Table A.7.3.6.1 Survey on Road Traffic(to city)						
Location	Jl. Tanjung Mutiara, access road to city destination					
	Time	Vehicle				
No.	From/To	Car	Bus	Truck	Trailler	Equivalent
						car units
1.	10:45/11:45	85		28	117	
2.	11:45/12:45	70		22	41	
3.	12:45/13:45	57		28	114	
4.	13:45/14:45	60	1	34	191	
5.	14:45/15:45	79		27	196	
6.	15:45/16:45	84		24	146	
7.	16:45/17/45	74		11	153	
8.	17:45/18:45	42		10	67	
9.	18:45/19:45	15		6	114	
10.	19:45/20:45	22		4	147	
11.	20:45/21:45	16		2	75	
12.	21:45/22:45	5		2	56	
13.	22:45/23/45	15		2	66	
14.	23:45/00:45	7		1	28	
15.	24:45/01/45	1		1	39	
16.	01:45/02:45	6			33	
17.	02:/03:4545	2			16	
18.	03:45/04:45	4			4	
19.	04:45/05:5	6	1		10	
20.	05:45/06/45	15		1	21	
21.	06:45/07/45	35			14	
22.	07:45/08:45	70		10	77	
23.	08:45/09/45	63		14	130	
24.	09:45/10:45	60		15	145	
TOTAL		**893**	**2**	**242**	**2000**	

Table A.7.3.6.2 Survey on Road Traffic(to toll)						
Location	Access to Toll Road					
	Time	Vehicle				
No.	From/To	Car	Bus	Truck	Trailler	Equivalent car units
1.	11:00/12:00	460	16	383	70	
2.	12:00/13:00	488	12	307	17	
3.	13:00/14:00	350	9	286	61	
4.	14:00/15:00	433	12	320	74	
5.	15:00/16:00	390	21	328	109	
6.	16:00/17:00	707	11	203	68	
7.	17:00/18:00	666	19	214	51	
8.	18:00/19:00	330	6	89	14	
9.	19:00/20:00	166	7	76	49	
10.	20:00/21:00	156	5	93	49	
11.	21:00/22:00	121	6	85	21	
12.	22:00/23:00	50	6	39	15	
13.	23:00/00:00	40	7	49	5	
14.	00:00/01:00	23	3	55		
15.	01:00/02:00	15	3	39	3	
16.	02:00/03:00	19		49	3	
17.	03:00/04:00	13	3	48	2	
18.	04:00/05:00	40	6	48	2	
19.	05:00/06:00	52	6	56	10	
20.	06:00/07:00	161	13	63	11	
21.	07:00/08:00	400	6	147	11	
22.	08:00/09:00	250	4	255	62	
23.	09:00/10:00	437	6	323	147	
24.	10:00/11:00	484	9	373	135	
TOTAL		**6251**	**196**	**3928**	**989**	

Table A 7.4.1(1) Environmental Impact Work Sheet for Port Development

Environmental Impact Factor	Content of Plan	Impact to be Considered	Countermeasures
Dredging, Bottom Stirring, Soil Dumping into Water	Dredgeing □ yes → dredged soil □ no for disposal □ unknown ↓ □ ground □ on land □ coastal reclamation □ offshore dumping □ unknown	Water/Bottom Pollution(SS, Hazardous Materials)	Settling Pond, Sedimantation Coagulant, Selection of Construction Methods & Machines, Silt Curtains
		Offensive Odor	Selection of Construction Method & Machines, Introduction of Odor Treatment Method
		Decreases of Aquatic Lives	Settling Pond, Sedimentation, Coagulant, Selection of Construction Methods & Machines, Silt Curtains, Selection of Construction Period, Monitoring of alternative Habitats
		Pollution of Marine Products	Settling Pond, Sedimentation, Coagulant, Selection of Construction Methods & Machines, Silt Curtains, Selection of Construction Period, Monitoring of alternative Habitats
		Devaluation of Tourism Resources(Water Color, Coral Reef)	Settling Pond, Sedimentation, Coagulant, Selection of Construction Methods & Machines, Silt Curtains
Employment of Laborers	Inflow of Laborers from outside □ likely □ not likely □ no □ unknown	Inflow of Alien Culture	Employment Planning, Disclosure of Information
		Change in Economic Activities	Employment Planning, Human Resources Development
Impact from Port Facilities & Sites			
Emergence of Sites(included landfill)	Landfill Piers □ yes □ yes □ no □ no □ unknown □ unknown	Water/Bottom Pollution	Change of Face Line, Dredging Sludge, Promotion of Sea water Exchange

Table A 7.4.1(1) (continued)

Environmental Impact Factor	Content of Plan	Impact to be Considered	Countermeasures
		Beach Erosion/Acceration	Change of Face Line, Coastal Defense Construction, Littoral Nourishment
		Decrease of Habitats for Aquatic Lives	Transplant, Discharge of Seeds & Saplings
		Decrease of Habitats for Terrestrial Lives	Change of Face Line, Establishment of Nature Conservation Area, Artificial Tidal Flats, Transplant
		Resettlement of Residents	Resettlement Disclosure
		Loss of Fishing Ground	Expansion of Functions of Fishing Ports and Marine Products Transportation System
Emergence of external Facilities	Breakwater ☐ yes ☐ no ☐ unknown	Impact on Water/Bottom Conditions	Change of Face Line, Mud Dredging, Enhancement of Sea Water Exchange
		Beach Erosion/Accretion	Change of Face Line, Coastal Defense Construction
		Decrease of Habitats for Coastal Lives	Transplant, Discharge of Seeds & Saplings
Impact from Loading & Storage			
Loading & Use of Storage	Handling Bulk Cargo ☐ yes ☐ no ☐ unknown	Air Pollution(dust)	Buffer Zone, Enclosure, Surface Treatment, Selection of Loading Machines
		Water/Bottom Pollution	Buffer Zone, Enclosure, Surface Treatment, Selection of Loading Machines, Form of Apron
		Offensive Odor	Zoning, Storage Sealing, Deodorizer

Table A 7.4.1(1) (continued)

Environmental Impact Factor	Content of Plan	Impact to be Considered	Countermeasures
		Change in Coastal Ecosystem	Buffer Zone, Enclosure, Surface Treatment, Selection of Loading Machines, Form of Apron, Monitoring of Pollution of Marine Products
Impact from Operation of Facilities handling Hazardous Materals			
Petroleum distribution Base & Facilities Handling Hazardous Materials	Petroleum distribution Base & Facilities Handling Hazardous Materials □ yes □ no □ unknown	Air Pollution	Reduction of Generated Pollutants(dust collection, desulfurization, denitrification), Promotion of Dispersion
		Water/Bottom Pollution(oil)	Waste Oil Treatment Facilities, Oil Fence
		Offensive Odor	Zoning, Containment of Odor, Deodorizer
		Change in Coastal Ecosystem	Waste Oil Treatment Facilities, Oil Fence, Monitoring of Pollution of Marine Products
		Change in Terrestrial Ecosystem	Waste Oil Treatment Facilities, Oil Fence, Designation of Nature Conservation Area
		Decrease in amount of Agricultural Products, Fish Catches, Prices	Waste Oil Treatment Facilities, Oil Fence, Monitoring of Pollution of Marine Products
Impact from Waste Treatment Facilities	Petroleum distribution Base & Facilities Handling Hazardous Materials □ yes □ no □ unknown	Air Pollution	Reduction of Generated Pollutants(dust collection, desulfurization, denitrification), Promotion of Dispersion
		Water/Bottom Pollution(oil)	Reduction of Wastes, Drainage Treatment Facilities
		Offensive Odor	Zoning, Containment of Odor, Deodorizer
		Change in Coastal Ecosystem	Reduction of Wastes, Drainage Treatment Facilities

Table A 7.4.1(1) (continued)

Environmental Impact Factor	Content of Plan	Impact to be Considered	Countermeasures
		Change in Terrestrial Ecosystem	Waste Oil Treatment Facilities, Oil Fence, Designation of Nature Conservation Area
		Decrease in amount of Agricultural Products, Fish Catches, Prices	Reduction of Air Pollution(dust collection, desulfurization, denitrification), Promotion of Dispersion Drainage Treatment Facilities
Impact of Final Treatment Facilities	Waste Disposal Site ☐ yes ☐ no ☐ unknown	Air Pollution	Buffer Zone, Surface Treatment, Fence
		Water/Bottom Pollution	Sheet Cover(rain Prevention), Settling Pond
		Offensive Odor	Zoning
		Change in Coastal Ecosystem	Sheet Cover(rain Prevention), Settling Pond
		Change in Terrestrial Ecosystem	Zoning, Buffer Zone, Surface Treatment, Fence, Sheet Cover(rain Prevention), Settling Pond
		Generation of Wastes	Buffer Zone, Surface Treatment, Fence, Sheet Cover(rain Prevention), Settling Pond, Structure of Bulkhead
		Formation of Slums	Management Plan for Treatment Facilities

Table A 7.4.1(2) Environmental Impact Work Sheet for Activities Closely Related to Port Development

Environmental Impact Factor	Content of Plan	Impact to be Considered	Countermeasures
Impact from Industrial Production activities			
Operation of Factories and Plants	Industrial Activities □ large scale □ small scale □ none □ unknown	Air Pollution	Reduction of Generated Pollutants(dust collection, desulfurization, denitrification), Promotion of Dispersion
		Water/Bottom Pollution	Reduction of Water Pollutants, Drainage Treatment Facilities
		Noise/Vibration	Zoning, Buffer Zone, Soundproof Fence, soundproof Food
		Offensive Odor	Zoning, Containment of Odor, Deodorizer
		Ground Subsidence	Regulation on Use of Groundwater
		Change in Coastal Ecosystem	Reduction of Water Pollution, Dredging of Sludge
		Change in Terrestrial Ecosystem	Designation of Nature Conservation Area
		Generation of Wastes	Plan for Collection, Treatment, Disposal of Wastes
		Changes in Distribution of Local Population	Plans for Employment, Disclosure of Information

Table A 7.4.2 Environmental Impact Checklist for Port Development

Environmental Impact Factors	Environmental Impact	Countermeasures	Size of Impact (check appropriate boxes)			
			No	Small	Moderate	Major
1. Impact from Construction Works						
1.1 Operation of Working Boats, Construction Machines	1.1.1 Air Pollution	management of construction process, selection of working hours, smoke prevention fence				
	1.1.2 Generation of Noise /Vibration	selection of construction methods/machines, selection of working hours, placement of sources of noise/vibration				
	1.1.3 Changes in Terrestrial Ecosystem	selection of construction methods/machines				
1.2 Dredging, Stirring Bottom Soil, Soil Dumping into Water	1.2.1 Pollution of Water and Bottom Sediments(SS, Hazardous Materials)	settling pond, sedimentation coagulant, selection of construction methods/machines, silt curtains				
	1.2.2 Offensive Odor	selection of construction methods/machines, introduction odor treatment methods				
	1.2.3 Reduction of Aquatic Lives	settling pond, sedimentation coagulant, selection of construction methods/machines, silt curtains, selection of construction period, monitoring of alternative habitats				
	1.2.4 Pollution of Marine Products	settling pond, sedimentation coagulant, selection of construction methods/machines, silt curtains, selection of construction period, monitoring pollution of fishery products				

Table A 7.4.2 (continued)

Environmental Impact Factors	Environmental Impact	Countermeasures	Size of Impact (check appropriate boxes)			
	1.2.5 Devaluation of Tourism Resources (water color, coral reef)	settling pond, sedimentation coagulant, selection of construction methods/machines, silt curtains				
1.3 Soil Removal	1.3.1 Changes in Topography, Underground Water System	prior elucidation of underground water system				
	1.3.2 Extinction on Terrestrial Ecosystem	transplantation of important species/vegetation				
1.4 Generation of Surplus Soil, Wastes, Dumping of Dredged Soil on Ground	1.4.1 Pollution of Water/Bottom Sediments	treatment site planning				
	1.4.2 Impact on Terrestrial Ecosystem	disposal site planning				
1.5 Employment of Laborers	1.5.1 Inflow of Alien Cultures	employment planning, enclosure of information				
	1.5.2 Change in Economic Activities	employment planning, vocational training				
1.6 Congestion of Work Vehicles and Boats	1.6.1 Economic Loss (traffic jam)	construction of access roads				
	1.6.2 Devaluation of Fishing Ground	alternative fishing ground				

Table A 7.4.2 (continued)

Environmental Impact Factors	Environmental Impact	Countermeasures	Size of Impact (check appropriate boxes)			
2. Impact from Port Facilities and Site						
2.1 Emergence of Site (including landfill)	2.1.1 Pollution of Water and Bottom Sediments	changes of face lines, dredging sludge, promotion of sea water exchange				
	2.1.2 Beach Erosion and Accretion	changes of face lines, construction of breakwaters against beach erosion, littoral nourishment				
	2.1.3 Changes in Coastal Currents	changes of face lines, construction of breakwaters, selection of type of offshore structure				
	2.1.4 Decrease of Habitats for Aquatic Lives	transplant, discharge of seeds & saplings				
	2.1.5 Decrease of Habitats for Terrestrial Lives	change of face lines, designation of nature conservation areas, artificial tidal flats, transplant				
	2.1.6 Change in Scenic Beauty	location of facilities, selection of color, plantation				
	2.1.7 Resettlement of Local Residents and Culture	transfer planning, information disclosure				
	2.1.8 Extinction of Fishing Grounds	expansion of functions of fishing ports, marine products transportation functions				
2.2 Emergence of External Facilities	2.2.1 Pollution of Water and Bottom Sediments	change of face lines, dredging sludge, promotion of sea water exchange				

Table A 7.4.2 (continued)

Environmental Impact Factors	Environmental Impact	Countermeasures	Size of Impact (check appropriate boxes)			
	2.2.2 Beach Erosion and Accretion	changes of face lines, construction of breakwaters against beach erosion, littoral nourishment				
	2.2.3 Change in Coastal Current	changes of face lines, construction of breakwaters for wave prevention, selection of type of offshore structure				
	2.2.4 Decrease of Habitats for Aquatic Lives	transplant, discharge of seeds & saplings				
	2.2.5 Change of Scenic Beauty	changes in shape of facilities, selection of color				
2.3 Emergence of Sea route	2.3.1 Change in Coastal Currents	changes of face lines, construction of breakwaters for wave prevention				
	2.3.2 Decrease of Habitats for Aquatic Lives	transplant, discharge of seeds & saplings				
2.4 Emergence of Anchorage	2.4.1 Change in Coastal Currents	changes of face lines, construction of breakwaters for wave prevention, selection of type of offshore structure				
	2.4.2 Decrease of Habitats for Aquatic Lives	transplant, discharge of seeds & saplings				
3. Impact from Utilization of Facilities						
3.1 Impact from Boats	3.1.1 Air Pollution	reduction of stoppage time in ports, compulsory use of high quality oil				
	3.1.2 Water Pollution (bilge)	strengthening of laws and regulations				

Table A 7.4.2 (continued)

Environmental Impact Factors	Environmental Impact	Countermeasures	Size of Impact (check appropriate boxes)			
	3.1.3 Beach Erosion Caused by Furrow Wave	speed limit, beach protection structure				
	3.1.4 Generation of Wastes (dredged material included)	strengthening of laws and regulations, recycling/disposal system				
	3.1.5 Obstruction to Fisheries Activities	alternative fishing ground and artificial fishing sites, expansion of function of fishing ports and transportation of marine products				
4. Impact from Cargo Loading and Utilization of Storage Facilities						
4.1 Cargo Loading Activities and Utilization of Storage Facilities	4.1.1 Air Pollution (dust)	establishment of buffer zone, enclosure, surface treatment, selection of loading machines				
	4.1.2 Pollution of Water and Bottom Sediments	establishment of buffer zone, enclosure, surface treatment, selection of loading machines, shape of apron				
	4.1.3 Generation of Noise	zoning, soundproof fence/hood				
	4.1.4 Generation of Offensive Odor	zoning, sealing of storage facilities, deodorization facilities				

