

**Final Report**

**The Study for  
Development of  
the Greater Jakarta Metropolitan Ports  
in the Republic of Indonesia**

**Main Report Volume-2  
Development Potential and Strategy**

**December 2003**

The Overseas Coastal Area Development Institute of Japan (OCDI)  
Pacific Consultants International (PCI)

SSF

J R

03-151

Exchange Rate

1USDoller=8,500Rupiah=120Yen

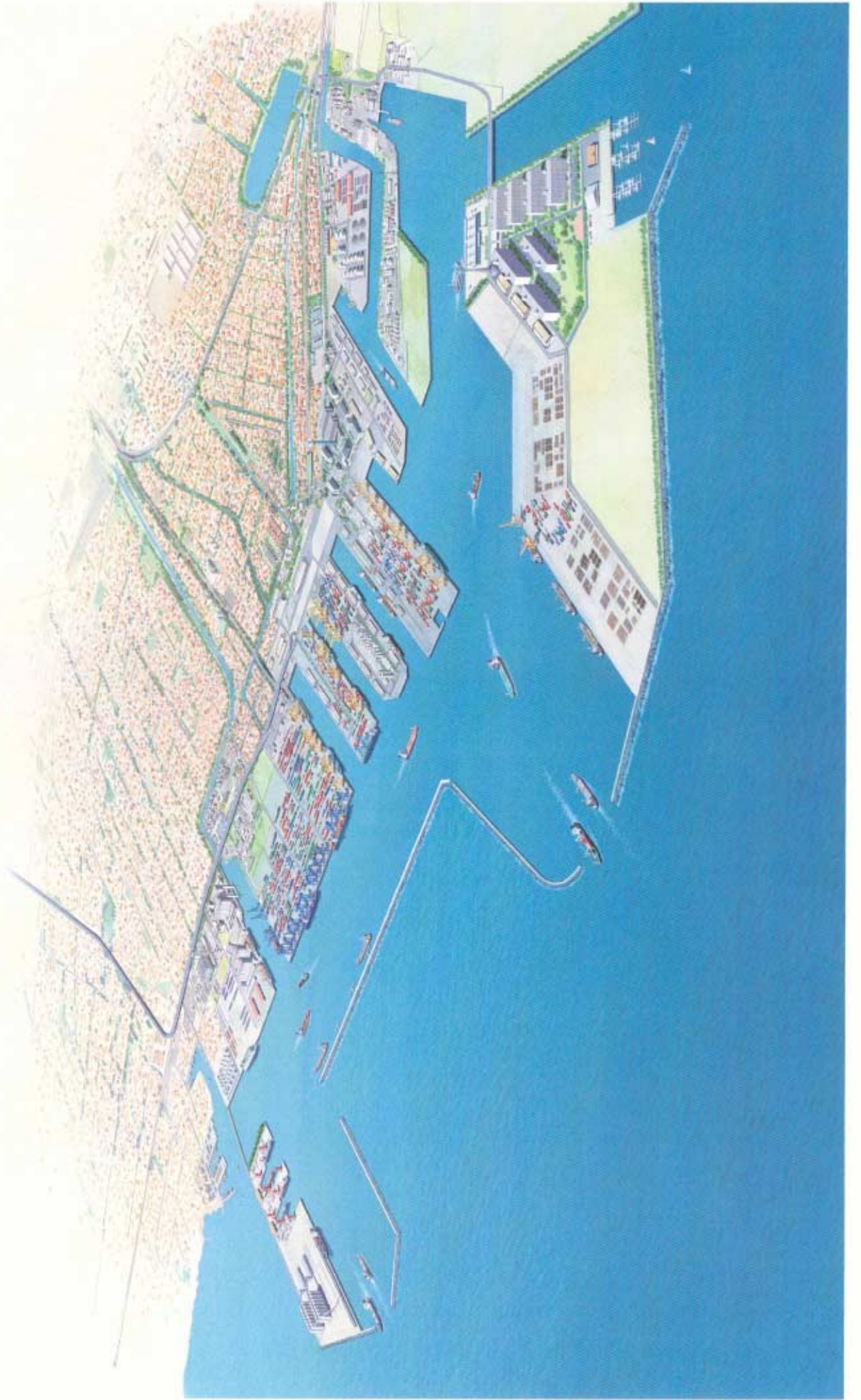
(As June 2003)

**Final Report**

**The Study for  
Development of  
the Greater Jakarta Metropolitan Ports  
in the Republic of Indonesia**

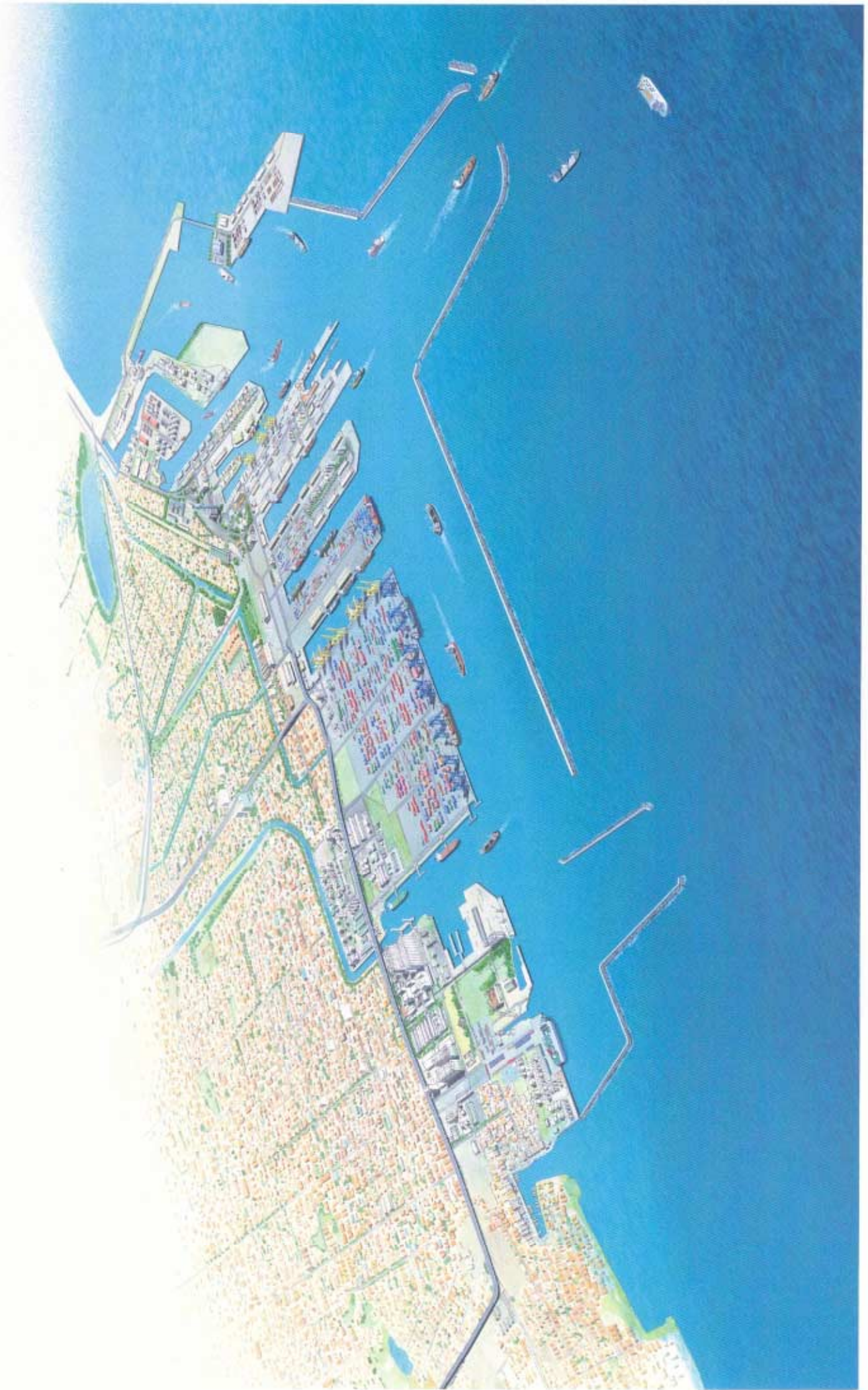
**Main Report Volume-2  
Development Potential and Strategy**

**December 2003**



Tanjung Priok Port (2025)





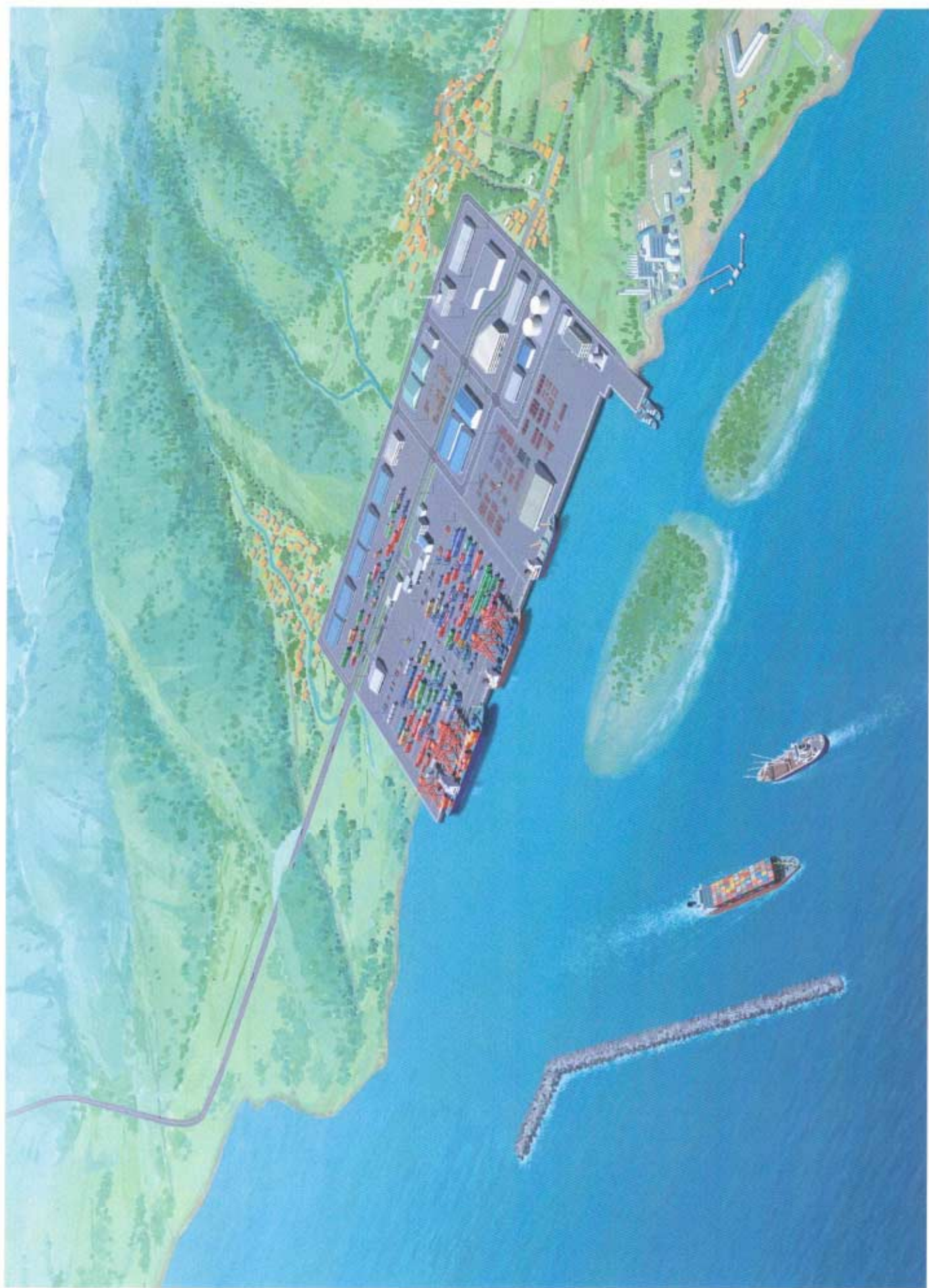
Tanjung Priok Port (2012)





Bojongegara Port (2025)





Bojonegara Port (2012)

## **PREFACE**

In response to a request from the Government of the Republic of Indonesia (hereinafter referred to as “GOI” ), the Government of Japan decided to conduct a Study for the Greater Jakarta Metropolitan Ports in the Republic of Indonesia and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team to Indonesia four times between March 2002 and October 2003, which was headed by Mr. Hidehiko Kuroda of the Oversea Coastal Area Development Institute of Japan (OCDI) and was comprised of OCDI and Pacific Consultants International, Ltd (PCI).

The team held discussions with the officials concerned of the GOI and conducted the field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

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

Finally, I wish to express my sincere appreciation to the officials concerned of GOI for their close cooperation extended to the team.

November 2003

Kazuhisa Matsuoka

Vice President

Japan International Cooperation Agency



## LETTER OF TRANSMITTAL

November 2003

Mr. Kazuhisa Matsuoka  
Vice President  
Japan International Cooperation Agency

Dear Mr. Matsuoka:

It is my great pleasure to submit herewith the Final Report of "The Study for Development of the Greater Jakarta Metropolitan Ports in the Republic of Indonesia".

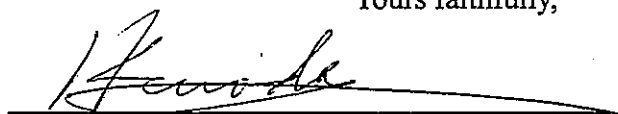
The study team comprised of the Overseas Coastal Area Development Institute of Japan (OCDI) and Pacific Consultants International (PCI) conducted surveys in the Republic of Indonesia over the period between March 2002 and October 2003 according to the contract with the Japan International Cooperation Agency (JICA).

The study team compiled this report, which proposes the future development scenario for the Greater Jakarta Metropolitan ports and Master Plans and Short-term Plan of Tanjung Priok Port and Bojonegara new port up to 2025 and 2012 respectively, together with the feasibility study on urgent project for both ports, through close consultations with officials of the Ministry of Communications of the Indonesian Government and other authorities concerned.

On behalf of the study team, I would like to express my heartfelt appreciation to the Ministry of Communications and other authorities concerned for their cooperation, assistance, and heartfelt hospitality extended to the study team.

I am also greatly grateful to the Japan International Cooperation Agency, the Ministry of Foreign Affairs, the Ministry of Land, Infrastructure, and Transport, and the Embassy of Japan in Indonesia for valuable suggestions and assistance during the course of the study.

Yours faithfully,



Hidehiko KURODA  
Team Leader

The Study for Development of the Greater Jakarta  
Metropolitan Ports in the Republic of Indonesia

## LIST OF ABBREVIATIONS

A	ADPEL	Port Administrator Office
	AFTA	ASEAN Free Trade Area
	AMDAL	Environmental Impact Assessment
	ADB	Asian Development Bank
	ASEAN	Association of South East Asian Nations
B	BAPEDAL	Environmental Impact Management Agency
	BAPEDALDA	Brunch Office of BAPEDAL
	BAPPEDA	Provincial Development and Planning Board
	BAPPENAS	National Development Planning Agency
	BCH	Box/Crane/Hour
	B/C	Benefit/Cost
	BKPM	Investment Coordination Board
	BOD	Biological Oxygen Demand
	BOR	Berth Occupancy Ratio
	BOT	Build-Operate-Transfer
	BPS	Central Bureau of Statistics
	BPPN	International Bank of Reconstruction and Development
	BT	Berthing Time
	BUMN	State Owned Company
C	CFS	Container Freight Station
	COD	Chemical Oxygen Demand
D	DGLC	Directorate General of Land Communication
	DGH	Directorate General of Highways
	DGSC	Directorate General of Sea Communication
	DO	Dissolved Oxygen
	DTV	Daily Traffic Volume
E	EDI	Electric Data Interchange
	EIA	Environmental Impact Assessment
	EIRR	Economic Internal Rate of Return
	ET	Effective Time (at Berth)
F	FCL	Full Container Load
	FTA	Free Trade Area
	FIRR	Financial Internal Rate of Return
	FDI	Foreign Direct Investment
G	GBHN	Broad Outlines of the Nation's Direction
	GDP	Gross Domestic Product
	GOI	Government of Indonesia
	GOJ	Government of Japan
	GRDP	Gross Regional Domestic Product
	GT	Gross Tonnage



## H

I	IAPH	International Association of Ports and Harbors
	IBRD	International Bank of Reconstruction and Development
	IDB	Islamic Development Bank
	IEE	Initial Environmental Examination
	IMF	International Monetary Fund
	IMTN	Indonesia Medium Term Notes
	INSA	Indonesian National Ship Owner Association
	IPC	Indonesia Port Corporation

J	Jabotabek	Jakarta, Bogor, Tangerang and Bekasi area
	JBIC	Japan Bank for International Cooperation
	JICA	Japanese International Cooperation Agency
	JICT	Jakarta International Container terminal
	JKT	Jakarta
	JO	Joint Operation
	JORR	Jakarta Outer Ring Road
	JV	Joint Venture

K	KANPEL	Port Administration Office (Non-commercial Port)
	KANWIL	Provincial Office of a Central Ministry
	Keppres	Presidential Decree
	Kimpraswil	Ministry of Settlements and Regional Development
	KM	Ministerial Decree
	KSO	Kerjasama Operasi (Joint Operation)

L	LCL	Less than Container Load
---	-----	--------------------------

M	MENEG LH	State Ministry for Environment
	MOC	Ministry of Communication
	MOF	Ministry of Finance
	MOSOE (MOSOC)	Ministry of State-Owned Enterprises (Companies)
	M(O)SRD	Ministry of Settlements and Regional Development

N	NGOs	Non Government Organizations
	NPS	National Port System
	NPV	Net Present Value

O	OD	Origin and Destination
	ODA	Official Development Assistance

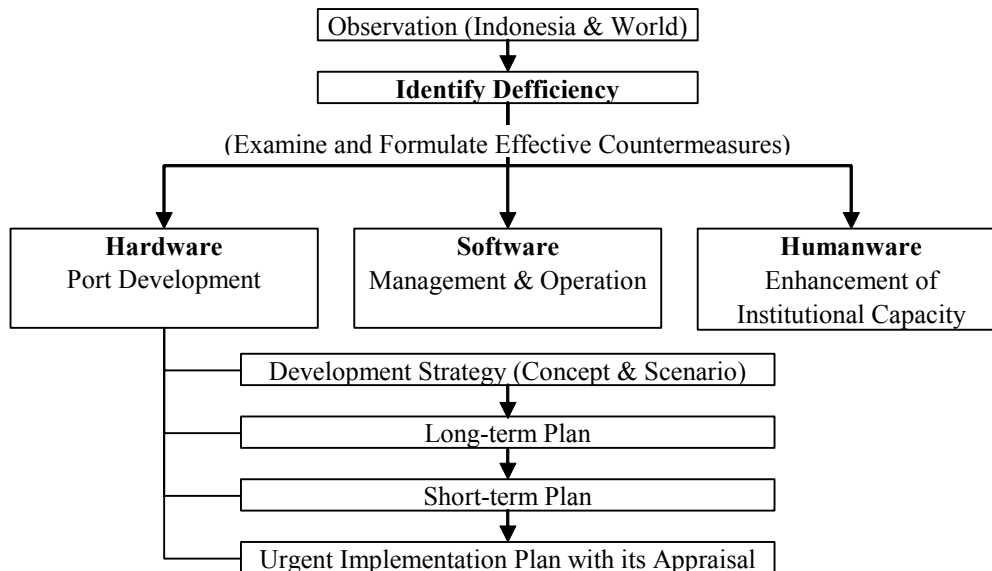
P	PCC	Pure Car Carrier
	PCU	Passenger Car Unit
	PELINDO	Indonesia Port Corporation
	PELNI	Indonesian National Shipping Company
	PERSERO	State-Owned Company

	PERUM ASDP	State-Owned Inland Waterways & Ferry Company
	pH	Hydrogen ion concentration
	PIANC	Permanent International Association of Navigation Congress
	PJP	The Second Long Term Development Plan
	PM10	Particular matter less than 10 $\mu$ m
	PP	Government Regulation
	PPKB	Permintaan Pelayanan Kapal dan Barang (The Demands of Ship and Good Services)
	PPSA	One Roof Port Service Center
	PROPENAS	National Development Policy
	PRT	Port Related Traffic
	PSA	PSA Company (changed from Port of Singapore Authority)
	PSP	Private Sector Participation
	PT.	Limited Company
	PT.RUKINDO	Indonesia Dredging State Limited Company
R	REPELITA	National Five-year Development Plan
	REPELITADA	Local Five-year Development Plan
	RKL	Environmental Management Plan
	Rp.	Rupiah
	RPL	Environmental Monitoring Plan
	RTRW	Spatial Use Plan
	RTG	Rubber Tire mounted Gantry
S	SIMOPPEL	Port Operation Management Information System
	SOLAS	International Convention on Safety of Life at Sea
	SOR	Shed Occupancy Ratio
	SPM	Suspended Particle Matter
	SS	Suspended Solid
T	TEU	Twenty Foot Equivalent Unit
	THC	Terminal Handling Charge
	TGH	Ton/Gang/Hour
	TOR	Term of Reference
	TTV	Through Traffic Volume
U	UNCTAD	United Nations Conference on Trade and Development
	UU	Law
W	WB	World Bank
Y	YDT	Yard Dwelling Time
	YOR	Yard Occupancy Ratio



## **Executive Summary -Conclusion and Recommendation-**

1. The study for “Development of Greater Jakarta Metropolitan Ports”, was implemented following the procedure hereunder:



2. Conclusions and recommendations of the study are given below.

### **A. Identified Deficiencies**

3. Tanjung Priok port now functions as the largest trading port in the Western Java area. However, its physical figure is almost the same as it was in the Dutch colonial era and the port productivity has been gradually deteriorated compared to major ASEAN ports. This will let the port's function paralyzed in near future, and which will surely depress the investment climate especially for foreign investors. As a result, global companies will likely withdraw from this area and Indonesian products will lose competitiveness in the international market, especially in the ASEAN market.

4. The critical issue now facing the existing Tanjung Priok port are as follows, which are summarized in “being unable to meet the port users’ needs”:

- Lack of speedy and credible cargo transit through the port
- Lack of safe and secure cargo handling
- Lack of available port facilities and space to accommodate the cargo demand
- Lack of fair and transparent dues and charge

5. The study team identified the causes of this unfavorable situation as follows:

- Limited capacities on ship navigation, land space and inland transport
- Low efficiency/productivity of cargo handling due to capacity constraints and disorderly land use

- Institutional defectiveness in trade facilitation such as inefficient customs clearance, inefficient and inflexible terminal operating system, ineffective EDI system etc.
6. The study team strongly proposes DGSC and IPC-II to duly and continuously follow up and monitor these problems through the collection and observation of accurate data and information.

## **B. Hardware –Development of the Ports–**

7. The study team examined cargo trends and the development potential of the ports, set the port development goal and strategy for ports in the Western Java area and formulated the master plan and the short-term development plan both for Tanjung Priok and Bojonegara. In addition, the study team selected the priority projects for urgent implementation and assessed the viability of the projects both for Tanjung Priok and Bojonegara.

### **B-1 Development Strategy**

#### ***Development Targets of Jakarta Metropolitan Ports***

- To make the Greater Jakarta Metropolitan port function as a “**Logistic Center**” in **ASEAN regions** in order to maintain and enhance the competitiveness of Indonesian industry in the region by providing an attractive business /investment environment.
- To make the Greater Jakarta Metropolitan port function as a **Regional Hub Port**” not only attracting international trunk lines but also linking them to domestic/inter-island lines

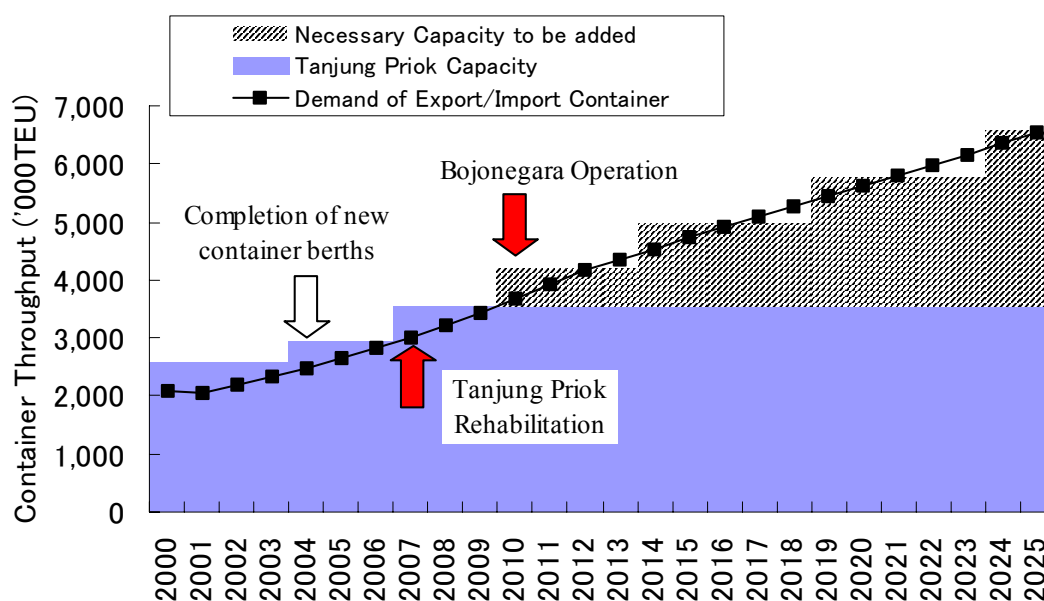
#### ***Development Focus***

8. In order to achieve the above development targets, the following points should be focused on:
- Best use of the existing facilities
  - User friendliness of port facilities
  - Strategic port development and management
  - Environmental friendliness

#### ***Development Scenario***

9. The proposed development scenario is as follow:
- To increase the port capacity of Tanjung Priok by its urgent rehabilitation up to 2008 with maximum use of the existing port facilities, which will increase the international container handling capacity of the port up to 3.6~3.8 million TEUs against the current capacity of around 3 million TEUs
  - To develop a new container handling port in Bojonegara by 2010 as a twin port of Tanjung Priok, considering the following points:
    - Spatial constraints for new development in the existing Tanjung Priok port and huge cost for new development outside Tanjung Priok port
    - Avoiding intensive concentration of cargo traffic especially large container trailers on the roads of the metropolitan area.





