

## 11. PRIOR EFFORTS TO ESTABLISH CRITERIA ON THE NATION'S PORTS

In order to prepare the evaluation criteria for the principal river ports, the Study Team briefly reviewed the previous efforts to categorize the Indonesian ports.

### 11.1 JICA Study on the Port Development Strategy

JICA Study on the Port Development Strategy proposed a container port network of Indonesia. In selecting prospective ports as a transshipment hub and a mother port, the Study prepared a set of criteria (Table 11.1.1). Cargo demand and cost aspects were quantified in the Study. Among the aspects mentioned in the criteria, demand forecast was given the top priority.

**Table 11.1.1 Criteria for Selecting a Container Hub**

Aspects to be considered	Remark
Demand Forecast	Ports are examined to see if they meet the minimum throughput to become a hub
Total Costs for Port Development	
Transportation Cost Saving	
Reliable Transportation Network	
Increase in the Economic Activities	Qualitative Evaluation Ports with a large hinterland economy is preferred
Rectifying Regional Disparity	Qualitative Evaluation Ports in under developed areas receive a high mark
Environmental Consideration	Qualitative Evaluation
Recovery of the National Economy	To be considered in a phasing plan
Risks in Port Investment	High risks are envisaged in a hub port development

Source: Final Report, The Study on the Port Development Strategy in the Republic of Indonesia (March 1999, JICA)

## 11.2 TSSS Study (Transport Sector Strategy Study)

The government of Indonesia carried out a transportation sector study (TSSS Study) to work out a national transport strategy. This study is designed to prepare policy recommendations in response to the dramatically changed economic and institutional environments of the Indonesian transportation sector. TSSS Study proposed a set of criteria to select priority projects taking into account the policy-mix proposed by PROPENAS. These criteria include a variety of aspects and a time factor (Table 11.2.1).

**Table 11.2.1 TSSS Prioritization Criteria**

Evaluation/Prioritization	Weighting (%)	Short-term	Middle-term	Long-term
Strategic Network Status	7.00	C	B	A
Strategic Network Impact	9.25	C	B	A
Social/Political Aspects	15.00	A	B	C
Regional Development	7.00	A	B	C
Estimated Costs of Project (low costs projects are preferred)	6.25	C	B	A
Economic Aspects (EIRR)	18.00	C	B	A
Financial Aspects (Private Sector Participation)	13.50	C	B	A
Impact on International Trade and Tourism	5.50	A	B	C
Environment Costs and Benefits	9.50	C	B	A
Safety Impact	9.00	C	B	A

Note: A-C signifies the importance of each evaluation item over a time span

Source: Transport Sector Strategy Study

### 11.3 DGSC Network Plan

DGSC and IPCs are jointly preparing the Network Development Plan of Port Infrastructure in the National Port Arrangement. It identifies criteria for classifying the nation's ports. These criteria are determined according to the cargo throughput in a port (Table 11.3.1).

**Table 11.3.1 Criteria to Decide Port Function**

Port Category	Container	General cargo	Bulk cargo	Passenger
Primary Trunk Port	Cargo 3million TEU Depth 14 m	-	Cargo 20 million ton Depth 12 m	-
Secondary Trunk Port	Cargo=1.5-3 million TEU Depth 12 m	Cargo 7.5 million ton Depth 12 m	Cargo=5-20 million ton Depth 10 m	2.4million passengers Depth 8 m
Tertiary Trunk Port	Cargo=0.1-1.5 million TEU Depth 12 m	Cargo=5-7 million ton Depth 10 m	-	1-2 million passengers Depth 6 m
Regional Feeder Port	Cargo=0.05-0.1 million TEU Depth 10 m	Cargo=2-5 million ton Depth 6 m	Cargo=2 million ton Depth 6 m	0.5-1 million passengers Depth 6 m
Local Feeder Port	Cargo 0.05 million TEU Depth 8m	Cargo=2 million ton Depth 4 m	-	0.5 million passengers Depth 5 m

Source: Network Development Plan for Port Infrastructure in the National Port Arrangement

## 12. SELECTION OF THE PRIORITY PORTS

### 12.1 Project Profiles and Evaluation Criteria

The Study Team prepared preliminary development scenarios for the seven ports (see section 11.3). The two priority ports are selected assuming these scenarios. The proposed projects at the seven ports are outlined below (Table 12.1.1).

**Table 12.1.1 Project Profiles**

Port	Project Site	Project Profiles	Time to start
Pekanbaru	Pekanbaru	Converting Old port into Urban Use Constructing a New Bridge Expanding the Siak Haska Terminal	Long-term
	Perawang	Procuring Yard Equipment Installing Lights Improving Access Road Providing CPO Handling Capacity Expanding Container Terminal	Short-term  (Ongoing) Long-term
	Siak River	Installing Navigation Aids	Short-term
Jambi	Talang Duku	Repairing Yard Equipment Repairing Bulkhead Expanding Terminal	Short-term  Long-term
	Muara Sabak	Improving Access Road Providing Yard-side Capacity Creating Industrial Base Expanding Terminal Strengthening Linkage between Both Sides of River	(Ongoing) Short-term  Long-term
Palembang	Boom Baru	Extending Crane Rails Replacing dilapidated Equipment Procuring additional Equipment	Short-term  Long-term
	Sungai Lais	Providing CPO Handling Capacity Creating Public Terminals	(Ongoing) Long-term
	Musi River	Repairing Navigation Aids Optimizing Maintenance Dredging Testing Pilot Measures for Siltation Prevention	Short-term  Long-term
	Tanjung Api-Api	Creating Deep Sea-port and Industrial Base	(Partially ongoing)