Table A 7.4.2 (continued)

Environmental Impact Factors	Environmental Impact	Countermeasures	Size of Impact (check appropriate boxes)			
	4.1.5 Change in Coastal Ecosystem	establishment of buffer zone, enclosure, surface treatment, selection of loading machines, shape of apron, monitoring of pollution of marine products				
	4.1.6 Generation of Wastes	planning for collection, treatment and disposal of wastes				
	4.1.7 Employment Effect	vocational training				
5. Impact from Operation of Facilities Handling Hazardous Materials						
5.1 Operation of Oil Distribution Base and Facilities Handling Hazardous Material	5.1.1 Air Pollution	reduction of air pollutants (dust collection, desulfurization, denitrification), promotion of dispersion				
	5.1.2 Pollution of Water and Bottom Sediments (oil)	facilities for waste oil treatment, oil fence				
	5.1.3 Generation of Offensive Odor	change of zoning, containment of offensive odor, deodorizer				
	5.1.4 Change in Coastal Ecosystem	facilities for waste oil treatment, oil fence, monitoring of pollution of marine products				
	5.1.5 Change in Terrestrial Ecosystem	facilities for waste oil treatment, oil fence, establishment of nature conservation area				

Table A 7.4.2 (continued)

Environmental Impact Factors	Environmental Impact	Countermeasures	Size of Impact (check appropriate boxes)			
	5.1.6 Decrease in Amount of Agricultural Products, Fisheries Products and Price	facilities for waste oil treatment, oil fence, monitoring of pollution of marine products				
6. Impact from Waste Treatment and Disposal						
6.1 Operation of Waste Treatment Facilities	6.1.1 Air Pollution	reduction of air pollutants (dust collection, desulfurization, denitrification)				
	6.1.2 Pollution of Water and Bottom Sediments	reduction of discharge, drainage treatment facilities				
	6.1.3 Generation of Offensive Odor	zoning, containment of offensive odor, deodorizer				
	6.1.4 Change in Coastal Ecosystem	prevention of water pollution				
	6.1.5 Change in Terrestrial Ecosystem	prevention of air/water pollution				
6.2 Operation of Waste Treatment Facilities	6.2.1 Air Pollution (dust)	establishment of buffer zone, syrface treatment, fence				
	6.2.2 Pollution of Water and Bottom Sediments	sheet cover (rain prevention), settling pond, selection of bulkhead structure				
	6.2.3 Generation of Offensive Odor	zoning				

Table A 7.4.2 (continued)

Environmental Impact Factors	Environmental Impact	Countermeasures	Size of Impact (check appropriate boxes)			
	6.2.4 Change in Coastal Ecosystem	prevention of water pollution				
	6.2.5 Change in Terrestrial Ecosystem	prevention of air/water pollution				
	6.2.6 Formation of Slums	management plans for disposal site				
7. Impact from Traffic Function						
7.1 Road Traffic	7.1.1 Air Pollution	improvement of transportation system/routes, establishment of buffer zone, road pavement, green belt, cover on a bed of trucks				
	7.1.2 Generation of Noise / Vibration	correction of routes, establishment of buffer zone, selection of roads/trackage, structure, road pavement, soundproof fence				
	7.1.3 Change in Terrestrial Ecosystem	correction of routes, establishment of buffer zone, nature conservation areas, prevention of air pollution				
	7.1.4 Change in Local Population Distribution	information disclosure, enlightening the local people on the concerned project				
	7.1.5 Traffic Jam / Accidents	relocation of routes, overpass				

Table A 7.4.2 (continued)

Environmental Impact Factors	Environmental Impact	Countermeasures	Size of Impact (check appropriate boxes)			
8. Impact from Industrial Production Activities						
8.1 Operation of Factories and Plants	8.1.1 Air Pollution	reduction of air pollutants (dust collection, desulfurization, denitrification), promotion of dispersal				
	8.1.2 Pollution of Water and Bottom Sediments	reduction of discharge, drainage treatment facilities				
	8.1.3 Generation of Noise / Vibration	zoning, establishment of buffer zone, soundproof fence, soundproof hood				
	8.1.4 Generation of Offensive Odor	zoning, containment of offensive odor, deodorization facilities				
	8.1.5 Ground Subsidence	regulation on the use of underground water				
	8.1.6 Change in Coastal Ecosystem	prevention of water pollution, dredging of sludge				
	8.1.7 Change in Terrestrial Ecosystem	establishment of nature conservation area				
	8.1.8 Generation of Wastes	planning for collection treatment and disposal of wastes				
	8.1.9 Change in Local Population Distribution	establishment of employment planning, information disclosure				
	8.1.10 Employment Effect	vocational training				

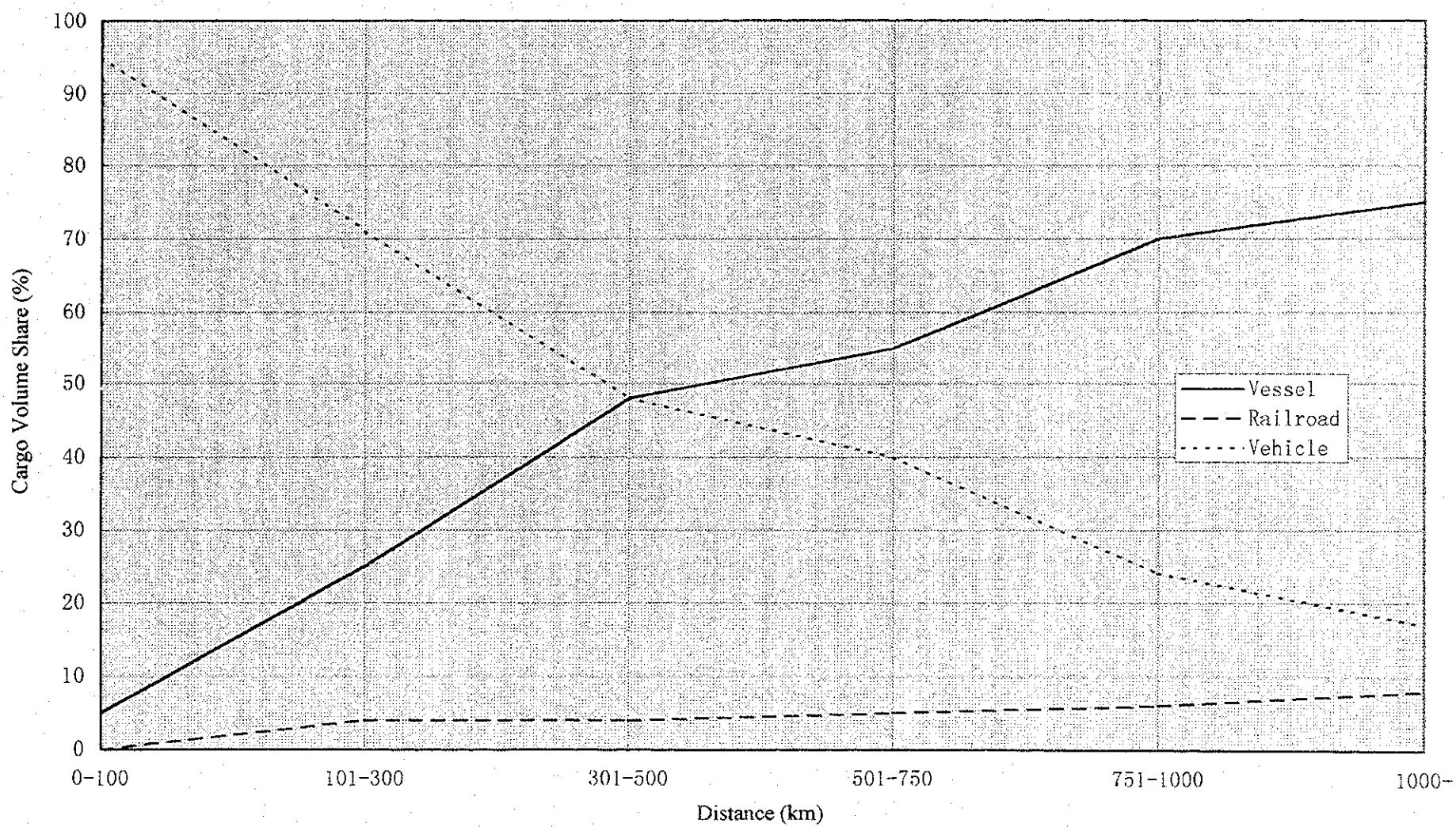
Table A 7.4.2 (continued)

Environmental Impact Factors	Environmental Impact	Countermeasures	Size of Impact (check appropriate boxes)			
9. Impact from Distribution and Storage Facilities						
9.1 Storage Functions	9.1.1 Air Pollution	zoning, establishment of buffer zone, containment, sprinkling, sheet cover, surface treatment				
	9.1.2 Pollution of water and Bottom Sediments	zoning, containment, sheet cover, establishment of drains and settling pond				
	9.1.3 Generation of Offensive Odor	zoning, containment of offensive odor, deodorizer				
9.2 Cargo Handling	9.2.1 Generation of Noise	zoning, establishment of buffer zone, selection of machines, soundproof fence, soundproof hood				
	9.2.2 Employment Effect	vocational training				
10. Impact from Operation of Recreational Facilities						
10.1 Utilization of Hotels, Marinas, Artificial Beaches	10.1.1 Pollution of Water and Bottom Sediments	water quality control through laws and regulations, water quality improvement, in the shallow coastal area including artificial beaches				
	10.1.2 Change in Coastal Ecosystem	prevention of pollution of water and bottom sediments				
	10.1.3 Generation of Wastes	planning for collection, treatment and disposal of wastes				
	10.1.4 Inflow of Alien Cultures	selection of project location, information disclosure, enlightening to the local people on the concerned project				

Table A 7.4.2 (continued)

Environmental Impact Factors	Environmental Impact	Countermeasures	Size of Impact (check appropriate boxes)			
	10.1.5 Employment Effect	employment planning, vocational training				
	10.1.6 Obstruction to Fishing Activities	securing of alternative fishing grounds				

Figure A 7.4.1 Cargo Volume Share of Transport Means by Travel Distance in Japan



A.7.5.2 Maintenance of the channels

(1) Dredging Area and Volume

Dredging works are conducted at about forty ports in Indonesia. The name of ports, dredged volume and site conditions are listed in Table A.7.5.2.1. The DGSC conducted dredging in fifteen ports out of thirty five ports, which are dredged once or more in this five years plan.

(2) Dredgig fleet

PT. RUKINDO has a fleet of twenty seven dredgers consists of fourteen trailing suction hopper dredgers, four cutter suction dredgers, two sand pump dredgers and seven grab/clamshell dredgers. Table A.7.5.2.2 shows specifications, dredging realization and working area of trailing suction hopper dredgers. Table A.7.5.2.3 shows specifications, dredging realization and working area of grab/clamshell dredgers. Table A.7.5.2.4 shows specifications, dredging realization and working area of cutter suction dredgers. Table A.7.5.2.5 shows specifications, dredging realization and working area of sand pump dredgers.

(3) National budget for dredging

Table A.7.5.2.7 shows National budget for port development, maritime safety and pioneer shipping. The dredging budget occupies 9.1% of total national budget for port development, maritime safety and pioneer shipping including port development, maritime safety and pioneer shipping in 1997. The share becomes to 30.3% of national budget for maritime safety including government budget and foreign loan in 1997. And the share becomes to 15.5% of total national budget for port development, maritime safety and pioneer shipping excluding foreign loan.

(4) Dredging Implementation

Implementation of the dredging works at ports and shipping channels are listed in Table A.7.5.2.6 for 30 years. Figure A.7.5.2.1 shows dredged volume, Figure A.7.5.2.2 shows dredging cost, and Figure A.7.5.2.3 shows specific cost of dredging by fiscal years.

Table A.7.5.2.1 The names of ports and dredged volume

Unit: '000m3

No.	Name of Port	Abbreviation	Realization of Year I 1994/1995	Realization of Year II 1995/1996	Realization of Year III 1996/1997	Realization of Year IV 1997/1998	Plan of Year V 1997/1998	Site			
								Length(m)	Width(m)	Depth(m)	Slope
1	Belawan	Bel	1,655.77	1,805.88	1,800.00	1,800.00	1,800.00	15,500	100	9.5	1:5
2	Kuala Langsa										
3	Palembang	Plg	2,300.00	2,300.00	2,300.00	2,300.00	2,300.00	80,000	100	6.5 to 7	1:6
4	Pangkal Balam			140.00			200.00				
5	Tanjung Pandan			105.00			200.00				
6	Muntok						200.00				
7	Jambi	Jbi	350.00	350.59	350.00	350.00	350.00	8,100	70	4.5	1:8
8	Kuala Tungkal						500.00				
9	Muara Pandang				76.37		80.00				
10	Air Bangis						350.00				
11	Bengkulu	Bkl			1,172.55	193.20	1,000.00	2,700	80	10.0	1:4
12	Cirebon	Crb		250.00	250.00	250.00	250.00	2,100	70	6.0	1:4
13	Karangantu						100.00				
14	Semarang	Smg					350.00	4,000	100	10.0	1:5
15	Juwana	Jua		350.23		350.00		3,500	30	3.0	1:5
16	Tegal	Teg		100.00	75.06	100.00	100.00	3,500	50	4.0	1:4
17	Batang				80.00		80.00				
18	Pekalongan						150.00				
19	Rembang						50.00				
20	Cilacap										
21	Surabaya	Sba			700.00			7,000	100	10.0	1:5
22	Probolinggo						200.00				
23	Pasuruan						200.00				
24	Kalianget					275.00					
25	Pontianak	Ptn	1,506.96	1,700.00	1,700.00	1,700.00	1,700.00	12,000	80	5.5	1:5
26	Sintete						500.00				
27	Banjarmasin	Bjm	2,331.88	2,500.00	2,169.46	2,400.00	2,500.00	14,000	60	5.5	1:6
28	Samarinda	Smd	1,617.47	1,477.43	1,333.33	1,350.00	1,500.00	23,435	60	7.0	1:6
29	Kumai	Kum	400.00			500.00		18,900	60	5.0	1:8
30	Sampit	Spt		780.00		700.00		14,700	50	5.0	1:8
31	Pulang Pisau						1,000.00				
32	Gorontalo					90.00					
33	Manado						60.00				
34	Luwuk						60.00				
35	Benoa						500.00				
36	Lembar						60.00				
37	Nabire										
38	Serui										
39	DKI Jakarta					1,000.00					
40	Tanjung Priok	Tpk						8,000	120	14.0	1:4
	TOTAL		10,162.08	11,859.13	12,006.77	13,358.20	16,340.00				

