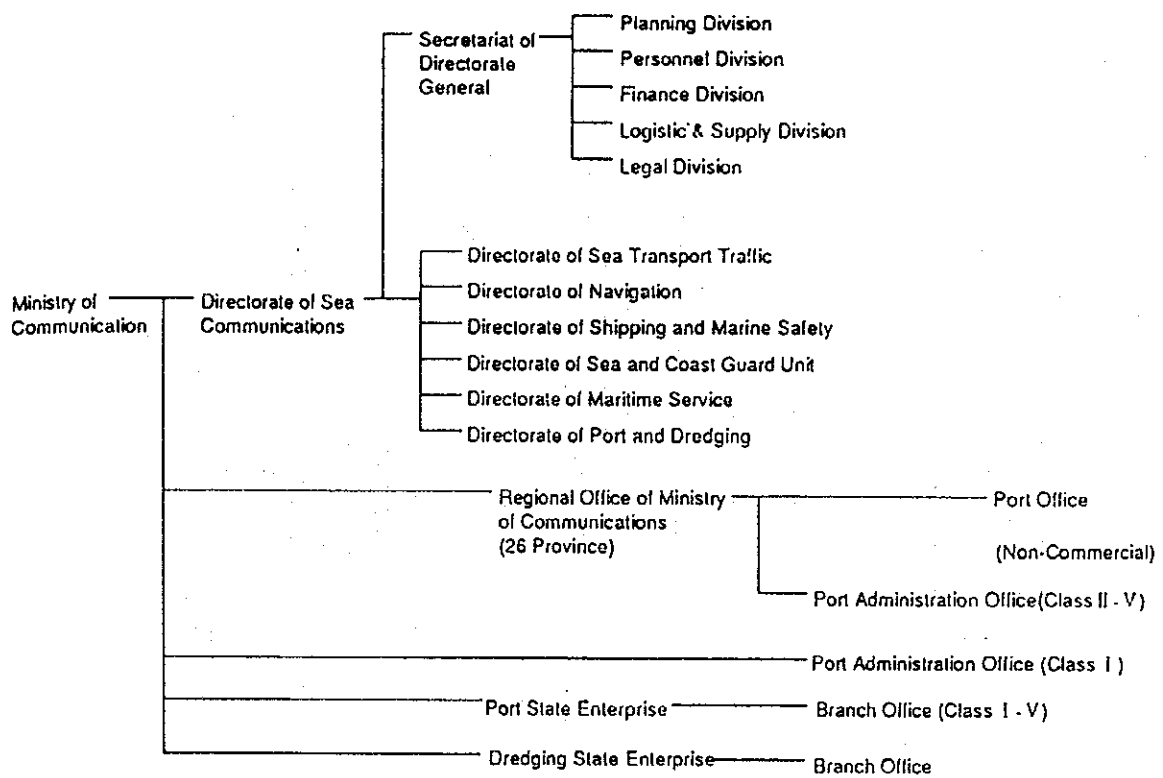


Fig. 2.24 Condition of Port Management and Operation

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 Pandang 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	8	9	7	27
	D. I. Aceh North Sumatra Riau	West Java Jambi South Sumatra Bengkulu Lampung West Java D. K. I. Jakarta West Kalimantan	Central Java East Java Bali East Timor West Nusa Tenggara East Nusa Tenggara Central Kalimantan South Kalimantan D. k. I. Yogyakarta	East Kalimantan South Sulawesi Central Sulawesi Southeast Sulawesi North Sulawesi Maluku Irian Jaya	