Pontianak	Pontianak	Expanding Existing Container Terminal Procuring a Container Crane and additional Loading/Unloading Equipment Improving Yard-side Capacity Further Expansion of Existing Container Terminal Providing additional Loading/Unloading Equipment Increasing Yard-side Capacity Relocating Passenger Terminal Testing Pilot Measures for Pilotage prevention	Short-term          Long-term
	Nipah Kuning	Improving Yard-side Capacity Improving Access Road to Site (A new CPO/non-container cargo terminal will be also considered.)	Short-term          (Long-term)
	New River Port	Creating a new CPO/non-container Cargo Terminal Providing Loading/Unloading Equipment Providing Yard-side Capacity Strengthening Linkage between New Port and Pontianak	Long-term
Kumai	Kumai	Procuring additional Loading/Unloading Equipment Testing Pilot Measures for Siltation Prevention	Short-term          Long-term
	Bumiharjo	Creating a CPO terminal Providing Loading/Unloading Equipment Providing Yard-side Capacity Improving the access road to the site Creating the full-scale CPO and container/general cargo terminal Providing additional Loading/Unloading Equipment Providing additional Yard-side Capacity Strengthening Linkage between New Port and Kumai	(Ongoing)          Short-term          Long-term

Sampit	Sampit	Procuring additional Loading/Unloading Equipment Testing Pilot Measures for Siltation Prevention	Short-term Long-term
	Bagendang	Creating a CPO terminal Providing Loading/Unloading Equipment Providing Yard-side Capacity Improving Access Road to Site Creating Full-scale CPO and Container/General cargo Terminal Providing additional Loading/Unloading equipment Providing additional Yard-side Capacity Strengthening Linkage between New Port and Sampit	(Ongoing)  Short-term Long-term
Samarinda	Samarinda	Converting Wooden Wharf into New Container Berth Procuring additional Loading/Unloading Equipment Replacing dilapidated Equipment Increasing Yard-side Capacity, including demolishing Old Port Buildings Improving Port Access Road behind Port Further Increase of Loading/Unloading Capacity Relocating Passenger Terminal Testing Pilot Measures for Siltation Prevention	Short-term     Long-term
	Mangku Palas	Providing Cargo Handling Equipment Providing Yard-side Capacity Improving Access Road to Site	Short-term
	New Port (Oceanfront or Riverside)	Creating a New Container/General Cargo Terminal Providing Loading/Unloading Equipment Providing Yard-side Capacity Strengthening Linkage between New Port and Samarinda.	Long-term

The Study Team carried out an overall evaluation based on the analysis by several evaluation criteria (Table 12.1.2). Due to the nature of the criteria, the evaluation process is mostly qualitative.

**Table 12.1.2 Evaluation Criteria**

Aspects	Criteria
Political Aspects	Conformity to the Nation's Goals
Economic Aspects	Capacity Requirement
	Impacts on Regional Economy
	Transportation Network and Regional Development
	Economics of Port Development
Engineering Aspects	Engineering Feasibility
Environmental Aspects	Environmental Impacts

Evaluation results by each criterion are shown in the following sections (Section 12.2-12.8).

## 12.2 Conformity to the Nation's Goals

The Study Team prepared a set of selection criteria regarding the project's conformity to the nation's goals. Each aspect is evaluated with relevant indicators (Table 12.2.1). Evaluation results are shown in Table 12.2.2.

**Table 12.2.1 Evaluation Criteria**

Aspects	High Mark	Low Mark	Indicator(s)
Decentralization	Projects in Underdeveloped Area	Projects in Developed area	Per Capita GRDP Population Density
Poverty Alleviation	Catalyst for Labor Intensive Industries	Catalyst for Less Labor Intensive Industries	Expected Industrial Development
Competitive Industries	Catalyst for Industries with Competitive Advantages in Market	Catalyst for Industries without Competitive Advantages in Market	Expected Industrial Development
Rehabilitation	Less Costly Rehabilitation Projects	Large-scale Greenfield Projects	Project Profiles
Separation of Functions	Projects with Strong Presence of the Government	Projects based on Entrepreneurial Initiative	Main Player of Project
Accessibility	Projects improving Accessibility to Remote Area with Sizable Population	Projects in a Developed Area with Variety of Access	Transportation Network
Private Sector Participation	Projects with Private Sector Participation	Projects without Private Sector Participation	Prospective Investor



Table 12.2.2 Evaluation (Conformity to the Nation's Goals)

Project sites	Pekanbaru		Jambi		Palembang		Pontianak		Kumai		Sampit		Samarinda		
	existing port	new site	existing port	new site	existing port	new site	existing port	new site	existing port	new site	existing port	new site	existing port	new site (river port)	new site (ocean port)
Criteria	Pekanbaru	Perawang	Talang Duku	Muara Sabak	Boom Baru / Sungai Lais	Tg. Api-Api	Pontianak/ Nipah Kuning	Jungkat	Kumai	Bumiharjo	Sampit	Bagendang	Samarinda	Palaran/Mangkung Palas	Marang Kayu
Decentralization	High per capita population density	GRDP, low density	Low GRDP, medium density	Low GRDP, low density	Medium GRDP, high density	Medium GRDP, low density	Medium GRDP, high density	Medium GRDP, low density	Medium GRDP, medium density	Medium GRDP, low density	Medium GRDP, medium density	Medium GRDP, low density	High GRDP, high density	High GRDP, low density	High GRDP, low density
Poverty alleviation/Competitive industries	Stevedoring at Siak Haska	Stevedoring and CPO processing	Stevedoring and CPO storage	Stevedoring, CPO processing, and distribution	Stevedoring and CPO processing	Stevedoring, CPO processing, and coal storage	Stevedoring and CPO processing	Stevedoring and CPO processing	Stevedoring and CPO processing	Stevedoring and CPO processing	Stevedoring and CPO processing	Stevedoring and CPO processing	Stevedoring and distribution	Stevedoring and distribution	Stevedoring and distribution
Rehabilitation	No rehabilitation on project	No rehabilitation on project	Some rehabilitation on projects	No rehabilitation on project	Some rehabilitation on projects	Greenfield project	Greenfield project	Greenfield project	No rehabilitation on project	Greenfield project	No rehabilitation on project	Greenfield project	Greenfield project	Greenfield project	Greenfield project
Separation of functions/Private sector participation (expected players of the project)	IPC and private sector	IPC and private sector	IPC and private sector	IPC, local government, and private sector	IPC and private sector	Local government and private sector	IPC and private sector	IPC and private sector	IPC and private sector	IPC and private sector	IPC and private sector	IPC and private sector	IPC, local government, and private sector	IPC, local government, and private sector	IPC, local government, and private sector
Accessibility	Good	Poor	Good	Remote area	Good	Remote area	Good	Poor	Good	Poor	Good	Poor	Good	Fair	Remote area

### 12.3 Capacity Requirements

The Study Team examined whether the river ports need urgent expansion due to capacity constraints. The Team evaluated berth occupancy ratio, productivity, and demand growth rate of each port and compared them. If those indicators are high in a port, expansion of the port is judged urgent.