Source: DGSC

Table A.7.5.2.2 Trailing Suction Hopper Dredgers

Neme of Ship	Overall Length (m)	Muoded Breadth (m)	Muoded Dept (m)	Loaded Draught (m)	Gross Tonnage (TON)	Net Tonnage (TON)	Output Propulsion Machinery	Power of Dredgers Pumps	Dredging Depth (m)	Hopper Capacity (m3)	Dredging Capacity		Dredging Realization (m3/Year)	Shipyard	Ports
											Water (m3/h)	Mixtre (m3/h)			
BALI II	124.40	18.04	8.05	7.00	10,420.00	8,620.00	2x3,000kw	800/1,300KW	30	5,000	12,000	5,400	3,000,000	V&W(Germany 1993	Plg,Bel,Tpk
ARU II	124.40	18.04	8.05	7.00	10,420.00	8,620.00	2x3,000kw	800/1,300KW	30	5,000	12,000	5,400	3,000,000	V&W(Germany 1994	Tpk
IRIAN JAYA	109.88	18.04	8.05	6.33	5,179.20	2,469.08	2x1,795HP	2x898HP	20	4,000	7,970	3,580	2,000,000	O&K(West Germany/1981	Bel,Smd,Tpk,Plg,Bel
KALIMANTAN	109.88	18.04	8.05	6.33	5,097.52	2,469.08	2x1,795HP	2x898HP	20	4,000	7,970	3,580	2,000,000	O&K(West Germany/1981	Bel,Tpk,Sba
SULAWESI II	92.50	16.00	8.00	7.33	4,179.85	1,179.00	2x1,900HP	2x900HP	20	300	7,500	3,375	1,200,000	IHC/Holand/1975	Tpk,Plg
BETUAH	92.00	16.00	8.00	7.33	3,932.00	1,179.00	2x1,900HP	2x900HP	20	3,000	7,500	3,375	1,000,000	IHC/Holand/1977	Bjm,Smd,Tpk,Sba
SERAM	92.50	16.00	8.00	7.30	3,932.00	1,179.00	2x2,100HP	2x900HP	20	3,000	7,500	3,375	1,500,000	IHC/Holand/1981	Ptn,Tpk
HALMAHERA	92.50	16.00	8.00	7.33	3,932.00	1,179.00	2x2,000HP	2x900HP	20	3,000	7,500	3,375	1,500,000	IHC/Holand/1983	Bjm,Smd,Tpk
TIMOR	95.00	18.40	7.00	3.00	4,145.34	1,989.34	2x2,100HP	2x550HP	20	2,000	5,000	2,250	1,000,000	IHI/Japan/1980	Plg,Tpk
FLORES	95.00	18.40	7.00	5.00	4,145.34	1,989.34	2x2,100HP	2x550HP	20	2,000	5,000	2,250	1,000,000	IHI/Japan/1983	Ptn,Bjm,Tpk
BANDA	71.10	14.00	4.90	4.05	1,629.34	797.80	2x846HP	1x438HP	14	1,000	2,500	1,125	600,000	IHC/Holand/1982	Ptn,Spt,Sba,Crb
NIAS	71.10	14.00	4.90	4.05	1,629.34	797.80	2x846HP	1x438HP	14	1,000	2,500	1,125	600,000	IHC/PT.Doc/IND/1984	Ptn,Smd,Spt,Sba
NATUNA	64.90	14.00	4.90	4.05	1,629.34	797.90	2x486HP	1x438HP	14	1,000	2,500	1,125	600,000	IHC/PT.Dok/IND/1984	Sba,Crb
LOMBOK	64.90	13.00	5.46	3.50	1,660.37	560.45	2x750HP	1x700HP	10	750	4,800	2,160	100,000	IHI/Japan/1974	Tpk

Source: PT. RUKINDO

Table A.7.5.2.3 Grab/Clamshell Dredgers

Name of Ship	Overall Length (m)	Moulded Bredth (m)	Moulded Depth (m)	Grab Capacity	Dredging Dept (m)	Machinery For Grab	Dredging Capacity		Dredging Realization (m3/Year)	Shipyard/Build Year	Ports
							Water (m3/h)	Mixture (m3/h)			
SINGKARAK	26.00	11.00	2.50	5.50m3	14.00	1x325HP	180	162	200,000	Indonesia/1981	Tpk.Sba
BATUR	28.00	13.00	2.60	7.00CbY	20.00	1x455HP	240	216	200,000	Pelita Bahari/IND/1985	Dum.Bel
RANAU	28.00	13.00	2.60	7.00CbY	20.00	1x455HP	240	216	300,000	Pelita Bahari/IND/1985	-
POSO	28.00	13.00	2.60	7.00CbY	20.00	1x455HP	240	216	300,000	Pelita Bahari/IND/1985	-
TONDANO	28.00	13.00	2.60	7.00CbY	20.00	1x455HP	240	216	300,000	Pelita Bahari/IND/1985	-
MANINJAW 93/III	25.92	9.13	2.03	3.50m3	7.00	1x211HP	180	162	150,000	Sngapore/1976	Sba
TOWUTI	26.00	13.00	1.60	2.50m3	7.00	1x160HP	180	162	100,000	PT.Dok/IND/1977	-

Source: PT. RUKINDO

Table A.7.5.2.4 Cutter Suction Dredgers

Name of Ship	Overall Length (m)	Moulded Bredth (m)	Moulded Depth (m)	Diameter c Suction pi (Inch)	Dredging Dept (m)	Power of Dreding Pump	Dredging Capacity		Dredging Realization (m3/Year)	Shipyard	Ports
							Water (m3/h)	Mixture (m3/h)			
BATANG ANAI	80.00	18.50	7.00	30	24.00	1x2,650KW	9,000	2,000	1,600,000	V&W/Germany/1994	Bkl,Sba
MUSI 30	41.45	13.41	2.90	30	17.68	1x3,600HP	4,800	1,200	600,000	Ellicott/USA/1977	Bjm,Sba
KAPUAS 30	41.45	13.41	2.90	30	17.68	1x3,600HP	4,800	1,200	250,000	Ellicott/USA/1977	Bkl,Sba
MAHAKAM 24	41.45	13.41	2.90	24	17.68	2x1,225HP	4,000	1,000	250,000	Ellicott/USA/1976	Bjm,Sba

Source: PT. RUKINDO

Table A.7.5.2.5 Sand Pump Dredgers

Name of Ship	Overall Length (m)	Moulded Bredth (m)	Moulded Depth (m)	Dredging Dept (m)	Power of Dreding Pump	Dredging Capacity		Dredging Realization (m3/Year)	Shipyard	Ports
						Water (m3/h)	Mixture (m3/h)			
AGUNG	48.10	14.66	4.10	40.00	1x681KVA				O&K/West Germany/198 Modification 1996	-
MERAPI	48.10	14.66	4.10	40.00	1x681KVA	1,800	600	250,000	O&K/West Germany/198 Modification 1992	-

Source: PT. RUKINDO

Table A.7.5.2.6 Implementation of dredging

No.	FISCAL YEAR	VOLUME OF MUD DREDGED (m3 SITU SOIL)		COST (Rp.)	
		PLAN	REALIZATION	PROVIDED	REALIZATION
1	1969/1970	9,741,000	9,772,679	1,028,000,000	838,044,888.13
2	1970/1971	6,096,424	10,484,462	724,400,000	551,038,275.34
3	1971/1972	9,600,000	11,207,263	1,600,000,000	1,323,308,030.34
4	1972/1973	9,000,000	12,100,172	1,499,900,000	1,411,656,855.25
5	1973/1974	5,164,755	7,568,793	1,600,000,000	1,581,088,211.00
6	1974/1975	7,035,000	9,118,026	2,192,500,000	1,968,411,505.00
7	1975/1976	9,177,950	12,091,052	3,665,500,000	2,884,017,877.00
8	1976/1977	9,350,245	12,413,950	4,000,000,000	3,827,689,448.00
9	1977/1978	11,284,408	12,247,168	5,021,300,000	4,906,139,671.00
10	1978/1979	12,536,000	15,764,843	5,272,500,000	4,888,812,311.00
11	1979/1980	15,040,540	15,737,908	5,212,200,000	5,090,220,560.75
12	1980/1981	17,082,950	19,841,068	6,801,011,600	5,111,073,091.50
13	1981/1982	17,207,625	19,623,400	7,545,012,000	7,523,998,769.69
14	1982/1983	16,894,425	19,387,117	7,986,052,000	6,151,287,088.00
15	1983/1984	15,727,000	16,385,609	6,445,601,000	6,447,739,744.00
16	1984/1985	13,030,400	14,186,449	6,211,855,000	6,201,000,000.00
17	1985/1986	11,416,534	12,582,272	6,023,000,000	6,010,000,000.00
18	1986/1987	11,817,773	11,972,165	5,618,955,000	5,600,800,000.00
19	1987/1988	7,200,122	7,570,665	3,315,725,000	3,314,300,000.00
20	1988/1989	9,014,850	11,934,050	9,128,515,000	9,125,450,000.00
21	1989/1990	12,020,000	12,793,247	13,450,024,000	13,445,250,000.00
22	1990/1991	16,254,000	16,130,448	16,850,000,000	16,838,750,000.00
23	1991/1992	21,886,982	14,366,127	26,785,000,000	26,775,600,000.00
24	1992/1993	14,933,000	13,707,522	25,549,738,000	24,444,203,000.00
25	1993/1994	21,106,257	13,349,700	42,045,850,000	22,874,000,000.00
26	1994/1995	10,400,000	10,162,080	26,808,000,000	26,587,990,000.00
27	1995/1996	14,181,000	11,859,130	40,328,000,000	31,796,360,000.00
28	1996/1997	10,650,000	12,006,770	32,531,000,000	32,282,880,000.00
29	1997/1998	14,115,000	13,358,200	48,234,000,000	42,119,400,000.00
30	1998/1999	10,725,000	15,400,000	40,422,000,000	51,583,640,000.00

Source: DGSC

Table A7.5.2.7 National budget for port development, maritime safety and pioneer shipping

(Unit: million Rp.)

Item		FY1995	FY1996	FY1996
Port development	Government	119,925	124,844	133,186
	Foreign loan	137,560	101,972	150,894
	Total	257,485	226,816	284,080
Maritime safety (FASP) *( )=for dredging	Govrnment	75,594 (31,864)	82,823 (32,500)	97,805 (42,341)
	Foreign loan	196,871 (0)	43,482 (0)	41,943 (0)
	Total	272,465 (31,864)	126,305 (32,500)	139,748 (42,341)
Poineer shipping (Artis=Armada Perintis)	Government	24,455	40,689	41,333
	Foreign loan	0	0	0
	Total	24,455	40,689	41,333
Grand total	Government	219,974	248,356	272,324
	Foreign loan	334,431	145,454	192,837
	Total	554,405	393,810	465,161