Demand and Capacity (International Container)

**Functional Allotment**

10. Basic functions of Tanjung Priok port and Bojonegara new port are set as follows, based on the development target and their potentials:

- Tanjung Priok
  - Principal international gate-way port supporting industrial development in Western Java area
- Bojonegara
  - Complementary gate-way port of Tanjung Priok
  - Basic and strategic logistic infrastructure for regional development of Banten

11. Functional allotment among the Ports in the Western Java Area is summarized as follows:

**Summary of Functional Allotment among the Ports in the Western Java Area**

	Tanjung Priok	Bojonegara	Ciwandan	Merakmas	Merak	Cirebon
Export/Import Container	+++	+++	+	+	-	+
Domestic Container	+++	+	-	-	-	-
Transshipment Container	++	++	-	-	-	-
Conventional Cargo	+++	+++	+++	+	-	+++
Passenger	+++	-	-	-	+++	-
Ro-Ro Cargo	++	++	-	-	+++	-
Car Cargo	+++	+	-	-	-	-

+++ indicates principal ports

++ indicates ports which may become principal ports in future

+: indicates ports which may handle a small portion of cargo in future

-: indicates that cargo will not be handled

**B-2 Master Plan and Short Term Development Plan*****Development Concepts***

12. Recognizing the strength and the weakness of each port, the study team sets the following development targets and project concepts.

	<b><i>Development Concepts</i></b>	<b><i>Project Concepts</i></b>
<b><i>Tanjung Priok</i></b>	<ul style="list-style-type: none"> <li>✓ To increase the port capacity/productivity</li> <li>✓ To ensure safety and security of the port</li> <li>✓ To meet the port users' needs and to provide appropriate services</li> <li>✓ To consider environment-friendly development</li> </ul>	<ul style="list-style-type: none"> <li>✓ Navigational Condition Improvement (in terms of Capacity &amp; Safety)</li> <li>✓ Automobile Terminal Development</li> <li>✓ Re-organizing Land-use of the Existing Port</li> <li>✓ Development of new port area to accommodate functional relocation from the existing port as well as future demand</li> <li>✓ Road Improvement/development in/around the port</li> <li>✓ Ecological Area Development</li> </ul>
<b><i>Bojonegara</i></b>	<ul style="list-style-type: none"> <li>✓ To establish high grade, world standard international container terminal</li> <li>✓ To attract cargo by providing competitive services</li> <li>✓ To consider environment-friendly development</li> </ul>	<ul style="list-style-type: none"> <li>✓ Development of new Container Terminal with Related Port Facilities</li> <li>✓ To provide good access to/from the port</li> <li>✓ To enhance regional industrial development and ensure sufficient coordination with new port development</li> <li>✓ To minimize the impact of port development on the surrounding environment</li> </ul>

***Project Components***

13. The following project components are recommended to be implemented toward 2025, while projects indicated by bold type are proposed to be developed in the short-term toward 2012.

**Long-term Plan (toward 2025)**

- Breakwater
- Demolition
- Channel, Basin Dredging
- Car terminal
- Passenger terminal
- Multi Purpose Terminal
- Green Buffer Zone
- Port Related Zone
- Re-development / Reclamation (Port Side)
- Re-development (Urban Side)
- No colored area basically remains the present function
- Ancol Reclamation Project Area (Original)
- Port Related Road
- Access Road Improvement (Urban Side)



410,000

410,000

410,000

410,000

410,000

410,000

410,000

# Long-term Plan (toward 2025)

- Container Terminal
- Multi purpose terminal (GC, CT etc.)
- Ro-Ro terminal or Multi Purpose Terminal
- Government zone
- Port related zone
- GC cargo Handled zone
- Special Wharf
- Channel, Basin Dredging
- Breakwater
- Road
- Railway





**Tanjung Priok**

<b>Project Concepts</b>	<b>Contents</b>	<b>Remarks</b>
Navigational condition improvement (to increase the capacity together with maintaining navigational safety)	- Widening main channel (300m) & turning basin	Short-term
	- Widening the channel & basin to the Nusantara area together with military relocation	Short-term
	- Opening the east channel to accommodate larger vessels	
Automobile terminal development (1 berth in the short term, 2 berth in the long term)		Short-term
Re-organizing land-use of the existing port		
Streamlined cargo handling zone	- Inter-island container handling (Pier III reorganization and MTI expansion)	Short-term
	- Bulk cargo handling (CPO, sand, cement etc.)	Short-term
	- Passenger terminal relocation	Short-term
	- Pertamina berths relocation together with consolidation of international container terminal	
Providing suitable and sufficient space for better port management	- Yard Development	Short-term
	- Reclamation of a part of Nusantara basin	Short-term
	- Consolidation of ship building yard	
	- Relocation of military base	Short-term
Land-use re-development in the urban area adjacent to the port	- Re-development around the Tanjung Priok railway station	Short-term (Urban side)
	- Re-development of the residential area to the south of JICT container terminal	Short-term (Urban side)
Development of new port area		
Ancol Development	- New Passenger Terminal	Short-term
	- Multi Purpose Terminal	Short-term
	- Access road	Short-term
Kalibaru Off-shore Development	- Consolidation of ship building yard	
	- Development of special cargo handling zone	
	- Access road	
	- Development of Kalibaru new port	
Environmental Improvement	- Improvement of water change through the port entrance by re-alignment of breakwater	Short-term
	- Ecological waterfront development with mangrove planting	
	- Development of amenity facilities such as observation tower	
Road development /improvement in/around the existing port	- Port Inner Road Improvement	Short-term
	- Eastern Port Access Highway to link with JORR	Short-term (Road sector)
	- Improvement of the existing urban road including western port access road and access road to/from JIUT	Short-term (Road sector)

**Bojonegara**

Project Concepts	Contents	Remarks
Basic Infrastructure Development	- Breakwater, channel, basin and necessary port service facilities	Short-term
Development of new Container Terminal (2 berths (600m) in the short term, 8 berths (2,400m) in the long term)		Short-term
Unitized and other cargo handling facilities development	- Multi purpose terminal	Short-term
	- General cargo berth	
	- Ro-Ro terminal	Short-term
	- Special cargo handling	
To provide good access to/from the port	- High-standard access road connecting the existing Jakarta-Merak toll road	Short-term (Road sector)
	- Railway service connected with an inland container distribution center/terminal	
	(In addition to the above access road, JORR (Jakarta Outer Ring Road) is indispensable for the new port operation.)	

**B-3 Urgent Plan**

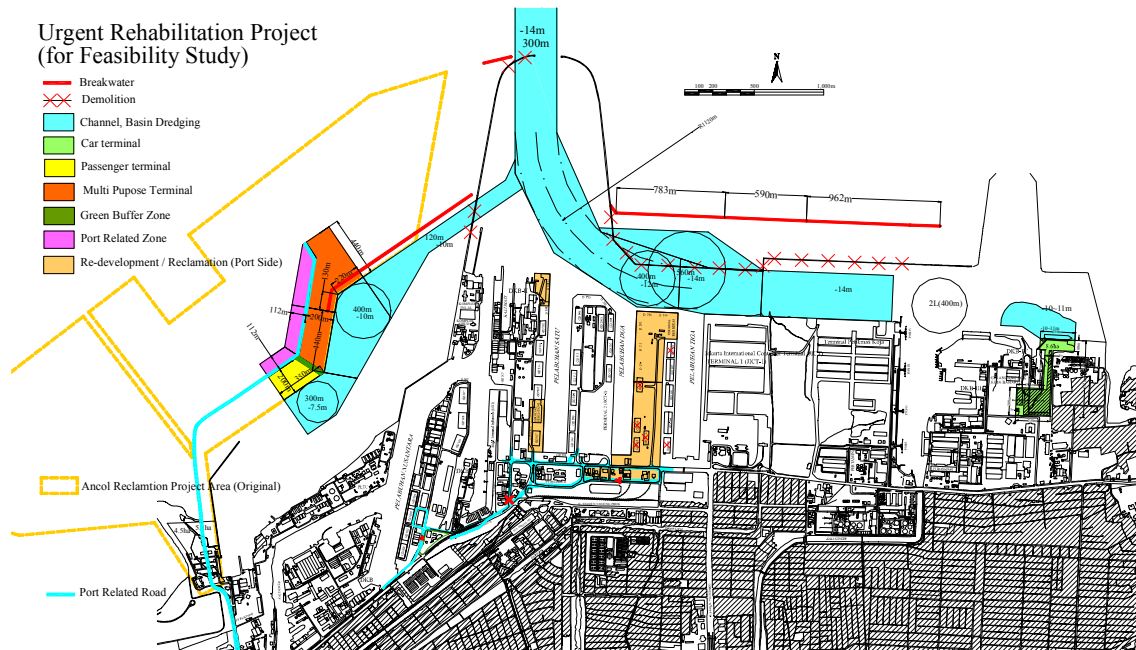
14. Among the projects in the master plan and the short-term development plan, the following projects are proposed to be implemented urgently. The study team assessed viability of the projects from economic, financial and environmental view points.

**Urgent Rehabilitation Plan of Tanjung Priok**

- Widening the Main Channel and expanding turning basin (should be partly realized by 2006)
- Automobile Terminal Development (should be realized by 2006)
- Inter-island Container Handling Improvement in Pier-III (Step by step redevelopment together with Ancol development; should be partly realized by 2008)
- Ancol Development including New Passenger Terminal, Multi Purpose Terminal and Access Road (Initial development should be realized by 2010)
- Port Inner Road Improvement (should be realized by 2006)
- Eastern Port Access Highway Development Linking with JORR - This project is urgent but should be implemented by Kimpraswil because road itself is outside of the port and will be a part of the urban road network.)

**(Feasibility)**

- Economic evaluation: EIRR (Port project, excluding Ancol) = 33.0%  
EIRR (Port project, including Ancol) = 18.2%  
EIRR (Access road project) = 25.1%
- Financial evaluation: FIRR (Public sector, excluding Ancol)= 10.7%  
FIRR (Public sector, including Ancol) = 4.3%  
FIRR (Automobile terminal operator) = 16.0%
- Not serious impacts on environment, however, it is desirable to be implemented in accordance with a proper environmental management plan and a monitoring plan.

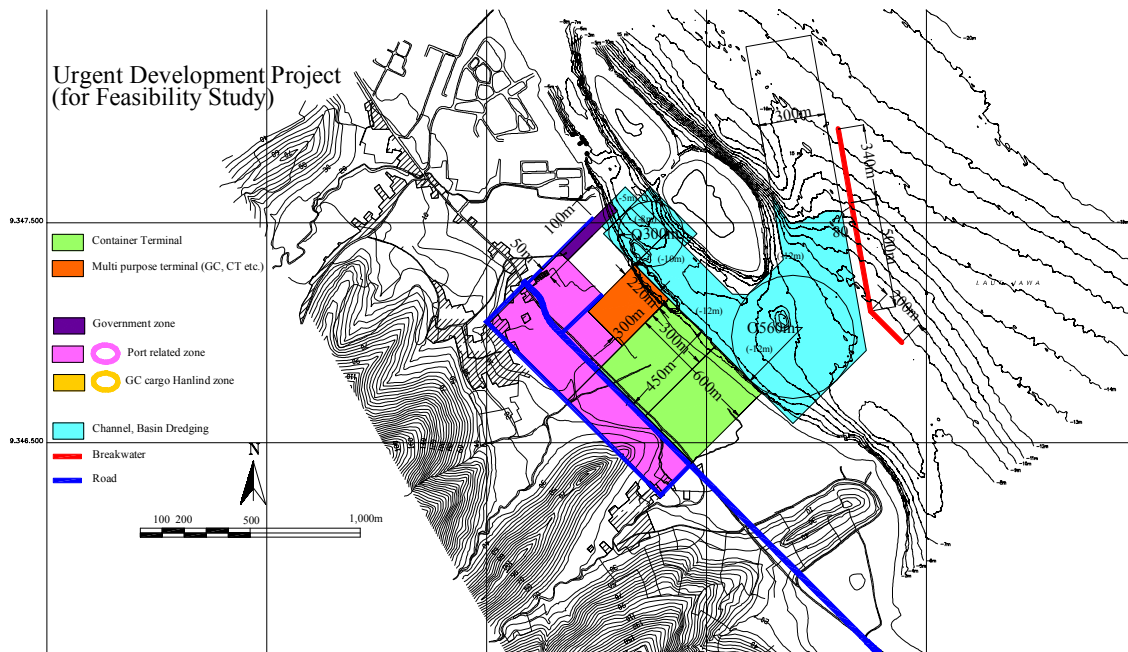


### Bojonegara

- Container Terminal Development (should be completed by 2010)
- Multi Purpose Terminal Development (should be completed by 2008)
- Breakwater, Channel and Basin Development (should be developed together with terminal development; breakwater will be necessary for container terminal operation.)
- Port Access Road Development, implemented by Kimpraswil as a national road status (should be developed by 2008 when multi purpose terminal will be into operation.)

### (Feasibility)

- Economic evaluation: EIRR=17.9%
- Financial evaluation: FIRR (Public sector)= 6.0%  
FIRR (Container terminal operator)= 18.7%
- Not serious impacts on environment, however, it is desirable to be implemented in accordance with a proper environmental management plan and a monitoring plan.



#### **B-4 Recommendations**

15. Based on the above results and conclusions, the study team recommends that the following matters be followed up by DGSC and IPC-II.

***To implement the proposed urgent project at the earliest possible time***

16. DGSC and IPC-II should make their best efforts to implement and realize the proposed urgent projects for Tanjung Priok rehabilitation as well as for Bojonegara new port development by the combination of soft loan and private fund.

***To improve the port access road condition***

17. Road sector, i.e. Kimpraswil and/or Jasa Marga should improve the condition of port access roads in good cooperation with port sector, i.e. DGSC and IPC-II. JORR completion is also indispensable for Bojonegara development because the port hinterland will be dependent on the toll road network including JORR.

***To formalize master plans as well as land-use plans by government regulation***

18. DGSC and IPC-II should follow up the study results and stipulate master plans as well as land-use plans of the Jakarta Metropolitan port by government regulation at the earliest possible time to avoid disorderly development of the port and hinterland.

***To take prompt actions for re-organizing the existing port area***

19. DGSC and IPC-II should take a prompt action for re-organizing the existing port area, especially on the following matters:

- Military relocation
- Keeping inactivated and/or unutilized land in the port area under the port administration control to prevent disorderly and unchecked development



*To follow up environmental matters*

20. DGSC and IPC-II should duly consider environmental affairs in carrying out port activities and/or new development. In particular, the following issues should be addressed:

- Countermeasures to deal with drainage and waste material from the city to the port
- Improvement of water quality in/around the port by relocation of breakwater making use of ecological waterfront such as mangrove plantation etc.

**C. Software –Management and Operation of the Ports–**

21. For better management and operation of the port, the following measures should be taken by DGSC in collaboration with IPC-II:

**C-1 Status of Jakarta Metropolitan Port**

22. Tanjung Priok and Bojonegara, important infrastructure supporting industrial activities in Western Java area, should be given the status of International Hub Port, and should be properly managed as twin ports of Jakarta Metropolitan port.

**C-2 Terminal Operation***To establish an appropriate operation scheme for the automobile terminal*

23. A full fledged loading/unloading operation of automobile products requires special skills. Therefore, IPC-II should establish an appropriate operation scheme for the automobile terminal immediately. The study team recommends the following:

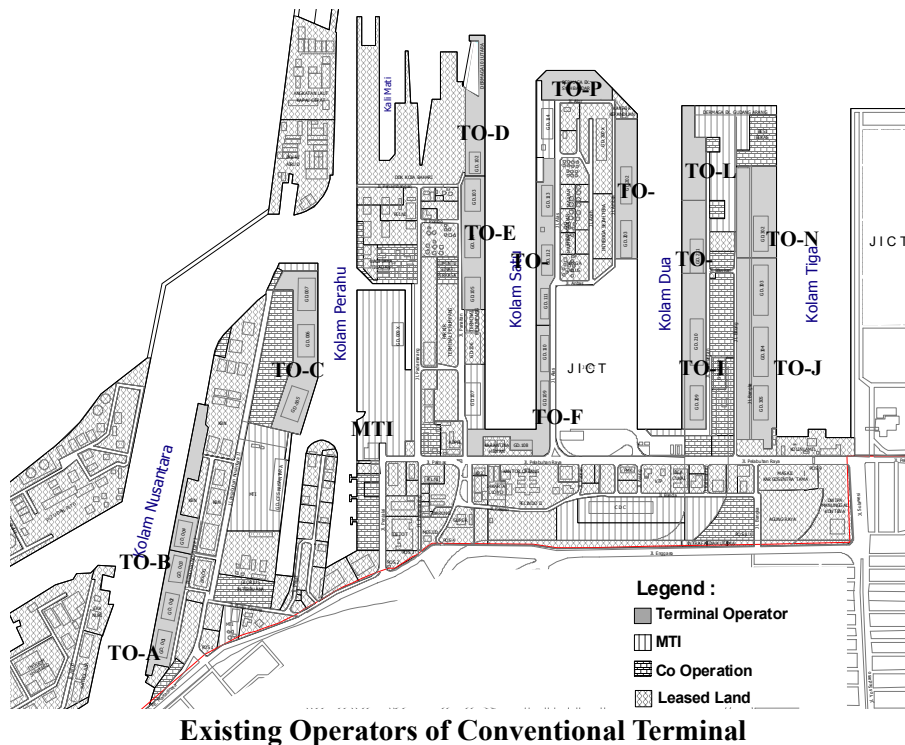
- Terminal operation itself should be left to the expertise of automobile transport/handling companies
- Reasonable handling tariff should be set after examining the examples of other terminal as well as taking the port users' opinions into consideration (Based on the financial analysis, the study team proposes around US\$13/unit.)
- The terminal should be operated under common use principle for various automotive manufacturing companies

*To improve operational performance of terminals*

- To monitor operational performance of terminals properly through the following actions:
  - Clearer performance indicators should be introduced to supervise the performance of operators
  - Performance target should be incorporated in the concession agreement or management agreement
- Consolidation of the operators of conventional terminal considering the following points: (From the theoretical point of view, excessive numbers of operator decreases the scale merit in terms of number of available berths for common carriers and this situation causes unnecessary waiting for carriers.)
  - The existing operators of conventional terminal should be grouped into smaller numbers to operate reasonable number of berths jointly to pursue the scale merit.

It is suitable that 5 to 10 berths are available for each terminal operator centering on terminal operators and/or stevedoring with good performance.

- Selection of terminal operators should be carried out by open-tender.
- To reduce berthing time by changing berthing fee system from day charge to time charge
- To establish an effective land traffic management system in/around the port as well as improvement of roads in/around the port.
- To reduce direct delivery ratio to/from the ports with appropriate regulations. To promote the use of yard/transit shed with some incentive is also necessary.
- To properly maintain port facilities and equipment



***To create appropriate concession scheme for Bojonegara container terminal development***

24. In introducing the concession scheme to Bojonegara container terminal development, the following points should be taken into consideration:

- Open tender system to secure fairness and transparency should be adopted.
- Assessment of business viability from view points of both IPCII/Government and concessionaire through risk analysis and identifying proper risk sharing scheme between IPCII/Government and concessionaire should be conducted as early as possible after the feasibility study.
- Performance target should be incorporated in the concession agreement and management agreement. Corporate articles together with clear accounting system should be more clearly defined when a joint stock company is a concessionaire candidate. DGSC should play a role of regulator.

**C-3 Port Management*****To provide reasonable and competitive tariff/charge and maintain transparency of price setting***

- Leadership of DGSC should re-examine the existing tariff/charge system comparing with other cases in neighboring ports.
- Based on the above examination, DGSC should formulate the revised concept/system of tariff and port charge and open it to the public.
- IPC-II should show the maximum level of tariff/charge and give terminal operators and/or stevedoring companies a free hand to set actual tariff/charge within the maximum.

(Based on the financial analysis, handling charge at the container terminal in Bojonegara could be reduced to 60~70% of its current level. The team also proposes a rate of about US\$13/unit for the automobile terminal in Tanjung Priok.)

***To achieve efficient customs clearance***

- Three customs offices in the port area should be integrated into one customs office together in order to achieve a single window procedure

***To improve EDI system***

**25.** EDI system expedites documentation procedures in ports including customs clearance. EDI system has already been established in Tanjung Priok, however, it is not fully utilized and optimized yet. The study team recommends the following actions:

- To integrate the existing EDI system with close coordination and cooperation of customs office
- IPC-II should utilize an EDI service provider as a means of getting information on port activities to analyze berth performance

***To enhance port security***

- To set up a security committee composed of related organizations in order to prevent such incident as pilferage in the port. The committee will meet regularly to discuss problems reported from related offices as well as port users, measures and recommendations to improve the situation.
- To introduce sufficient hardware for port security such as fence and ITV which can be monitored from a central office, together with a constant surveillance system in actual site.

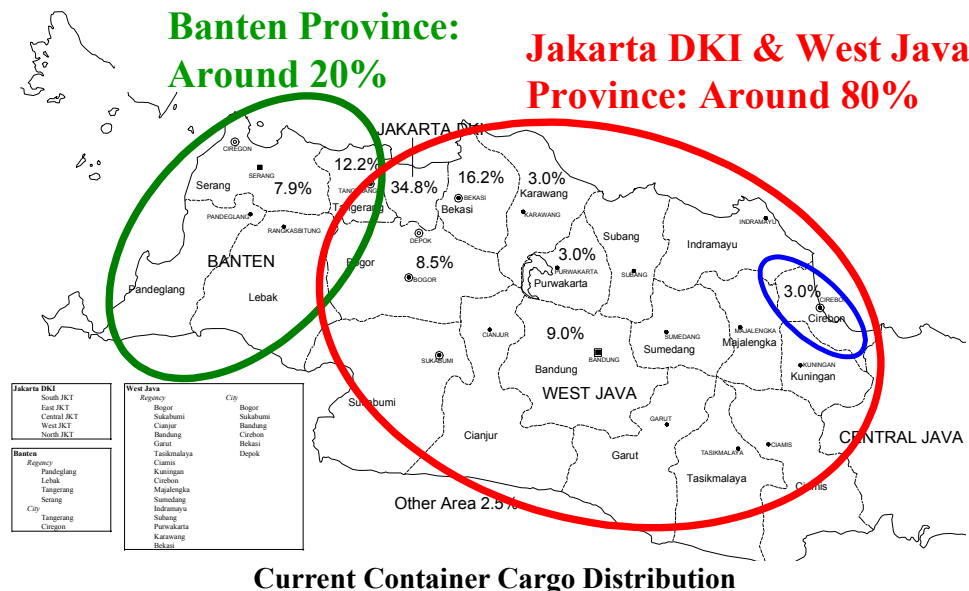
***To control land-use of the port area***

- Keeping inactivated and/or unutilized land in the port area under the port administration control to prevent disorderly and unchecked development

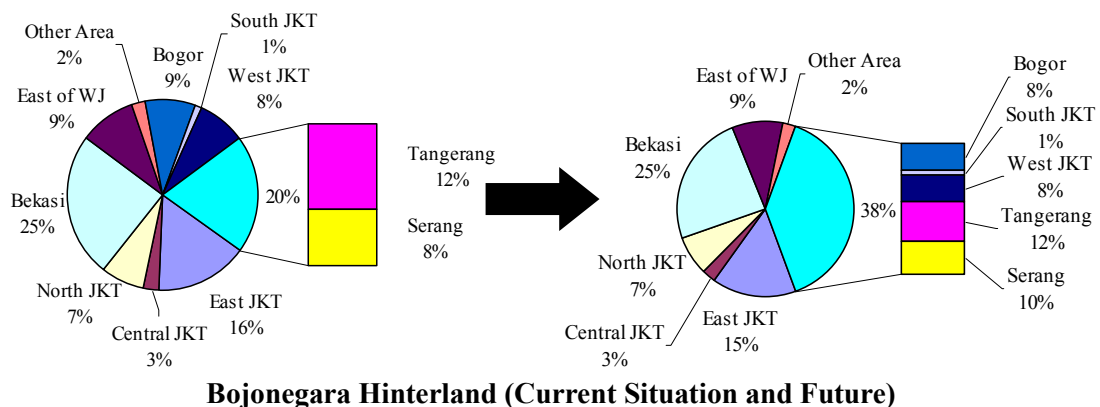
***To activate promotion of the port***

- IPC-II should hold meetings with related parties such as shipping companies, shippers and consignees to exchange necessary information and viewpoints, to obtain precise information on the shipping market, and to grasp the needs of users.
- To clarify the sales points of the port and to reinforce port sales promotion activity to potential users

- To develop the hinterland and attract more cargo, especially for Bojonegara new port
- It is important to coordinate port development with regional development, especially industrial location. Special economic zone should be developed adjacent to the ports, especially for Bojonegara new port



**Current Container Cargo Distribution**



#### C-4. Finance

*To optimize soft loans to realize substantial port development of the Greater Jakarta Metropolitan ports*

26. To realize the development plans of the Greater Jakarta Metropolitan ports, IPC2 will have to prepare sufficient funds. As the financial situation of IPC-2 will have been tough for the time being, the proposed urgent projects both for Tanjung Priok port and Bojonegara new port should be implemented optimizing soft loans which have advantages of low interest as well as long grace period.