**Table 12.3.1 Berth Occupancy and Productivity**

Port	Berth Occupancy Ratio (%)	Productivity		
		General Cargo (t/gang/hour)	Bag Cargo (t/gang/hour)	Container Cargo (box/crane/hour)
Pekanbaru	59.2 (1999)	15.7 (1999)	21.0 (1999)	-
Jambi	70.7 (2000)	International 18.4 (2000) Domestic 9.6 (2000)	International 20.4 (2000) Domestic 11.2 (2000)	Conventional Wharf 7.0 (2000)
Palembang	57.9 (2000)	International 27.7 (2000) Domestic 39.3 (2000)	International 33.8 (2000) Domestic 33.9 (2000)	Container wharf 21 (2000)
Pontianak	71.5 (2000)	International 16.5 (2000) Domestic 14.0 (2000)	International 28.0 (2000) Domestic 25.0 (2000)	Container wharf 20 (2000) Conventional wharf 10-12 (2000)
Kumai	70.0 (2000)	8.4 (2000)	6.0 (2000)	-
Sampit	80.0 (2000)	16.8 (2000)	18.2 (2000)	Conventional Wharf 12 (2000)
Samarinda	N.A. (Judged high from field visits)	16.0 (2000)	18.0 (2000)	Conventional Wharf 7 (2000)
Baseline Productivity	-	20	25	Container Wharf 20 TEU/crane/hour Conventional Wharf 10 TEU/crane/hour

**Table 12.3.2 Demand Growth Projection (2000-2025)**

(% /year)

Port	International	Domestic	Total	Public	Total container
Pekanbaru	5	5	5	8	7
Jambi	4	4	5	12	12
Palembang	3	4	4	5	8
Pontianak	5.4	5.7	6.1	6.4	7.3
Kumai	1.4	4.3	5.3	3.6(excluding CPO)	14.6 (2007-2025 )
Sampit	4	3	4	7 (excluding CPO)	9
Samarinda	4	2.1	3.4	5.5	6.9

**Table 12.3.3 Evaluation (Capacity Evaluation)**

Project sites	Pekanbaru		Jambi		Palembang		Pontianak		Kumai		Sampit		Samarinda		
	existing port	new site	existing port	new site	existing port	new site	existing port	new site	existing port	new site	existing port	new site	existing port	new site (river port)	new site (ocean port)
Criteria	Pekanbaru	Perawang	Talang Duku	Muara Sabak	Boom Baru / Sungai Lais	Tg. Api-Api	Pontianak/ Nipah Kuning	Jungkat	Kumai	Bumiharjo	Sampit	Bagendang	Samarinda	Palaran/M angku Palas	Marang Kayu
Berth occupancy ratio	59.2%	-	70.7%	-	57.9%	-	71.5%	-	70.0%	-	80.0%	-	N.A. (Judged high from field visits)	-	-
General cargo productivity (t/gang/hour)	15.7	18.4 (International) 9.6 (Domestic)	27.7 (International) 39.3 (Domestic)	21 (Container wharf)	16.5 (International) 14.0 (Domestic)	8.4	16.8	16	12 (Conventional wharf)	7 (Conventional wharf)	7.0%	3.6%	5.5%		
Container cargo productivity (box/crane/hour)	8.0%	12.0%													
Public cargo growth rate per year (2000-2025)															

## 12.4 Impacts on the Regional Economy

The Study Team examined the impacts of river port development on the regional economy in two viewpoints, region's dependence on the port and improvement of the region's economic potential. To evaluate the former aspect, the Team used per capita export value and total international trade volume as indicators (Table 12.4.1). If these figures are high in a region, the region's economy is judged highly dependent on the port and vice versa.

**Table 12.4.1 (1) International Trade (1)**

Province	Export Value (US\$ 1,000)	Import Value (US\$ 1,000)	Total (US\$ 1,000)	Population	Per Capita Export Value (US\$ per capita)
Riau	7,165,350	1,033,019	8,198,369	4,122,146	1,738
Jambi	445,288	41,768	487,056	2,541,101	175
South Sumatra	914,935	695,478	1,610,413	7,734,200	118
West Kalimantan	434,250	110,846	545,096	3,945,300	110
Central Kalimantan	113,953	9,892	123,845	1,719,241	66
East Kalimantan	5,337,380	1,135,278	6,472,658	2,525,480	2,113
Indonesia	48,665,400	24,003,300	72,668,700	206,517,000	236

Source: Statistical Year Book of Indonesia and Each Province 1999, BPS

Figures of Riau and Central Kalimantan are for 1998. The other figures are for 1999

**Table 12.4.1 (2) International Trade (2)**

Province	Export Volume (1,000 t)	Import Volume (1,000 t)	Total Volume (1,000 t)
Riau	105,064	965	106,029
Jambi	1,020	90	1,110
South Sumatra	2,685	738	3,423
West Kalimantan	825	248	1,073
Central Kalimantan	241	11	252
East Kalimantan	57,338	3,126	60,464

Source: Statistical Year Book of Indonesia and Each Province 1999, BPS

Figures of Riau and Central Kalimantan are for 1998. The other figures are for 1999

To evaluate the latter aspect, the Team used value added ratio as an indicator. If industries envisaged in a port development yield high value added ratio, the port development is judged instrumental in improving the region's economic potential. The industrial development encouraged by river port expansion is mainly CPO processing and wood processing. Value added ratio of these industries is about the same as the average of all manufacturing industries (Table 12.4.2).