Source: DGSC

Figure A.7.5.21 Dredged Volume

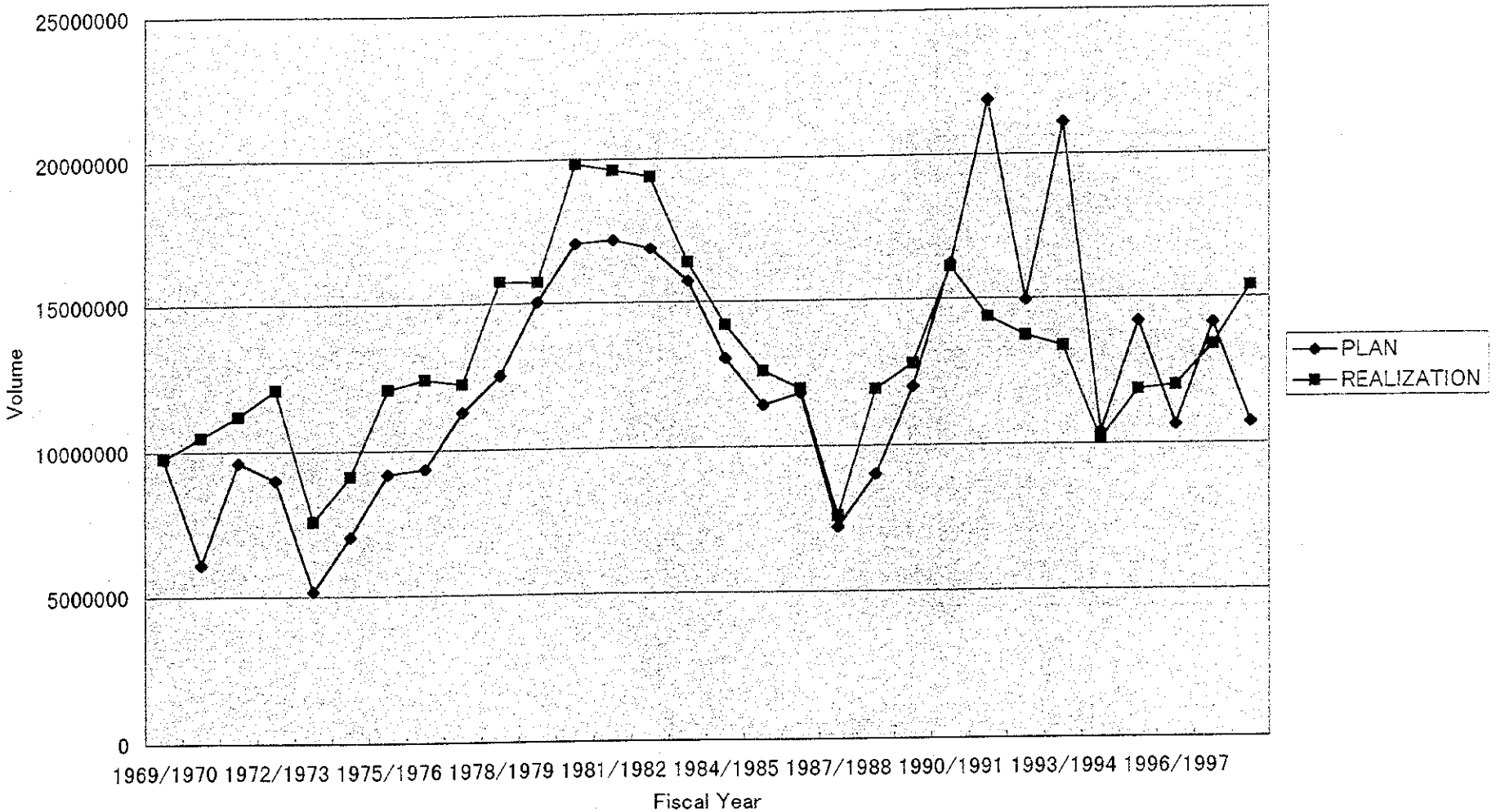


Figure A.7.5.2.2 Dredging Cost

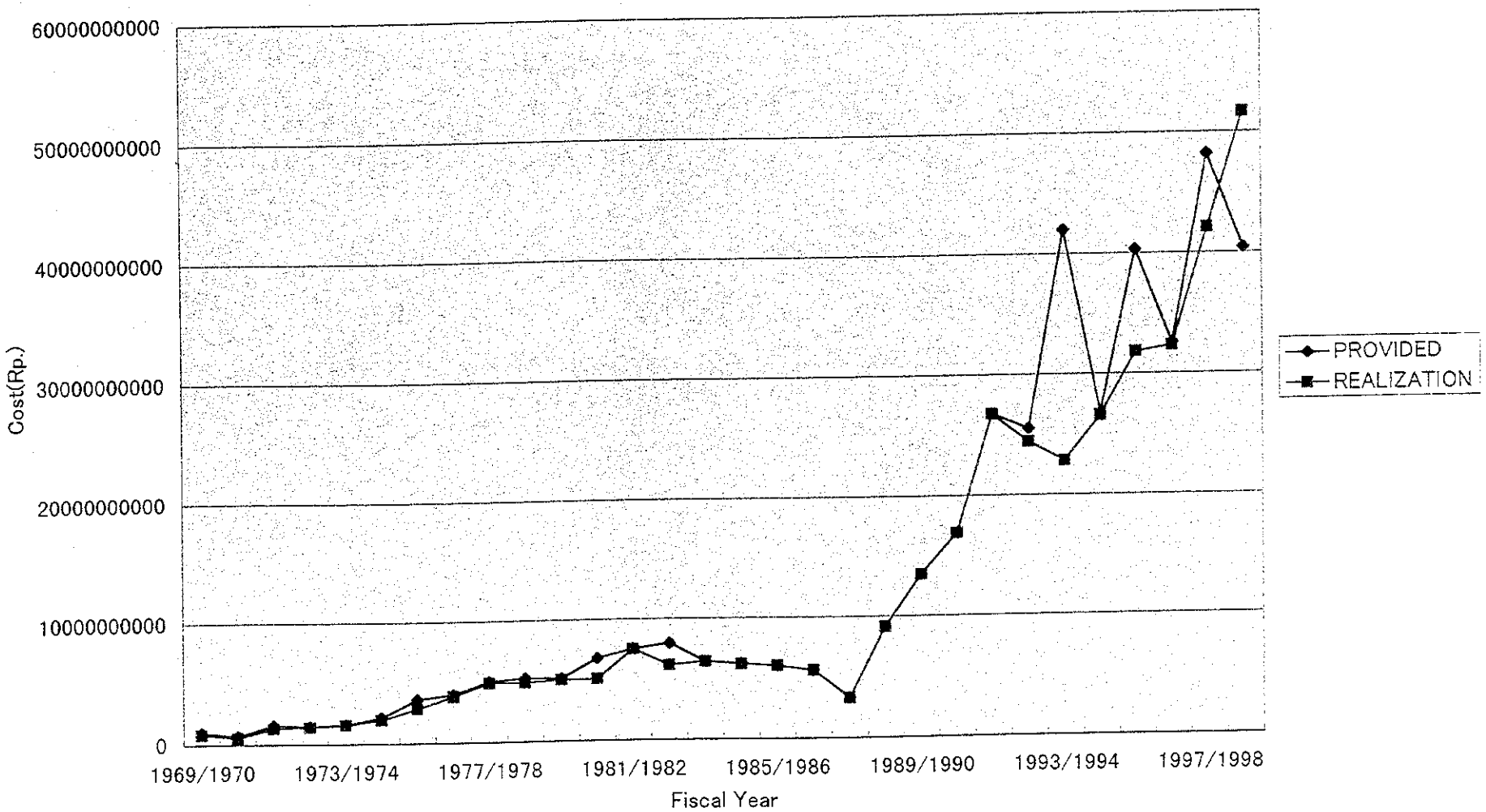
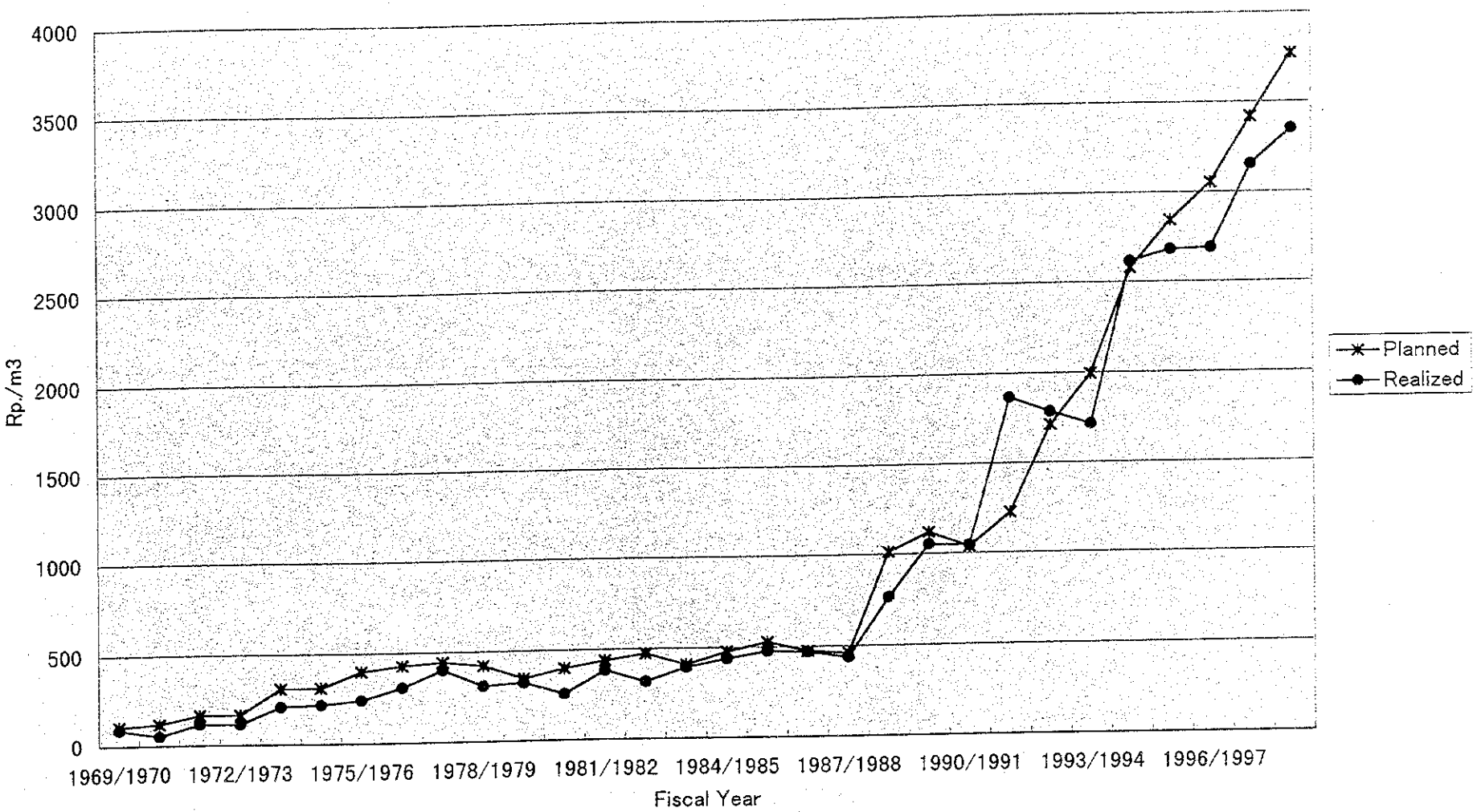


Figure A.7.5.2.3 Specific Cost of Deredging



A.7.6 Stuff Training of Port Sector

A.7.6.1 Training Program for Management and Operation in Indonesia

(1) Training system in the Directorate General of Sea Communication (DGSC)

The DGSC's training system is a part of the DGSC's human resources development system which is oriented toward optimum career planning for DGSC's staffs in order to provide most qualified personnel to fulfill the demand of the organization in most effective and efficient ways.

1) Pre – Service Training

Pre – Service Training are compulsory orientation trainings for newly recruited personnels introducing the organization functions and the general duties and responsibilities of government officials. This training are classified into:

(a) 1# Rank Pre Service Training, given to newly recruited personnels holding lower level formal education certificates (Primary of Junior High Certificates or Vocational in this level);

(b) 2# Rank Pre Service Training, given to newly recruited personnels holding higher level formal education certificates (Senior High or Colleges Certificates, or Vocational in this level) and;

(c) 3# Rank Pre Service Training, given to newly recruited personnels of university graduates.

2) In – Service Training

In service Training in the DGSC are basically of three kinds, They are:

(a) Structual Managerial Training are compulsory trainings for DGSC's personnels who are in the position of managements (Heads of Units of DGSC). These are of four ypes:

a) Lower Structual Managerial Training, for those who sit as lower manager (Rank V or IV managers);

b) Middle Structual Managerial Training, for those who sit as middle managers (Rank III managers);

c) Higher Structual Managerial Training, for those who sit as higher managers (Rank II managers) and;

d) Top Structual Managerial Training, for those who sit as top manaers (Rank I managers).

(b) Technical-Functional Trainings are types of training which directly deal with the Technical-functional of the main duties of DGSC, they concern with port, shipping and maritime safety.

a) Technical=functional Trainings concerning Port

b) Pilot

c) Supervision and Inspection of Port Construction

d) Port Management

e) Hydro Oceanography-Topography Investigation

(c) Technical-Functional Trainings Concerning Shipping and Sea Traffic

a) Shipping Management

b) Administration and Management of Sea Transport Service Companies

(d) Technical-Functional Trainings Concerning Maritime Safety

a) Ship Safety

* Harbor Master Type "A", for bigger ports' harbor master
* Harbor Master Type "B", for amall ports' harbor master
* Marine Inspector Type "A", for bigger vessel inspector
* Marine Inspector Type "B", for small vessel inspector
* Ship Measurement
* Ship Registry
* Marine Radio Inspector
* Maintenance and Repair of Inflatable Life Raft
* Handling of Dangerous Goods
* Radio Communication System (VHF)
* Maritime Safety Regulations
* Tanker Inspection

b) Sea and Coast Guard

* Basic Sea and Coast Guard for Low Rank Coast Guard Officers.
* Basic Sea and Coast Guard for Middle Rank Coast Guard Officers.
* Basic Sea and Coast Guard for High Rank Coast Guard Officers.
* Marine Pollution Response
* OSC SAR and MARPOL Response
* Underwater Welding
* Non Destructive Test Diving
* Cardio Pullmonery Resuscitation & Diving
* Chanber/Operator Decompression Chamber (RUBT) Diving

c) Aids to Marine Navigation

* Aids to Marine Navigation
  - -Basic
  - -Intermediate
  - -Advance
* Coastal adio Station
  - Marconis I
  - Marconis II

- Marconis III

* Operational Vessel for Aids to Marine Navigation
  - Basic Semansip
  - Rating for Deck Dept.
  - Rating for Engine Dept.
  - 3# Mate
  - 3# Engineer
  - 2# Mate
  - 2# Engineer
  - 1# Mate
  - Chief Engineer

d) Workshop for Aids to Marine Navigation
  - Elementary Welding
  - Mechanical Technology

(e) Auxilliary Training

These Trainings are primarily concerned with secretarial work, such as typing or computer courses, personnel administration course, project management course, and the like.

Trainees are selected accordingly to the qualifications according their educational background, skills and job description as well as their prospective positioning. Contents of training are described in detail in the curricula of each kind of training and changed continually according to the needs. Number of DGSC's staff on March 1998 is 8,907 people

Organisazion to Exchange (Transfer)	Number	Term	Note
Other Ministry	1	As demmanded	Lower Manager
Local Organisation			
Local Public Body	4	Permanent	Lower Manager
Private Enterprise			
Foreign Government			

To enter DGSC one should pass several selection/examinations:

(a) Administrarive Selection, ie: Originality of Indonesia Citizenship, Originality of Certifictes and related apers/data.

(b) Health Examinations by Government medical doctor.

(c) Physocological Test

(d) Test of General Knowledge, ie: language, citizenship, history of Indonesia, Indonesian Constitution, and Pancasila (The State Philosophy)

(e) Test of Specific Skills acoording to each major stream of candidates ducational background.

(f) Interview Test for personality and physical appearance, and re like.

(2) IPC I

The IPC I conducts several kinds of training courses for their staff. A series of the training course is shown in Table A.7.6.1.1.

The IPC I conducts examinations on basic knowledge (substantial test), skilled and related knowledge, English, physical test, medical test, administration requirement, interview and mental ideology test to promote and enhance talent of their stuff. The IPC I does not exchange stuff with any ministry, local ministry, enterprise and foreign government.

Table A.7.6.1.1 Stuff training in the IPC I

Kind of training	Trainee	Contents of training	Others
Master degree program	Senior potential staff	Master degree program in business and management	
Junior/lower level managerial training	Supervisor and stuff	Management skilled and related port business knowledge	
Senior managerial training	Manager	Advance management skilled	
Improving port performance training	Supervisor and staff	Port operation and port performance improvement technique	
Warehousing operation training	Supervisor and stuff	Port operation and port performance improvement	
Operational supervision training	Supervisor and stuff	Port operation	
Pilotage training	Pilot supervisor and operator	Pilotage operation and ship operation	
Technical supervision training	Supervisor	Maintenance management and related technical matters	
Environmental assessment course	Staff	Environmental impact assessment and monitoring	
Equipment maintenance training	Operator and Supervisor	Port equipment maintenance system	
Financial reporting training	Staff	Financial reporting	
Tax – course	Staff	Tax assessment and related matters	
Job orientation training	New employee	Company business scope, port operation and related basic knowledge	
Management of port	Senior technical	Port equipment	Abroad training

equipment	staff	management	
Management of container operation	Senior staff	Container operation management	Abroad training
Seminar on port management	Senior staff	Port management	Abroad training/seminar
Seminar port business	Senior staff	Port business	

Source: IPC I

(3) IPC II

The number of personnel of Indonesia Port Corporation II (IPC II) was 5,086 persons in 1996. In this year, 45 persons joined overseas training and 2,428 persons or about 47.3% followed in house training in 1996.

The port equipment technical cooperation center is planning to be established in cooperation with Japanese government. The center aims to establish educational facilities for training engineers and experts in terminal management and control knowledge, information processing techniques, and advanced cargo handling equipment maintenance techniques, which are required primarily at container terminals. Table A.7.6.1.2 shows staff training at IPC II in 1997. The IPC II has 5,173 persons, and exchanged their staffs with other organizations such as local public body and private enterprises in 1997. One person was transferred to the IPC III (01/05/95 – 31/07/97) and six persons were transferred to private enterprises.

Table A.7.6.1.2 Staff Training Program at IPC II in 1997

No.	Kinds of Training	Number of Trainees	Contents of Training	Notes Jan-Sept, 1998
1.	Improving Port Performance I	39	-Port Performance Indicator -Ship Operations -Quay transfer Operations -Stacking Operations -Receipts and Deliveries Opr. -Operation Planned -Management of Quay -Site Visit	37
2.	Improving Port Performance II	0	-Introduction to Container Terminal, Planing and Case Study -Steps to Design Container Term. And Planning Strategy	18

			-Container Terminal Development and selecting the need of Container Yard -Design of Terminal consist of the need of Stacking Area and selecting the right Equipment -Organization of Container Terminal, in Planning of the Worker and Expert -Container Terminal Opr.	
3.	Improving Port Performance III	0	-Equipment Management -Warehouses Planned -Equipment Supplied -Maintenance Equipment Management -Management of Supplied -Equipment Operation -Management & Development of Employee -Management Information System (MS) -Organization Factor in Equipment Management -Improving of Equipment Management	19
4.	Port Operation Management	37	-Role and Function of Ports -Principles of Port Planning -Navigation & Traffic Control -Pilotage Operations -Quay and Warehouse Opr. -Container Yard an Freight Station (CFS) Operations -Selection of Cargo Handling Equipment -Intro. to Dangerous Goods -Port Tariffs -Human Resource in Port	29
5.	Container Terminal Operations	105	-Planning and Operations of Container Transport (Train) -Distribution, Consolidation and Operation of CFS -Equipment and Manpower allocation -Procedure and Tariff System of Container -Operations Performance	58

			Indicator/MIS	
6.	Port Tariffs	26	-Introduction to Port Services -Definition of Port Tariff -Function of Port Tariff -Sorts of Port Tariff -Nature of Tariff Calculation -Flowchart of Tariff Calculation	41
7.	Warehouse Operation	42	-Management of Logistic -Warehouses Conditions -Warehouses Operations System -Distribution Planning and Strategy -Function of Distribution Management -Storage and Stock Operation -Fleet Operation -Cargo Handling Operation -Warehouse Security System	19
8.	Operation Supervision	40	-Quay Transfer Operations -Storage Operations -Receipts and Deliveries Opr. -Insurance and Claim -Work Safety and Health	17
9.	Quay Crane Simulation Trining	13	-Duties and Responsibilities of Operators -Types and Classification of Containers -Specifications and Characteristics of the Crane -Routine Checks -Practical Simulation Training (by Crane Simulator) -Work Safety and Health	0
10.	Transtainer Operator (RTG)	8	-Duties and Responsibilities of Operators -Types and lassification of Containers -Specifications and Characteristics of TT -Routine Checks -Practical Simulation Training (by RTG Simulator) -Work Safety and Health	0

11.	Dangerous Goods Handling	15	-Physical/Chemical Properties of Cargo and their Hazards -SOLAS Regulation -IMO Classification -Marking, Labelling, Stowage andf Security Requirements -Handling and Stowage Requirements in Warehouses -Safe Handling Cargo -Right and Liabilities of Shippers -Fire Prevention	43

(4) IPC III

The IPC III has many kind of in house training courses. And the IPC III has their own elementary, junior high, senior high school, and academy for their staff and their family. A series of training courses is shown Table A.7.6.1.3.