***To formulate proper financial scheme for development, operation and maintenance of the ports***

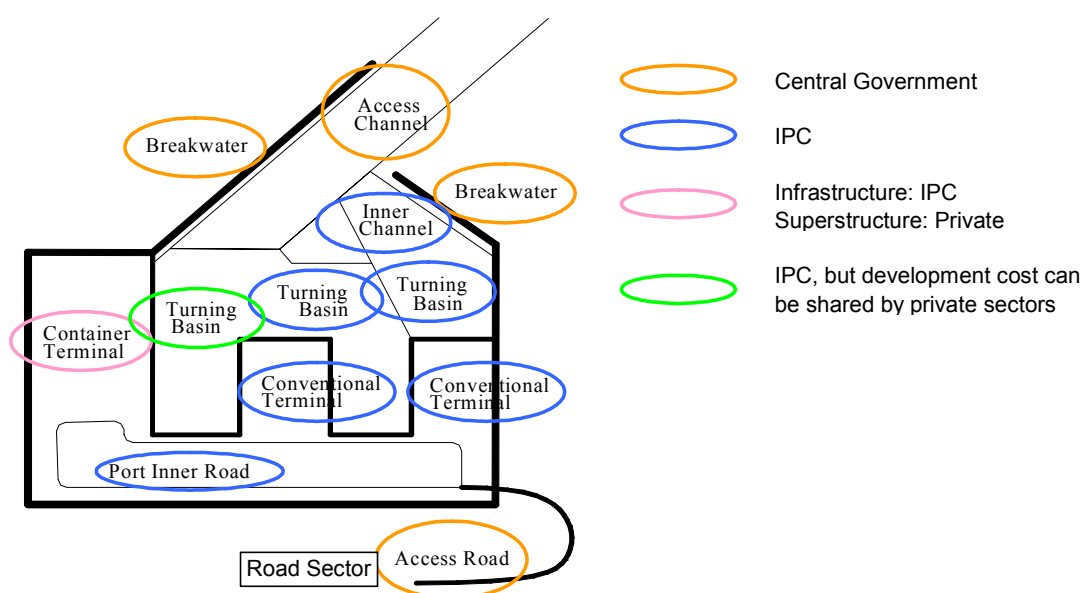
27. In order to implement port development projects smoothly, it is crucial to formulate proper financial scheme for development, operation and maintenance of the ports, and the Ministerial Decree on National Port System should be amended incorporating financial aspects of port investment and operation. The study team proposes the following framework for the proposed projects of Tanjung Priok and Bojongegara:

	Development	Management/ Operation	Remarks
Breakwater, Access Channel	CG	CG / IPC-2*1	
Inner Channel and Basin	IPC-2	IPC-2	
Terminal (Profitable)			Container terminal etc.
Infrastructure	IPC-2 / CG*2	Private	Quay wall, front basin etc.
Superstructure	Private		Handling equipment, pavement etc.
Terminal (Less profitable)	IPC-2 / CG*2	Private / IPC-2	Conventional terminal etc.
Port Inner Road	IPC-2	IPC-2	
Access Road	Road Sector*3	Road Sector*3	

\*1 : When an integrated management by IPC-2 needed

\*2 : In case that project risk will be considered to be high, it should be examined whether the CG will bear the cost.

\*3 : CG or Local Government



28. It is also essential that the financial burden of IPC-2 should be lowered to keep good port management and operation, and in this connection, private funds should be utilized properly and effectively. In case that beneficiaries by the port development are able to be specified in such case as development of turning basin in front of specific terminal, they should pay for a part of the project cost in accordance with the extent of their benefit. And when the project risk is considered to be relatively low, e.g. in case of expanding container terminal, there will be a possibility to introduce complete BOT scheme for infrastructure development. For access road development, local government as well as related public sector should be involved.

**D. Humanware –Enhancement of Institutional Capacity–****D-1 Establishment of effective training system**

- To provide good training system for port workers/gangs
- To activate port related organization by introducing such system as Quality Control (QC) circle
- To enhance the function of the Port Training Center (PTC)

**D-2 Setting up the information unit together with the development of effective database system**

- To develop appropriate statistical system and to establish the integrated database system
- To enhance the capability of planning as well as port performance evaluation utilizing the above database system

29. To achieve afore-mentioned improvements of soft-ware issues, it is recommended that “Administrative & Management Skill Enhancement Program” should be implemented by DGSC and IPC2 with the support of external experts. The said program can provide various tools that are necessary to resolve the wide-ranging problems.

30. DGSC and IPCs should commence the following actions with the assistance of the proposed Administrative & Management (A & M) Skill Enhancement program.

- To modify port statistics system
- To conduct training for the enhancement of the capability of assessing/evaluating performance of the private sector
- To modify the institutional framework for responding “Decentralization” and “Privatization”

31. Major activities of the program are as follows:

- Establishment of “Port Affairs Information Unit (provisional name)”
- Recipient of external expert team for technology transfer
- Inspection/examination of detailed administrative system
- Training of staff of the Port Affairs Information Unit
- Establishment of the “Port Affairs Information System (provisional name)”
- Provision of guidelines regarding port administrative procedures
- Formulation of training program

32. Outcome of the program are as follows

- Establishment of a new organization that is able to control and analyze all port affairs information,
- Establishment of a new information system that enables comprehensive evaluation of port activities due to its standardized format and integrated contents
- Fostering of administrative officials who have the skill to evaluate/asses basic

data/information

- Establishment of a technology transfer scheme from the central government (a new unit) into IPCs, local governments, etc.

## Main Report

### Volume-II: Development Potential & Strategy

## Contents

<b>CHAPTER-7. TRENDS AND PROSPECTS OF PORT DEMAND .....</b>	<b>1</b>
7-A. SOCIO-ECONOMIC FRAMEWORK .....	1
7-A-1 Population .....	1
7-A-2 GDP (Gross Domestic Product) .....	2
7-B. FORECAST OF CARGO DEMAND BY PACKING TYPE.....	5
7-B-1 Historical Trend of Cargo Tonnage by Packing Type.....	5
7-B-2 Influence of Economic Crisis and Discontinuity of Historical Trend of Cargo Tonnage .....	11
7-B-3 Container Cargoes.....	13
7-B-4 Forecast of Other Cargo Demand.....	21
7-C. FORECAST OF CARGO DEMAND BY COMMODITIES IN TANJUNG PRIOK.....	25
7-C-1 Rice .....	27
7-C-2 Wheat .....	29
7-C-3 Other Grain and Powder.....	30
7-C-4 Crude Palm Oil (CPO).....	32
7-C-5 Cement.....	33
7-C-6 Gasoline and Other Fuel.....	35
7-C-7 Steel and Steel Product.....	36
7-C-8 Exported/Imported Cars .....	37
7-C-9 Passenger.....	40
7-C-10 Ro/Ro Traffic .....	41
7-C-11 Summary.....	43
7-D. POTENTIAL DEMAND FOR CONTAINER TRANSSHIPMENT (INTERNATIONAL – INTER-ISLAND) .....	44
7-D-1 Trend of International Container Transshipment .....	44
7-D-2 Domestic Inter-Island Transshipment .....	46
7-D-3 Total Volume of Domestic Inter-Island Transshipment Containers .....	47
7-D-4 Integration of International/Domestic Containers.....	49
7-D-5 Some Suggestions to stimulate Potential Inter-Island Transshipment Containers.....	49
<b>CHAPTER-8. CAPACITY AND DEVELOPMENT POTENTIAL OF THE PORTS .....</b>	<b>51</b>
8-A. PORT CAPACITY.....	51
8-A-1 Off Shore Capacity (Navigational Capacity) of Tanjung Priok .....	51
8-A-2 On-shore Capacity (Quay Side & Yard Side Capacity) .....	58
8-B. LAND TRANSPORT CAPACITY.....	65
8-B-1 Tanjung Priok .....	65
8-B-2 Improvement of Railway Access to Tanjung Priok.....	78
8-B-3 Cirebon Port Access Road .....	79
8-B-4 Banten (Ciwandan & Merakmas) Access Road .....	85
8-B-5 Bojonegara Port Access Road.....	88
8-C. ENVIRONMENTAL FACTORS .....	93
8-C-1 Tanjung Priok .....	94
8-C-2 Cirebon.....	98
8-C-3 Banten/Ciwandan Port .....	99
8-C-4 Bojonegara Site (Proposed Port Project Area).....	101
8-D. NATURAL CONDITION.....	105
8-D-1 Topography.....	107



8-D-2	<i>Tide</i> .....	108
8-D-3	<i>Wave</i> .....	108
8-D-4	<i>Water Depth</i> .....	109
8-D-5	<i>Maintenance Dredging and Sedimentation</i> .....	109
8-D-6	<i>Subsoil Condition</i> .....	110
8-D-7	<i>Possibility of Land Subsidence in the Northern Part of DKI Jakarta</i> .....	111
8-E.	HINTERLAND SITUATION.....	113
8-E-1	<i>Hinterland Characteristics</i> .....	113
8-E-2	<i>Outlook for the Socio-Economic Development of the Hinterland</i> .....	115
8-E-3	<i>Accessibility to/from the Hinterland</i> .....	125
8-F.	POTENTIAL IN THE INTERNATIONAL CONTAINER NETWORK.....	129
8-G.	AVAILABLE SPACE FOR PORT EXPANSION/DEVELOPMENT .....	135
8-H.	SUMMARY - DEVELOPMENT POTENTIAL & CONSTRAINTS OF THE PORTS.....	136
<b>CHAPTER-9. PORT DEVELOPMENT STRATEGY .....</b>		<b>137</b>
9-A.	EXISTING PROBLEMS .....	137
9-A-1	<i>Inability to Accommodate the Needs of Port Users</i> .....	137
9-A-2	<i>Comparison with Other Asian Ports</i> .....	139
9-A-3	<i>Inability to Function as a Hub Port</i> .....	143
9-A-4	<i>Deteriorated Environment in/around the Port</i> .....	143
9-A-5	<i>Countermeasures for Solving Problems</i> .....	143
9-B.	DEVELOPMENT TARGETS AND FOCUSES .....	145
9-C.	BASIC PORT DEVELOPMENT SCENARIO IN WESTERN JAVA AREA .....	146
9-C-1	<i>Development Scenario Alternatives</i> .....	146
9-C-2	<i>Comparison of the Scenarios</i> .....	147
9-D.	FUNCTIONAL ALLOTMENT.....	148
9-D-1	<i>Principle of Functional Allotment of Bojonegara</i> .....	148
9-D-2	<i>International Container</i> .....	149
9-D-3	<i>Inter-island Container</i> .....	155
9-D-4	<i>Transshipment Container (Ocean-going - Inter-island)</i> .....	156
9-D-5	<i>General and Bag Cargo</i> .....	156
9-D-6	<i>Dry Bulk &amp; Liquid Bulk</i> .....	159
9-D-7	<i>Automobile Products</i> .....	159
9-D-8	<i>Passenger</i> .....	160
9-D-9	<i>Ro-Ro Cargo</i> .....	161
9-D-10	<i>Summary</i> .....	161
9-E.	PROPOSED DEVELOPMENT SCENARIO.....	161

## Table and Figure Contents

TABLE 7-A-1 HISTORICAL TREND AND PROJECTION OF INDONESIA'S POPULATION .....	1
TABLE 7-A-2 MACRO-ECONOMIC INDICATORS .....	3
TABLE 7-B-1 CARGO TONNAGE BY PACKING TYPE IN THE STUDY AREA.....	6
TABLE 7-B-2 FORECAST OF INTERNATIONAL CONTAINER THROUGHPUT, TANJUNG PRIOK .....	14
TABLE 7-B-3 HISTORICAL TREND AND FORECAST OF DOMESTIC CONTAINER, TANJUNG PRIOK.....	17
TABLE 7-B-4 SUMMARY OF DEMAND FORECAST OF DOMESTIC CONTAINER, TANJUNG .....	17
TABLE 7-B-5 THROUGHPUT COMPARISON BETWEEN MOTHER PORTS AND LOCAL PORTS .....	18
TABLE 7-B-6 CONTAINER MOVEMENT ON SELECTED LOCAL SHIPPING ROUTES (EXPANDED TO ANNUAL VOLUME/ ORIGINAL DATA JAN. - MAY 2002).....	19
TABLE 7-B-7 CONTAINER THROUGHPUTS AT LOCAL PORTS IN EASTERN REGION.....	20
TABLE 7-B-8 TOTAL CONTAINER THROUGHPUT AT TANJUNG PRIOK.....	21
TABLE 7-B-9 METHODOLOGIES APPLIED FOR FORECASTING BY PACKAGE TYPE .....	22
TABLE 7-B-10 CARGO TONNAGE BY PACKAGE TYPE.....	23
TABLE 7-C-1 COMPARISON BETWEEN OFFICIAL STATISTICS AND COMMODITY-WISE TOTAL .....	25
TABLE 7-C-2 NON-CONTAINERIZED MAJOR CARGOES.....	26
TABLE 7-C-3 METHODOLOGIES FOR FORECASTING BY MAJOR COMMODITY/TRAFFIC TYPE .....	27
TABLE 7-C-4 HISTORICAL TREND AND FORECAST, RICE .....	28
TABLE 7-C-5 HISTORICAL TREND AND FORECAST, WHEAT.....	30
TABLE 7-C-6 HISTORICAL TREND AND FORECAST, OTHER GRAIN.....	31
TABLE 7-C-7 HISTORICAL TREND AND FORECAST, CRUDE PALM OIL.....	32
TABLE 7-C-8 HISTORICAL TREND OF DOMESTIC CONSUMPTION AND FORECAST.....	34
TABLE 7-C-9 HISTORICAL TREND AND FORECAST, CEMENT/CLINKER/GYPSUM .....	35
TABLE 7-C-10 HISTORICAL TREND AND FORECAST, GASOLINE AND OTHER FUEL.....	36
TABLE 7-C-11 HISTORICAL TREND AND FORECAST, STEEL AND STEEL PRODUCT.....	37
TABLE 7-C-12 IMPORT/EXPORT VOLUME OF CBU (FINISHED CARS) BY COMPANIES .....	39
TABLE 7-C-13 ESTIMATE OF TOTAL IMPORT/EXPORT VOLUME OF CBU .....	39
TABLE 7-C-14 EXPORTED/IMPORTED CBU CARS .....	40
TABLE 7-C-15 HISTORICAL TREND AND FORECAST OF PASSENGERS, TANJUNG PRIOK .....	41
TABLE 7-C-16 HISTORICAL TREND OF Ro/Ro TRAFFIC ON THE MERAK - BAKAUHENI.....	42
TABLE 7-C-17 FORECAST, Ro/Ro TRAFFIC (OVERFLOW FROM EXISTING CAPACITY).....	43
TABLE 7-C-18 SUMMARY OF DEMAND FORECAST BY MAJOR COMMODITY/TRAFFIC TYPE.....	44
TABLE 7-D-1 TRANSSHIPMENT PORTS/HUBS AND TRANSSHIPMENT % .....	45
TABLE 7-D-2 DETAILS OF LOADING CONTAINERS AT JICT ( TERMINAL 1&2 ).....	46
TABLE 7-D-3 DETAILS OF UNLOADING CONTAINERS AT JICT ( TERMINAL 1&2 ).....	46
TABLE 7-D-4 EXPORT CONTAINER TO ALL DESTINATIONS FROM FOUR MAJOR PORTS ( 2001 )..	48
TABLE 7-D-5 CONTAINER THROUGHPUT AT TANJUNG PRIOK ( TEU ).....	48
TABLE 8-A-1 INTERVAL OF SHIP MOVEMENTS BY BERTHING PLACE.....	53
TABLE 8-A-2 NUMBER OF SEQUENTIAL MOVEMENTS IN THE SAME DIRECTION (IN/OUT) .....	54
TABLE 8-A-3 CAPACITY SETTING FOR NUMBER OF SHIP CALLS AT THE EXISTING TANJUNG PRIOK .....	58
TABLE 8-A-4 CAPACITY OF EXISTING FACILITIES .....	58
TABLE 8-A-5 CAPACITY OF FUTURE FACILITIES (WITHOUT NAVIGATIONAL CONDITION IMPROVEMENT) .....	59
TABLE 8-A-6 CAPACITY OF FUTURE FACILITIES (WITH NAVIGATIONAL CONDITION IMPROVEMENT) .....	59
TABLE 8-A-7 CAPACITY AND DEMAND (CONTAINER, TANJUNG PRIOK) .....	60
TABLE 8-A-8 QUAY SIDE CAPACITY OF EXISTING FACILITIES (WITHOUT NAVIGATIONAL CONDITION IMPROVEMENT).....	61
TABLE 8-A-9 QUAY SIDE CAPACITY OF EXISTING FACILITIES (WITH NAVIGATIONAL CONDITION IMPROVEMENT) .....	62
TABLE 8-A-10 CAPACITY AND DEMAND (CONVENTIONAL CARGO, TANJUNG PRIOK) .....	62
TABLE 8-A-11 YARD CAPACITY.....	63
TABLE 8-A-12 QUAY SIDE CAPACITY OF CIREBON .....	64
TABLE 8-A-13 QUAY SIDE CAPACITY OF CIWANDAN .....	64

TABLE 8-A-14 QUAY SIDE CAPACITY OF MERAKMAS .....	65
TABLE 8-B-1 SECTIONAL ROAD TRAFFIC VOLUME (VEH/DAY) .....	68
TABLE 8-B-2 TRAFFIC VOLUME THROUGH GATES OF TANJUNG PRIOK PORT.....	69
TABLE 8-B-3 DAILY TRAFFIC VOLUME OF PORT RELATED AND THROUGH TRAFFIC IN 2002 .....	69
TABLE 8-B-4 DIRECTIONAL CLASSIFICATION.....	70
TABLE 8-B-5 TRAILER TRUCKS DIRECTIONAL TRAFFIC VOLUME (VEH/DAY) .....	70
TABLE 8-B-6 SHARE OF TRANSPORTING CLASSIFIED CARGO BY VEHICLE TYPE .....	71
TABLE 8-B-7 CORRELATION FACTOR OF VEHICLE TYPE TO CLASSIFIED CARGO AND PASSENGERS.....	72
TABLE 8-B-8 FORECAST OF CLASSIFIED CARGO IN 2012 AND 2025.....	72
TABLE 8-B-9 FOR YEAR 2012 FORECAST OF DAILY TRAFFIC VOLUME OF VEHICLE TYPE .....	72
TABLE 8-B-10 FOR YEAR 2025 FORECAST OF DAILY TRAFFIC VOLUME OF VEHICLE TYPE.....	73
TABLE 8-B-11 SUMMARY OF FORECAST OF PORT RELATED TRAFFIC BY VEHICLE TYPE.....	73
TABLE 8-B-12 GROWTH RATE OF VEHICLE TYPE 2010 AND 2025 .....	74
TABLE 8-B-13 FORECAST OF THROUGH TRAFFIC VOLUME (VEH/DAY).....	74
TABLE 8-B-14 PCU FACTOR .....	74
TABLE 8-B-15 FORECAST OF DAILY TRAFFIC VOLUME BY PCU .....	75
TABLE 8-B-16 FORECAST OF DIRECTIONAL DAILY TRAFFIC VOLUME IN 2012 AND 2025.....	76
TABLE 8-B-17 FUTURE TRAFFIC VOLUME AND PEAK HOUR VOLUME BY DIRECTION .....	76
TABLE 8-B-18 CAPACITY FACTOR OF EXISTING ARTERIAL ROADS AROUND TANJUNG PRIOK .....	77
TABLE 8-B-19 CAPACITY OF EXISTING ROAD BY DIRECTION .....	77
TABLE 8-B-20 FORECAST OF HOURLY DIRECTIONAL TRAFFIC (PCU/HR/LANE).....	78
TABLE 8-B-21 CAPACITY CALCULATION FACTOR OF TOLL WAY .....	78
TABLE 8-B-22 THE DAILY TRAFFIC VOLUME BY TYPE OF VEHICLES.....	80
TABLE 8-B-23 TRAFFIC VOLUME OF CIREBON PORT IN 1996 AND 2001.....	81
TABLE 8-B-24 PORT RELATED TRAFFIC THROUGH CIREBON PORT IN 2001.....	81
TABLE 8-B-25 PORT RELATED TRAFFIC VOLUME AND PCU TRAFFIC VOLUME OF 2001 .....	81
TABLE 8-B-26 TOTAL DAILY TRAFFIC AROUND PORT OF 2001 .....	82
TABLE 8-B-27 CAPACITY FACTOR OF EXISTING ARTERIAL ROADS.....	83
TABLE 8-B-28 GROWTH RATE OF VEHICLE TYPE UP TO 2010 AND 2025 .....	83
TABLE 8-B-29 TRAFFIC DEMAND FORECAST THROUGH CIREBON PORT OF 2012 AND 2025 .....	84
TABLE 8-B-30 FORECAST OF TRAFFIC VOLUME THROUGH AND AROUND THE CIREBON PORT (VEH/DAY).....	84
TABLE 8-B-31 FORECAST OF DAILY TRAFFIC VOLUME BY PCU .....	84
TABLE 8-B-32 FUTURE TRAFFIC VOLUME AND PEAK HOUR VOLUME BY DIRECTION .....	85
TABLE 8-B-33 RESULT OF DAILY COUNTING TRAFFIC AROUND MERAKMAS AND CIWANDAN PORTS AREA.....	86
TABLE 8-B-34 THE CAPACITY CALCULATION OF ARTERIAL ROAD TO THE ACCESS TO THE PORTS .....	87
TABLE 8-B-35 DAILY TRAFFIC VOLUME BY PCU TO THE STUDY PORTS .....	87
TABLE 8-B-36 TRAFFIC FORECAST OF ARTERIAL ROAD TO CIWANDAN PORT.....	88
TABLE 8-B-37 TRAFFIC FORECAST OF ARTERIAL ROAD TO MERAKMAS CONTAINER TERMINAL.....	88
TABLE 8-B-38 THE DAILY TRAFFIC VOLUME BY TYPE OF VEHICLES.....	89
TABLE 8-B-39 DAILY TRAFFIC VOLUME AND PCU TRAFFIC VOLUME.....	90
TABLE 8-B-40 CAPACITY FACTOR OF EXISTING ARTERIAL ROADS .....	90
TABLE 8-B-41 GROWTH RATE OF VEHICLE TYPE 2010 AND 2025 .....	91
TABLE 8-B-42 TRAFFIC DEMAND FORECAST THROUGH CIREBON PORT OF 2012 AND 2025 .....	91
TABLE 8-B-43 FORECAST OF TRAFFIC VOLUME THROUGH AND AROUND THE BOJONEGARA PORT (VEH/DAY).....	92
TABLE 8-B-44 FORECAST OF DAILY TRAFFIC VOLUME BY PCU .....	92
TABLE 8-B-45 FUTURE TRAFFIC VOLUME AND PEAK HOUR VOLUME BY DIRECTION .....	93
TABLE 8-C-1 COMMUNITY PERCEPTION FOR POSITIVE/NEGATIVE IMPACT .....	97
TABLE 8-C-2 BRIEF DESCRIPTION OF MARINE LIFE IN BOJONEGARA SITE.....	102
TABLE 8-C-3 THE RESULTS OF INTERVIEW SURVEY.....	104
TABLE 8-D-1 PORT DEVELOPMENT POTENTIAL VIEWING FROM NATURAL CONDITIONS .....	106
TABLE 8-D-2 CHANGE OF ELEVATION OF THE EXISTING BENCHMARK AT DKI JAKARTA .....	111
TABLE 8-E-1 DISTRIBUTION OF CONTAINER CARGO VOLUME.....	113
TABLE 8-E-2 HINTERLAND POTENTIAL .....	114