**Table 12.4.2 Value Added Ratio of Manufacturing Industries**

Manufacturing industries	Gross output (billion Rp.)			Input costs (billion Rp.)			Value added (billion Rp.)			Value added ratio (B/A)			
	Large/medium scale	Small scale	Household	Total (A)	Large/medium scale	Small scale	Household	Total	Large/medium scale		Small scale	Household	Total (B)
Food, beverage and tobacco	94,568	6,592	10,642	111,802	58,947	4,891	7,351	71,189	35,621	1,702	3,291	40,614	0.36
Textiles, clothing, and leather	87,784	5,229	2,376	95,389	57,440	3,779	1,568	62,787	30,345	1,449	808	32,602	0.34
Wood and wood products	37,506	5,850	5,533	48,889	23,422	3,823	2,982	30,227	14,084	2,026	2,551	18,661	0.38
Paper and paper products	26,683	297	246	27,226	16,675	173	120	16,968	10,008	124	126	10,258	0.38
Chemicals, petroleum, coal, rubber, and plastic products	72,420	144	259	72,823	49,646	85	178	49,909	22,774	58	81	22,913	0.31
Non-metallic mineral products except petroleum and coal products	11,814	1,727	1,777	15,318	6,959	799	748	8,506	4,854	928	1,029	6,811	0.44
Basic metals	21,157	11	19	21,187	15,438	4	13	15,455	5,719	6	6	5,731	0.27
Fabricated metal products, machinery, and equipment	74,426	1,422	1,011	76,859	44,933	926	546	46,405	29,493	496	465	30,454	0.40
Other manufacturing industries	3,915	259	757	4,931	2,163	126	433	2,722	1,753	133	325	2,211	0.45
Total	430,273	21,531	22,620	474,424	275,622	14,607	13,939	304,168	154,651	6,923	8,682	170,256	0.36

Source: Statistical Year Book of Indonesia 1999, BPS

**Table 12.4.3 Evaluation (Impacts on the Regional Economy)**

Criteria	Pekanbaru		Jambi		Palembang		Pontianak		Kumai		Sampit		Samarinda		
	existing port	new site	existing port	new site	existing port	new site	existing port	new site	existing port	new site	existing port	new site	existing port	new site (river port)	new site (ocean port)
Project sites															
Criteria	Pekanbaru	Perawang	Talang Duku	Muara Sabak	Boom Baru / Sungai Lais	Tg. Api-Api	Pontianak/ Nipah Kuning	Jungkat	Kumai	Bumiharjo	Sampit	Bagendang	Samarinda	Palaran/Malangku Palas	Marang Kayu
Per capita export value (US\$ per capita)	1,738	175			118	110	66	66	66	66	66	66	66	66	2,113
International trade volume (,000t)	106,029	1,110			3,423	1,073	252	252	252	252	252	252	252	252	60,464
Improvement of the region's potential (Expected industrial development)	-	CPO processing, wood processing	Coal production	CPO processing, wood processing, coal production	CPO processing, coal production	CPO processing	CPO processing	CPO processing	-	CPO processing	CPO processing	CPO processing	-	Wood processing	-

## 12.5 Transportation Network and Regional Development

The following aspects are evaluated in this section:

- Alternative transportation routes
- Prospects of the key supporting infrastructure
- Prospects of the key regional development

Each aspect is evaluated with the following criteria (Table 12.5.1). Evaluation results are shown in Table 12.5.2.

**Table 12.5.1 Evaluation Criteria**

Aspects	High Mark	Low Mark
Alternative Transportation Routes	No attractive alternative route is available.	Attractive alternative route is available.
Prospects of Key Supporting Infrastructure	Key supporting infrastructure is already provided.	No effort has been done to provide fundamental infrastructure.
Prospects of Key Regional Development	Key regional development projects are underway.	No concrete schedule is fixed to realize key regional development projects.



**Table 12.5.2 Evaluation (Transportation Network and Regional Development)**

Project sites	Pekanbaru		Jambi		Palembang		Pontianak		Kumai		Sampit		Samarinda		
	existing port	new site	existing port	new site	existing port	new site	existing port	new site	existing port	new site	existing port	new site	existing port	new site (river port)	new site (ocean port)
Criteria	Pekanbaru	Perawang	Talang Duku	Muara Sabak	Boom Baru / Sungai Lais	Tg. Api-Api	Pontianak/ Nipah Kuning	Jungkat	Kumai	Bumiharjo	Sampit	Bagendang	Samarinda	Palaran/Malangku Palas	Marang Kayu
Alternative Transportation Routes	Deep draft terminal at Dumai	No attractive alternative	No attractive alternative	No attractive alternative	No attractive alternative	No attractive alternative	No attractive alternative	No attractive alternative	New port 11km upstream	New port 11km upstream	New port 22km downstream	Deep draft terminal at Balikpapan			
Prospects of the Key Supporting Infrastructure	Planned: new bridge downstream	Needed: upgrade of access road	No major infrastructure upgrade in sight	Ongoing: access road, under negotiation: hydrolic power plant, planned: industrial estate	No major infrastructure upgrade in sight	Ongoing: access road	Under negotiation: container terminal extention needed: upgrade of the access road/CPO terminal	No major infrastructure upgrade in sight	No major infrastructure upgrade in sight	Ongoing: CPO terminal needed: upgrade of the access road	No major infrastructure upgrade in sight	Ongoing: CPO terminal needed: upgrade of the access road	Planned: new bridge downstream	Planned: new bridge upstream	No major infrastructure upgrade in sight
Prospects of the Key Regional Development Projects	No major regional development project in sight	No major regional development project in sight	No major regional development project in sight	Under negotiation: hydrolic power plant, petrochemical industry Planned: industrial	No major regional development project in sight	Planned: production increase at Tanjung Enim	No major regional development project in sight	No major regional development project in sight	No major regional development project in sight	Planned: CPO processing industry	No major regional development project in sight	Planned: CPO processing industry	No major regional development project in sight	No major regional development project in sight	No major regional development project in sight

## 12.6 Engineering Feasibility

This section deals with the engineering aspects of selecting the two priority ports.