Table A.7.6.1.3 Staff Training Program at IPC III in 1997

No.	Kind of training	Trainee	Number of participants
1	National Workshop on the implementation of MARPOL	Commerce directorate	1
2	Workshop on Facilitation of IMO(F.A.L) Convention	Commerce directorate	1
3	Workshop on International Trade Technical and Negotiation	Commerce directorate	2
4	Container Discharging Tools Operator Certification Training	Commerce directorate	49
5	National Seminar on Transportation Business Strategic Alliance Opportunities	Commerce directorate	2
6	ISO 9002 Quality Management System Training	Commerce directorate	21
7	Training and Education for Sea Pilot	Commerce directorate	12
8	Seminar on Concrete Corrosion	Technical directorate	2
9	Limited Seminar on Study on the Access Channel Banjarmasin	Technical directorate	2
10	Seminar on Bankrupty for Overcoming Debts Problems	Finances directorate	1
11	Course on Implementation of No.1 1998 Government Rule in Debts Settlement	Finances directorate	3
12	Course of MS Word Computer Package	General affair	17

13	English Course	General affair	59
14	Seminar on Work Safety and Health and The Roles of Workers Social Insurances	General affair	1
15	Workshop on Changing Management Implementation for Optimalizing Human Resource Performance	General affair	2
16	Retired Program Accounting Training Product and Service Price Appraisal Management Training	General affair	1
17	Training and Education for Enterpreneurship on Fishery, Poultry	General affair	2
18	Husbandary and Food Technology Training for Screening department Officers	General affair	60
19	Time Management Workshop Training for Screening department Officers	General affair	2
20	Time Management Workshop	General affair	2
22	Expertise of work Safety and Health	General affair	1
23	Seminar on The Business and management research of National Communication Forum IV and The Second Anniversary of Magister Management Program	General affair	11
24	Effective Communication Skills Training	General affair	2
25	Training and Education for Leadership Seminar on Control of Privatization Process	General affair	105
26	Re-orientation on The Efforts of New Scheme in appropriate way of state	General affair	2
27	owned Company Management Seminar of Goods and service Procurement with the Basic of Quality System	General affair	2
28	Training and Education for Restructure and Privatization of State Owned Company	General affair	2
29	Training of work Safety and Health Management System	General affair	4
30	Training of work Safety and Health Management System	General affair	3
31	Public Relation Training	Law, Public Relation and International Relationship Department	2
32	Contract Arrangement in International and National Joint Venture Training	Law, Public Relation and International	1

33	Secretary's off air talk show	Relationship Department Law, Public Relation and International Relationship Department	1
34	Negotiation Skills for Dispute settlement and Contract Arrangement	Relationship Department Law, Public Relation and International Relationship Department	1
35	Training of The Basic Audit Affairs	Internal Audit Body	1
36	Training of Intern Audit-Intermediate	Internal Audit Body	2
37	Audit Task Management Training	Internal Audit Body	1
38	Audit Training Program	Internal Audit Body	1
39	Training of The Basic Audit Intern	Internal Audit Body	4
40	External Quality Audit Training	Internal Audit Body	1
41	Document Quality Guidelines Multi Internal Evaluation Auditor	Internal Audit Body	1
42	EDP Audit Executive	Internal Audit Body	1
43	Advance Intern Audit	Internal Audit Body	1
44	New Seven Tools Workshop	Total Quality Management/Total Quality Control Body	3
45	New Seven Tools Training	Total Quality Management/Total Quality Control Body	52
46	Seminar of Environmental Toxycology	Plan and development Department	2
47	Seminar of Environmental Law	Plan and development Department	2
48	Training of Internet	Data and Information Department	25
49	Training of Microsoft Auto Cad	Data and Information Department	4
50	Training of Microsoft Hand-On	Data and Information Department	5

Source: IPC III

Job rotation with other ministries, local ministries, local public bodies, private enterprises and foreign government are not conducted in IPC III.

The following examination are taken at the first step to employee recruitment. Selection of complete application, Psychology test, General knowledge, Individual environmental/Screening and Interview.

A.7.6.2 Training Program in Singapore

(1) The Marine and Port Authority

The Marine and Port Authority (MPA) has the National Maritime Academy (NMA) for training maritime and port personnel. The NMA provides quality training to ensure that there is a ready pool of highly skilled maritime and port personnel to meet the needs of the port industries. The NMA conducts courses for officers and ratings at pre-sea and post-sea upgrading level, including various supplementary safety course to meet the need of the shipping industry. The training division of the MPA also organizes workshops/seminars/lectures on topical issues of interest for the maritime/port community.

(2) The PSA Corporation Limited

The PSA Corporation Limited (PSA) provides training for personnel from the local and regional maritime industries since 1970. The PSA trained 107,000 personnel from the local shipping industries and 4,600 personnel from ports and shipping organizations from 67 countries. The PSA has also customized training programs for ports in Indonesia, Philippines, Oman, Sri Lanka, Italy, Vietnam and Republic of China.

The PSA invests some S$14 million in 2 quay/yard crane simulators and 1 full-mission ship handling simulator to cope with the advancement in technology and to support the training of equipment operations and marine personnel.

The PSA also maintains a maritime library with a collection of over 13,000 books.

A.7.6.3 Training program in Japan

(1) The Port and harbor bureau of MOT in Japan

The port sector in the Ministry of Transport in Japan conducts several kinds of stuff training to raise the level of ability, expertise and knowledge necessary to cope with new system and technologies.

Training for newly recruited staff, training for each category of staff, special training on specialized category such as accounting and port statistics are conducted. In addition to stuff training, the MOT has the on the job training and job rotation between local government, port authorities, agencies, and foreign government to raise ability and knowledge of their stuff. Table A.7.6.3.1 shows staff training at the port and harbor bureau of MOT.

Table A.7.6.3.1 Staff training at MOT

Training in the MOT	General training	For new adapted staffs
		For each class staffs
		Special training
	Expert training	Improvement and application with personal computer
		Transport administration information
		Personnel management work
		Accounting(basic and expert)
		Transport technique
		Net work, LAN management
		Guide for data base
		System planning
		Information systems
		Compensation work
		Port and harbor administration
		Personnel work
		Technique staff of port and harbor
Training outside the MOT	Training at NPA	
	Training at the PHRI	
	Training at	Port and harbor administration(office work)
		Port and harbor administration(technique)
Training abroad	Short term studying abroad	
	Long term studying abroad	
	Others	

Many of staffs of the port and harbor bureau of MOT are transferred to other ministries, local bureaus, local government and corporations positively. Total number of technical officer in the port and harbor bureau of MOT is 1,933 and total number of secretary is 1,105. Technical officers of 280 and secretary of 22 are transferred to other organization in the port and harbor bureau of MOT in 1998. Table A.7.6.3.2 shows detailed number of staffs transferred to other organization.

Table A.7.6.3.2 Number of staffs transferred to other organization

Organization	Technical officer	Secretary	Term
Other ministry	96	8	2 – 3 years
Local public body	43	2	2 – 3 years
Corporation	96	12	2 - 3 years
Foreign organization	15	0	

(2) The Port of Yokohama

1) Yokohama Harbor Polytechnic College

Yokohama city has operated the Yokohama Harbor Polytechnic College to bring up talents who can meet various needs of the harbor industry as well as the distribution industry practically and efficiently. Many distribution management engineers graduate from this junior college every year.

2) Harbor Training College of Yokohama

The purpose of Harbor Training College of Yokohama is to develop the ability of workers in the Port of Yokohama trough seminars and various training courses such as practical training for operating large cargo handling equipment and driving transportation vehicles.

Table A 7.7.1 An Example of Questionnaire for Vessel and Cargo

Vessel									Cargo									
							Mooring		Outbound					Inbound				
												Destination					Origin	
Entering Time (Waiting Time)	Name of Vessel	GT (ton)	Domestic or International	Course	Nationality	Purpose	Place	Time	Lot	Form	Volume	Country	Port	Lot	Form	Volume	Country	Port

Table A 7.7.2 An Example of Questionnaire for Stockyard

Classification			Number of Yards	Area	Stock	Handling Volume		Remark
						Shipping	Arrival	
Coal Yard	Water	for Business						
		for Private Use						
	Land	for Business						
		for Private Use						
	Total							
Timber Yard	Water	for Business						
		for Private Use						
	Land	for Business						
		for Private Use						
	Total							
Open Storage		for Business						
		for Private Use						
		Total						

Table A 7.7.3 An Example of Questionnaire for Warehouse and Storehouse

Classification		Number of	Area or Capacity	Stock		Handling Volume	
				ton	Lot	Shipping	Arrival
Warehouse	for Business						
	for Private Use						
	Total						
Storehouse	for Business						
	for Private Use						
	Total						
Silo	for Business						
	for Private Use						
	Total						

Appendix 7.8 Port Engineering, Research and Survey

Appendix 7.8.1 Important Technical Development Tasks in the Long-Term Policies

1) Improvement of qualities of port and harbour space
Creation of general-purpose port and harbour space with human life, logistics and industrial functions in complete harmony

2) Creation of new coastal space
Promotion of offshore artificial island project

3) Construction of high-efficiency terminal
Promotion of modal shift to ocean transportation

4) Labor saving in port construction work
Use of machines and robots for survey and construction work

5) Prevention of greenhouse effect of the earth
Prevention of the disaster caused by sea level rise

6) Promotion of better waste management
Promotion of recycling

7) Creation of better coastal environment
Promotion of Eco-Port project

8) Improvement of the durability of port and habour facilities
Broader application of maintenance-free facilities

9) Improvement of waterfront to withstand disasters
Reduction of damages caused by great earthquake

10) Cooperation with developing countries
Development of technologies for local application

Appendix 7.8.2 Present Situation of the Development of "Techno Super Liner"(TSL)

(1) Background

This project is undertaken due to the transportation of seaborne contents caused by the recent worldwide structural reform of industry. At present, vessels still play a significant role in mass transport of primary product such as mineral resources and heavy industrial cargoes. Meanwhile, the mode and quality of the transportation system has witnessed a phenomenal change attributed to the increase in cargo volume of manufactured goods and half-finished goods. Also, this change can be ascribed to the speedy transport of small lots of commodities by aircraft in the wake of the progress made in internationalization of industrial activities. This trend is especially noticeable in the increase of small and light cargoes requiring fast delivery. In addition, the advance in air transportation has created intermodal transport which unites land, sea and air transportations.

In Japan, where industrial and economic structures have changed rapidly, improvement of transportation system is needed to cope with the sizable increment in the volume of trade existing between Japan and Newly Industrializing Economies (NIES) of Asia. Additionally, the betterment and revitalization of underdeveloped resources have become more of a necessity than ever.

Thus, an ultra-high-speed vessel like Techno Super Liner, which is halfway between a container ship and aircraft for speedy transport of parcels, to carry more cargoes than a plane and move cargoes more quickly than conventional ships, is being sought.

(2) Characteristic

In order to attain high speed performance, various ideas are considered in the hull form design concept such as utilization of air cushion, dynamic lift by hydrofoil and so on for reduction of hull resistance in high speed.

Coupled with the employment of sophisticated control technology, these outstanding features will put Techno Super Liner in a better position to overcome the wave resistance than a high-speed conventional ship. Regarding the propulsion plant, the gas turbine and the water jet propulsion system in a combined form is now being considered. It is necessary to develop a reliable and light hull structure system with comprehensive R & D in order to realize the concept.

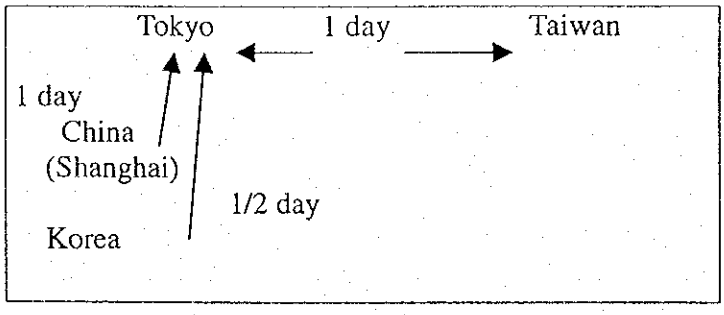
(3) Prospect

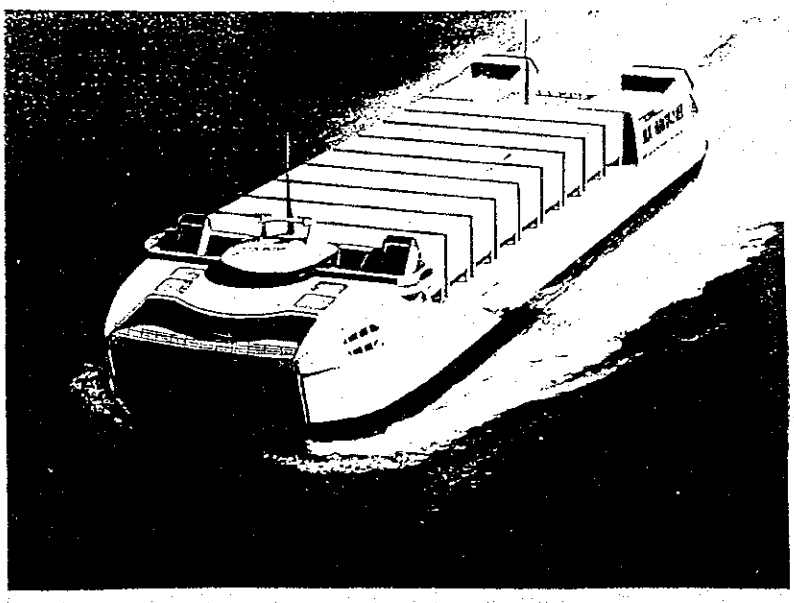
In the event Techno Super Liner makes its debut in world transportation, the question is "What can be expected from it ?" For the answer, one only needs to refer to the the illustration provided. The distance between Japan and China, Taiwan or Korea can be covered in only one day. Moreover, the vessel will function as a main artery of the Asian

economic area now rapidly growing.

As for Japan, Techno Super Liner will be able to greatly enhance the functions of long-distance ferryboat service and serve as a powerful means to energize because of its ulta-high-speed. For example, the vessel will be able to negotiate the distance between Hakata in the southern part of Japan in half a day. Another favorable characteristics is expected that since the structure of hull minimizes rolling and pitching in rough sea, the liner promises an ultra-speed ferry and accelerate transport remote regions.

When Techno Super Liner will be served in Indonesian sea waters, most of the main ports in network would be connected within one or two days which will yield a great economic effect.





TSL Container Vessel

L.O.A: 125.0 m
B. Mld: 27.5 m
D. Mld: 10.5 m

Draft Off Cushion: 4.7 m
Draft On Cushion: 1.7 m
Engine: Gas Turbine 28,000ps x 4
Speed: About 45 knots
Cargo Load: About 1,400 tons

Source: Technological Research Association of Techno Super Liner

With the progress of world economy, revaluation of manufactured goods and global industrial network have been developed. The demand how to transfer the manufactured

Appendix 7.8.3 Present situation of the Development of Shallow Draft Vessels along River Yangtze

The length of The River Yangtze is approximately 2,850km which starts from Yichang, the city of upper river to Shanghai, one of the major Chinese international port.
There are 15 ports open for international trades, of which 11 ports can be entered by foreign vessels. (See Figure A.7.8.3.1)

Apart from open sea ports like Shanghai Gang, inland ports have their local problems for vessels peculiar to river port such as shallow draft in dry season and bridge clearance in rainy season. Port operation in inland ports is closely related to the seasonal and topographical factors. There are many kinds of circumstances which ports have to adapt to.