TABLE 8-E-3 ECONOMIC GROWTH RATE OF EACH REGENCY/CITY IN BANTEN PROVINCE.....	116
TABLE 8-E-4 POTENTIAL ECONOMY SECTOR IN BANTEN PROVINCE.....	116
TABLE 8-E-5 LEADING SECTOR IN WEST JAVA.....	117
TABLE 8-E-6 ESTIMATED ECONOMY GROWTH RATE BY LAND USE .....	119
TABLE 8-E-7 POPULATION IN THE STUDY AREA .....	119
TABLE 8-E-8 GRDP OF DKI JAKARTA AT 1993 CONSTANT PRICE BY INDUSTRIAL ORIGIN.....	120
TABLE 8-E-9 GRDP OF WEST JAVA (INCLUDING BANTEN) AT 1993 CONSTANT PRICE BY INDUSTRIAL ORIGIN .....	121
TABLE 8-E-10 VALUE OF GROSS OUTPUT BY GROUP OF INDUSTRY (WEST JAVA PROVINCE).....	122
TABLE 8-E-11 PERMITS ISSUED FOR INDUSTRIAL ESTATES.....	123
TABLE 8-E-12 FUTURE DEVELOPMENT FOR TOLL ROAD .....	123
TABLE 8-E-13 EXISTING TRAFFIC VOLUME ON THE ACCESS ROAD FOR BOJONEGARA .....	127
TABLE 8-E-14 LOCATION AND ACCESSIBILITY OF THE PORTS.....	128
TABLE 8-F-1 REGION-WISE SERVICES FREQUENCY TO/FROM JAKARTA.....	130
TABLE 8-F-2 DIRECT SAILINGS TO SINGAPORE FROM INDONESIAN PORTS OTHER THAN JAKARTA .....	134
TABLE 8-F-3 MAIN ITEMS OF CHALLENGES FOR JAKARTA BECOMING A SECOND SINGAPORE ...	135
TABLE 8-G-1 SPATIAL AVAILABILITY FOR PORT EXPANSION/DEVELOPMENT .....	135
TABLE 8-H-1 SUMMARY OF DEVELOPMENT POTENTIAL & CONSTRAINTS OF THE PORTS IN WESTERN JAVA AREA .....	136
TABLE 9-A-1 CHANNEL CHARACTERISTICS OF MAIN JAPANESE PORTS .....	140
TABLE 9-A-2 CHANNEL CHARACTERISTICS OF MAIN ASEAN PORTS .....	140
TABLE 9-D-1 CARGO DEMAND BY PORT (CONTAINER CARGO) .....	154
TABLE 9-D-2 CARGO DEMAND BY PORT (GENERAL AND BAG CARGO).....	158
TABLE 9-D-3 PRELIMINARY COMPARISON FOR DEVELOPING AN AUTOMOBILE TERMINAL.....	160
TABLE 9-D-4 SUMMARY OF FUNCTIONAL ALLOTMENT AMONG THE PORT IN WESTERN JAVA AREA .....	161
TABLE 9-D-5 SUMMARY OF CARGO VOLUME ALLOTMENT AMONG THE PORT IN WESTERN JAVA AREA .....	161
FIGURE 7-A-1 HISTORICAL TREND OF GDP GROWTH RATES OF INDONESIA .....	2
FIGURE 7-A-2 GROWTH RATE IN MAJOR TRADE PARTNERS .....	4
FIGURE 7-B-1 LIQUID BULK CARGO, TANJUNG PRIOK.....	6
FIGURE 7-B-2 DRY BULK CARGO, TANJUNG PRIOK.....	6
FIGURE 7-B-3 NON-BULK CARGO, TANJUNG PRIOK AND SUNDA KELAPA .....	7
FIGURE 7-B-4 GENERAL CARGO, BANTEN.....	8
FIGURE 7-B-5 DRY BULK CARGO, BANTEN .....	8
FIGURE 7-B-6 DRY BULK CARGO, CIREBON .....	9
FIGURE 7-B-7 BAG CARGO, CIREBON .....	9
FIGURE 7-B-8 GENERAL CARGO, SUNDA KELAPA .....	10
FIGURE 7-B-9 BAG CARGO, SUNDA KELAPA.....	10
FIGURE 7-B-10 OTHERS, SUNDA KELAPA.....	11
FIGURE 7-B-11 TOTAL TONNAGE OF TANJUNG PRIOK.....	11
FIGURE 7-B-12 SIMPLE REGRESSION ANALYSIS CARGO TONNAGE VS GDP.....	12
FIGURE 7-B-13 ACTUAL AND ESTIMATE USING MULTIPLE REGRESSION MODEL .....	13
FIGURE 7-B-14 HISTORICAL TREND AND FORECAST OF INTERNATIONAL CONTAINER, TANJUNG PRIOK .....	15
FIGURE 7-B-15 COMPARISON WITH OTHER FORECASTS (INTERNATIONAL CONTAINER) .....	16
FIGURE 7-B-16 HISTORICAL TREND AND FORECAST OF DOMESTIC CONTAINER, TANJUNG PRIOK .....	17
FIGURE 7-B-17 THROUGHPUTS OF DOMESTIC CONTAINERS .....	18
FIGURE 7-B-18 TOTAL CONTAINER THROUGHPUT, TANJUNG PRIOK .....	21
FIGURE 7-B-19 TOTAL THROUGHPUT AT MAJOR METROPOLITAN PORTS.....	24
FIGURE 7-B-20 CONTAINERIZATION RATIO.....	25

FIGURE 7-C-1 PRODUCTION AND CONSUMPTION OF RICE IN INDONESIA.....	28
FIGURE 7-C-2 TOTAL TONNAGE OF RICE, TANJUNG PRIOK.....	29
FIGURE 7-C-3 TOTAL TONNAGE OF WHEAT, TANJUNG PRIOK.....	30
FIGURE 7-C-4 PRODUCTION DEMAND OF OTHER GRAIN IN INDONESIA.....	31
FIGURE 7-C-5 TOTAL TONNAGE OF OTHER GRAIN, TANJUNG PRIOK.....	31
FIGURE 7-C-6 TOTAL TONNAGE OF CRUDE PALM OIL, TANJUNG PRIOK.....	32
FIGURE 7-C-7 CEMENT INDUSTRY IN INDONESIA.....	33
FIGURE 7-C-8 TOTAL TONNAGE OF CEMENT/CLINKER/GYPSUM, TANJUNG PRIOK.....	35
FIGURE 7-C-9 TOTAL TONNAGE OF GASOLINE AND OTHER FUEL .....	36
FIGURE 7-C-10 TOTAL TONNAGE OF STEEL AND STEEL PRODUCT .....	37
FIGURE 7-C-11 TREND OF CAR PRODUCTION, SALES, IMPORT/EXPORT.....	38
FIGURE 7-C-12 TREND OF AUTOMOBILE EXPORT FROM LAEM CHABANG PORT IN THAILAND....	40
FIGURE 7-C-13 SHIPPING ROUTES OF PELNI.....	40
FIGURE 7-C-14 HISTORICAL TREND AND FORECAST OF DOMESTIC PASSENGERS, TANJUNG PRIOK .....	41
FIGURE 7-C-15 FORECAST OF FREIGHT ON MERAK-BAKAUHENI FERRY ROUTE .....	42
FIGURE 7-C-16 FORECAST OF VEHICLES ON MERAK-BAKAUHENI FERRY ROUTE.....	42
FIGURE 8-A-1 AVERAGE IN/OUT SHIP MOVEMENTS PER DAY (EXCLUDING BERTH SHIFT) .....	52
FIGURE 8-A-2 HOURLY IN/OUT SHIP MOVEMENT .....	52
FIGURE 8-A-3 RELATION BETWEEN DAILY MOVEMENTS AND FREQUENCY OF IN/OUT CHANGE.....	53
FIGURE 8-A-4 RELATION BETWEEN MOVEMENT AND CUMULATIVE TIME.....	55
FIGURE 8-A-5 RESULT OF SIMULATION.....	56
FIGURE 8-A-6 RELATIONSHIP NUMBER OF SHIP CALLS WAITING TIME AND BOR .....	57
FIGURE 8-A-7 RESULT OF SIMULATION (TWO-WAY).....	57
FIGURE 8-A-8 QUAY SIDE CAPACITY AND DEMAND (INTERNATIONAL CONTAINER, TANJUNG PRIOK) .....	60
FIGURE 8-A-9 QUAY SIDE CAPACITY AND DEMAND (INTER-ISLAND CONTAINER, TANJUNG PRIOK) .....	60
FIGURE 8-A-10 QUAY SIDE CAPACITY AND DEMAND (GENERAL AND BAG CARGO) .....	62
FIGURE 8-A-11 QUAY SIDE CAPACITY AND DEMAND (DRY-BULK CARGO) .....	63
FIGURE 8-A-12 QUAY SIDE CAPACITY AND DEMAND (LIQUID-BULK CARGO).....	63
FIGURE 8-B-1 LOCATION OF GATES AND INTERSECTION OF SURVEY .....	67
FIGURE 8-B-2 JICT 1 INTERSECTION.....	68
FIGURE 8-B-3 ENGGANO INTERSECTION .....	68
FIGURE 8-B-4 TRAFFIC FLOW DIAGRAM AROUND TANJUNG PRIOK PORT AREA.....	68
FIGURE 8-B-5 O/D DIAGRAM OF TRAILER TRUCKS FROM TANJUNG PRIOK PORT AND CILINCING CONTAINER DEPOTS.....	69
FIGURE 8-B-6 TRACTOR TRUCKS DIRECTIONAL TRAFFIC FLOW DIAGRAM .....	70
FIGURE 8-B-7 TOLL ROAD DEVELOPMENT PLAN .....	79
FIGURE 8-C-1 WATER QUALITY DISTRIBUTION IN TANJUNG PRIOK PORT .....	94
FIGURE 8-C-2 RELATION WITH SALINITY, COD AND AMMONIUM NITROGEN .....	95
FIGURE 8-C-3 DISTRIBUTION OF HEAVY METAL CONCENTRATION IN BOTTOM SEDIMENT.....	95
FIGURE 8-C-4 SEDIMENT CONDITION IN BANTEN PORT .....	100
FIGURE 8-C-5 CORAL REEF AND MANGROVE DISTRIBUTION IN BOJONEGARA SITE .....	102
FIGURE 8-C-6 LAND PURCHASE CONDITION IN 2002 .....	103
FIGURE 8-D-1 LAND SUBSIDENCE IN NORTHERN PART OF DKI JAKARTA .....	112
FIGURE 8-E-1 CURRENT CARGO DISTRIBUTION .....	113
FIGURE 8-E-2 ROAD NETWORK IN FUTURE (WESTERN JAVA AREA) .....	123
FIGURE 8-E-3 ROAD NETWORK IN FUTURE (DKI AREA) .....	124
FIGURE 8-E-4 RAILWAY NETWORK IN FUTURE .....	125
FIGURE 8-E-5 PROVIDED ROAD NETWORK AND VEHICLE SPEED.....	127
FIGURE 8-E-6 TRANSPORTATION TIME IN PRESENT SITUATION.....	127
FIGURE 8-E-7 TRANSPORTATION TIME IN FUTURE SITUATION .....	127
FIGURE 8-E-8 MAJOR INDUSTRIAL AREA .....	127
FIGURE 8-F-1 DISTRIBUTION OF DIRECT SAILING PORTS FROM JAKARTA .....	129
FIGURE 9-A-1 CURRENT SITUATION OF SHIP NAVIGATION.....	138
FIGURE 9-A-2 MAIN CHANNEL IN THE PORTS WITH OTHER ASIAN PORTS.....	140

FIGURE 9-A-3 BERTH PRODUCTIVITY AND HANDLING TARIFF (40F LADEN) .....	141
FIGURE 9-A-4 AUTOMOBILE TERMINAL IN LAEM CHABANG PORT (THAILAND).....	142
FIGURE 9-A-5 CHARGE FOR AUTOMOBILE EXPORT (PER 1 UNIT (12 TONNE), WITH 5 DAYS OF STORAGE).....	142
FIGURE 9-C-1 DEVELOPMENT SCENARIO-1 .....	146
FIGURE 9-C-2 DEVELOPMENT SCENARIO-2 .....	147
FIGURE 9-D-1 BASIC FUNCTION OF THE PORTS .....	149
FIGURE 9-D-2 HINTERLAND POTENTIAL .....	151
FIGURE 9-D-3 CURRENT CARGO DISTRIBUTION .....	151
FIGURE 9-D-4 BOJONEGARA HINTERLAND (CURRENT SITUATION AND FUTURE) .....	152
FIGURE 9-D-5 FUNCTIONAL ALLOTMENT OF INTERNATIONAL CONTAINER.....	153
FIGURE 9-D-6 FUNCTIONAL ALLOTMENT OF INTER-ISLAND CONTAINER.....	155
FIGURE 9-D-7 FUNCTIONAL ALLOTMENT OF GENERAL AND BAG CARGO.....	157



## CHAPTER-7. TRENDS AND PROSPECTS OF PORT DEMAND

### 7-A. SOCIO-ECONOMIC FRAMEWORK

#### 7-A-1 Population

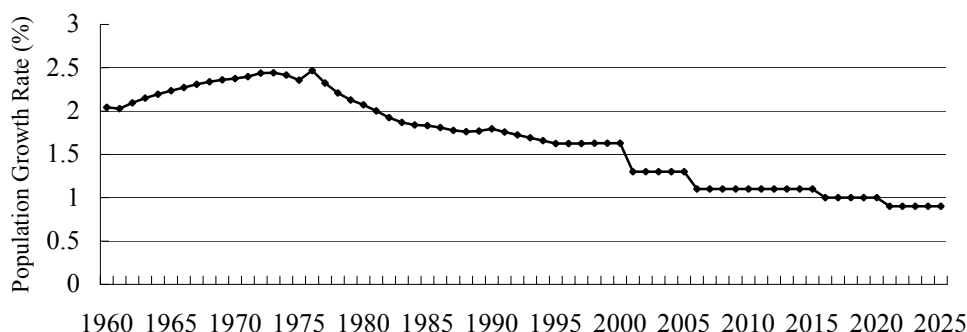
1. According to World Bank Statistics, total population of Indonesia in 2000 is 210 million, which is the third largest in Asia after about 1,263 million people in China and about 1,016 million people in India. Population growth rate nationwide registered 1.66 % during 1990s, an improvement over 1.84 % during the previous decade. The decline in the population growth rate is the fruit of family planning encouraged by the government. DKI Jakarta is one of the District/Province where the growth rate is less than 1 %.
2. It can be projected that such historical trend of the gradual decline of the annual population growth rate would continue towards the future considering worldwide social phenomena of the decline of the birthrates presumably attributing to the progress of women's employment and high-level education.
3. The World Bank has been publishing not only the historical trend of population but also a long term population projection of each country. According to this projection, the annual population growth rates in Indonesia will continue to decline, and become 1.00 % in 2015, and 0.90 % after 2020. The population growth rates will surely decline, however, total population in Indonesia continues to grow and will reach 275 million people in 2025, which is 1.31 times larger than that in 2000.
4. Historical trend and future projection of Indonesia's population and its annual growth rates are shown in Table 7-A-1.

**Table 7-A-1 Historical Trend and Projection of Indonesia's Population**

(Unit: ' 000)

	1980	-1990	-2000	2001-05	2006-15	2016-20	2021-25
Population	148,303	178,232	210,421	224,459	250,408	263,181	275,239
Growth Rate		1.84%	1.66%	1.30%	1.10%	1.00%	0.90%

Source: World Development Indicators 2002, World Bank

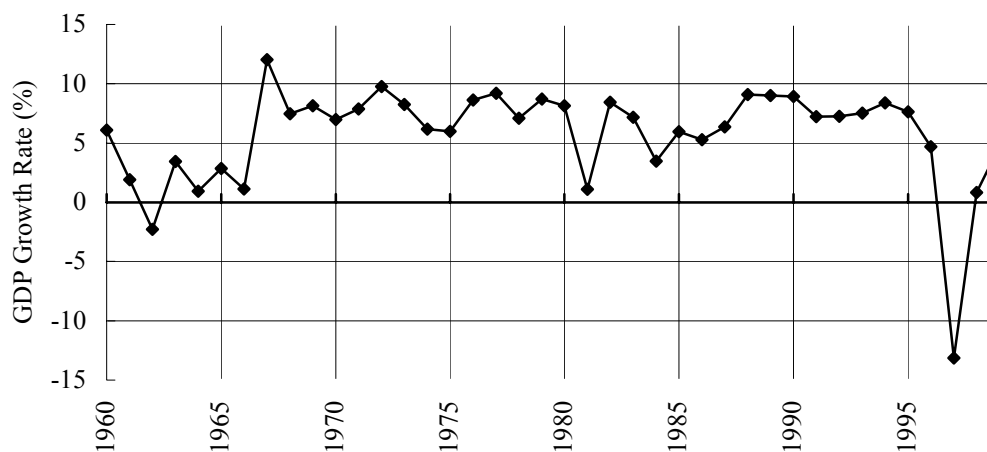


## 7-A-2 GDP (Gross Domestic Product)

### 1) Indonesia

5. The Indonesian economy is still suffered from hangovers from the Asian economic crisis and has not gotten back on track of the healthy economic growth. It is reported that the GDP growth rate in 2003 is likely around 4 %, which is lower than the government's initial forecast, partially due to adverse effects of the domestic and international insecurity.

6. Most of economists agree that Indonesia needs a sustained period of strong economic growth and low inflation in order to consolidate its recovery from the 1997-98 financial crisis. Indonesia's present 4-percent GDP growth rate is only slightly more than half of the 7.2 percent average GDP growth the country experienced from 1990-96. Historical trend of GDP growth rates is shown in Figure 7-A-1.



Source: World Development Indicator 2002, World Bank

**Figure 7-A-1 Historical Trend of GDP Growth Rates of Indonesia**

7. These positive economic growth rates, however, are not enough to provide working opportunities for Indonesian people since current unemployment rate is between 15-20% in Indonesia. Economists calculate that Indonesia's labor force is increasing by 2.2-2.7% a year, a growth rate equivalent to 2-2.5 million new job seekers each year. The National Development Planning Agency (BAPPENAS) in turn estimates that 4% GDP growth translates into an increase in the demand for labor of 2.4%, or 2.2 million new job opportunities per year. These figures make it clear that in order to re-employ large numbers of workers who lost their jobs during the 1997-98 crisis and absorb new labor market entrants, Indonesia needs a sustained period of GDP growth well above 4%.

8. 'Guidelines for National Development' (GBHN) and Five-Year Plan called 'PROPENAS', which was formerly called 'REPELITA' before the economic crisis, together set out the basis for national development plan in Indonesia. Based on the latest GBHN (1999-2004), the current Five-Year Plan, PROPENAS (2000-2004), has been formulated by BAPPENAS although a new long-term plan covering 20 to 25 years is being currently examined.

9. On annual basis, the plan called REPETA should be made for each fiscal year based on the PROPENAS in its duration. According to the draft of REPETA for 2003, macro-economic indicators are predicted as in Table 7-A-2. In reflecting recent economic slowdown and

increasing inflation, the economic growth rate target is re-estimated lower than the original such as from 6-7% to 5-6% of GDP growth in 2004, while inflation rate in the same year is revised from original 3-5% to 7-9%.

**Table 7-A-2 Macro-economic Indicators**

Indicator	1999	2000	2001	2002	2003	2004	2005
Inflation rate, CPI (%)	2.0%	9.4%	12.5%	9-10%	8-10%	7-9%	6-8%
Exchange rate (Rp/US\$)	7,809	8,438	10,255	8,750	8,550	8,500	8,500
GDP growth (%)	0.3%	4.9%	3.3%	3.5-4.5%	4.5-5.5%	5-6%	5.5-6.5%
GDP per/c (at 1998 constant, Rp)	4,785.0	4,967.0	5,058.0	5,186.0	5,370.0	5,588.0	5,843.0
GDP per/c growth		3.8%	1.8%	2.5%	3.5%	4.1%	4.6%
Current account deficit / GDP (%)	4.0%	3.2%	3.7%	2.5%	1.0%	-0.1%	-1.0%
Total investment (% in GNI)	12.5%	19.3%	20.5%	22.2%	24.7%	28.3%	28.3%
Private	7.2%	11.2%	13.8%	15.9%	17.0%	19.1%	21.4%
Government	5.3%	4.6%	3.9%	4.6%	5.3%	5.7%	5.2%

Source: REPETA for 2003 (National Annual Plan)

10. The framework of the REPETA for 2003 is rather challenging setting a GDP growth rate of around 6% in 2005. However, 5-6% economic growth in the middle and long term appears to be an appropriate target when we considered the following points:

- Indonesia needs a sustained period of strong economic growth because a period of sustained GDP growth would provide employment opportunities to Indonesia's millions of unemployed and under-employed workers.
- Economists calculate that Indonesia's labor force is increasing by 2.2-2.7% a year, a growth rate equivalent to 2-2.5 million new job seekers each year. BAPPENAS estimates that 4% GDP growth translates into an increase in the demand for labor of 2.4%, or 2.2 million new job opportunities per year.
- Rapid and sustained GDP growth is the key to reducing Indonesia's debt/GDP ratio as well as the GOI's debt servicing burden. World Bank report in May 2000 noted that Indonesia could reduce its debt/GDP ratio to approximately 50% with annual GDP growth rates of 6%.

11. In this study, the JICA study team assumes that the Indonesia's GDP growth rate in 2003 will be nearly same as that in 2002, and that a 6 % growth rate will be realized in 2006. It is also assumed that the 6 % growth rate will be maintained afterwards through 2012, and then will slightly decline because the population growth rate has been continuously decreasing as shown earlier.

## 2) *Major Trade Partners*

12. Formulating future economic frameworks of trade partners is also one of the important works for demand forecast.

13. As discussed in Chapter II, Japan, United States, Singapore, and Australia have been most important trade partners with Indonesia for the last decades. In addition to these individual countries, Asia and Europe as regional economic compounds are also important trade partners.

14. GDP growth rates of these countries and regions after 1980 are shown in the following chart. Economies of East Asia and Pacific region had shown the highest growth rate of around 8 % before the year 1997 when economic and financial crisis collapsed the region's economic prosperity.

15. United States has shown a steady economic growth for the last decade, and its growth rates have been exceeding 4 % for the latest couple years. On the contrary Japan has been suffered by economic slump since 1998, and annual growth rates have been around 1 or 2 % recently. Department of Commerce of the US has publicized that US's GDP growth rate was 0.3 % in 2001. Business prospects are getting somber in both US and Japan.

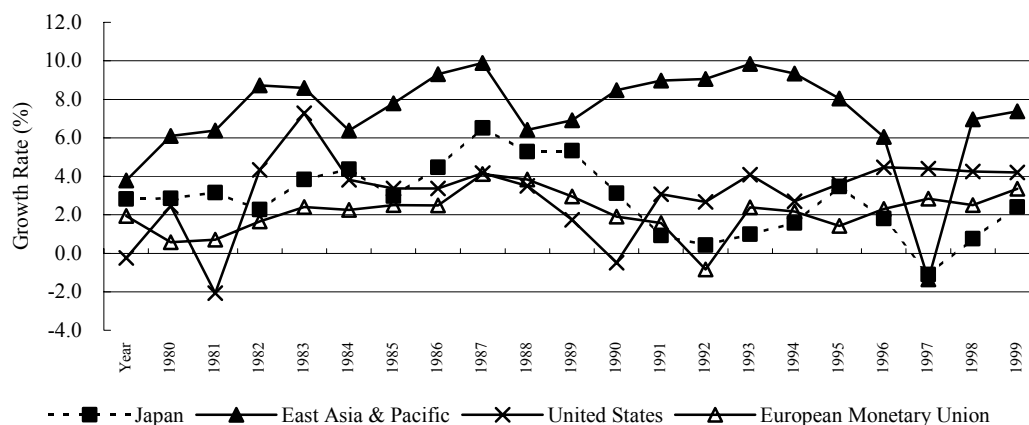


Figure 7-A-2 Growth Rate in Major Trade Partners

16. Future GDP growth rates of the trade partners were taken and extrapolated from the World Bank estimate for 2010. It is assumed in this study that the GDP growth rates of the trade partners' will decrease by one percentage point after 2013 because population growth rates in respective trade partners have been decreasing.

### 3) GDP Growth Rate (Summary)

17. In case the economy in Indonesia or in the world does not grow as estimated in this study, cargo throughput will be affected accordingly. It is necessary to know how sensitive the cargo throughput is against changes of surrounding economies. In this sense, in addition to the basic economic framework, two other economic frameworks are formulated: slightly higher economic growth rate case and slightly less positive economic framework case.

18. The assumed GDP growth rates of Indonesia and trade partners by case are shown in Table II-2. The growth rates of the high case are set at 0.5 percentage point higher, and those of the low case are 0.5 percentage point lower, than those of the basic case, respectively.

**Basic Case**

Year	2000	2001	2002	2003	2004	2005	2006-12	2013-25
Indonesia	4.90%	3.30%	4.00%	4.00%	5.00%	5.50%	6.00%	5.00%

Trade Partners	1991-2000	2001-12	2013-25
United States	3.71%	2.70%	1.70%
G4 Europe	1.57%	2.30%	1.30%
JAPAN	1.07%	2.00%	1.00%
East Asia and Pacific	6.92%	6.00%	5.00%

**High Case**

Year	2000	2001	2002	2003	2004	2005	2006-12	2013-25
Indonesia	4.90%	3.30%	4.50%	4.50%	5.50%	6.00%	6.50%	5.50%

Trade Partners	1991-2000	2001-12	2013-25
United States	3.71%	3.20%	2.20%
G4 Europe	1.57%	2.80%	1.80%
JAPAN	1.07%	2.50%	1.50%
East Asia and Pacific	6.92%	6.50%	5.50%

**Low Case**

Year	2000	2001	2002	2003	2004	2005	2006-12	2013-25
Indonesia	4.90%	3.30%	3.50%	3.50%	4.50%	5.00%	5.50%	4.50%

Trade Partners	1991-2000	2001-12	2013-25
United States	3.71%	2.20%	1.20%
G4 Europe	1.57%	1.80%	0.80%
JAPAN	1.07%	1.50%	0.50%
East Asia and Pacific	6.92%	5.50%	4.50%

**7-B. FORECAST OF CARGO DEMAND BY PACKING TYPE****7-B-1 Historical Trend of Cargo Tonnage by Packing Type**

19. One of the scope of this study is to propose basic development directions both of the existing Metropolitan ports, which are composed of 4 ports, i.e. Tanjung Priok Port, Banten Port, Sunda Kelapa Port and Cirebon Port, and of the prospective new port, Bojonegara Port. In order to achieve this goal, it is necessary to forecast future traffic demand of these ports.

20. Indonesian Port Corporation II publishes annual port statistics on port activities under its jurisdiction. Cargo tonnage handled at each port is disaggregated into packing types, which are categorized into the six groups; General cargo, Bag cargo, Liquid Bulk cargo, Dry Bulk cargo, Container, and Others. Information on trade type such as loading/unloading, and by commodity-wise are not available.

21. Banten Port is located at the westernmost tip of Java Island, about 100 km away from Jakarta. This port is composed of several port districts such as Ciwandan and Merakmas. Banten Port covers several privately owned/operated jetties as well as public/commercial entities.

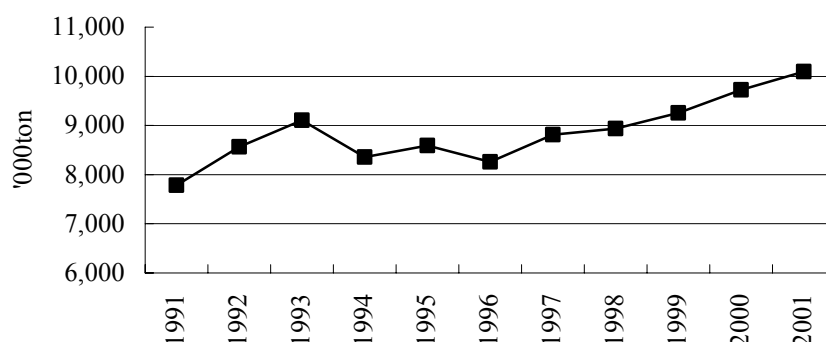
Sunda Kelapa Port is located in North Jakarta, only several km away from Tanjung Priok Port. This port is divided into two port districts. The port primarily serves inter-island traditional sailing vessels and is also well known for tourism. Cirebon Port is located in the most eastern side of West Java province. This port is the sole commercial port in the province after Banten province was separated.