Promising sites for large-scale development will be identified and their engineering feasibility will be examined. The focal point will be the cost of construction and maintenance as well as engineering risks.

The items to be examined are as follows (refer to Table 12.6.1).

(1) Conditions of river channel

Location and distance of the study port from river mouth / navigable vessel size / dimensions of design channel / volume of maintenance dredging,

(2) Design Conditions

Morphology and sub-soil conditions / hydrographic conditions (tidal range, water level fluctuation) / seismic force,

(3) Viability of project

Capability of port expansion / Controlling cost factor

(1) Condition of river channel

This condition covers the ability of the river channel (or water area) to cope with the large-scale development. The following points are evaluated:

- i) Distance of the development site from the river mouth,
- ii) Size of navigable vessel (maximum LOA, maximum draft)
- iii) Scale of shipping channel (width and water depth of channel)
- iv) Volume of maintenance dredging of navigation channel

The wider channel and/or deeper channel will be evaluated as more advantageous for saving construction cost as well as maintenance cost.

The site of Muara Sabak is located nearer from the river mouth of Batanghari River and also has the advantage that the larger sizes of vessels are navigable when compared to the existing Jambi Port (Talang Duku).

The existing Pontianak port is located nearer from the river mouth than the other development sites among the other river ports in Kalimantan.

The condition of maintenance dredging has a direct relation to the maintenance cost of the port and the navigation channel. Higher evaluation will be given to the channel with less volume since it will be advantageous for saving maintenance cost.

Except for Siak River (Pekanbaru) where maintenance dredging is negligible, the sites along Batanghari River have the lowest maintenance dredging among the Study areas.

(2) Design conditions

Design condition has direct relation with port availability, design freedom of the port facilities as well as the construction cost. Higher evaluation will be given to the development site having stiff and stable foundations since it will be advantageous to save cost for initial construction and/or improvement.

The sites of Tanjung Apiapi (Palembang) and Marang Kayu (Samarinda) are considered disadvantageous because of the strong accretive and advancing shoreline. The present water area at those sites is assumed to be in the process of changing to land area.

At the Jambi (Talang Duku) site, water level fluctuation in the river between rainy season and dry season is large. This is a restraint for design of the port facilities and effective cargo handling at the port.

### (3) Viability of project

Viability of projects adds the long-term development viewpoint of the site to the evaluation. Higher evaluation will be given to the site where there is less expansion difficulty to cope with the long-term growth of the port.

The “cost factor” is added to identify the elements that will be necessary to implement the development and/or improvement but will cause cost-increase.

For example, the construction of an access road is necessary for the development at three sites: Muara Sabak (Jambi), Tanjung Apiapi (Palembang) and Marang Kayu (Samarinda).

Difficulty in land acquisition is assumed in the re-development of the existing port area at Pekanbaru, Pontianak, Kumai, Sampit and Samarinda. Improvement of the quay structures of the present Samarinda Port will be necessary but costly.

Construction of breakwater and sand-barrier to cope with the rough sea and littoral sand drift will be necessary in the development of seaport at Marang Kayu.

A summary evaluation table of engineering considerations for the 16 port development sites of the seven Study Areas is presented in Table 12.6.1.

**Table 12.6.1 Engineering Aspect of Evaluation / Selection of Priority Ports**

Name of Port	Pekanbaru		Jambi		Palembang		Pontianak		Kumai		Sampit		Samarinda					
	Existing	New Site	Existing	New Site	Existing	New Site	Existing	New Site	Existing	New Site	Existing	New Site	Existing	New Site				
Name of Port Development Site	Pekanbaru	Perawang	Talang Duku	Muara Sabak	Boom Baru	Sungai Lais	Tanjung Apiapi	Pontianak	Jungkat	Kumai	Bumiharjo	Sampit	Bagedang	Samarinda	Palaran	Marang Kayu	New Site	
Distance from River Mouth	165 km	135 km	155 km	25 km	105 km	98 km	River-mouth	30 km	15 km	25 km	36 km	75 km	55 km	65 km	55 km	Sea port		
Navigable Vessel Draught	Max. LOA	90 m	75 m	115 m	185 m	185 m	185 - 200 m	109 m	109 m	Assumed 100 m	Assumed 100 m	Assumed: 100 m	Assumed: 100 m	153 m		-		
	Max. Draught	6.0 m	5.0 m	6.5 m	6.0 m	6.0 m	11.0 m	6.0 m	6.0 m	Assumed 6.0 m	Assumed 6.0 m	Assumed: 6.0 m	Assumed: 6.0 m	6.8 m		-		
Shipping Channel (Design)	Width	60 - 100 m	50 - 80m	4.5 m	100 m	100 m	1.5 - 2 km	80 m	80 m	50 m	50 m	50 m	50 m	60 - 70 m		-		
	Depth (LWS)	6 m	8 m	4.5 m	6.5 m	6.5 m	10 - 12 m	5.5 m	5.5 m	5.0 m	5.0 m	4.5 m	4.5 m	5.0 - 6.0 m		-		
Maintenance Dredging of Channel	Negligible		Average 350,000 m <sup>3</sup> /year		Average 2,300,000 m <sup>3</sup> /year		Average 1,300,000 m <sup>3</sup> /year		Average 440,000 m <sup>3</sup> /year		Average 720,000 m <sup>3</sup> /year		Average 1,450,000 m <sup>3</sup> /year		Presumed high			
Morphology and Sub-soil Conditions	Urban area, Clay, Fine sand	River-bank Clay, Fine sand	River-bank Sand, clay	River-bank Lowland, swamp Clay, silt	Riverbank, Lowland, swamp, Sand, clay	Riverbank, Lowland, swamp, Sand, clay	Swamp, Mangrove forest, Risk of advancing shoreline.	River-bank Silt, clay	River-bank Silt, clay, Coral in shallow layer	Urban area, Clay, Fine sand	River-bank of hilly area; Silty clay	Urban Area	Lowland, swamp	Urban Area	River-bank of hilly area, Lowland, Swamp	Lowland, Swamp, Risk of accretive shoreline		
	2.2 m (Tide)	3 - 3.5 m (Tide)	6 - 7 m (Tide: 2.4 m)	3 - 3.5 m (Tide)	3.8 m (Tide)	2.5 m (Tide)	1.2 m (Tide)	1.3 m (Tide)	1.0 m (Tide)	1.0 m (Tide)	2.0 m (Tide)	2.0 m (Tide)	2.0 m (Tide)	1.5 m (Tide)				
Seismic Force	Very weak		Very weak		Very weak		Nil		Very weak		Very weak		Very weak		Weak			
Port Expansion	Hard	Possible	Possible	Possible	Possible	Possible	Hard	Possible	Hard	Possible	Hard	Possible	Hard	Possible	Hard	Possible	Hard	Possible
	Difficulty in land Acquisition	-	-	Access traffic	-	-	Access traffic	Difficulty in land Acquisition	-	Difficulty in land Acquisition	-	Difficulty in land Acquisition	-	Improvement of Quay Structure	Access traffic	Break-water		