In eleven ports found downstream including Shanghai, Nangtong Gang, Zhangjing gan Gang, ocean vessels between 10,000DWT～25,000DWT are able to navigate.
In midstream ports such as Wuhu Gang, Wuhan Gang, vessel up to 5,000DWT can enter these ports while Chongqing located in upper stream of the river, can accommodate vessels up to 3,000DWT in the rainy season.

In 1995, the containers handled in 4 international ports (Shanghai Gang, Nanjing Gang, Zhangjing gang Gang, Nantong Gang) downstream of Yangtze were about 1,870,000TEU and shared 97% of whole container throughput in Yangtze. However, Wuhan Gang, main port in midstream, handled only 24,000TEU

The customers along Yangtze, want import cargo to be transported intact to the final upper stream ports, where they can receive it without any damage. However, the present operation is that the cargoes are devanned at the ports in downstream and drayed to customer's premises by barge or by railway. This method takes much time and also often causes cargo damage and irregularity of cargo delivery.

MOT Team studied the possibility of whether the direct container vessel can be put into operation from Kobe to Wuhan in midstream. Meanwhile until the completion of the Three Gorges Dam Project in 2009, the shallowest draft in dry season is 2.5m, making it impossible to operate direct container vessel from Kobe to Chongqing in upper stream. Therefore, the Team studied the best way to transfer containers onto a small container vessel for Chongqing Gang at the most economical cost.

When we look at the present situation of inland river ports and inter-island ports in Indonesia, there seems to be some common interest with shipping and inland transportation in China. In order to study the future shipping and ports of inland waterways, we recommend Indonesian shipping circles and port authorities to make use of the study, especially concerning vessels which will run in the river Yangtze.
Here are particulars and outlook of typical full container vessels for river and river/ocean transportation.

Figure A.7.8.3.1 WATERWAY OF RIVER YANGTZE

City/Port	Yibing Chongquing Yi-Chang Three Gorges Dam (under construction)	Wuhan Yue-Yang	Huan-Shi Wuhu An-Ging Jiu-Jiang	Mouth of Yangtze Shanghai Nantong
Distance & Draft	Upper Stream 1,040 km 380 km, 660 km 1.8 m, 2.9m	Mid Stream 630 km 420 km, 210 km 2.9 m, 3.2 m	Down Stream 1,070 km 430 km, 200 km, 440 km 4.0 m, 4.5 m, 7.0 m	110km 7.0m
Ships in Servtce	Chongqing-Shanghai Passenger Cruise 91.5m x 16.4m x 2.5m (3,000GRT) (1,000DWT) (Down bound 5 days/Up bound 7 days)	Vessels draft under 2.9m (Cargo vessel about 1,500 DWT, &Barge 5,000 tons Convoy)	Wuhan-Shanghai Cargo vessel (About 5,000DWT) (Down bound 3 days/Up bound 4 days)	Cargo vessel (15,000～20,000DWT)

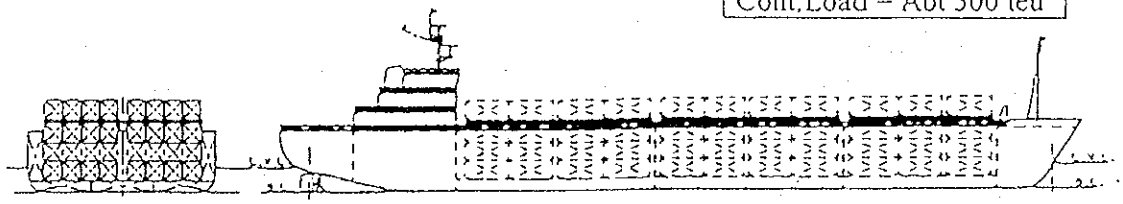
(See Table A.7.8.3.1)
(See Figure A.7.8.3.2～7.8.3.5)

Table A.7.8.3.1 LIST OF SHALLOW DRAFT CONTAINER SHIP

Vessel Type	Both for Ocean/ River	Both for Ocean/ River	River	River
Route	Wuhan-Kobe (Direct)	Wuhan-Kobe (Direct)	Wuhan-Nantong -Shanghai (Transship)	Chongqing-Wuhan-Shanghai (T/S)
L.O.A	110M	75M	110M	77M
Breadth Molded	26M	13.5M	26M	20M
Depth Molded	8.5M	6M	5.9M	5.6M
Full Load Draft (Fresh Water)	3.5M	3.5M	3.5M	2.5M
Cargo Weight (Fresh Water)	4,000Tons	1,650Tons	4,000Tons	1,500Tons
Gross Registered Tons	6,800Tons	1,650Tons	4,900Tons	2,500Tons
Container Load Capacity	300TEU	100TEU	300TEU	100TEU
Speed	12Knot	10Knot	10Knot	9Knot
Horsepower	2x3,400PS	1x1,500PS	2x1,700PS	2x950PS
Main Engine	Diesel Engine	Diesel Engine	Diesel Engine	Diesel Engine
Propeller	2	1	2	2
Building Cost (US$ 1,000)	21,200	8,900	13,300	8,000

Source: M.O.T

Main Particulars
L.O.A = About 110 M
B.Mld = Abt 26 M
D.Mld = Abt 8.5 M
F.L.Draft = Abt 3.5 M
Cont.Load = Abt 300 teu



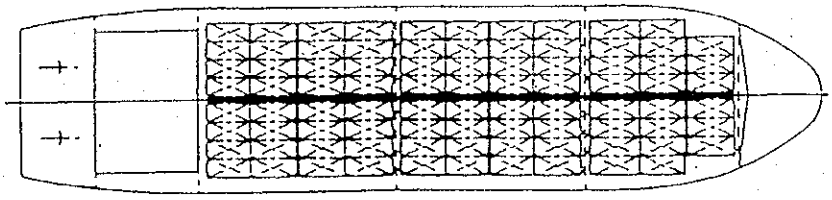


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Figure:A 7.8.3.2 Shallow Draft Container Ship For River/Sea

Main Particulars
L.O.A = About 75 M
B.Mld = Abt 13.5 M
D.Mld = Abt 6 M
F.L.Draft = Abt 3.5 M
Cont.Load = Abt 100 teu

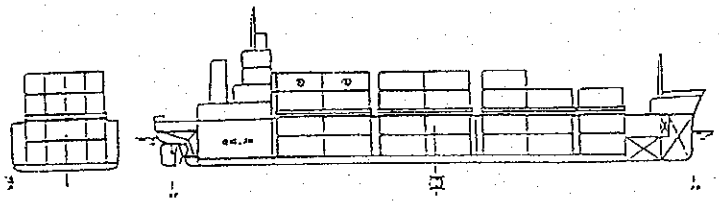

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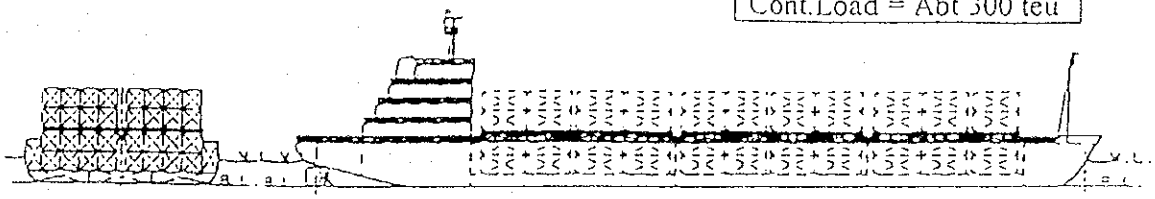
Figure:A 7.8.3.3 Shallow Draft Container Ship For River/Sea

Main Particulars
L.O.A = About 110 M
B.Mld = Abt 26 M
D.Mld = Abt 5.9 M
F.L.Draft = Abt 3.5 M
Cont.Load = Abt 300 teu



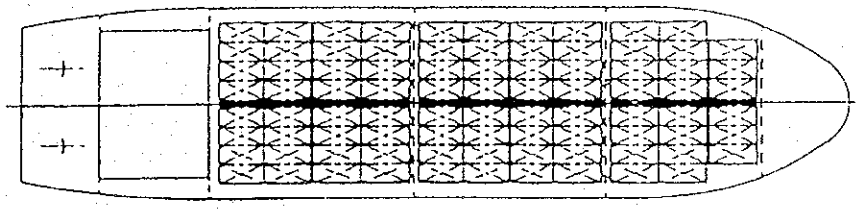


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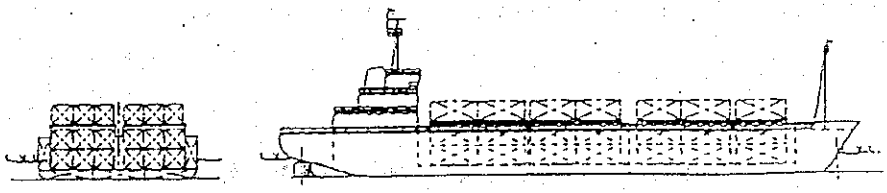
Figure:A 7.8.3.4 Shallow Draft Container Ship For River

Main Particulars
L.O.A = About 77 M
B.Mld = Abt 20 M
D.Mld = Abt 5.6 M
F.L.Draft = Abt 2.5 M
Cont.Load = Abt 100 teu



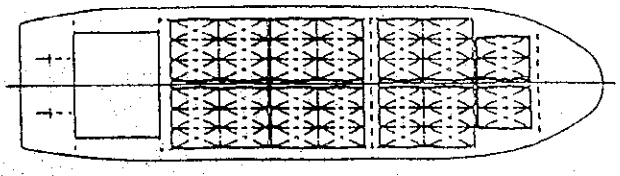


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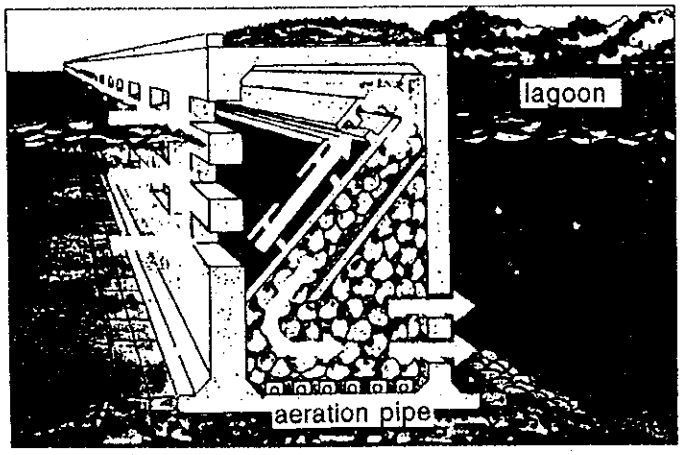
Figure:A 7.8.3.5 Shallow Draft Container Ship For River

Appendix 7.8.4 Water Purification by Biological Oxidization Function

a) Gravel contact purification method

The gravel contact purification method is a system that, when sea water passes through spaces between gravels, the film of microbes living on the surface of gravels decomposes organic pollution substances, etc. contained in the sea water. In other words, water purification function of a natural seashore is artifically enhanced. At present, experimental facilities are constructed in the port of Amagasaki-Nishinomiya-Ashiya and related study has been operated.



b) Artificial inland dry beach construction technology

In bays of Tokyo, Osaka, etc., severe eutrophication is in progress, and every year, red tides, etc. occurs while damaging water industries, etc. Measures to restore the environment include maintenance and restoration of a inland dry beach and a seashore capable of improving water qualities. For this purpose, technologies to construct a practical, artificial inland dry beach have been developed.

Appendix 7.9 Supporting Activities for Port Sector Development

Table A 7.9.1 Japanese Semi-Public Sector Related to Port (abstract)

- Service Center of Port Engineering
- Coastal Development Institute of Technology
- Waterfront Development Association
- Japan Transport Economic Research Center
- Japan Transport Consultants Association
- Maritime International Cooperation Center of Japan
- Waterfront Revitalization Research Center
- International Port Cargo Distribution Association of Japan
- International Association of Ports and Harbors Foundation
- The Overseas Coastal Area Development Institute of Japan
- Ship & Ocean Foundation
- Japan Maritime Development Association
- Japan Oceangoing Passenger Ship Association
- Japan Container Association
- Japan Association for Preventing Maritime Accidents
- The Japan Harbor Transportation Association
- Japan Port and Harbor Association
- Japan Harbor Welfare Association
- Japanese Shipowners' Association
- Japan Shipbuilding Industry Foundation
- Maracca Strait Council

APPENDIX FOR CHAPTER 8

APPENDIX 8.3

Table A.8.3.1 Standardized Capacity for Port Development During REPELITA VI and VII

	Name of Facilities	Capacity	Unit
1	During REPELITA VI		
2	Container Berth	from 600 to 700	Box/m/year
	Marshalling Yard	25,000	TEU/Ha/year
	CFS	4,000	M^2/Terminal
	Quay Crane	60,000	Box/Crane/year
	Transtainer Crane	20,000	Box/Crane/year
	Head Truck	5	Units/QC
	Chasis	10	Units/QC
3	Ocean Going Berth	from 1,100 to 1,500	T/m/year
4	Domestic Berth	from 600 to 800	T/m/year
5	Local/Rakyat Berth	from300 to 400	T/m/year
6	During REPELITA VII		
7	Container Berth	900	Box/m/year
	Marshalling Yard	25,000	TEU/Ha/year
	CFS	4,000	M^2/Terminal
	Quay Crane	60,000	Box/Crane/year
	Transtainer Crane	4	Units/QC
	Head Truck	6 or 7	Units/QC
	Chassis	6 or 7	Units/QC
8	Ocean Going Berth	1,700	T/m/year
9	Domestic Berth	1,500	T/m/year
10	Local/Rakyat Berth	1,000	T/m/year

Source : DGSC

Table A.8.3.2 Standardized Facilities for Port Development at Present

Name of Facilities	Berth Length(m)		Depth(m)		Width(m)		Marshalling (m^2)		CFS or Shed (m^2)		Office (m^2)	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1. Container Terminal												
Full (Intra-Asia)	300	250	12	10		30	108,000	90,000		4,000		
Full (Domestic)	250	200	10	9		30	90,000	72,000		4,000		
2. Semi-Container												
Multi-Purpose (Oceangoing)	250	200	10	9	25	20	35,000	28,000		4,000		
3. Conventional												
Oceangoing	200	165	10	9	20	15						
Inter-Island	100	90	8	6	15	12						
Small Port (Perintis)		70		6		8						
Small Port (Local/Perla)	50	35	4	3		6						
4. Liquid Bulk Wharf	Sea Berth Type		10	8								
5. Dry Bulk Wharf	Trestle/Detached		12	10								
6. Passenger Terminal	250	150	8	6	20	10						

Name of Facilities	Superstructure and Equipment											
	QC(40t)	RTG(40t)	SL (40t)	Chassis	H.Truck	TL(20t)	SL(20t)	FL (10t)	FL (5t)	FL (3t)	Crane	Others
1. Container Terminal												
Full (Intra-Asia)	2	8	2	14	14				6			
Full (Domestic)	2	8	2	12	12				4			
2. Semi-Container												
Multi-Purpose (Oceangoing)				3	3	4	1		3			
3. Conventional												
Oceangoing								2	2	2	4	
Inter-Island									1	1	1	
Small Port (Perintis)										1 or 0		
Small Port (Local/Perla)												
4. Liquid Bulk Wharf												1 LS
5. Dry Bulk Wharf												1 LS
6. Passenger Terminal												1 LS

Table A.8.3.3 Proposed Standardized Facilities for Each Terminal until Target Year