22. Historical trend of cargo tonnage by packing type from 1991 through 2001 is summarized and shown in Table 7-B-1.

**Table 7-B-1 Cargo Tonnage by Packing Type in the Study Area**

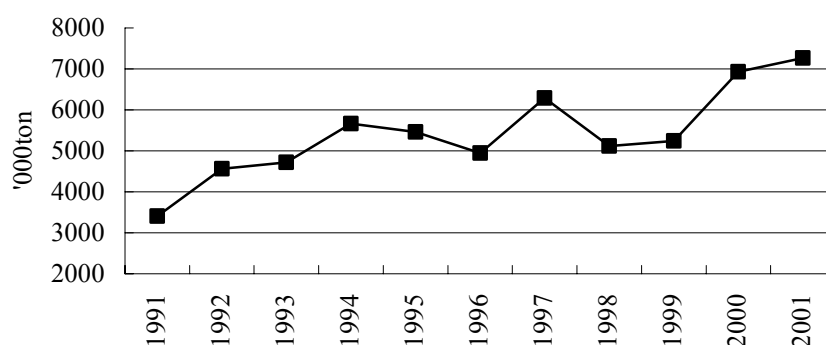
**1) Tanjung Priok Port**

23. Liquid bulk cargo at Tanjung Priok Port includes “Gasoline and Other fuel” and “Crude Palm Oil”. Majority of these commodities are unloaded at the port in the inter-island trade. Historical trend of cargo tonnage is shown in Figure 7-B-1.



**Figure 7-B-1 Liquid Bulk Cargo, Tanjung Priok**

24. Major commodities of dry bulk cargo at Tanjung Priok port are Cement/Clinker and grain such as wheat. Majority of the volume of grain are imported cargoes while cement/clinker are exported after the economic crisis in 1997/1998. Historical trend of the cargo volume handled at Tanjung Priok Port is shown in Figure 7-B-2.



**Figure 7-B-2 Dry Bulk Cargo, Tanjung Priok**



25. Although hinterland of Tanjung Priok Port is much larger than that of Sunda Kelapa Port, a considerable portion of these two hinterlands can be overlapped. International vessels call on Tanjung Priok Port, and Sunda Kelapa Port is solely engaged in inter-island trade. These two ports are not competing with each other, but they are acting in a complementary manner. It may be wise to consider that Sunda Kelapa Port is one district of Tanjung Priok Port.

26. Combined tonnage of non-bulk cargo (general cargo, bag cargo, and container) handled at Tanjung Priok Port and Sunda Kelapa Port is shown in Figure 7-B-3. This graph clearly reveals that the economic and financial crisis in 1997/1998 severely affected Indonesian economy, thus port activities. JICA study team constructed and applied a multiple regression model with a dummy variable for these historical trend data in order to forecast the future cargo tonnage. High coefficient of determination ( $R^2=0.9248$ ) was obtained.

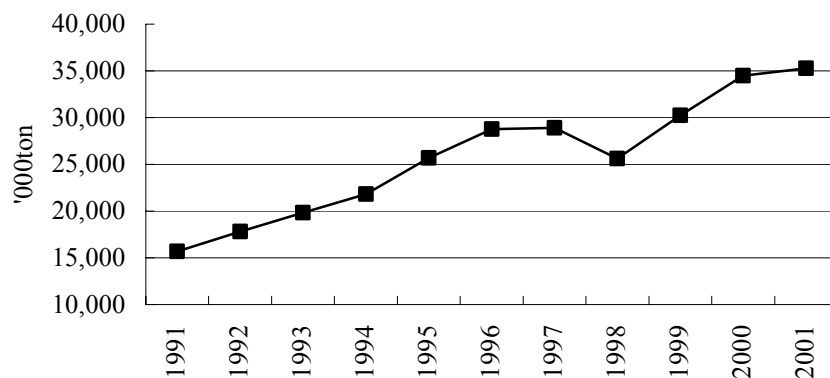


Figure 7-B-3 Non-Bulk Cargo, Tanjung Priok and Sunda Kelapa

27. The total tonnage of the non-bulk cargo at Tanjung Priok Port can be obtained by subtracting the cargo tonnage at Sunda Kelapa Port. Combined tonnage of general cargo and bag cargo at Tanjung Priok Port can also be obtained by subtracting the container volume, which is calculated in the section 7-B-1.

## 2) *Banten Port*

28. Banten Port is located in Indonesia's largest industrial zone, and has a wide port working area from Anyer to Bojonegara with a lot of special dedicated wharves under the jurisdiction of IPC2. Ciwandan area is only the public port in Banten. A multipurpose terminal at Merakmas is operated jointly by IPC2 and PT. Indah Kiat Pulp Paper Corporation.

29. Within a 100 km radius, some of the largest companies in Indonesia have already located their factories. Amongst those companies are Krakatau Steel, Indah Kiat Pulp & Paper, Trylooiita, Bakrie Corp, Gunanusa Utama Fabricators and Trans Bakrie.

30. In addition to the public port operated by IPC2, there are a number of privately run facilities. Those private port operators include PT Asahimas Subbentra Chemical, Pertamina, PT Redeco/PT Poly Chemlindo, and PT Gema Polytama Kimu.

31. Historical trend of general cargo tonnage handled at Banten Port is shown in Figure 7-B-4. Plots of the cargo tonnage are scattered in the range of 800,000 ton at low and 1.6 million ton at high. It is difficult to find any regularity in this historical trend.

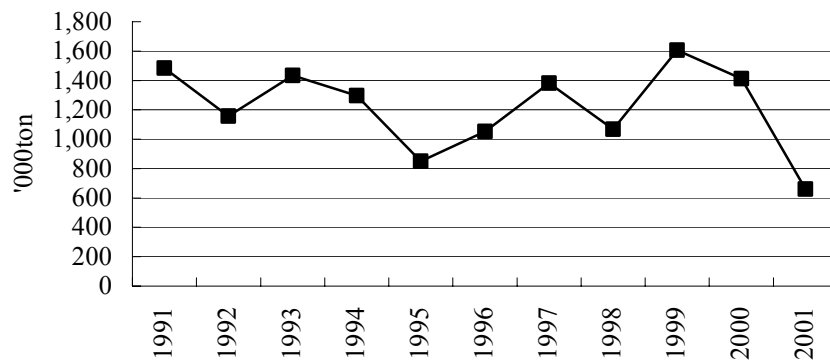


Figure 7-B-4 General Cargo, Banten

32. Dry bulk cargo forms the largest cargo group in Banten Port in terms of cargo tonnage. Coal is a major commodity of this group, and is mostly shipped from Kalimantan Island to Banten Port as a fuel to manufacture steel and cement. As shown in Figure 7-B-5, the cargo tonnage in general increases steadily year by year.

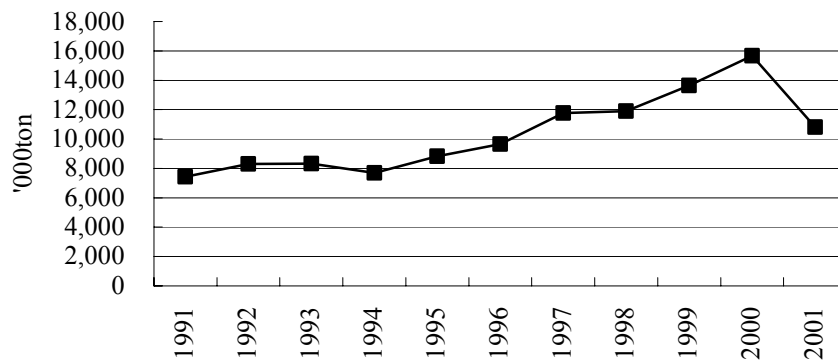


Figure 7-B-5 Dry Bulk Cargo, Banten

33. Containers are being handled at the multipurpose terminal with the berth of 300m length and -11m depth. Accurate container throughput in Merakmas has not yet been disclosed, however, the Study team estimates more than 20 thousand TEU was handled in 2001 judging from the fact that the total container throughput in Banten, i.e., Ciwandan and Merakmas, reached to 24 thousand TEU in 2001.

34. As container handling has just started at Banten Port, it is necessary to take note for a while before forecasting future throughput. If it is assumed that container throughput at Banten Port increases at the same rate as at Tanjung Priok Port, then future throughput can be calculated.

### 3) Cirebon Port

35. Port of Cirebon is located in Cirebon, North coast of West Java, approximately 250 kilometers eastward from Jakarta. Port of Cirebon has been playing a role in developing economic growth in West Java and also acting as a supporting port to handle overflow cargo from Tanjung Priok Port, particularly in inter-island trade.

36. In 2001, Port of Cirebon handled a total of 1,962,302 tons of cargo. By trade type, domestic unloading is dominant, 1,706,257, which is 87 % of the total. Main commodities are coal, fertilizer, lumber and crude palm oil for unloading, and rice and cement for loading.

37. By packing type, about fifty percent of the total is dry bulk cargo, followed by bag cargo. Historical trend of dry bulk cargo is shown in Figure 7-B-6.

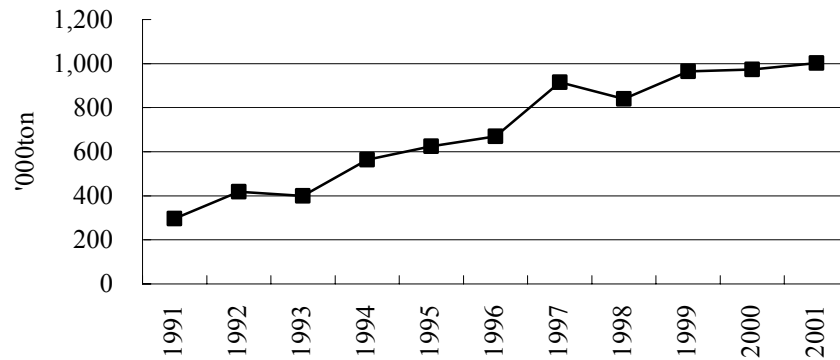


Figure 7-B-6 Dry Bulk Cargo, Cirebon

38. The second largest group in packing type is bag cargo. Historical trend of cargo tonnage is shown in Figure 7-B-7. The cargo volume has been rather stable, about half million tons in recent several years. For the rest of packing type, cargo volumes are not significant, and any regularity cannot be found in the historical trend.

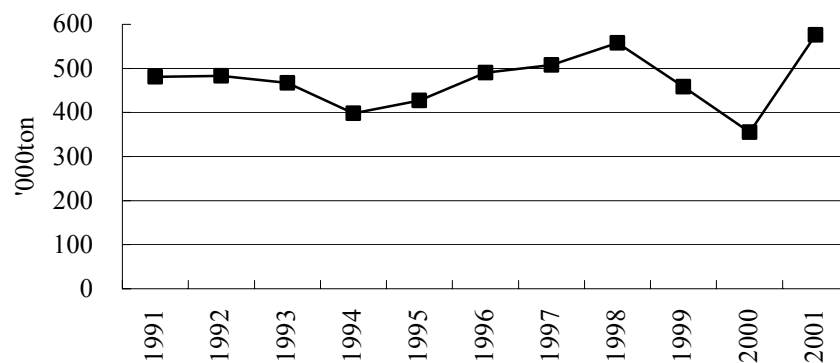


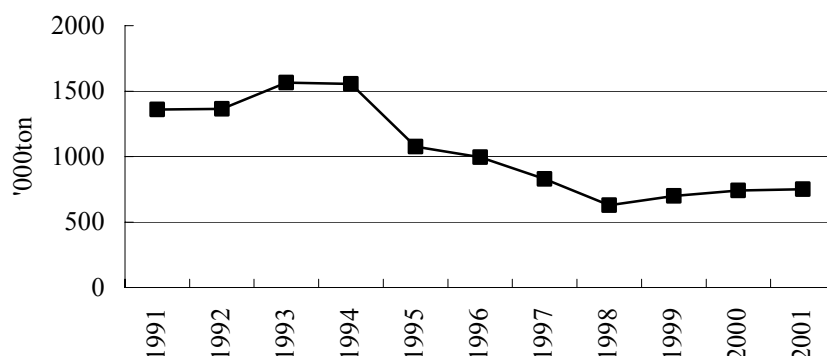
Figure 7-B-7 Bag Cargo, Cirebon

#### 4) *Sunda Kelapa Port*

39. Sunda Kelapa is the oldest port in Jakarta, and situated only a few miles west of Tanjung Priok Port. This port is devoted to inter-island transportation by timber schooners, and main commodities through this port include lumber mostly from Kalimantan; on the return journey daily consumption goods, and building materials are loaded.

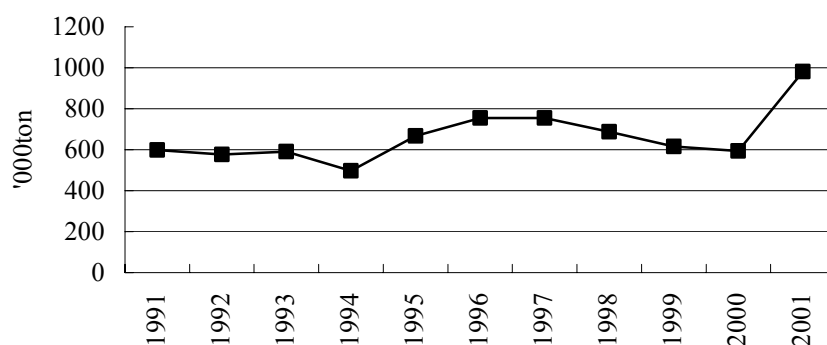
40. Historical trend of general cargo handled at Sunda Kelapa Port is shown in the Figure 7-B-8. In the early years of the 1990s, this port handled more than 1.5 million tons of general cargo. In the recent several years, however, Sunda Kelapa Port handled less than 800 thousand tons of

general cargo. General cargo tonnage passing through the Sunda Kelapa Port has been decreasing.



**Figure 7-B-8 General Cargo, Sunda Kelapa**

41. Historical trend of bag cargo is also shown in Figure 7-B-9. On the contrary to the general cargo, this type of cargo has not been decreasing, but rather stable. Volume of bag cargo in 2001 reached nearly one million tons. Main commodity of bag cargo is cement destined for local islands.



**Figure 7-B-9 Bag Cargo, Sunda Kelapa**

42. “Others” is one of the packing types in the Indonesian port statistics. Volumes of this type of cargo handled at Sunda Kelapa in the past several years are shown in Figure 7-B-10. Historical trend of the cargo tonnage has been dispersed in the range of about 1.5 million ton/year to 2.5 million ton/year.

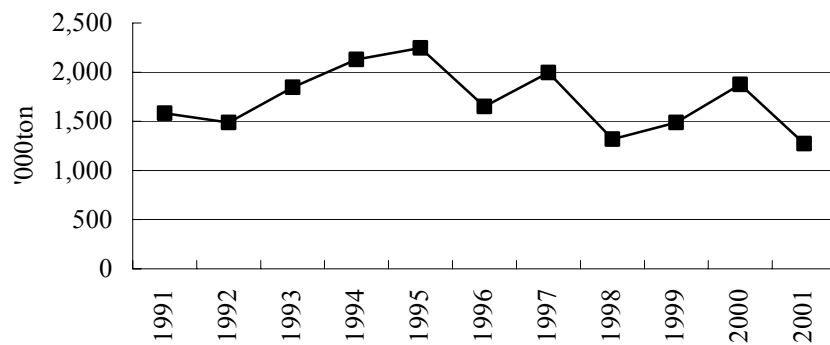


Figure 7-B-10 Others, Sunda Kelapa

43. One of the common aspects among commodity transportation through Sunda Kelapa Port is that almost all commodities are transported by wooden schooners. None of the three packing types above shows steady increase in the cargo tonnage. That is because building of new wooden vessels requires skilled labor which is difficult to be sustained in modern society. Therefore, it is estimated that cargo tonnage passing through this port cannot continue to increase.

#### 7-B-2 Influence of Economic Crisis and Discontinuity of Historical Trend of Cargo Tonnage

44. The Indonesian economy now appears to be in recovery process following the economic crisis of 1997. As Indonesia enjoyed the highest economic growth in Southeast Asia, low inflation and a relatively modest current account deficit before the economic crisis, it was widely argued that the crisis would pass without much effect even after the devaluation of the Thai bath in July 1997. However, reality is that Indonesia was the far worst affected economy in the Asian crisis.

45. Port activities were directly affected by the economic crisis. For example, total tonnage handled at Tanjung Priok Port was sharply dropped to 30.9 million tons in 1998 from 35.3 million tons registered in 1997. After 1998, the total tonnage resumed to increase and reached 42.3 tons in 2001. The historical trend of total tonnage at Tanjung Priok is shown in Figure 7-B-11.

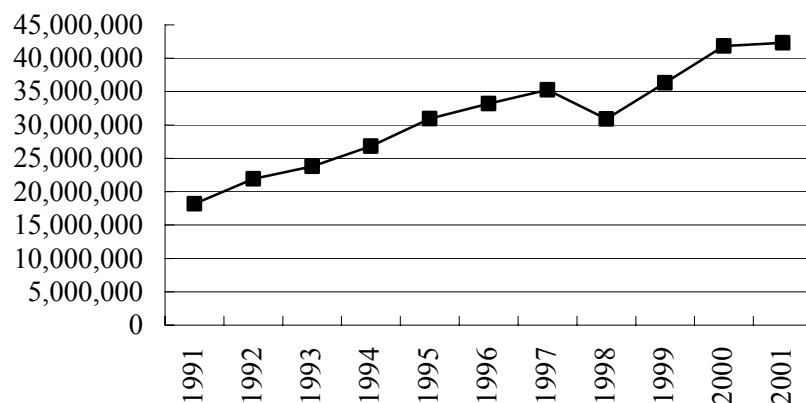


Figure 7-B-11 Total Tonnage of Tanjung Priok

46. As shown in the above Figure, the historical trend of total cargo tonnage at Tanjung Priok Port is discontinuous at 1997-1998. For the demand forecast, this discontinuity of the cargo tonnage means that time series analysis is not a suitable methodology because this forecasting method assumes the continuity of observed values as time proceeds.

47. Simple regression analysis is often utilized to forecast port demand. This model is expressed in the following formula.

$$Y = a + bX$$

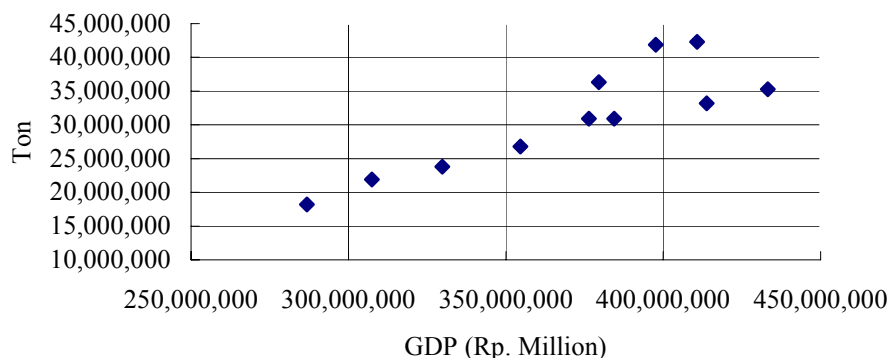
Where, X : Independent Variable

Y : Dependent Variable

a, b : Constants

48. Usually demand for cargo movement is caused by economic activities, and the volume of cargo to be transported is correlated with magnitude of economic activities. An economic index such as Gross Domestic Product (GDP) is often selected as an independent variable, and it shows high correlation with port demand in most cases.

49. In the case of relationship between port cargo tonnage and GDP in Indonesia, not high correlation exists for the period of 1991-2001 because of the discontinuity during the economic crisis, as shown in Figure 7-B-12. Total cargo tonnage at Tanjung Priok Port is shown on the Y-axis, and Indonesian GDP is on the X-axis. From 1991 through 1997 the relationship between the two is rather linear, but after 1998 the corresponding plots makes somehow a circle, revealing poor correlation between the two variables during this period. Coefficient of determination ( $R^2$ ) of the simple regression analysis during 1991-2001 is calculated at 0.7644, which is not sufficient for forecasting for the future port demand.



**Figure 7-B-12 Simple Regression Analysis Cargo Tonnage vs GDP**

50. Another method to examine how one variable is related to other variables is Multiple Regression. Multiple regression is the extension of simple regression, to take account of more than one independent variable. It is obviously the appropriate technique when we want to examine the effect on Y of several X variables simultaneously.

51. Now we introduce Dummy Variable (D) into the Multiple Regression Model in the following form;

$$Y = a + bX + cD$$

D is a 0-1 variable that clearly distinguishes between the two groups.



52. It is assumed that observed data of a dependent variable can be classified into two groups; non-affected by the economic crisis ( $D=0$ ), and affected ( $D=1$ ). Then relative to the reference line where  $D=0$ , the line where  $D=1$  is parallel and  $c$  units higher.

53. The Multiple Regression Model with a dummy variable was evaluated using the same data on cargo tonnage and GDP shown in the above figure so as to check whether this model was suitable enough to forecast future port demand. Both actual and theoretical tonnages based on this model are shown in Figure 7-B-13, and coefficient of determination ( $R^2$ ) was significantly improved from the simple regression model and turned out 0.9283, JICA study team will apply the multiple regression model with dummy variable in order to forecast the future port demand whenever appropriate.

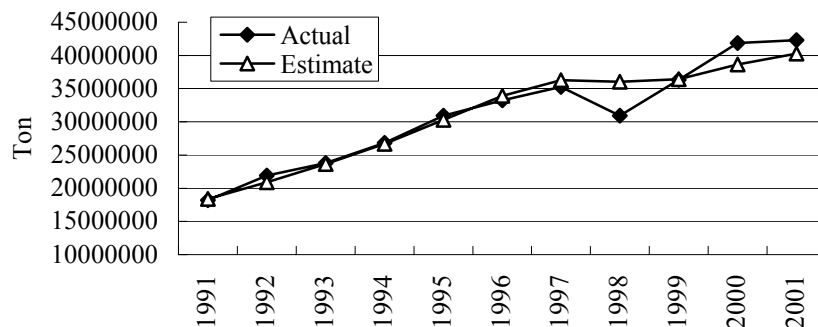


Figure 7-B-13 Actual and Estimate using Multiple Regression Model

### 7-B-3 Container Cargoes

#### 1) International Container

54. A Total of 18.6 million tons of international cargo was handled at Tanjung Priok Port in 2001 in the form of containers, which was equivalent to 2.06 million TEU. There are three dedicated container terminals: JICT I & II, and KOJA terminal. These dedicated container terminals handle mostly international containers. Conventional berths are also used for handling international containers, which account for less than 5% of the total international containers at the port.

55. A multiple regression model was used to forecast future port demand taking into consideration the discontinuity of historical trend of cargo tonnage. Multiple regression is the extension of simple regression, to take account of more than one independent variable. The JICA study team introduced Dummy Variable ( $D$ ) into the multiple regression model in the following form;

$$Y = a + bX + cD$$

$D$  is a 0-1 variable that clearly distinguishes between the two groups.

56. It is assumed that observed data of a dependent variable can be classified into two groups; before economic crisis ( $D=0$ ), and after economic crisis ( $D=1$ ). Then relative to the reference line where  $D=0$ , the line where  $D=1$  is parallel and  $c$  units higher.

57. Firstly, future cargo tonnage transported by containers was forecast using the multiple regression model. This work is implemented for export and import cargo individually. Trade partners' weighted GDP was applied as an independent variable for export cargo, and GRDP of the hinterland of Tanjung Priok Port for import cargo. Future GDP growth rates of the trade

partners were taken and extrapolated from the World Bank estimate for 2010, as shown previously.

58. Secondly, the number of containers is estimated as follows;

$$N = V/W \times 1/(1 - E)$$

where N : Number of containers (TEUs/year)  
 V : Cargo tonnage in containers (tons/year)  
 W : Cargo weight per loaded 20 ft container (tons/TEU)  
 E : Percentage of empty container

59. The average cargo weight per loaded 20 ft container (W) is set as 8.73 ton for export containers and 13.03 ton for import containers based on the actual records at JICT in 2001. Although total cargo tonnage of imported containers is slightly larger than that of exported, average tonnage per loaded TEU of the former is much larger than that of the latter. Therefore, export container cargoes need a larger number of container boxes (TEUs) than import container cargoes. Percentage of empty container is set as 6 % for export containers based on actual records in JICT.

60. Considering the fact that a highway network system in Java island is under development, and that Tanjung Priok Port is by far the largest container port in Indonesia, it is reasonable to assume that the number of imported containers is same as those of exported containers in the long run. The difference between the number of exported container and that of imported containers calculated from the cargo tonnage will be the number of imported empty containers.

61. Under the three socioeconomic frameworks, container throughputs were forecast. Total tonnage and the number of containers of international trade in the target years for the basic case are calculated at 36.3 million tons, 4.2 million TEU in 2012, and 65.6 million tons and 6.5 million TEU in 2025. Resulting TEU in the high case is 18.1% higher and that in the low case is 16.1% lower than the basic case in 2025, as shown in Table 7-B-2 and Figure 7-B-14.