## **12.7 Economic Criteria for Port Selection**

### **12.7.1 Introduction**

Previous Sections describe the purpose and nature of economic evaluation and covered the types of criteria that would be used in the selection process.

This Section describes the actual criteria used and the results of applying the criteria to the proposed port projects. The application of economic criteria have been refined and simplified to make the results more meaningful and relevant. They are also now coordinated with the other criteria to avoid double counting.

The most important change, since earlier reports, has been the need to simplify economic categories so that now we have only 5 economic criteria (aggregated from the original 12) and that these are now related to the development port planning scenarios.

Comments from the Working and Steering committees have also been addressed and explanations or modifications made where relevant.

### **12.7.2 Direct Economic Criteria**

#### **(1) Introduction**

Direct economic criteria are those used in traditional economic evaluation (cost benefit analysis) and basically analyse the net additional costs and benefits as described below.

#### **(2) Capital Cost**

From an economic viewpoint, capital cost is important but mainly in terms of cost per tonne of capacity provided. Existing sites are high cost, providing limited space and are therefore middle ranked. Green-field sites are invariably cheaper per se and, therefore, new river locations would be ranked higher.

New seaports have some benefits but suffer from additional infrastructure costs and are, therefore, also ranked lower.

Tanjung Api Api (TAA) development involves considerable additional infrastructure and the viability of a multi purpose terminal there on its own has been questioned in many recent reports. This type of terminal depends on the coal terminal being built first to offset some of the infrastructure development costs. TAA therefore, remains ranked as below the highest rank. Marang Kayu also ranks lower because all, or most, development costs would be loaded on to the new port.

#### **(3) Additional Land/Water Transport Costs**

Moving port facilities from an existing location involves additional land transportation costs and also sometimes additional river costs, although in the longer term industry relocates or new industry sets up nearer the new facilities. One could also argue that city

centre ports are, or will become, congested imposing costs on users and new locations may actually reduce costs long term.

However, existing port locations have been highest ranked, as no additional cost is assumed, with locations entailing a small additional access distance ranking one lower, other locations a ranking lower than that and relatively far locations such as TAA ranked lower still. Marang Kayu is ranked higher than TAA being relatively far but not as far as TAA.

#### (4) Reduced Sea and River Transport Costs for Cargo

Ultimately, the direct benefits of investing in new ports is based on lower transport costs. These can arise from increased capacity, higher productivity, reduced ship time and larger ship size. We have as a simplifying assumption assumed that the ability to handle larger vessels is a proxy for all the types of benefits that lower cargo costs. Therefore, Pekanbaru, Jambi, Kumai and Sampit are ranked almost lowest, with Samarinda, Palembang and Pontianak mid ranked as existing ports.

The proposed new river projects would raise Samarinda, Pontianak, Sungai Lais, Jambi to a rank higher. Ports at TAA and Marang Kayu could handle the largest vessels and are top ranked. The ports at Kumai, Sampit and Pekanbaru would only allow modest improvements in ship size and are mid ranked.

#### (5) Other Economic Criteria

Other economic criteria are not described elsewhere and include tangible and non-quantifiable benefits such as employment and wider investment promotion due to the implementation of the port projects.

Based on sound studies and significant existing traffic, it is world-wide experience that relatively large new projects that provide major cost advantages to industry, will generate cargo and help develop associated industries. Therefore, new projects such as Tanjung Api Api (TAA) and Marang Kayu are top ranked for these criteria. New projects, but still river located, will provide some benefits and so they are ranked one rung lower. Perawang is mid ranked due to its upstream location.

#### (6) Economic Risk

Risk is a very important aspect of economic evaluation and as we mentioned in the Progress report, there are many different types of economic risk. However, in order not to overweight the analysis we have combined all the risk types into an overall risk factor.

All investment involves risk so that there is no highest score. Rehabilitation and expansion in situ involve some risk but have the highest relative rank. Ports on new sites are the most risky and are ranked around the middle depending on circumstances. It is, after all, the objective of sound planning studies to identify, minimise and manage risk.

### 12.7.3 Results of the Analysis

The results of the analyses described above are shown in Table 12.7.1. All of the five criteria are important, but it is clear that, in the context of this study, new sea ports are expensive, involve high risk, but potentially can provide substantial benefits. Expansion of ports in situ can either be very difficult and/or expensive. New river ports therefore, provide an appropriate compromise.