	Name of Terminal	Capacity		Berth Length (m)		Berth Depth (m)		Berth Width (m)		Marshalling or Storage (1,000m²)	CFS or Shed (1,000m²)	Number of Quay Crane (Units)	Passenger Terminal (m²)	Parking Area (m²)
				Max.	Min.	Max.	Min.	Max.	Min.					
1	International Container Hub Terminal (Mother Port Type)	1,500	TEU /m /year	400	350	16	14	50	40	100	6	4		
2	International Container Hub Terminal (Transshipment Port	1,500	TEU /m /year	400	350	16	14	50	40	60		4		
3	Intra-Asia Container Terminal	1,200	TEU /m /year	350	300	14	12	40	35	65	5	3		
4	Domestic Container Terminal	1,000	TEU /m /year	300	250		12		35	43	3.5	2		
5	Multi-Purpose Berth (International)	2,000	t/m/year	250	200	14	12	25	20	45	4.5			
6	Multi-Purpose Berth (Domestic)	2,000	t/m/year	200	150	12	10		20	20	2			
7	Domestic Conventional Berth	1,000	t/m/year	150	100	8	5	20	15	5	1			
8	Small Port	600	t/m/year	100	30	5	3	10	6	2	0.5			
9	Liquid Bulk Berth	1,500	1,000t/berth/year	Sea Berth		5	3							
10	Dry Bulk Berth	3,000	1,000t/berth/year	Trestle /Detached		5	3							
11	Passenger Terminal (International)	2,000	Person /m/year	300	250	10	8	25	20				10	20
12	Passenger Terminal (National)	2,000	Person /m/year	250	200	8	7	20	15				6	12
13	Passenger Terminal (Domestic)	1,000	Person /m/year	200	150	7	5		15				4	8
14	Passenger Terminal (Local)	1,000	Person /m/year	100	60	5	3	10	6				2	4

Source : Prepared By The Study Team

Table. A.8.3.4 Capacity of Existing Facilities Estimated by The Study Team

Province	Container					Conventional			Bulk					Passenger	
	International			Domestic											
	Hub (m)	Intra (m)	Total Capacity (Teu/year)	Dome-stic (m)	Total Capacity (Teu/year)	Multi-Purpose (m)	Conven-tional (m)	Total Capacity (t/year)	Dry bulk (Berth)	Total Capacity (t/year)	Liquid bulk (Berth)	Total Capacity (t/year)	Grand Total Capacity (t/year)	Passenger (m)	Total Capacity (persons/y)
Aceh			0		0		742	742,000	0.50	1,500,000		0		288	576,000
North Sumatra			0	500	500,000		3,130	3,130,000	0.50	1,500,000	1.00	1,500,000		215	430,000
West Sumatra			0		0	150	940	1,240,000	1.00	3,000,000		0			0
Reau			0		0		2,564	2,564,000		0		0		114	228,000
Jambi			0		0		400	400,000		0		0			0
South Sumatra			0		0	150	475	775,000		0		0		100	200,000
Bengkulu			0		0		150	150,000	0.50	1,500,000		0			0
Lampung			0	300	300,000		1,007	1,007,000		0		0			0
Sumatera (total)			0		800,000		9,408	10,008,000		7,500,000		1,500,000	9,000,000		1,434,000
DKI.Jakarta		450	540,000	1,410	1,410,000		7,090	7,090,000	0.50	1,500,000	2.00	3,000,000		600	1,200,000
West Jawa			0		0		1,035	1,035,000	0.50	1,500,000	0.50	750,000			0
Central Jawa			0	345	345,000		1,100	1,100,000	0.50	1,500,000		0		150	300,000
D.I.Yogyakarta			0		0			0		0		0			0
East Jawa			0	1,000	1,000,000	450	6,023	6,923,000		0		0		400	800,000
Bali			0		0		306	306,000		0		0		290	580,000
Jawa (total)			540,000		2,755,000		15,554	16,454,000		4,500,000		3,750,000	8,250,000		2,880,000
West Kalimantan			0		0	100	517	717,000		0	0.50	750,000			0
Central Kalimantan			0		0		718	718,000		0		0			0
South Kalimantan			0		0	200	899	1,299,000	0.67	2,000,000		0		70	140,000
East Kalimantan			0		0		1,566	1,566,000		0		0		100	200,000
Kalimantan (total)			0		0		3,700	4,300,000		2,000,000		750,000	2,750,000		340,000
North Sulawesi			0		0		1,441	1,441,000		0	1.00	1,500,000			0
Central Sulawesi			0		0		385	385,000		0		0			0
South Sulawesi			0		0	670	1,437	2,777,000	1.00	3,000,000		0			0
Southeast Sulawesi			0		0		331	331,000		0		0			0
Sulawesi (total)			0		0		3,594	4,934,000		3,000,000		1,500,000	4,500,000		0
West Nusa Tenggara			0		0		557	557,000		0		0		120	240,000
East Nusa Tenggara			0		0		941	941,000		0		0			0
East Timor			0		0		240	240,000		0		0			0
Maluku			0		0		1,017	1,017,000		0		0			0
Irian Jaya			0		0		1,065	1,065,000		0		0			0
Other islands (total)			0		0		3,820	3,820,000		0		0	0		240,000
Total	0	450	540,000	3,555	3,555,000	1,720	36,076	39,516,000	5.67	17,000,000	5.00	7,500,000	24,500,000	2447	4,894,000

Source : Prepared by The Study Team

Table A.8.3.5 Construction Cost of Proposed Standard Port Facilities

	Standardized Port Facilities	Berth Length	Capacity	Construction Cost (US$)	Unit Length Cost (US$)	Cost Performance Index
1	International Container Hub Port Terminal (Mother Port Type)	400 m	1,500 TEU/m/Year	86,000,000	215,000	14
2	International Container Hub Port Terminal (Transshipment Port Type)	400 m	1,500 TEU/m/Year	76,500,000	191,250	13
3	Intra-Asia Container Terminal	350 m	1,200 TEU/m/Year	60,000,000	171,429	14
4	Domestic Container Terminal	280 m	1,000 TEU/m/Year	36,600,000	130,714	13
5	Multi-Purpose Berth for International Vessel	240 m	2,000 t/m/Year	17,800,000	74,167	37
6	Multi-Purpose Berth for Domestic Vessel	170 m	2,000 t/m/Year	9,500,000	55,882	28
7	Domestic Conventional Berth	130 m	1,000 t/m/Year	3,750,000	28,846	29
8	Small Port	80 m	600 t/m/Year	1,200,000	15,000	25
9	Liquid Bulk Berth	1 LS	1,500,000 t/Berth/Year	4,100,000	4,100,000	3
10	Dry Bulk Berth	1 LS	3,000,000 t/Berth/Year	9,000,000	9,000,000	3
11	Passenger Terminal (International)	280 m	2,000 Person/m/Year	11,800,000	42,143	21
12	Passenger Terminal (National)	220 m	2,000 Person/m/Year	7,280,000	33,091	17
13	Passenger Terminal (Domestic)	150 m	1,000 Person/m/Year	4,170,000	27,800	28
14	Passenger Terminal (Local)	60 m	1,000 Person/m/Year	1,660,000	27,667	28

Source : Prepared By The Study Team

Appendix 8.4 Projection of Port Development Investment

Table A.8.4.1.1 National & IPC Investment in REPELITA VI (FY 1994-1998)

(Unit : Rp. Million)

1. Sumatra

Province	Source	1994/95	1995/96	1996/97	1997/98	1998/99	Total
Ache	National	3,411	2,297	1,966	4,937	5,143	17,754
	IPC	223	35	845	440	2,044	3,587
	Total	3,634	2,332	2,811	5,377	7,187	21,341
Norrth Sumatra	National	8,859	8,201	5,896	11,876	8,593	43,425
	IPC	6,201	8,660	16,460	13,657	21,948	66,926
	Total	15,060	16,861	22,356	25,533	30,541	110,351
Riau	National	8,431	22,595	9,275	9,996	3,018	53,315
	IPC	2,219	3,776	3,661	5,260	8,538	23,454
	Total	10,650	26,371	12,936	15,256	11,556	76,769
West Sumatra	National	250	672	298	2,007	655	3,882
	IPC	1,038	4,049	473	6,254	7,249	19,063
	Total	1,288	4,721	771	8,261	7,904	22,945
Jambi	National	80	2,135	897	3,303	1,930	8,345
	IPC	1,686	4,670	3,454	1,683	3,625	15,118
	Total	1,766	6,805	4,351	4,986	5,555	23,463
Bengkulu	National	820	181	168	200	0	1,369
	IPC	423	1,176	1,197	1,089	6,084	9,969
	Total	1,243	1,357	1,365	1,289	6,084	11,338
South Sumatra	National	1,559	2,012	1,229	1,445	286	6,531
	IPC	820	1,009	2,794	11,218	13,017	28,858
	Total	2,379	3,021	4,023	12,663	13,303	35,389
Lampung	National	295	639	478	607	563	2,582
	IPC	17,771	15,239	19,813	16,711	17,248	86,782
	Total	18,066	15,878	20,291	17,318	17,811	89,364
Total	National	23,705	38,732	20,207	34,371	20,188	137,203
	IPC	30,381	38,614	48,697	56,312	79,753	253,757
	Total	54,086	77,346	68,904	90,683	99,941	390,960

2. Jawa

Province	Source	1994/95	1995/96	1996/97	1997/98	1998/99	Total
West Jawa	National	340	2,419	326	641	0	3,726
	IPC	30,535	73,279	200,843	207,090	335,753	847,500
	Total	30,875	75,698	201,169	207,731	335,753	851,226
Central Jawa	National	12,898	9,564	46,333	14,424	3,100	86,319
	IPC	2,702	2,057	5,462	2,038	52,400	64,659
	Total	15,600	11,621	51,795	16,462	55,500	150,978
East Jawa	National	10,300	10,373	10,582	7,703	4,361	43,319
	IPC	4,916	5,038	8,009	4,662	3,211	25,836
	Total	15,216	15,411	18,591	12,365	7,572	69,155
DKI Jakarta	National	5,912	35,359	29,063	4,782	11,803	86,919
	IPC	0	0	0	0	0	0
	Total	5,912	35,359	29,063	4,782	11,803	86,919
Total	National	29,450	57,715	86,304	27,550	19,264	220,283
	IPC	38,153	80,374	214,314	213,790	391,364	937,995
	Total	67,603	138,089	300,618	241,340	410,628	1,158,278

3. Kalimantan

Province	Source	1994/95	1995/96	1996/97	1997/98	1998/99	Total
West Kalimantan	National	1,153	1,205	3,611	1,490	4,053	11,512
	IPC	3,924	7,418	7,256	12,738	18,277	49,613
	Total	5,077	8,623	10,867	14,228	22,330	61,125
Central Kalimantan	National	2,210	612	1,657	2,300	0	6,779
	IPC	2,143	773	1,653	2,090	0	6,659
	Total	4,353	1,385	3,310	4,390	0	13,438
South Kalimantan	National	4,505	3,575	1,173	4,232	6,580	20,065
	IPC	4,407	2,388	1,167	2,626	9,778	20,366
	Total	8,912	5,963	2,340	6,858	16,358	40,431
East Kalimantan	National	11,730	4,041	3,733	3,872	5,138	28,514
	IPC	1,104	1,038	1,234	812	826	5,014
	Total	12,834	5,079	4,967	4,684	5,964	33,528
Total	National	19,598	9,433	10,174	11,894	15,771	66,870
	IPC	11,578	11,617	11,310	18,266	28,881	81,652
	Total	31,176	21,050	21,484	30,160	44,652	148,522

4. Sulawesi

Province	Source	1994/95	1995/96	1996/97	1997/98	1998/99	Total
North Sulawesi	National	919	8,867	1,997	3,929	2,465	18,177
	IPC	383	815	794	54	240	2,286
	Total	1,302	9,682	2,791	3,983	2,705	20,463
Central Sulawesi	National	4,052	8,831	4,732	9,543	990	28,148
	IPC	91	13	50	112	271	537
	Total	4,143	8,844	4,782	9,655	1,261	28,685
South Sulawesi	National	36,330	62,832	48,103	48,530	36,818	232,413
	IPC	1,157	1,624	1,325	2,476	845	7,427
	Total	37,487	64,256	49,428	51,006	37,663	239,840
Southeast Sulawesi	National	3,335	9,612	2,722	3,292	2,950	21,911
	IPC	36	288	47	135	403	909
	Total	3,371	9,900	2,769	3,427	3,353	22,820
Total	National	44,636	89,942	57,554	65,294	43,223	300,649
	IPC	1,667	2,740	2,216	2,777	1,759	11,159
	Total	46,303	92,682	59,770	68,071	44,982	311,808

5. Others

Province	Source	1994/95	1995/96	1996/97	1997/98	1998/99	Total
Bali	National	3,601	3,382	1,507	325	0	8,815
	IPC	1,998	3,336	1,507	299	0	7,140
	Total	5,599	6,718	3,014	624	0	15,955
Nusa Tengara Barat (NTB)	National	1,017	3,221	2,310	4,132	7,794	18,474
	IPC	2,032	1,290	1,194	0	7,660	12,176
	Total	3,049	4,511	3,504	4,132	15,454	30,650
Nusa Tengara Timur (NTT)	National	5,462	5,282	5,946	5,763	5,252	27,705
	IPC	2,643	1,218	3,193	1,962	0	9,016
	Total	8,105	6,500	9,139	7,725	5,252	36,721
Timor Timur	National	427	2,011	8,397	2,494	1,944	15,273
	IPC	298	4,449	6,266	978	1,018	13,009
	Total	725	6,460	14,663	3,472	2,962	28,282
Maluku	National	4,759	6,743	4,929	13,017	874	30,322
	IPC	235	327	602	35	163	1,362
	Total	4,994	7,070	5,531	13,052	1,037	31,684
Irianjaya	National	5,194	14,056	6,340	10,770	5,105	41,465
	IPC	368	350	1,586	80	345	2,729
	Total	5,562	14,406	7,926	10,850	5,450	44,194
Total	National	20,460	34,695	29,429	36,501	20,969	142,054
	IPC	7,574	10,970	14,348	3,354	9,186	45,432
	Total	28,034	45,665	43,777	39,855	30,155	187,486

6. Total

Island	Source	1994/95	1995/96	1996/97	1997/98	1998/99	Total	%
1. Sumatra	National	23,705	38,732	20,207	34,371	20,188	137,203	16%
	IPC	30,381	38,614	48,697	56,312	79,753	253,757	19%
	Total	54,086	77,346	68,904	90,683	99,941	390,960	18%
2. Jawa	National	29,450	57,715	86,304	27,550	19,264	220,283	25%
	IPC	38,153	80,374	214,314	213,790	391,364	937,995	71%
	Total	67,603	138,089	300,618	241,340	410,628	1,158,278	53%
3. Kalimantan	National	19,598	9,433	10,174	11,894	15,771	66,870	8%
	IPC	11,578	11,617	11,310	18,266	28,881	81,652	6%
	Total	31,176	21,050	21,484	30,160	44,652	148,522	7%
4. Sulawesi	National	44,636	89,942	57,554	65,294	43,223	300,649	35%
	IPC	1,667	2,740	2,216	2,777	1,759	11,159	1%
	Total	46,303	92,682	59,770	68,071	44,982	311,808	14%
5. Others	National	20,460	34,695	29,429	36,501	20,969	142,054	16%
	IPC	7,574	10,970	14,348	3,354	9,186	45,432	3%
	Total	28,034	45,665	43,777	39,855	30,155	187,486	9%
Total	National	137,849	230,517	203,668	175,610	119,415	867,059	100%
	IPC	89,353	144,315	290,885	294,499	510,943	1,329,995	100%
	Total	227,202	374,832	494,553	470,109	630,358	2,197,054	100%