**Table 7-B-2 Forecast of International Container Throughput, Tanjung Priok**

(Unit: ' 000)

Case	Year	Export		Import		Total	
		Ton	TEU	Ton	TEU	Ton	TEU
Hagh Case	2000	8,111	1,014	10,602	1,059	18,713	2,073
	2012	18,808	2,292	20,322	2,292	39,130	4,584
	2025	31,635	3,855	43,910	3,855	75,545	7,710
Basic Case	2000	8,111	1,014	10,602	1,059	18,713	2,073
	2012	17,140	2,089	19,134	2,089	36,273	4,177
	2025	26,795	3,265	38,851	3,265	65,646	6,530
Low Case	2000	8,111	1,014	10,602	1,059	18,713	2,073
	2012	15,558	1,896	18,000	1,896	33,558	3,792
	2025	22,487	2,740	34,317	2,740	56,803	5,480

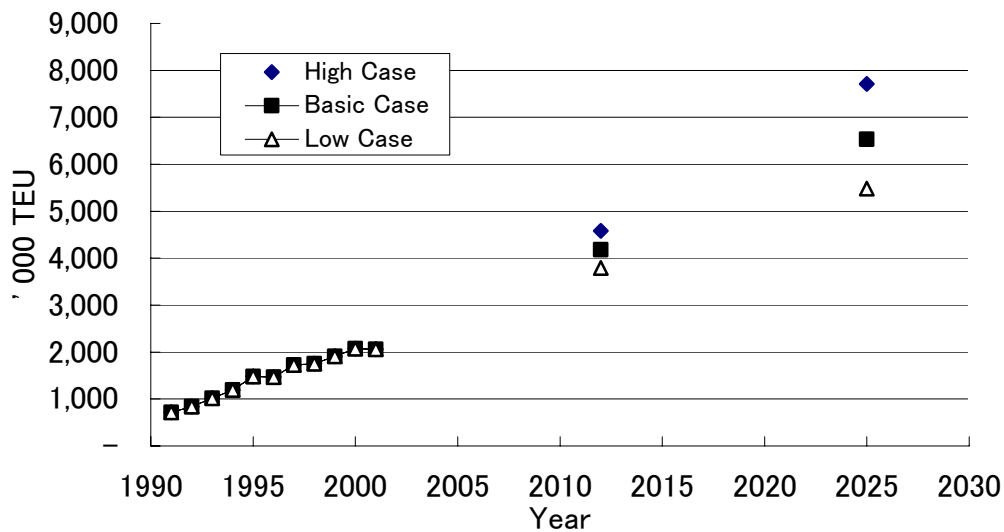


Figure 7-B-14 Historical Trend and Forecast of International Container, Tanjung Priok

## 2) Comparison with Other Forecasts of International Container

### a) UN/ESCAP

62. To provide countries with a planning context for shipping and port development strategies, the secretariat of ESCAP undertook a study to forecast trade flows, port container throughputs and capacity requirements through to the year 2011. According to the ESCAP model, container throughputs at Indonesian ports are forecast at 6,145 thousand TEUs in 2011, excluding domestic traffic.

63. Taking into consideration that Tanjung Priok Port has a share of about 60 % for the total container throughputs in the Indonesian foreign trade, and that domestic container throughputs account for about 10 % of the total in Tanjung Priok Port, the ESCAP's forecast is equivalent to 4.1 million TEUs as Tanjung Priok's total container throughput in 2011.

### b) OSC

64. U.K. based Ocean Shipping Consultants Limited forecast world container port throughput through 2015. Result of this forecast was published in 2000. This forecast neither presents individual container port throughput nor nation's total throughputs, but reveals region's growth rate. According to the OSC's forecast, East Asia, which include Southeast Asia, will have annual growth rates of container port throughputs as follows;

	Low	High
2005	7.4%	9.4%
2010	5.9%	6.8%
2015	5.0%	5.7%

65. As shown above, OSC assumes that the growth rates of container port throughput will decrease gradually through 2015. If assumption is made that decreasing growth rate continues through 2025, then resultant port throughputs are in the neighborhood of the following amounts:

	Low	High
2015	5.1 million TEU	5.9 million TEU
2025	7.4 million TEU	9.0 million TEU

### c) Comparison

66. The demand forecast by the study team together with the above figures by UN/ESCAP and OSC are shown in the other U.K. based Ocean Shipping Consultants Limited forecast world container port throughput

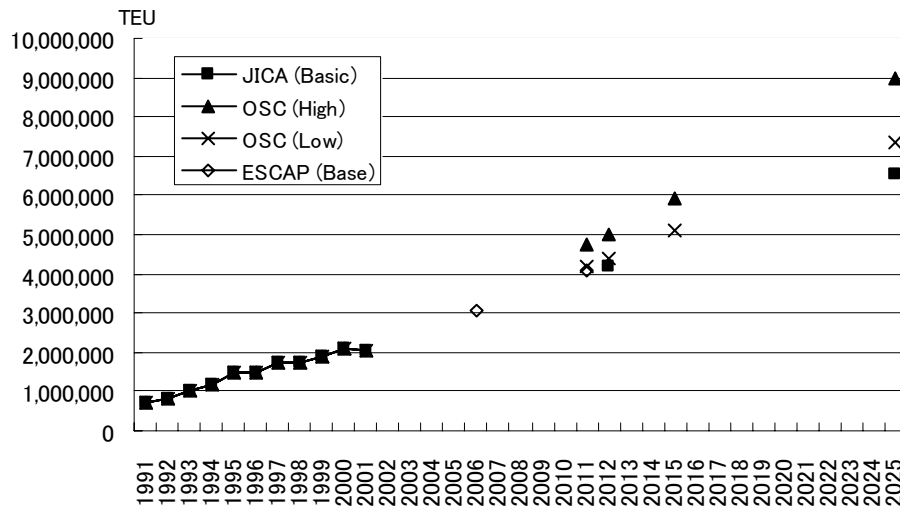


Figure 7-B-15 Comparison with Other Forecasts (International Container)

### 3) Domestic Container

67. Roughly speaking, total of 2 million tons or 200,000 TEU of inter-island containers were handled at Tanjung Priok Port in 2001. These inter-island containers are mostly loaded and unloaded at conventional berths. Although dedicated container terminals such as JICT are also used for handling inter-island containers, the volume is minimal.

68. Future demand for inter-island containers is also forecast in the same manner as the international containers. For the forecast of loading containers, Indonesian GDP is used as an independent variable because loading containers are destined for all corners of the archipelagos. For the unloading containers, GRDP of the hinterland serves as an independent variable.

69. The average cargo weight per loaded 20 ft container is set as 11.0 tons for loading containers and 13.0 tons for unloading containers based on the actual working records at conventional wharves. Percentage of empty container is set as 10.0% for loading containers based on the actual records.

70. Resulting volumes of inter-island containers handled at Tanjung Priok Port are estimated at about 6 million tons or 0.8 million TEU in 2012, and about 13 million tons or 1.7 million TEU in 2025. Loading and unloading volumes in the target years are found in Table 7-B-3.

**Table 7-B-3 Historical Trend and Forecast of Domestic Container, Tanjung Priok**

(Unit: ' 000)

Year	1991	1993	1995	1997	1999	2000	2001	2012	2025
Loading (Ton)	56	258	543	1,192	1,619	1,347	951	3,731	8,461
(TEU)	11	21	69	95	117	108	70	377	855
Unloading (Ton)	57	121	440	552	635	891	842	1,929	4,219
(TEU)	8	21	81	92	92	129	129	377	855
Total (Ton)	113	379	984	1,744	2,254	2,238	1,792	5,660	12,680
(TEU)	19	41	151	187	209	237	199	754	1,709

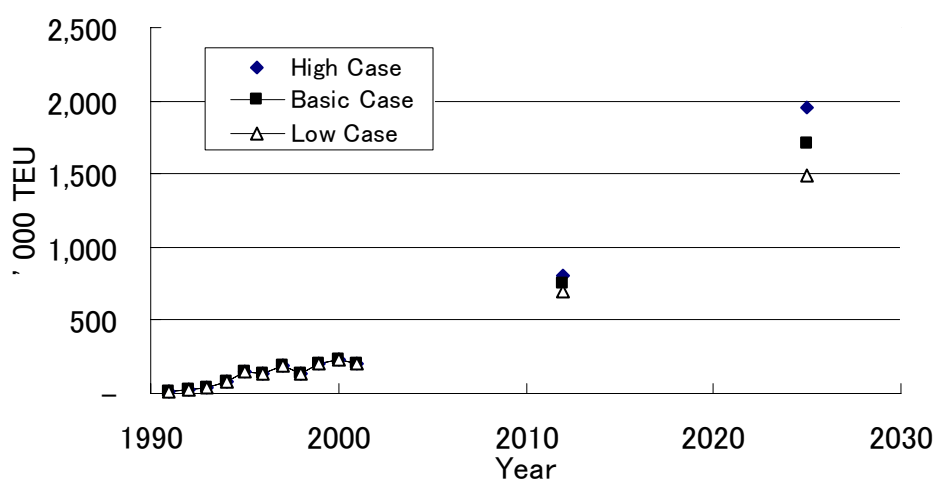
Source: IPC 2, JICA Study Team

71. Future demands under the different economic frameworks are also forecast. Resulting volumes in the target years are summarized in Table 7-B-4 and Figure 7-B-16. Estimated demands of the high case and low case are about 14 % larger or less respectively than that of the basic case in 2025.

**Table 7-B-4 Summary of Demand Forecast of Domestic Container, Tanjung**

(Unit: ' 000)

Case	Year	Domestic Loading		Domestic Unloading		Total	
		Ton	TEU	Ton	TEU	Ton	TEU
High Case	2000	1,347	108	891	129	2,238	237
	2012	4,016	406	2,067	406	6,083	811
	2025	9,675	977	4,806	977	14,481	1,955
Basic Case	2000	1,347	108	891	129	2,238	237
	2012	3,731	377	1,929	377	5,660	754
	2025	8,461	855	4,219	855	12,680	1,709
Low Case	2000	1,347	108	891	129	2,238	237
	2012	3,459	349	1,797	349	5,256	699
	2025	7,373	745	3,692	745	11,066	1,490

**Figure 7-B-16 Historical Trend and Forecast of Domestic Container, Tanjung Priok**

#### 4) *Transshipment Container*

72. Ports of Tanjung Priok and Tg Perak are two base ports for inter-island sea transportation in Indonesian archipelago. Not only passenger vessels, but also cargo vessels and container vessels call and stay at these ports regularly as base ports. Inter-island cargo shipping routes including



container transportation have been drafted and proposed by the DGSC, as shown in Figure XXX. The shipping routes which Tanjung Priok is the base port cover almost all regions in Indonesia.

73. Unlike in international transportation, sum of the loaded cargo tonnages at the all ports within a nation must be equal to that of the unloaded cargo tonnages in domestic transportation. The loaded cargo tonnage at a port of origin has to agree with the unloaded cargo tonnage at the port of destination unless cargoes disappear on the water.

74. With the cooperation of DGSC and Port Corporations, JICA Study Team collected historical trend data on container throughput at major public ports by trade type. JICA Study Team and DGSC members visited Ports of Tg Perak, Tg Emas, Makassar, Cirebon and Belawan on site to collect the data, and administrators and engineers of the Port Corporations kindly sent the necessary data for JICA Study Team for Ports of Palembang, Teluk Bayur, Panjang, Pontiak, Bengkulu, Banjarmasin, Samarinda, and Bitung.

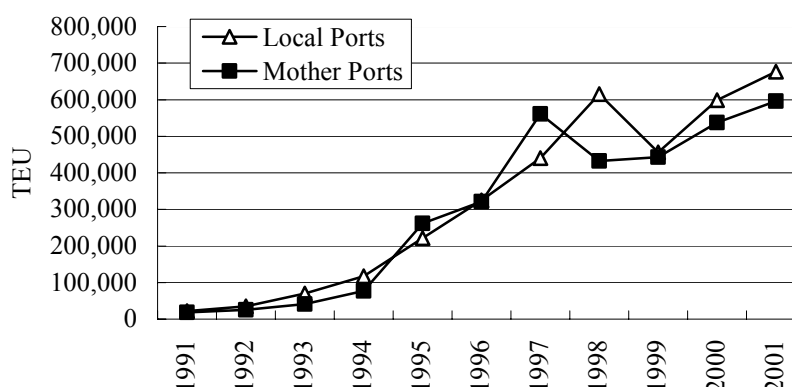
75. All Indonesian container handling ports mentioned above were classified into two groups; Mother ports and Local ports. The former constitutes Ports of Tanjung Priok and Tg Perak, and latter constitutes all of the rest ports. Domestic container throughputs were summed up by each group and compared with each other as shown in Table 7-B-5.

**Table 7-B-5 Throughput Comparison between Mother Ports and Local Ports**

(Unit: TEU)

Year	Local Ports			Tg Priok			Surabaya		
	Loading	Unloading	Sub Total	Loading	Unloading	Sub Total	Loading	Unloading	Sub Total
1991	9,781	11,873	21,654	11,032	7,775	18,807	0	0	0
1992	15,713	19,308	35,021	12,961	12,116	25,077	0	0	0
1993	32,937	36,911	69,848	20,874	20,588	41,462	0	0	0
1994	53,754	63,897	117,651	40,674	36,305	76,979	0	0	0
1995	100,890	120,702	221,592	69,144	81,455	150,599	44,595	66,893	111,488
1996	143,748	180,717	324,465	72,903	67,538	140,441	72,371	108,557	180,928
1997	199,515	240,489	440,004	94,827	92,013	186,840	149,773	224,660	374,433
1998	294,886	320,204	615,090	67,413	75,912	143,325	115,747	173,621	289,368
1999	216,136	239,929	456,065	117,355	91,602	208,957	93,518	140,277	233,795
2000	281,411	317,219	598,630	108,464	128,627	237,091	119,991	179,986	299,977
2001	327,031	349,762	676,793	70,227	128,691	198,918	202,516	194,575	397,091

Source: Indonesian Port Corporations



**Figure 7-B-17 Throughputs of Domestic Containers**

76. If all of the domestic container traffic have links with either Tanjung Priok or Tg Perak, and if domestic container traffic does not exist between the two mother ports, combined total throughput in domestic trade at the local ports must be equal to the total domestic throughput of Tanjung Priok and Tg Perak. As shown Table 7-B-5, total of the former was 676, 793 TEU in 2001, which was nearly equivalent to the latter, 596,009 TEU. The difference between the two figures may indicate the existence of the domestic container traffic between the two ports.

77. JICA Study Team also succeeded in obtaining operational records including local transshipment containers on some of the domestic shipping routes, as shown in Table 7-B-6. This table was developed from original 5 months operation records of domestic shipping companies and extended to annual basis by JICA Study Tem, by simply multiplying 2.4 times.

78. This table shows actual operation records on 5 domestic shipping routes; Jakarta-Pontianak, Jakarta-Banjarmasin, Jakarta-Makassar, Surabaya-Banjarmasin, and Surabaya-Makassar. Although this table represents the result of operations of plural domestic shipping lines, the figures cannot cover all of the activities at each port. The coverage varies case by case, and port by port. For example, according to this table, Pontianak Port unloaded 33, 840 TEU and loaded 23, 808 TEU, totaled 57, 648 TEU. According to the official statistics, Pontiak Port handled total of 74,467 TEU in the domestic trade in 2001. For Banjarmasin Port, total throughputs on the 2 shipping routes are 116,172 TEU in this table while official statistics revealed that Banjarmasin Port handled a total of 138,840 TEU in 2001. Roughly speaking, it seems that the table is covering about 70 % of the actual operation volumes

**Table 7-B-6 Container Movement on Selected Local Shipping Routes (Expanded to Annual Volume/ Original Data Jan. - May 2002)**

(Unit: TEU)

Local Port		Banjarmasin		Makassar		Pontiak		Total	
Mother Port		Out	In	Out	In	Out	In	Out	In
Jakarta	Domestic	22,008	11,508	28,836	15,444	33,840	23,808	84,684	50,760
	Transship	48	3,156	972	3,912	24	1,212	1,044	8,280
Surabaya	Domestic	43,092	29,280	41,556	25,992	0	0	84,648	55,272
	Transship	1,020	6,060	984	3,660	0	0	2,004	9,720

Source: Shipping Line

79. For domestic container trade, both Banjarmasin Port and Makassar Port have stronger ties of partnership with Surabaya Port than with Tanjung Priok Port. For international transshipment cargo, however, Makassar Port has evenly keen ties with the two ports. Needless to say, Pontianak Port has no tie with Surabaya Port in container traffic.

80. As mentioned in the Progress Report ( I ) of this Study, inter-island transshipment ratio at JICT was 1.03 % during the period from January through June 2002. Further, a bulletin published from KOJA terminal indicated that the transshipment ratio at the terminal was 4.60 % during the period from January through May 2002. Multiplying the transshipment ratio with the throughput at each terminal results in about 40,000 TEU. As a transshipped container is unloaded and loaded at the terminal, virtually about one percent of the total containers are currently transshipped at Tanjung Priok Port. This percentage is practically negligible at present.

81. Although ports in Sumatra Island have shipping networks with Tanjung Priok Port, many of them are geographically closer to Singapore and Malaysian ports than Tanjung Priok Port. Therefore container throughputs at local ports in Eastern Indonesian region only were summed up to evaluate the magnitude of potential transshipment container volume at Tanjung Priok Port

and shown in Table 7-B-7. Throughputs at all ports in Sumatra Island and Semarang as well as Tanjung Perak are excluded in this table.

**Table 7-B-7 Container Throughputs at local ports in Eastern Region**

(Unit: TEU)

Year	International			Domestic			Total		
	Export	Import	Sub Total	Loading	Unloading	Sub Total	International	Domestic	Total
1991	15,928	486	424	910	7,998	8,119	16,117	910	16,117
1992	15,936	1,527	1,510	3,037	13,050	14,146	27,196	3,037	27,196
1993	15,944	2,616	2,786	5,402	26,344	25,784	52,128	5,402	52,128
1994	15,952	3,317	2,428	5,745	43,030	43,169	86,199	5,745	86,199
1995	15,960	13,158	6,833	19,991	84,412	87,416	171,828	19,991	171,828
1996	15,968	21,463	11,304	32,767	121,662	134,421	256,083	32,767	256,083
1997	15,976	27,213	14,406	41,619	167,305	181,605	348,910	41,619	348,910
1998	15,984	19,728	9,987	29,715	267,576	284,317	551,893	29,715	551,893
1999	15,992	26,190	13,491	39,681	181,556	196,979	378,535	39,681	378,535
2000	16,000	35,609	17,023	52,632	226,607	245,637	472,244	52,632	472,244
2001	16,008	35,274	18,538	53,812	251,162	264,315	515,477	53,812	515,477

Source: PT. (Persero) Pelabuhan Indonesia II

Eastern local ports include Pontianak, Cirebon, Bengkulu, Banten, Banjarmasin, Samarinda, Bitung, Makassar. Semarang is excluded.

**82.** The locally borne international container volumes discussed above were forecast by a multiple regression model with Indonesian GDP as a regressor. Resulting volumes of locally borne export/import containers in eastern Indonesia are about 150 thousand TEUs in 2012, and 340 thousand TEUs in 2025 ( $R^2=0.921$ ). Even if all of them are transshipped at Tanjung Priok Port, the transshipment ratio of the inter-island containers will be less than 5% in the target years.

**83.** Forecast of volume of transshipment containers is quite difficult because whether shipping lines actually use the port as a transshipment port largely depends upon service level which terminal operators offer. It is useful to transfer the following remarks which a local shipping operator suggested to JICA Study Team: “Tanjung Priok Port has already served as a transshipment port for Banjarmasin, Pontianak, and Panjang even if currently at a small scale. This can be jacked up if infrastructure and institutional arrangements at Tanjung Priok Port are improved and better than those at Singapore so as to do this business.”

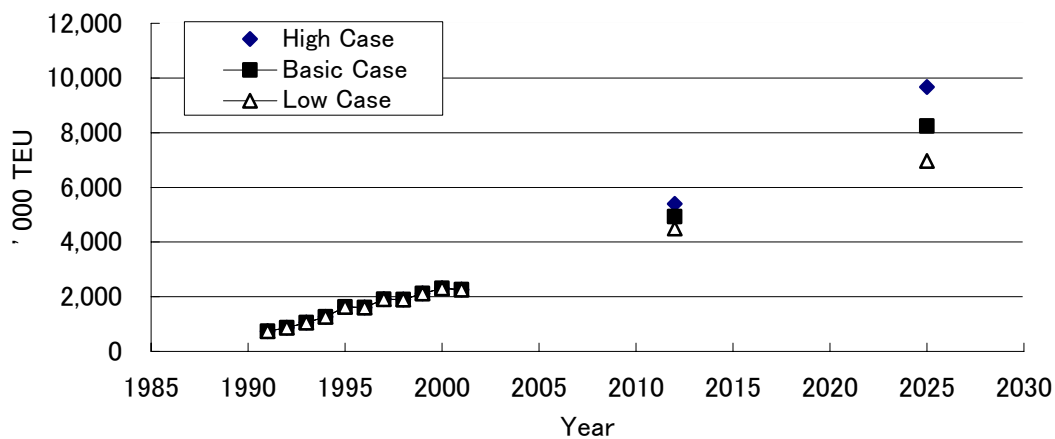
## 5) Summary

**84.** Total container throughputs at Tanjung Priok Port, which consist of international containers and domestic containers, are summarized in Table 7-B-8. Here, the study team excluded the category of transshipment container from the forecasted demand because their volume could be minimal and also there is a possibility it has been included in the forecast of international and domestic containers.

**Table 7-B-8 Total Container Throughput at Tanjung Priok**

(Unit: ' 000)

Case	Year	Total Loading		Total Unloading		Grand Total	
		Ton	TEU	Ton	TEU	Ton	TEU
High Case	2000	9,457	1,122	11,493	1,188	20,951	2,310
	2012	22,825	2,698	22,389	2,698	45,214	5,395
	2025	41,310	4,832	48,716	4,832	90,026	9,665
Basic Case	2000	9,457	1,122	11,493	1,188	20,951	2,310
	2012	20,871	2,466	21,062	2,466	41,933	4,931
	2025	35,256	4,120	43,070	4,120	78,326	8,240
Low Case	2000	9,457	1,122	11,493	1,188	20,951	2,310
	2012	19,017	2,245	19,797	2,245	38,814	4,491
	2025	29,860	3,485	38,009	3,485	67,869	6,970

**Total Container Throughput Forecast, Tanjung Priok Port****Figure 7-B-18 Total Container Throughput, Tanjung Priok****7-B-4 Forecast of Other Cargo Demand**

**85.** In this section, the other package types of cargoes (except container) at the 4 metropolitan ports are forecast. Methodologies for forecasting vary according to the package types, and are summarized in Table 7-B-9.

**86.** Regarding "General Cargo" and "Bag Cargo", a unique methodology is adapted in this study. Unlike bulk cargo, non-bulk cargo such as container, general cargo and bag cargo is distributed widely. Hinterland of each port might be overlapped with each other although the hinterland of Tanjung Priok Port is much larger than those of the other metropolitan ports.

**87.** Non-bulk cargo has another common tendency; most of them can be containerized. Cargoes which are transported in the form of general cargo or bag cargo can be transported in containers in the future although some of the non-bulk cargoes are ultimately not suitable for container transport.

**88.** Taking into consideration the facts mentioned above and future possibility of transportation network development in the metropolitan area, total volume of the non-bulk cargoes of the 4

ports is going to be forecast, and then subtract the container tonnage from the total non-bulk cargoes. Resulting combined tonnage of general and bag cargo will be allocated among the 4 metropolitan ports based on the present market share and future potential of each port.

89. The JICA study team constructed and applied a multiple regression model with a dummy variable for these historical trend data in order to forecast the non-bulk cargo tonnage through 2012. High coefficient of determination ( $R^2=0.922$ ) was obtained. For the period of 2013-2025, a growth model was applied, and the JICA study team assumed that the annual growth rates of the non-bulk cargo would be less than GRDP growth rates of the hinterland. This assumption stems from the well known tendency of decreasing elasticity of demand against GRDP in the long run.