This conflict is usually resolved quantitatively at the economic analysis stage. In that regard, subsequent economic analysis of Marang Kayu indicates low economic rates of return due to the impact of the high supporting infrastructure costs such as breakwaters and jetties.

Obviously, economic criteria are only useful in the context of a wide range of factors, as shown in the rest of this section.

#### Notes:

- a) Some Costs are increased in absolute terms but not necessarily per tonne: Similarly, benefits, for example, may involve larger ships and greater absolute costs but reduced cost per tonne
- b) Usually items not quantified in the economic and financial evaluation may be quantifiable, to a limited extent, in a combination of the economic and development analyses.
- c) Existing port locations have some benefits (like lower risk and lower land access cost) but usually are very difficult and/or expensive to expand and provide few development impacts.
- d) It should also be noted that many city port terminals are very congested so that lower land access costs may be short /medium term only
- e) Dredging costs are unlikely to change between ports and between scenarios.
- f) Tanjung Api Api capital cost score is based upon the assumption that a coal terminal will be built first and the road and other infrastructure will be provided by the coal terminal project.

**Table 12.7.1 Direct Economic Criteria For Port Selection (page 1/2)**

ECONOMIC CRITERIA for PRIORITY PORT SELECTION		PEKANBARU		JAMBI		PALEMBANG		
MAIN CRITERIA	HOW TO SCORE	Rehab./ In situ (c)	Perawang	Talang Duku	Muara Sabak	Boom Baru	Sungai Lais	Tj Api Api(f)
<b>A. QUANTITATIVE</b>	PROXY CRITERIA / NUMBER							
<b>COSTS (a)</b>	(1)							
Increased Port Costs (Including related infrastructure)	Capital Cost of Project/Cost per tonne of Capacity	Mid level costs	Lower Costs than in Situ	Mid level costs	Lesser Costs as already berth development	Mid level costs	Cheaper to develop per tonne capacity	Cheaper to develop per tonne capacity
Increased Land Transport Costs (to/from port)	(2)							
1. Time	Additional Distance(d)	None or Little extra Transport Costs	Some Additional Costs	None or Little extra Transport Costs	105 km to MS	None or Little extra Transport Costs	Some Additional Costs	110 km to TJJ
2. Vehicle Operating Costs (Change in land transport costs with project)								
<b>BENEFITS (a)</b>	(3)							
Decreased Handling Costs*	Ability to handle larger vessels	Low	Improved-Middle	Low	Much improved	Middle	Better	Handle Large vessels
Decreased Ship Costs*								
Decreased Transhipment Costs*								
Decreased Storage Costs*								
Decreased Inventory Costs*								
Avoided lighterage costs								
Avoided diversion of cargo costs *Decreased Per Tonne Cargo								
Decreased Dredging Costs	Based on reduced dredging length or depth							
<b>B.1 NON QUANTIFIABLE BENEFITS(b)</b>	(4)							
<b>B.2 INTANGIBLE BENEFITS/ COSTS</b>	Depends on the types and volume of industry and agriculture promoted	Not great impact	Some (but not maximum) Favourable Impacts	Not great impact	Much improved-esp with Parit Cutum	Not great impact	Some (but not maximum) Favourable Impacts	High Impact
Employment								
Investment Promotion	Subjective							
<b>C. RISK</b>	(5)							
<b>Economic Risk</b>	(Note that no Project is without risk) Investment not forthcoming (due to macro instability) Capital Cost higher than expected Traffic and benefits lower than expected Development Benefit less than expected	Least risk	Mid Risk	Least risk	Mid Risk	Least risk	Least to Mid Risk	Mid to High Risk



**Table 12.7.1 Direct Economic Criteria For Port Selection (page 2/2)**

HOW TO SCORE	PONTIANAK		KUMAI		SAMPTI		SAMARINDA		
	Existing/Nipah Kuning	Jungkat/Other	#REF!	Bumiharjo	#REF!	Bagendang	#REF!	Palaran	Marang Kayu
PROXY CRITERIA									
Capital Cost of Project/Cost per tonne of Capacity	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	Very expensive supporting infrastructure costs required
Additional Distance	#REF!	Some Additional Costs	#REF!	Small Additional Costs	#REF!	Additional Costs	#REF!	20 km additional	50 km additional
Ability to handle larger vessels	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	Improved	Significantly improved if 12 m depth but costs increase more than pro rata.
Based on reduced dredging length or depth	#REF!								
Depends on the types and volume of industry and agriculture promoted	#REF!	#REF!	Some impacts	#REF!	Some impacts	#REF!	#REF!	#REF!	#REF!
Subjective									
#REF!									
Investment not forthcoming (due to macro instability)									
Capital Cost Higher Than Anticipated	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	High Risk
Traffic and benefits lower than expected									
Development Benefit less than expected									

## 12.8 Environmental Impacts

Typical possible environmental impacts related to the port development plans are reviewed in this section. These environmental items are selected according to the findings of the field studies, existing information and data in the study areas.

The items to be reviewed fall into two main environmental categories (i.e., Social Environment and Natural Environment). The items to be evaluated at each project site are shown in Tables 12.8.1 and Table 12.8.2.

**Table 12.8.1 Social Environment**

	Environmental Item	Description
1	Relocation of people caused by land acquisition of existing port expansion or new port development	In case of expansion or new development of port, the residents in and around the planned area are to be moved and resettled. The number of such residents is one of the indexes of impact magnitude. Moreover the amount of compensation for the resettlement is related to the cost of development.
2	Obstruction to fisheries / fishing activities. Risk of collision with fishing/passenger boat.	Obstructions to fisheries and fishing activities caused by shipping and navigation. On the other hand, fishing boats cause obstruction to ship navigation. Only a little data is available on the fisheries and fishing activities in the river concerned, but actually they practice the fishing in the study areas.
3	Impact to traffic condition around the port area, risk of traffic accident, noise, dust pollution.	As increasing of vehicular traffic especially container trailer due to port expansion or new port development, risk of traffic accident and noise, dust pollution is anticipate to the community around the port area.