Table A.8.4.1.2 IPC Investment in REPELITA VI by Inland (FY 1994-1998)

(Unit : Rp. Million)

1. Sumatra

Province	IPC	1994	1995	1996	1997	1998 (planned)	Total
Ache	I	223	35	845	440	2,044	3,587
North Sumatra	I	6,201	8,660	16,460	13,657	21,948	66,926
Riau	I	2,219	3,776	3,661	5,260	8,538	23,454
West Sumatra	II	1,038	4,049	473	6,254	7,249	19,063
Jambi	II	1,686	4,670	3,454	1,683	3,625	15,118
Bengukulu	II	423	1,176	1,197	1,089	6,084	9,969
South Sumatra	II	820	1,009	2,794	11,218	13,017	28,858
Lampang	II	17,771	15,239	19,813	16,711	17,248	86,782
Total		30,381	38,614	48,697	56,312	79,753	253,757

2. Jawa

Province	IPC	1994	1995	1996	1997	1998 (planned)	Total
West Jawa	II	30,535	73,279	200,843	207,090	335,753	847,500
East Jawa	III	4,916	5,038	8,009	4,662	3,211	25,836
Central Jawa	III	2,702	2,057	5,462	2,038	52,400	64,659
Total		38,153	80,374	214,314	213,790	391,364	937,995

3. Kalimantan

Province	IPC	1994	1995	1996	1997	1998 (planned)	Total
West Kalimantan	II	3,924	7,418	7,256	12,738	18,277	49,613
Central Kalimantan	III	2,143	773	1,653	2,090	0	6,659
South Kalimantan	III	4,407	2,388	1,167	2,626	9,778	20,366
East Kalimantan	IV	1,104	1,038	1,234	812	826	5,014
Total		11,578	11,617	11,310	18,266	28,881	81,652

4. Sulawesi

Province	IPC	1994	1995	1996	1997	1998 (planned)	Total
North Sulawesi	IV	383	815	794	54	240	2,286
Central Sulawesi	IV	91	13	50	112	271	537
South Sulawesi	IV	1,157	1,624	1,325	2,476	845	7,427
Southeast Sulawesi	IV	36	288	47	135	403	909
Total		1,667	2,740	2,216	2,777	1,759	11,159

5. Others

Province	IPC	1994	1995	1996	1997	1998 (planned)	Total
Bali	III	1,998	3,336	1,507	299	0	7,140
Nusa Tengara Barat (NTB)	III	2,032	1,290	1,194	0	7,660	12,176
Nusa Tengara Timur (NTT)	III	2,643	1,218	3,193	1,962	0	9,016
East Timur	III	298	4,449	6,266	978	1,018	13,009
Maluku	IV	235	327	602	35	163	1,362
Irianjyaya	IV	368	350	1,586	80	345	2,729
Total		7,574	10,970	14,348	3,354	9,186	45,432

6. Total (1～5)

Islands	IPC	1994	1995	1996	1997	1998 (planned)	Total	Percentage (%)
1. Sumatra	I～II	30,381	38,614	48,697	56,312	79,753	253,757	19%
2. Jawa	II～III	38,153	80,374	214,314	213,790	391,364	937,995	71%
3. Kalimantan	II～IV	11,578	11,617	11,310	18,266	28,881	81,652	6%
4. Sulawesi	IV	1,667	2,740	2,216	2,777	1,759	11,159	1%
5. Others	III～IV	7,574	10,970	14,348	3,354	9,186	45,432	3%
Total		89,353	144,315	290,885	294,499	510,943	1,329,995	100%

(1) IPC I

(Unit : Rp. Million)

1. Sumatra

Port	Province	1994	1995	1996	1997	1998 (planned)	Total
L. Seumawe	Ache	28	35	757	250	1,937	3,007
Malahayati	Ache	195	0	51	190	66	502
Kuala Langsa	Ache	0	0	37	0	0	37
Sabang	Ache	0	0	0	0	0	0
Meulboh	Ache	0	0	0	0	41	41
Belawan	North Sumatra	4,618	5,564	10,760	10,425	7,947	39,314
Pangkalan BUN/SUSU	North Sumatra	0	0	0	0	0	0
Kuala Tanjung	North Sumatra	0	0	0	104	1,000	1,104
Sibolga	North Sumatra	20	0	65	0	319	404
Tg. Balai Asahan	North Sumatra	0	0	186	281	622	1,089
Gunung Sitoli	North Sumatra	0	0	34	25	289	348
Others	North Sumatra	1,563	3,096	5,415	2,822	11,771	24,667
Dumai	Riau	1,160	1,624	1,208	2,479	2,831	9,302
Tg. Piang	Riau	194	918	985	1,168	4,533	7,798
Pekanbaru	Riau	736	611	1,000	1,409	537	4,293
Tembilahan	Riau	40	41	357	90	378	906
Bengkalis	Riau	0	30	0	94	0	124
Selat Panjang	Riau	0	315	111	20	0	446
Bagan Siapi-Api	Riau	0	0	0	0	0	0
Rengat	Riau	89	237	0	0	0	326
Others	Riau	0	0	0	0	259	259
Total	–	8,643	12,471	20,966	19,357	32,530	93,967

2. Total

Island	IPC	1994	1995	1996	1997	1998 (planned)	Total
Sumatra	I	8,643	12,471	20,966	19,357	32,530	93,967
Total		8,643	12,471	20,966	19,357	32,530	93,967

(2) IPC II

(Unit : Rp. Million)

1. Sumatra

Port	Province	1994	1995	1996	1997	1998 (planned)	Total
Teluk Bayur	West Sumatra	1,038	4,049	473	6,254	7,249	19,063
Jambi	Jambi	1,686	4,670	3,454	1,683	3,625	15,118
Bengkulu	Bengkulu	423	1,176	1,197	1,089	6,084	9,969
Palembang	South Sumatra	405	177	1,729	10,430	10,179	22,920
Pangkal Balam	South Sumatra	345	374	544	561	2,115	3,939
Tanjung Pandan	South Sumatra	70	458	521	227	723	1,999
Panjang	Lampung	17,771	15,239	19,813	16,711	17,248	86,782
Total	–	21,738	26,143	27,731	36,955	47,223	159,790

2. Jawa

Port	Province	1994	1995	1996	1997	1998 (planned)	Total
Tg. Priok	West Jawa	5,954	19,610	49,719	41,227	48,145	164,655
Tg. Priok (UTPK)	West Jawa	22,270	42,331	101,124	112,709	157,602	436,036
Cirebon	West Jawa	545	1,687	7,880	1,539	3,378	15,029
Banten	West Jawa	1,187	7,128	38,631	13,177	15,613	75,736
Sunda Kelapa	West Jawa	579	2,523	3,489	8,923	2,402	17,916
Others (Bojonegara)	West Jawa	–	–	–	29,515	108,613	138,128
Total	–	30,535	73,279	200,843	207,090	335,753	847,500

3. Kalimantan

Port	Province	1994	1995	1996	1997	1998 (planned)	Total
Pontianak	West Kalimantan	3,924	7,418	7,256	12,738	18,277	49,613
Total	–	3,924	7,418	7,256	12,738	18,277	49,613

4. Total (1～3)

Island	IPC	1994	1995	1996	1997	1998 (planned)	Total
1. Sumatra	II	21,738	26,143	27,731	36,955	47,223	159,790
2. Jawa	II	30,535	73,279	200,843	207,090	335,753	847,500
3. Kalimantan	II	3,924	7,418	7,256	12,738	18,277	49,613
Total		56,197	106,840	235,830	256,783	401,253	1,056,903

(3) IPC Ⅲ

(Unit : Rp. Million)

1. Jawa

Port	Province	1994	1995	1996	1997	1998(Planned)	Total
Tg. Perak	East Jawa	0	629	0	0	0	629
Gresik	East Jawa	4,916	4,409	8,009	4,662	3,211	25,207
Tg. Emas	Central Jawa	2,522	1,769	5,462	1,905	52,400	64,058
Tegal	Central Jawa	180	288	0	133	0	601
Total	-	7,618	7,095	13,471	6,700	55,611	90,495

2. Kalimantan

Port	Province	1994	1995	1996	1997	1998(Planned)	Total
Pangkalan BUN	Central Kalimantan	0	178	0	0	0	178
Sampit	Central Kalimantan	2,143	482	0	2,090	0	4,715
Pulang Pisau	Central Kalimantan	0	113	0	0	0	113
Kumai	Central Kalimantan	0	0	1,653	0	0	1,653
Banjarmasin	South Kalimantan	2,395	2,388	1,167	2,626	9,778	18,354
Kotabaru	South Kalimantan	2,012	0	0	0	0	2,012
Total	-	6,550	3,161	2,820	4,716	9,778	27,025

3. Others

Port	Province	1994	1995	1996	1997	1998(Planned)	Total
Benoa	Bali	1,998	2,256	0	0	0	4,254
Celukan Bawang	Bali	0	1,080	1,507	299	0	2,886
Bima	NTB	0	1,290	1,194	0	1,684	4,168
Lembar	NTB	1,057	0	0	0	5,976	7,033
Badas	NTB	975	0	0	0	0	975
Tenau	NTT	116	1,036	0	0	0	1,152
Waingapu	NTT	42	0	3,193	1,962	0	5,197
Maumere/Ende	NTT	2,485	182	0	0	0	2,667
Dili	East Timor	298	4,449	6,266	978	1,018	13,009
Total	-	6,971	10,293	12,160	3,239	8,678	41,341

4. Total (1～3)

Island	IPC	1994	1995	1996	1997	1998(Planned)	Total
1. Jawa	Ⅲ	7,618	7,095	13,471	6,700	55,611	90,495
2. Kalimantan	Ⅲ	6,550	3,161	2,820	4,716	9,778	27,025
3. Others	Ⅲ	6,971	10,293	12,160	3,239	8,678	41,341
Total		21,139	20,549	28,451	14,655	74,067	158,861

(4) IPC Ⅳ

(Unit : Rp. Million)

1. Kalimantan

Port	Province	1994	1995	1996	1997	1998(Planned)	Total
Balikpapan	East Kalimantan	630	918	574	720	130	2,972
Samarinda	East Kalimantan	474	50	514	50	426	1,514
Tarakan	East Kalimantan	0	70	146	42	270	528
Total	-	1,104	1,038	1,234	812	826	5,014

2. Sulawesi

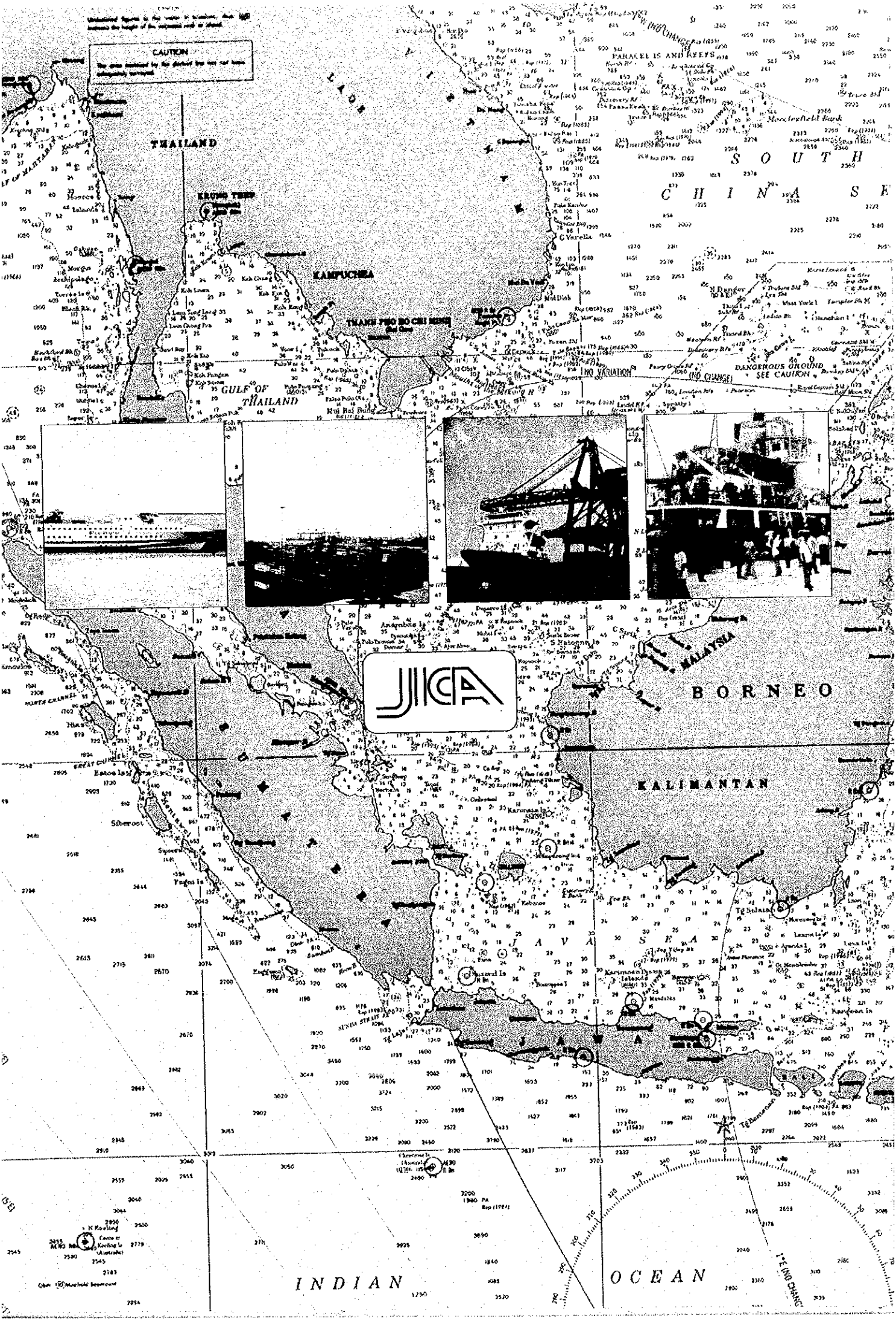
Port	Province	1994	1995	1996	1997	1998(Planned)	Total
Gorontalo	North Sulawesi	17	252	0	34	210	513
Bitung	North Sulawesi	366	563	794	20	30	1,773
Pantoloan	Central Sulawesi	91	13	50	112	271	537
Makassar	South Sulawesi	501	610	687	1,893	98	3,789
Parepare	South Sulawesi	62	227	25	12	240	566
HRD (Education)	South Sulawesi	594	787	613	571	507	3,072
Kendari	Southeast Sulawes	36	288	47	135	403	909
Total	-	1,667	2,740	2,216	2,777	1,759	11,159

3. Others

Port	Province	1994	1995	1996	1997	1998(Planned)	Total
Ambon	Maluku	220	271	481	0	163	1,135
Ternate	Maluku	15	56	121	35	0	227
Sorong	Irianjyaya	96	20	144	0	0	260
Jyayapura	Irianjyaya	187	55	68	0	0	290
Biak	Irianjyaya	58	149	1,259	15	181	1,662
Merauke	Irianjyaya	7	50	0	20	9	86
Manokwari	Irianjyaya	9	36	40	15	98	198
Fakfak	Irianjyaya	31	40	75	30	57	233
Total	-	603	677	2,188	115	508	4,091

4. Total (1～3)

Island	IPC	1994	1995	1996	1997	1998(Planned)	Total
1. Kalimantan	Ⅳ	1,104	1,038	1,234	812	826	5,014
2. Sulawesi	Ⅳ	1,667	2,740	2,216	2,777	1,759	11,159
3. Others	Ⅳ	603	677	2,188	115	508	4,091
Total		3,374	4,455	5,638	3,704	3,093	20,264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