90. Methodology to allocate the obtained total tonnage into the general cargo and the bag cargo at a given port will be explained in the latter part of this report. Resulting volume by package type for 4 metropolitan ports are summarized in Table 7-B-10 and Figure 7-B-19

**Table 7-B-9 Methodologies applied for forecasting by package type**

***By Packing Type, Tanjung Priok***

Container	Multiple regression model against trade partners' weighted GDP and Dummy for export tonnage, then convert to TEU using average weight/stuffed TEU and % of empty container. Number of TEU is assumed as same for export and import. Domestic traffic is forecast in the same way as international traffic. Applied regressors are national GDP for loading and hinterland GRDP for unloading containers, respectively.
Bag + General	<ol style="list-style-type: none"> <li>1. Combined tonnage of non-bulk cargo at Tg Priok, Sunda Kelapa, Banten and Cirebon is regressed against Hinterland GRDP and Dummy to get 2012 estimate. Annual growth model is then applied to obtain the 2025 non-bulk cargo estimate.</li> <li>2. Subtracting the pre-estimated container cargo tonnage of the metropolitan ports.</li> <li>3. Allotment to the 4 ports based on the present shares and future potential.</li> </ol>
Dry Bulk	Multiple regression against Hinterland GRDP and Dummy
Liquid Bulk	Correlation analysis between Hinterland Population

***By Packing Type, Sunda Kelapa***

Liquid Bulk	Null
Dry Bulk	Null
Container	Null
Bag + General	Same as Tanjung Priok

***By Packing Type, Banten***

Liquid Bulk	Multiple regression model against West Java GRDP and Dummy
Dry Bulk	Multiple regression model against West Java GRDP and Dummy
Container	Same growth ratio as Tanjung Priok Port
Bag + General	Same as Tanjung Priok

***By Packing Type, Cirebon***

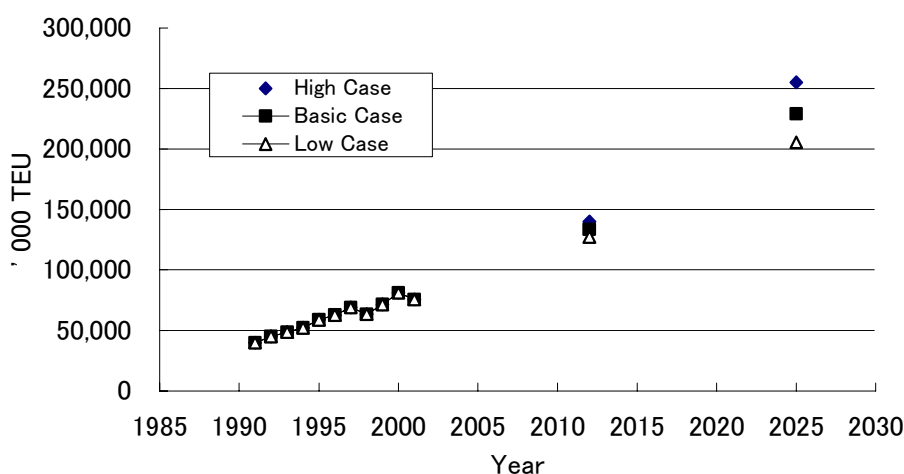
Liquid Bulk	Present level
Dry Bulk	Multiple regression model against West Java GRDP and Dummy
Container	Past Record
Bag + General	Same as Tanjung Priok

**Table 7-B-10 Cargo Tonnage by Package Type**

<b>Basic Case</b>		(Unit: ' 000 Ton)		
		2000	2012	2025
Container	Total	21,133	42,545	79,466
Bag + General	Total	13,878	22,351	28,591
Liquid Bulk	Total	18,830	33,049	60,370
	Tg Priok	9,726	11,644	14,046
	Banten	8,928	21,255	46,174
	Sunda Kelapa	28	0	0
	Cirebon	148	150	150
Dry Bulk	Total	23,578	33,452	58,470
	Tg Priok	6,929	11,004	20,129
	Banten	15,676	20,288	33,908
	Sunda Kelapa	0	0	0
	Cirebon	973	2,160	4,433
Others	Total	1,935	2,048	2,000
	Tg Priok	0	0	0
	Banten	59	48	0
	Sunda Kelapa	1,875	2,000	2,000
	Cirebon	1	0	0
Total	Total	79,354	133,445	228,897

<b>High Case</b>		(Unit: ' 000 Ton)		
		2000	2012	2025
Container	Total	21,132	45,871	91,335
	Tg Priok	20,951	45,214	90,026
	Banten	181	657	1,309
Bag + General	Total	13,878	22,562	29,943
Liquid Bulk	Total	18,830	34,552	66,763
	Tg Priok	9,726	11,644	14,046
	Banten	8,928	22,758	52,567
	Sunda Kelapa	28	0	0
	Cirebon	148	150	150
Dry Bulk	Total	23,578	34,960	64,888
	Tg Priok	6,929	11,554	22,470
	Banten	15,676	21,109	37,402
	Sunda Kelapa	0	0	0
	Cirebon	973	2,297	5,016
Others	Total	1,935	2,043	2,000
	Tg Priok	0	0	0
	Banten	59	43	0
	Sunda Kelapa	1,875	2,000	2,000
	Cirebon	1	0	0
Total	Total	79,353	139,988	254,929

Low Case		(Unit: ' 000 Ton)		
		2000	2012	2025
Container	Total	21,132	39,378	68,855
	Tg Priok	20,951	38,814	67,869
	Banten	181	564	986
Bag + General	Total	13,878	22,141	27,360
Liquid Bulk	Total	18,830	31,617	54,639
	Tg Priok	9,726	11,644	14,046
	Banten	8,928	19,823	40,443
	Sunda Kelapa	28	0	0
	Cirebon	148	150	150
Dry Bulk	Total	23,578	32,015	52,715
	Tg Priok	6,929	10,480	18,030
	Banten	15,676	19,505	30,775
	Sunda Kelapa	0	0	0
	Cirebon	973	2,030	3,910
Others	Total	1,935	2,051	2,000
	Tg Priok	0	0	0
	Banten	59	51	0
	Sunda Kelapa	1,875	2,000	2,000
	Cirebon	1	0	0
Total	Total	79,353	127,202	205,569



**Figure 7-B-19 Total Throughput at Major Metropolitan Ports**

91. Based on the above demand forecast for container cargo and general & bag cargo, future containerization ratio in total can be calculated and described as in Figure 7-B-20. It will be exceeding 70% in the future and this is reasonable figures comparing other cases in developed countries.



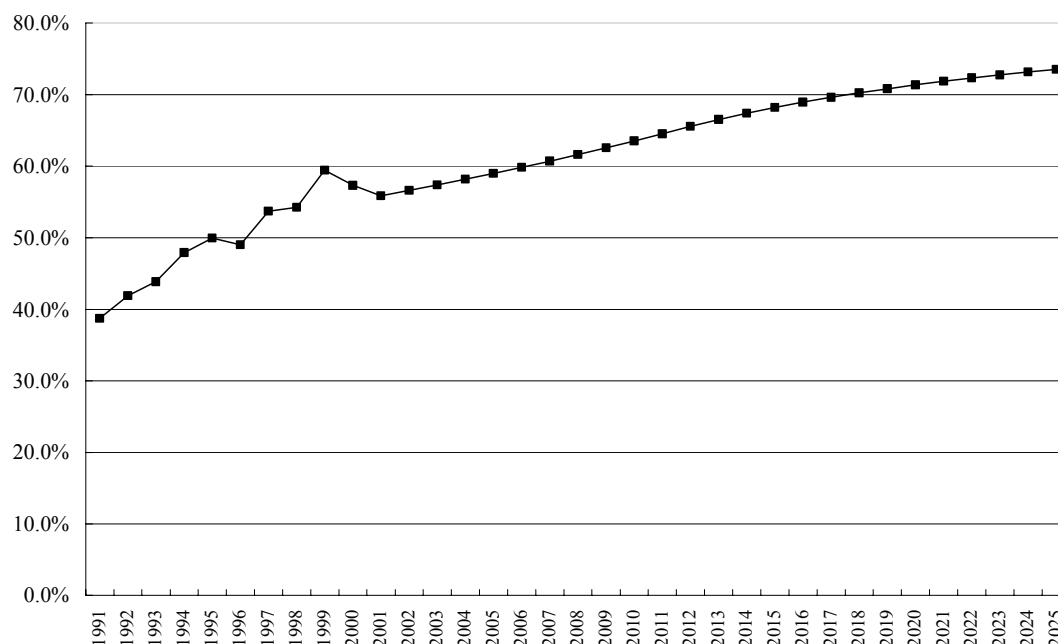


Figure 7-B-20 Containerization Ratio

### 7-C. FORECAST OF CARGO DEMAND BY COMMODITIES IN TANJUNG PRIOK

92. “Data Operasional Pelabuhan Tanjung Priok Tahun 2001” published in February 2001 is a key information source about port activities at Tanjung Priok Port. Regarding cargo tonnage handled at the port, this booklet provides us with commodity-wise information on strategic commodities. Historical trend of cargo volume of these commodities is, however, limited to four years only; from 1998 through 2001. Data for longer period of time are usually required as base information for forecasting future port demand.

93. Fortunately, commodity-wise information was provided in the form of “Arus Barang Menurut Jenis Komoditi Tahun 1990 S/D 1995”. Further, similar information was also given to the Study team for 1996 through 2000 in the form of computer diskette. The latter constitutes more detailed information, not only by trade type but also by terminal.

94. Comparison was made to verify these commodity-wise statistics with official cargo statistics, as shown in Table 7-C-1. Cargo volume of the commodity-wise statistics in 2000 is too small to be utilized, and that in 1995 is only about 80% of the official statistics. The other volumes of commodity-wise statistics are quite close to those of the official statistics.

Table 7-C-1 Comparison between Official Statistics and Commodity-wise Total

(Unit: '000 Ton)											
Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Official Statistics		18,184	21,912	23,799	26,805	30,938	40,212	42,431	38,344	43,437	49,816
Commoditywise Total	17,374	17,722	21,416	23,327	26,223	24,750	40,511	42,295	36,287	43,810	15,601

Source: IPC 2

1990-1995: Excluding oil discharged, 1996-2000: Including oil discharged

95. The commodity statistics reveal cargo tonnage by commodity. However, classification system of port cargo has not established either at Tanjung Priok Port or in Indonesia.

Commodities were classified into more than one hundred items, which seem to be too much subdivided. For example, each of Besi Baja, Besi Bangunan, Besi Beam, Besi Beton, Besi Bilet, Besi Coil, Besi, Pipa, BesiPlat, Besi Roll, Besi Siku, Besi Tua, and Besi Ass is treated as a single commodity category in this statistics. It sometimes is more practical and convenient for users if these commodities are aggregated into a single category. It is highly recommended that consistent cargo classification system be established in throughout Indonesian ports as soon as possible.

96. JICA study team proposed a temporal cargo classification system for the purpose of implementation of this study, which was already shown in the Progress Report (1). Cargo volumes classified by the commodity-wise statistics were rearranged and summed up into the proposed cargo classification category so that they can serve as basic data for forecasting future port demand by commodity.

97. The commodity-wise statistics 1999 provide the latest information on cargo volume not only by commodity but also by terminal. As the cargo volumes of containers have been already examined and forecast, it is better to forecast volumes of non-containerized cargoes. JICT and KOJA terminal are the dedicated container terminals, and container cargo tonnage handled at the conventional terminal is less than 5 % of the total container tonnage at Tanjung Priok Port. Therefore, when cargo tonnage is categorized by commodity, then percentage of the two dedicated container terminals almost represents containerized ratio. Commodities which meet the conditions that the cargo tonnage is more than one million tons and the containerized ratio (percentage of the container terminals) is less than 5 % are chosen for detailed demand forecast, which are shown in Table 7-C-2.

**Table 7-C-2 Non-Containerized Major Cargoes**

Code and Commodity	Total Tonnage	% of Container
11. Rice	1,027,030	0.0%
12. Wheat	1,354,680	0.0%
13. Other grain (beans,maize, corn), and powder	1,331,154	2.7%
14. Crude Palm Oil (CPO)	1,020,157	0.0%
31. Cement, clinker and gypsum	4,579,940	1.8%
43. Gasoline and other fuel	6,557,263	0.0%
51. Steel and steel products	1,554,208	9.1%

Source: IPC 2, JICA Study Team

98. After submitting the Interim Report (I), the Study team held a series of meeting with counterpart personnel to discuss the draft outcome of the port demand, and constructive comments as well as the latest information were provided.

99. In addition to that, the counterpart agencies helped the Study team by arranging a series of meetings and interviews with major port customers, which included a steel manufacturing company and cement industries. Market development strategies of individual companies and future prospects of the respective industries were obtained.

100. The study team has revised the demand forecast proposed in Interim Report (I) based on the suggestions and comments given by the counterpart and the latest information obtained through the interviews with port customers.

101. Methodologies applied for demand forecasting, which are summarized in Table 7-C-3, vary according to the commodity type, and basically follow the ways utilized in the previous report. Statistical data sources for forecasting have not been limited to Indonesian sources but databases of International institutions such as the World Bank, FAO, IEA have been reviewed

for reference. Outcomes of the future demands are also cross checked with Asian and international standpoints.

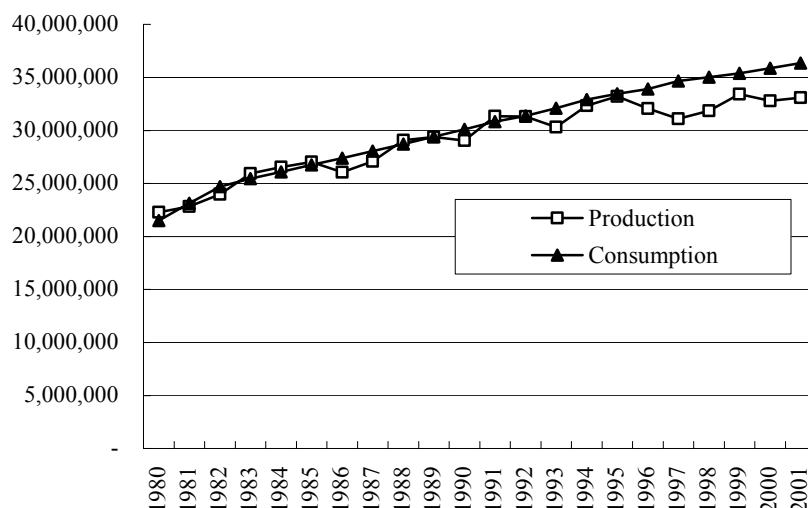
**Table 7-C-3 Methodologies for Forecasting by Major Commodity/Traffic Type**

Commodity	Methodology
Container	As shown by package type
Rice	Production and consumption of rice in Indonesia are checked first. The former is forecast by time series analysis, and the latter is regressed against population. Import makes up for the shortage, 40% of which will pass through the port of Tanjung Priok. Past records are also taken into consideration for the domestic trade forecast.
Wheat	Import volume is regressed against GDP per capita and Dummy. Share of Tg Priok is set at 57.2 % of the total import. Export volume is forecast by the past record, and domestic portions are calculated on ratio to the import vol.
Other Grain	Deficit between domestic production and consumption will increase with 4.3% annual growth rate up to 2012, and 3.3 % afterward. Fifty five percent of the total national import will pass through Tg Priok Port. Total tonnage at the port is 1.2 times larger than the import volume.
Crude Palm Oil	Regressed against Hinterland Population.
Cement	Domestic consumption is regressed against construction sector's GDP. Export of cement/clinker will grow at the same rate as the economic growth rate in Asia & Pacific. When utilization rate reaches 100%, export volume decreases as domestic demand increases. Expansion of production capacity is taken into consideration. Tg Priok Port will handle 30% of national export. Gypsum is 4% of the total production. 33% of required gypsum will pass through Tg Priok Port. 63.8% of the required volume will be obtained through foreign market. Ratio of domestic loading against the domestic consumption is 2.4 % and that of domestic unloading is 2 %.
Gasoline and Other Fuel	Growth model with annual 1.6%
Steel and Steel Products	Domestic consumption of steel products is regressed against Hinterland GRDP and Dummy. National import of steel and steel products is then regressed against the domestic consumption. Tg Priok Port will handle 40% of the national import of this cargo. Cargo volumes of export and domestic trade are also added up.
Stone, Sand and Clay	Regressed against Hinterland GRDP and Dummy.
Others	Difference between the total and sum of individual forecast.
Exported/Imported Cars	Based on interviews and logistic plan of 4 car assemblers, congregated market share of which is around 60 % in 2005. Annual growth rate of Ex/Im CBU cars is 4.5% after 2006.
Passenger	Regressed against population, GDP per capita, and Dummy. After 2006 the number of passengers will grow at the same rate of population growth. International passengers are added up based on past records.
Ro/Ro	Freight and vehicle traffic is regressed against GRDP of the hinterland, and passenger traffic is forecast by a growth model with annual 4.0% up to 2011, and 3.0 % afterward.

### 7-C-1 Rice

**102.** Indonesia experienced poor crop in 1997, 966,000 tons drop from the previous year. Then import volume of rice at Tanjung Priok Port registered 1,463,977 tons in 1998. Nearly one million tons of rice was imported through Tanjung Priok Port in 1995 and 1999. Last year only

158,009 tons of rice was unloaded at the port. Thus, volume of rice has been influenced by weather conditions and its yield. Based on the FAO's statistics, production and consumption of rice in Indonesia are shown in Figure 7-C-1.



**Figure 7-C-1 Production and Consumption of Rice in Indonesia**

**103.** Future production of rice was forecast by time series analysis ( $R^2=0.9515$ ), and consumption was regressed on Indonesian population ( $R^2=0.9823$ ). The result tells that amount of production in Indonesia will meet the amount of consumption in around 2006. Therefore, theoretically there will be no need to import rice after that.

**104.** However, weather conditions in future cannot be easily forecast. In lean years, import is necessary because rice is staple diet for Indonesian people. On the other hand, in years of rich harvest, surplus rice has to be exported to international markets. Further, domestic trade of rice is inevitable because production and consumption do not always agree in each region over time.

**105.** In case of poor crop, maximum one million tons are assumed to import, and actual past records were taken into consideration for the future domestic trade volume. However, these forecasts should not be regarded as the target year's tonnage, but might be better to be taken as reserve.

**106.** Historical trend and forecast are summarized in Table 7-C-4 and Figure 7-C-2

**Table 7-C-4 Historical Trend and Forecast, Rice**

(Unit: '000 Ton)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2012	2025
Total Tonnage	196	157	332	189	565	1,077	638	352	1,630	1,027	534	194	1,500	1,500

Source: IPC 2, JICA Study Team

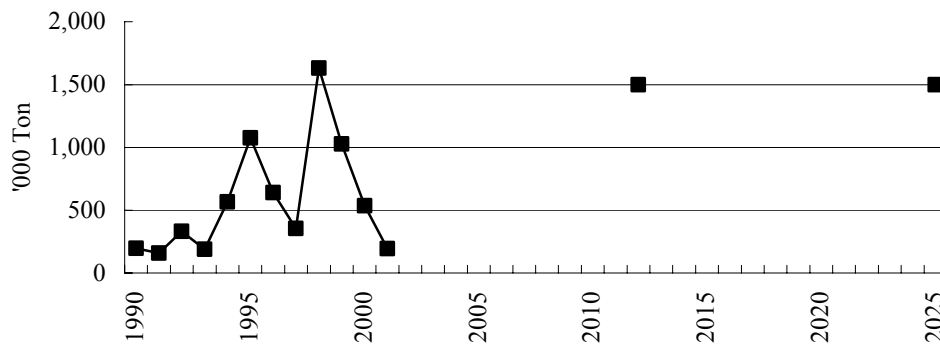


Figure 7-C-2 Total Tonnage of Rice, Tanjung Priok

### 7-C-2 Wheat

**107.** Wheat and flour are important food in Indonesia after rice. The largest users of flour are the small-scale enterprises such as the wet & dry noodle industry, market share of which is about 30 %. Bakery and biscuit industry consume about 25 % and 15 % respectively. Instant noodle industry consumes about 20 %, and fried snack and general household consume about 10 %.

**108.** Basic material of flour is wheat. Nearly all of the consumed wheat in Indonesia are supplied by foreign producers. Main import origins are Australia, Argentina, the United States, and Canada.

**109.** There are currently four flour companies in Indonesia; PT ISM Bogasari Flour Mills in Jakarta and Surabaya, PT Sriboga Raturaya in Semarang, PT Panganmas Inti Persada in Cilacap, and PT Berdikari Sari Utama Flour Mills in Makassar.

**110.** Bogasari has a production capacity of 3.6 million tons per year, the largest in the world in a single location. Bogasari Jakarta has 140 wheat silos with a total capacity of 4,000 mt, pellet silos with a capacity of 69,000 mt and warehouses for the storage of goods with a capacity of 65,000 mt.

**111.** This company has two piers, 185 m and 200 m in length and 9 m and 14 m deep (according to the date of IPC2 175m and 187m with -10m), and equipped with a pneumatic unloading equipment of 3,800 mt per hour. One of these piers can accommodate the Panamax class size vessels. Marine Division of this company operates three wheat transport vessels capable of carrying 100,000 mt and three barges with a capacity of 8,000 mt.

**112.** Presently Indonesia imports a total of about four million tons of wheat annually, and more than half are passing through Tanjung Priok Port. Consequently this port handles over two million tons of cereal, together for international and inter-island trade. About 90 %, however, of the total tonnage handled at Tanjung Priok Port are import cargoes.

**113.** Historical trend of Indonesian import of wheat can be obtained from the FAO statistics, and its future volume was forecast by a multiple regression model, in which GDP per capita was served as a regressor together with a dummy variable. ( $R^2=0.887$ ) It was set that 57.2 % of the total import of wheat will be unloaded at Tanjung Priok Port based on actual records. Export volume was forecast by the past record, and inter-island trade volumes are calculated on the basis of the ratio to the import volume.

**114.** It is wise to cross check and verify the forecast result. As mentioned above, future import volume is forecast by the multiple regression model. The resulting volume of imported wheat in total Indonesia is 10.8 million in 2025. Currently Indonesia's wheat flour consumption per capita is 10 to 12 kg only. If 10.8 million tons wheat/flour are imported and consumed, per capita consumption of flour will be 22.5 kg in 2025. Presently Singapore and Malaysia's per capita consumption of flour are 71 kg and 40 kg respectively. It can be said that continuous growth of wheat industry is possible in Indonesia.

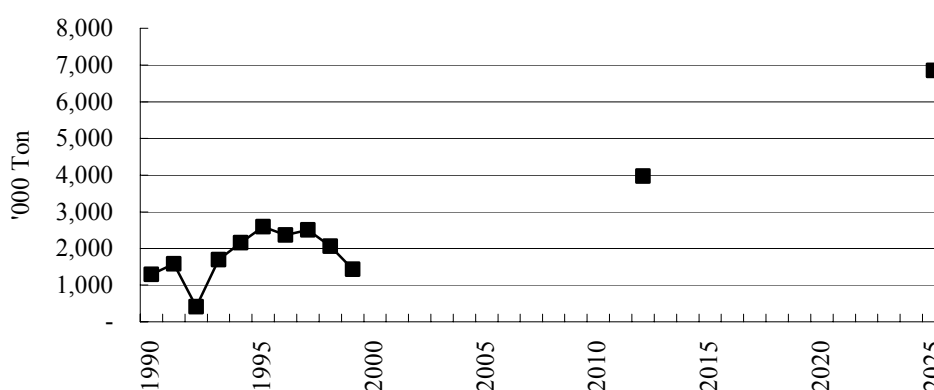
**115.** Historical trend and forecast volumes of the target years are shown in Table 7-C-5, and Figure 7-C-3.

**Table 7-C-5 Historical Trend and Forecast, Wheat**

(Unit: ' 000 Ton)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2012	2025
Total Tonnage	1,289	1,573	412	1,690	2,157	2,589	2,364	2,502	2,061	1,426	3,976	6,847

Source: IPC 2, JICA Study Team



**Figure 7-C-3 Total Tonnage of Wheat, Tanjung Priok**

### 7-C-3 Other Grain and Powder

**116.** A category of "Other Grain and Powder" constitutes beans, maize, soybeans and their powder. These crops and products are directly consumed as food or given the cattle as their feed.

**117.** FAO statistics provide historical trend of production and demand of these grains in Indonesia. The data for the period from 1990 through 2000 are shown in Figure 7-C-4. The demand for these commodities have been outweighed the domestic production over the decade, resulting considerable amount of import. Amount of shortage has been increasing over the years, and exceeded 2.5 million tones in 2000.

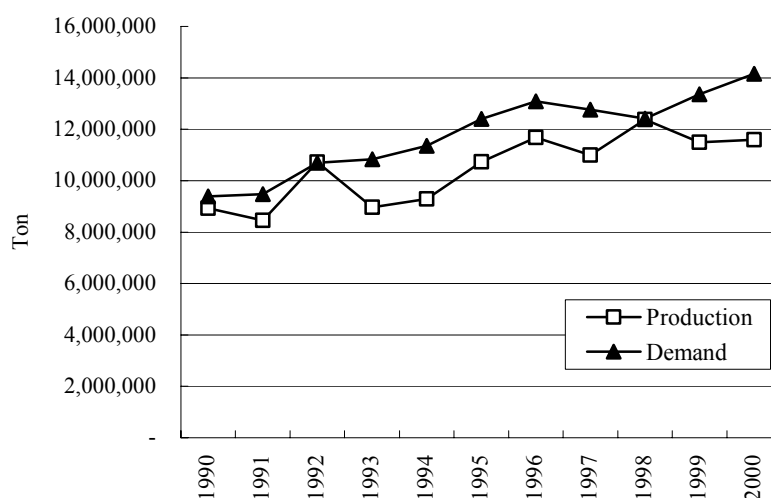


Figure 7-C-4 Production Demand of Other Grain in Indonesia

118. The amount of shortage was 2.07 million in 1994, thus its average growth rate is calculated at 4.3 % per annual over 1994-2000. JICA study team assumes that the gap between production and consumption will continue with the annual increase rate of 4.3 % up to 2012, and then decrease to 3.3 %, taking consideration the decrease rate of population growth rate in Indonesia.

119. Based on the actual result, it is forecast that 55 % of the total volume of the national import of other grain will pass through Tanjung Priok Port, and total tonnage including inter-island trade will be 20 % larger than the import volume.

120. Historical trend and forecast of other grain and powder at Tanjung Priok Port for the target years are shown in Table 7-C-6 and Figure 7-C-5.

Table 7-C-6 Historical Trend and Forecast, Other Grain

(Unit: ' 000 Ton)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2012	2025
Total Tonnage	524	806	590	931	1,542	1,083	849	789	606	1,331	2,188	3,782

Source: IPC 2, JICA Study Team

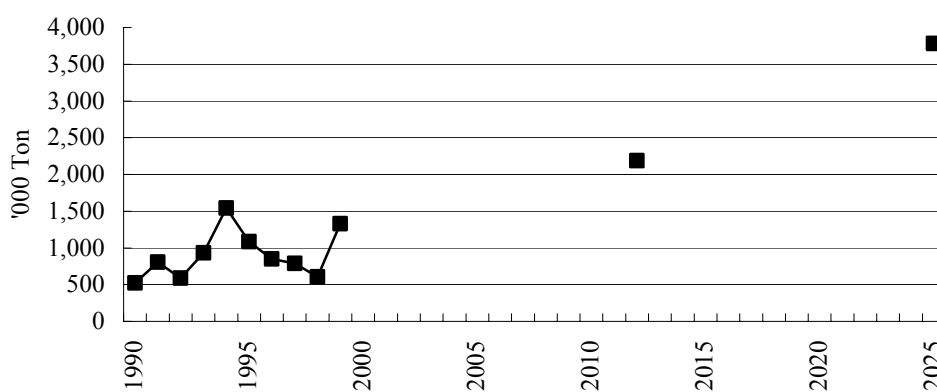


Figure 7-C-5 Total Tonnage of Other Grain, Tanjung Priok



**7-C-4 Crude Palm Oil (CPO)**

**121.** Crude Palm Oil (CPO) is mainly used to produce refined, bleached and deodorized palm oil (RBDPO). RBDPO is further fractionated to produce RBD olein and RBD stearine. RBD olein is used mainly in the manufacture of cooking oil and margarine. RBD stearine is primarily used in the manufacturing of soaps and detergent.