**Table 12.8.2 Natural Environment**

	Environmental Item	Description
1	Impact to the rare species of Fauna and Flora	Red Data Book species (Rare, Very rare, Threatened, Endangered) inhabiting around the proposed area and the precious plant community especially mangrove forest (community) in the port development areas are to be evaluated.
2	Change of Riverine (Coastal) Zone caused by Reclamation /Dredging	Hydrological and ecological impacts caused by reclamation or dredging and the consequent dumping of the dredged materials in the riverine/coastal zone.
3	Change of Landscape / Aesthetics	Change of topography and vegetation due to the port development, land reclamation, etc. Deterioration of aesthetic harmony by the appearance of structures.

Table 12.8.3 shows the outcome of the Port Selection Evaluation from the viewpoint of environmental impact caused by port development in the study areas.

**Table 12.8.3 Evaluation of Environmental Aspect / Selection of Priority Ports**

Study Ports	Existing/ New Port	Study Site	Environmental Description
Pekanbaru	Existing Port	Pekanbaru	- Relocation of people: <b>Yes</b> - <b>Negative</b> impact of traffic increasing - <b>No</b> rare Fauna and Flora
	New Port	Perawang	- Relocation of people: <b>No</b> - <b>No</b> rare Fauna and Flora
Jambi	Existing Port	Talang Duku	- Relocation of people: <b>No</b> - Fishery Ground / 70 fishermen - <b>Negative</b> impact of traffic increasing - <b>No</b> rare Fauna and Flora
	New Port	Muara Sabak	- Relocation of people: <b>No</b> - Fishery ground / 80 fisherman, fishery port required - <b>No</b> rare Fauna and Flora, but small mangroves
Palembang	Existing Port	Boon Baru	- Relocation of people: <b>Yes</b> - Large/small, boats are crowded, <b>risk of collision</b> - <b>Negative</b> impact of traffic increasing - <b>No</b> rare Fauna and Flora
	New Port	Sungai Lais	- Relocation of people: <b>No</b> - <b>Negative</b> impact of traffic increasing - <b>No</b> rare Fauna and Flora
	New Port	Tg.Api-Api	- Relocation of people: <b>No</b> - <b>Marvelous mangrove (Api-Api)communities</b>
Pontianak	Existing Port	Pontianak	- Relocation of people: <b>Yes</b> - <b>Negative</b> impact of traffic increasing - <b>No</b> rare Fauna and Flora
	New Port	Jungkat	- Relocation of people : <b>Yes</b> - White Belly Sea Eagle nesting
Kumai	Existing Port	Kumai	- Relocation of people: <b>Yes</b> - <b>Negative</b> impact of traffic increasing - <b>No</b> rare Fauna and Flora
	New Port	Bumiharjo	- Relocation of people: <b>No</b> - <b>No</b> rare Fauna and Flora, but small mangroves
Sampit	Existing Port	Sampit	- Relocation of people: <b>Yes</b> - <b>Negative</b> impact of traffic increasing - <b>No</b> rare Fauna and Flora
	New Port	Bagendang	- Relocation of people: <b>No</b> - <b>No</b> rare Fauna and Flora
Samarinda	Existing Port	Samarinda	- Relocation of people: <b>Yes</b> , Commercial area - Large/small, boats are crowded, <b>risk of collision</b> - <b>Negative</b> impact of traffic increasing - <b>No</b> rare Fauna and Flora
	New Port	Palaran	- Relocation of people: <b>Yes</b> - <b>Negative</b> impact of traffic increasing - <b>No</b> rare Fauna and Flora
	New Port	Marang Kayu	- Relocation of people: <b>No</b> - <b>Impact from dredging work because of shallow bay</b> - <b>No</b> rare Fauna and Flora, but small mangroves

## 12.9 Overall Evaluation

Throughout the evaluation process, Jambi, Palembang, and Samarinda stood out among the seven ports, but all the ports were found to have legitimate reasons to be developed. Accordingly, the Study Team followed the following principles in proposing the two ports for further study.

- 1) Bearing in mind that this Study should give the Indonesian side a guideline for river port development in general, it would be better to study the ports suffering from the most acute symptoms peculiar to river ports, narrow port area, siltation, and draft limitation.
- 2) One priority port in Sumatra and another in Kalimantan should be selected.
- 3) Ports with a current development plan do not have an urgent need for a JICA study at this time.
- 4) For the smooth conduct of the Study, safety at the project sites needs to be guaranteed.

The Team understands that all the seven ports have strong reasons for further development. The development needs of each port are clearly shown in the section 11.2. In other words, all the ports need a study in order to respond to the existing problems and future demand growth.

The Team proposed Jambi in Sumatra and Samarinda in Kalimantan for further study. Samarinda was proposed as its port area is the most heavily congested among the seven ports and needs urgent attention. Samarinda has no port master plan either. On the other hand, the other three ports in Kalimantan, Pontianak, Kumai, and Sampit, have their port master plans. Creation of a new terminal is already underway in Kumai and Sampit. There is also security concern for Kumai and Sampit.

Jambi was proposed as it has the most severe draft limitation, requiring vessels a tidal operation to call at Talang Duku. There is no port master plan covering Jambi Port, Talang Duku, Muara Sabak, and Kuala Tungkal.

Port of Palembang has a development plan at Tanjung Api-Api, a new site for a deep draft port. This plan is now under a detailed review pending negotiations with the private sector. Since the results of the negotiation would greatly influence the viability of a public port development there, the Team took the view that it should wait for the results before commencing a JICA Study at Palembang. It would be worth conducting a JICA study after the development scheme and private sector involvement for Tanjung Api-Api is clarified.

As for Pekanbaru, it will need a port expansion at Perawang. However, a large port investment is underway at Dumai, which provides the province with an access to deep water.

With these factors taken into account in addition to the evaluation tables, the Team regards Jambi and Samarinda most suitable for further study at this time.