**122.** Indonesia currently produces about 6 million tones of CPO annually, and ranked as the second largest CPO producer only after Malaysia. About half of the CPO produced are consumed domestically.

**123.** The average growth in global demand for palm oil has been 7.6% per year from 1991 to 1996 (ING Barings Research Report, June 1999). The CPO-derived cooking oil industry has experienced continuous growth in the last 10 years, along with the growth of the country's palm oil industry.

**124.** North Sumatra has been played as the center of the cooking oil industry in Indonesia. Jakarta is sub-center of this industry in Indonesia. In 1999, 12 CPO-based cooking oil factories were located in this capital city with production capacity of 1,364,455 ton.

**125.** Tanjung Priok Port has been utilized as a unloading point for CPO, which primarily produced in Sumatra. As products of CPO are mostly consumed domestically, per capita volume of CPO unloaded at Tanjung Priok Port have been stable over the years. Therefore, future CPO volume unloaded at the port can be estimated at multiplying the population in the target year. Total tonnage including loading tonnage can be estimated by the ratio between loading and unloading volume.

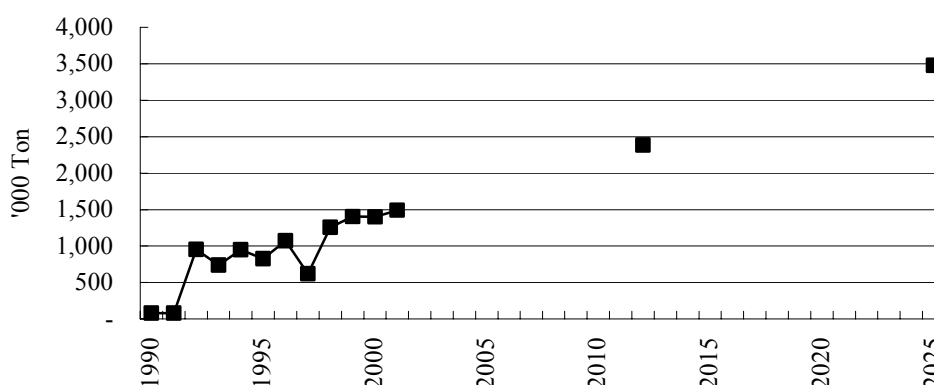
**126.** Historical trend and future volume of CPO in the target years are shown in Table 7-C-7 and Figure 7-C-6.

**Table 7-C-7 Historical Trend and Forecast, Crude Palm Oil**

(Unit: '000 Ton)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2012	2025
Total Tonnage	77	77	950	738	949	826	1,070	617	1,255	1,402	1,401	1,490	2,386	3,480

Source: IPC 2, JICA Study Team

**Figure 7-C-6 Total Tonnage of Crude Palm Oil, Tanjung Priok**

### 7-C-5 Cement

**127.** The Indonesian cement industry consists of nine companies, six of which are Government-owned. According to Indonesia Cement Statistics 2001, total cement design capacity is 47.57 million tonnes, about 38% of which is controlled by the Government. The cement industry has historically been dominated by three companies: Indocement, PT Semen Gresik ("Semen Gresik") and PT Semen Cibinong ("Cibinong"), which together control over 90 % of domestic production capacity.

**128.** Previously, the Indonesian cement industry was heavily regulated by the Government such as the prices, export quota, and expansion permit. Furthermore, the Government also influences the cement industry through the direct ownership of various cement producers. However, as part of the recent IMF reform package, the Government has moved towards a full market oriented policy, removing the regional retail guidance prices and export quotas.

**129.** In 2001, Indonesian cement factories produced 31 million tones of cement, and 25.7 million tones were sold in domestic market, and 9.5 million tones were sold in overseas market. As shown in Figure 7-C-7, the production capacity was expanded just before the economic crisis in 1998, many cement companies have suffered from the overcapacity. Currently average utilization ratio of cement manufacturing plants is about 65 %. According to the operation report of Tanjung Priok Port, a total of 2.7 million tones of cement were loaded and unloaded at the port.

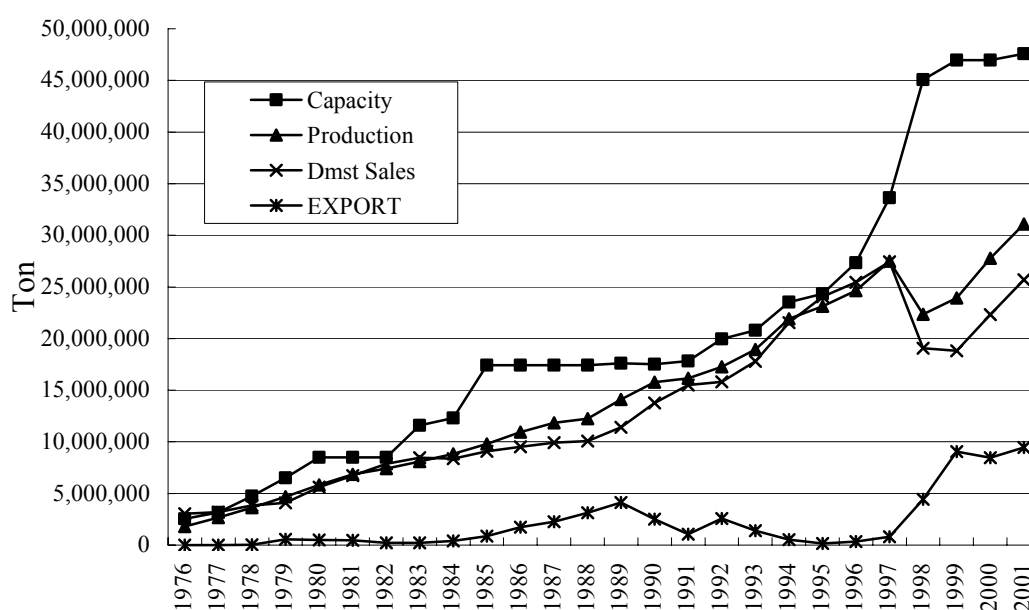


Figure 7-C-7 Cement Industry in Indonesia

**130.** Among the nine cement companies, two companies have manufacturing plants in West Java:

PT Indocement Tunggal Prakarsa	Citeureup	9 Kiln
	Palimanan	2 Kiln
PT Semen Cibinong	Narogong	4 Kiln

**131.** Limestone and clay make up 90 % of raw material requirements, and they are usually quarried at the manufacturing sites. The raw materials are dried, ground, proportioned and homogenized before being transferred to rotary kilns to be burned. The resulting material is called clinker, and crushed with gypsum at the cement grinding mill to make Portland cement. Gypsum typically makes up 3 to 5 % of the finished product. Cement production requires energy to heat kilns and electricity to run other machinery and equipment. Coals are usually used as energy resources in Indonesia, and transported from East Kalimantan. Most of them are unloaded at Banten Port and Cirebon Port.

**132.** Cement consumption in Indonesia has historically been correlated with general economic activity and, in particular, growth in the construction sector. In the period from 1991 to 1999, gross domestic product (GDP) grew at an average annual rate of 6.9%, while consumption of cement increased at an average rate of approximately 10.4%.

**133.** Domestic cement consumption is forecast using a multiple regression model with a independent variable of the construction sector's GDP. Future growth rate of the construction sector's GDP is assumed to be higher than GDP of the general economy. As shown in Table 7-C-8, resulting volumes are 37 million tons in 2012, and 79 million tons in 2025, which are 1.67 times and 3.53 times larger than those in 2001, respectively. Coefficient of Determination (R<sup>2</sup>) is 0.9407.

**Table 7-C-8 Historical Trend of Domestic Consumption and Forecast**

(Unit: ' 000 Ton)												
Year	1976	1980	1985	1990	1995	1996	1997	1998	1999	2000	2001	2012
Total Tonnage	3,023	5,605	9,082	13,762	24,062	25,435	27,447	19,075	18,817	22,307	25,700	37,677
												2025
												79,174

Source: Indonesia Cement Statistics 2001, JICA Study Team

**134.** In 1997, the Government removed the export quota system in connection with the IMF reform package. Indonesian cement makers exported a total of 8.5 million tones of cement and clinker in 2000, and 9.5 tonnes in 2001. Main export markets for Indonesian producers include Bangladesh, Malaysia, Namibia and Singapore.

**135.** Indonesian cement market is experiencing oversupply because a domestic demand cannot reach 30 million while national capacity is more than 47 million. In order to increase the utilization rate of the manufacturing plants, cement companies have been trying to expand overseas markets.

**136.** Indocement's majority shareholder is HeidelbergCement – a world class cement producer based in Germany and operating in 50 countries. The link-up to HeidelbergCement's global marketing network intensified the company's opportunities in the export market. In addition, the second largest shareholder in PT Semen Cibinong Tbk is Holderbank, which is one of the world's leading suppliers of cement, and has shares of companies in 70 countries. These worldwide networks enable the companies to expand international markets.

**137.** Considering these situations surrounding the Indonesian cement market, JICA study team assumes that cement and clinker export will grow with annual growth rate of 10 % up to 2005, and export ratio against total annual national production will be kept at the 2005 level through 2012. During 2012 -2025, export volume of cement and clinker will remain at the 2012 level. It is also assumed that Tanjung Priok Port will handle 35 % of the exported volume of cement and clinker based on the actual cargo tonnage and market shares of Indocement and Semen Cibinong. Ratio between cement and clinker is assumed at 60 % the former vs 40 % the latter .

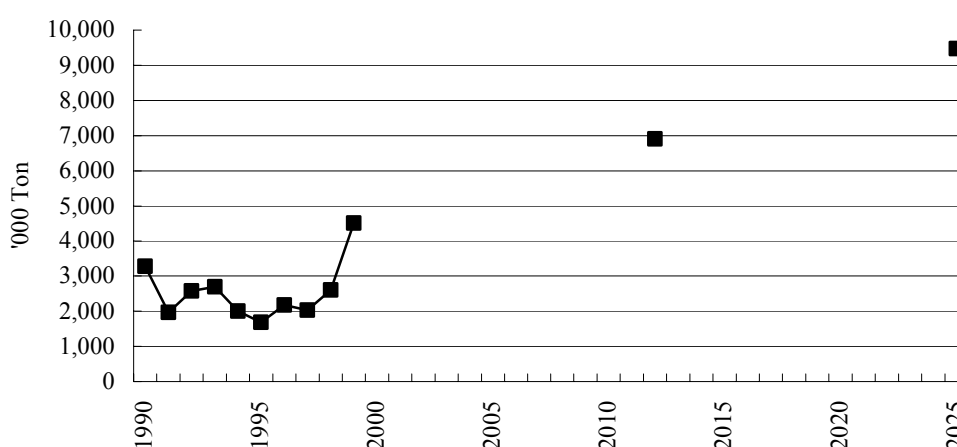
**138.** Volume of gypsum can be calculated at 4 % of the total cement/clinker production, and 35 % of the resulting volume will pass through Tanjung Priok Port. Regarding volumes of cement and clinker in the inter-island trade are forecast in consideration of actual ratios against the volumes of the domestic consumption.

**Table 7-C-9 Historical Trend and Forecast, Cement/Clinker/Gypsum**

(Unit: ' 000 Ton)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2005	2012	2025
Cement	2,207	1,177	1,394	1,705	1,231	1,179	1,679	1,381	2,241	3,024	4,261		
Clinker	745	504	878	594	365	179	143	275	67	1,148	2,295		
Gypsum	322	287	307	394	403	323	357	371	294	341	568		
Total	3,274	1,968	2,579	2,693	1,999	1,682	2,179	2,027	2,602	4,514	7,125	6,909	9,473

Source: IPC 2, JICA Study Team



**Figure 7-C-8 Total Tonnage of Cement/Clinker/Gypsum, Tanjung Priok**

### 7-C-6 Gasoline and Other Fuel

**139.** Volume of cargo classified as “Gasoline and Other Fuel” amounted to 6.6 million tones in Tanjung Priok Port in 1999. Nearly 100 % of the total cargo tonnage was unloading cargo. These cargoes are consumed as fuels for industries and transportation vehicles in the metropolitan area.

**140.** Total tonnage of this cargo at Tanjung Priok Port was 6.3 million in 1996. Therefore annual growth rate for the period of 1996–1999 is calculated at 1.4 %. Study report on the development plan of the bulk terminal at Tanjung Priok Port by Bandung Institute of Technology provides a different data on cargo volume. According to this report, Tanjung Priok Port handled 7.0 million tones of oil in 1994, and 7.4 tonnes of oil in 1998. the resulting growth rate over the period is 1.6 % annually.

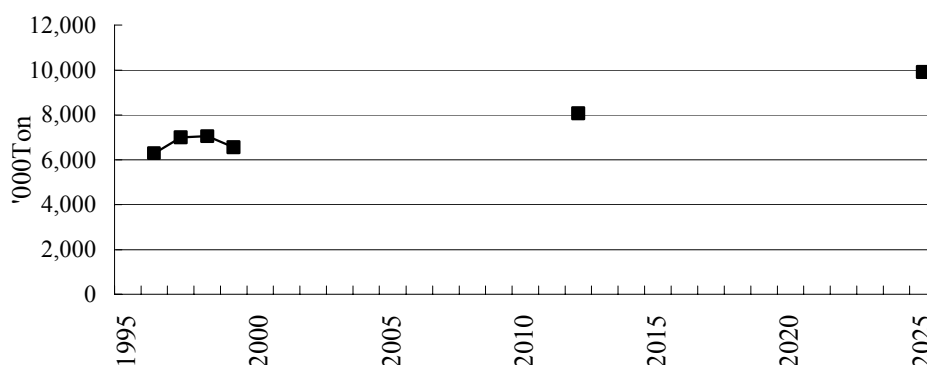
**141.** On September 22, 2002, International Energy Agency published a study report on long term energy demand. According to this report, the world oil demand for energy will increase with annual growth rate of 1.6 % annually from 2000 through 2030. JICA study team follows this long term forecast, and a growth model is applied to forecast the target years’ demands.

**142.** Historical trend and forecast of “Gasoline and Other Fuel” are shown in Table 7-C-10, and Figure 7-C-9.

**Table 7-C-10 Historical Trend and Forecast, Gasoline and Other Fuel**

(Unit: ' 000 Ton)						
Year	1996	1997	1998	1999	2012	2025
Gasoline and Other Fuel	6,280	6,995	7,054	6,557	8,060	9,907

Source: IPC 2, JICA Study Team

**Figure 7-C-9 Total Tonnage of Gasoline and Other Fuel****7-C-7 Steel and Steel Product**

**143.** Generally speaking, the level of steel consumption in Indonesia has had a direct correlation with prevailing economic conditions. For the past 10 years from 1988 to 1997, average annual growth rate of steel consumption in Indonesia registered 12 percent. This is accounted for various infrastructure projects and industrial factory developments in that period.

**144.** In the last decade, Indonesia was the largest steel producer in ASEAN. By 1996, the steel production in Indonesia accounted for 35 percent of the total production in ASEAN region. On the other hand, steel consumption in Indonesia during this period of time overweighed production, resulting in significant inflow of steel and steel products from foreign countries. In 1996, domestic steel consumption registered 14.1 million tonnes.

**145.** The steel industry in Indonesia is essentially comprised of one integrated mill, PT Krakatau Steel, that makes steel from iron ore and many mini-mills that use scrap metal as their raw material. The principal products made in Indonesia include hot rolled sheets, cold rolled sheets, wire rods, and galvanized steel.

**146.** Tanjung Priok Port handled 2.2 million tones of steel and steel product in 1996, and 2.5 million tones in 1997. Indonesian economy was hampered by the economic crisis in 1997/98, and cargo tonnage dropped to 1.4 million tones. Since then the cargo volume has been gradually increasing. It is expected that in 2005 the domestic consumption of steel products will reach 13.9 million tones.

**147.** It is widely believed that the steel consumption is correlated with prevailing economic conditions, so as cargo tonnage at the port. A multiple regression model was constructed to forecast the target years' import volume of steel. As majority of steel handled at Tanjung Priok Port has been imported one, GRDP of the hinterland was selected as a regressor ( $R^2=0.9425$ ).

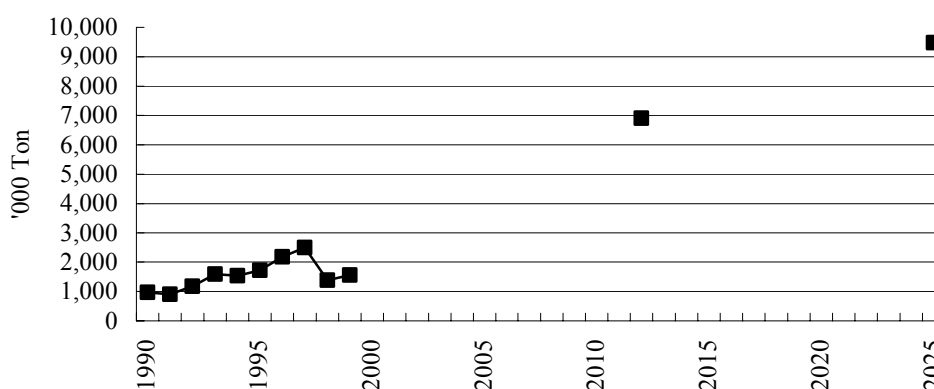
**148.** According to International Iron and Steel Institute, the world average for apparent steel consumption per capita was 138.2 kg in 1999. Indonesia registered the highest steel consumption of 14.1 million in 1996, resulting per capita consumption was about 70 kg only. It is reported that currently per capita steel consumption in China is 107 kg, South Korea 757 kg, and Taiwan 1,109 kg. Indonesia economy needs plenty of steel and steel products to catch up with Newly Industrialized Economies.

**149.** Historical trend of cargo tonnage and forecast volumes of steel and steel products at the target years' are summarized and shown in Table 7-C-11 and Figure 7-C-10.

**Table 7-C-11 Historical Trend and Forecast, Steel and Steel Product**

(Unit: '000 Ton)												
Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2012	2025
Total Tonnage	969	910	1,178	1,588	1,537	1,719	2,174	2,498	1,388	1,554	6,909	9,473

Source: IPC 2, JICA Study Team



**Figure 7-C-10 Total Tonnage of Steel and Steel Product**

### 7-C-8 Exported/Imported Cars

**150.** The development of automotive industry in Indonesia was started in 1964 by assembled parts and components of automobile imported in Semi Knocked Down (SKD) bases. In 1969, the policy, particularly those for sedan and commercial cars, was changed in which the importation of parts and components should be in a Complete Knock Down condition. In 1974, importation was allowed only for CKD bases. In order to support the automotive industry, the Government in 1976 issued a regulation that persuasively drove automotive industry to use locally manufactured components in their assembling operations.

**151.** After 1993 Indonesian Government launched a series of policies regarding development of Indonesian car industries, including the National Car Program. On January 15, 1999, however, Indonesia Government committed that subsidy programs including for automotive industry should be eliminated. Currently attentions are paid to AFTA agreement.

**152.** Indonesia is a member of ASEAN Free Trade Area (AFTA), Asia Pacific Economic Cooperation (APEC) and therefore bound to its commitment to these regional trade arrangements. Indonesia, and other ASEAN countries, is also committed to the AICO scheme. AFTA agreement consist of:

- Common Effective Preferential Tariffs, where by the year 2002 the maximum tariff in and among ASEAN countries is 5%;

- Inclusion List, effective January 1st, 2000, where the maximum tariff (included motor vehicles) is 20%;
- AICO scheme, where the maximum tariff (included motor vehicles) is 5 %.

**153.** Presently around twenty automobile assemblers are operating in Indonesia, and manufacturing 22 brands of automobiles. Total capacity of the assembling manufacturers exceeds 700,000 units per year.

**154.** Production, sales and export/import volume of automobiles during 1989 through 2002 can be depicted in Figure 7-C-11. In this table, import volume is estimated by subtracting car production from total sales. The growth was quite promising from 1994 to 1997. When the economic crises began in 1998, production volume was dropped sharply from 389,259 units to merely 58,079 units and from 392,185 to 68,809 for total sales volume. However, this figure tends to recover starting from the year of 1999, in which the production volume increased to 89,027 units, and to 125,469 for total sales volume, which resulted in rapid increase of export volume (31,655) as well as import volume (36,442). In 2000, production and domestic sales were jumped to the level of 300,000 units. Many experts in automotive industries estimate that production will recover to the pre-crisis level at 2005-2007, while production and sales during recent years from 2000 to 2002 remain relatively flat.

**155.** Future production, sales and export/import is estimated as in Figure 7-C-11 assuming the growth rate of domestic sale will be equivalent to the economic growth rate, and ratio of export to total sales and ratio of import to domestic sales will be reached to 20% and 25% respectively as shown in the table.

#### **Figure 7-C-11 Trend of Car Production, Sales, Import/Export**

**156.** In the past years, the volume of exported and imported CBU cars through Tg Priok Port had been minimal, however, since last years when taking effect of AFTA agreement, the export/import volume of CBU has dramatically increased reaching almost 10,000 units yearly base. It is expected that the number of CBU cars passing through ports will increase in ASEAN countries.

**157.** A series of interviews and discussion were carried out by JICA Study Team members with executives of automotive manufacturing companies regarding prospects of production and transportation of cars and parts in Indonesia. Regarding information on export and import of the CBU cars are summarized in Table 7-C-12.



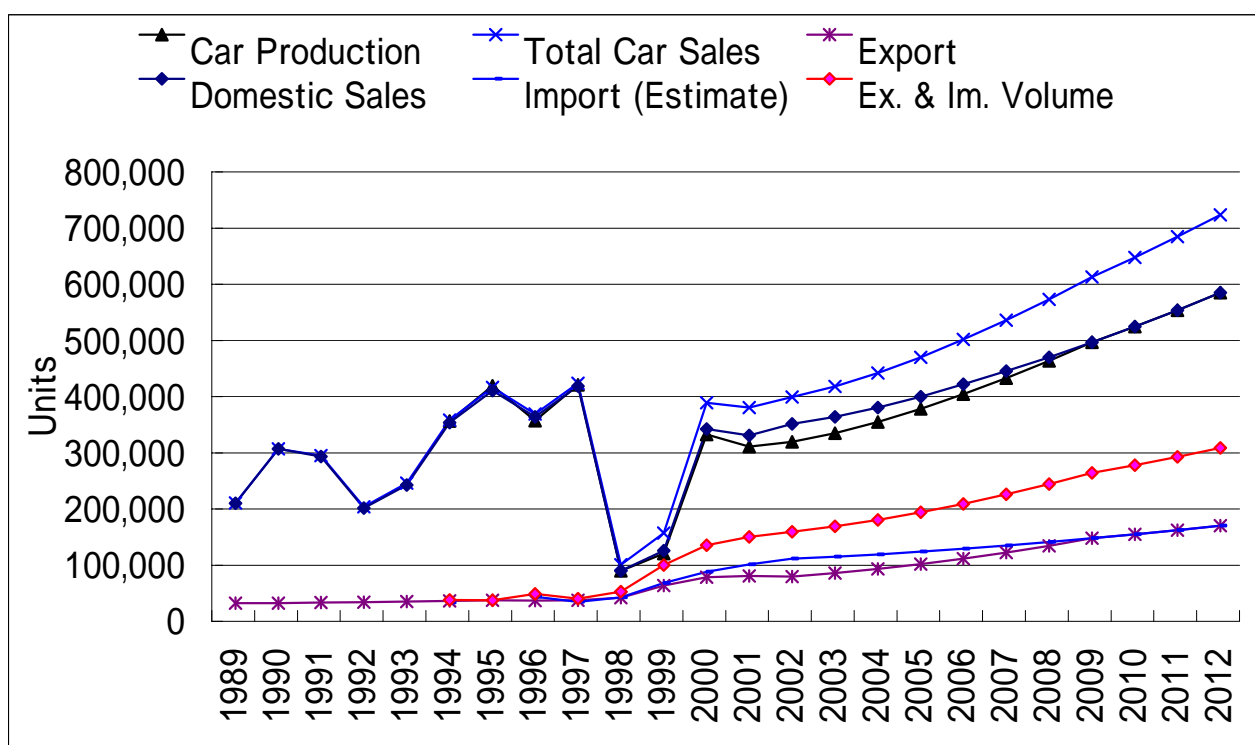
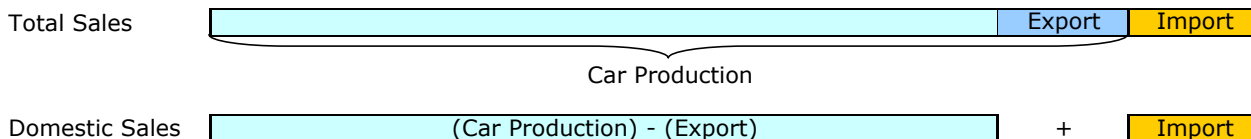
## Trend of Car Production, Sales, Import/Export and Estimate (Macro)

Units

Year	Car Production	Total Car Sales	Export	Ex. Ratio	Domestic Sales	Growth Rate	Import (Estimate)	Im. Ratio to Dom. Sales	Ex. & Im. Volume
1989		178,812	649	0.4%	178,163				
1990		275,395	441	0.2%	274,954	54.3%			
1991		263,036	1,729	0.7%	261,307	-5.0%			
1992		171,999	2,368	1.4%	169,631	-35.1%			
1993		214,298	3,619	1.7%	210,679	24.2%			
1994	325,021	326,471	4,706	1.4%	321,765	52.7%	1,450	0.5%	6,156
1995	387,541	384,439	5,755	1.5%	378,684	17.7%			5,755
1996	325,585	337,399	5,364	1.6%	332,035	-12.3%	11,814	3.6%	17,178
1997	389,259	392,185	5,494	1.4%	386,691	16.5%	2,926	0.8%	8,420
1998	58,079	68,809	10,506	15.3%	58,303	-84.9%	10,730	18.4%	21,236
1999	89,027	125,469	31,655	25.2%	93,814	60.9%	36,442	38.8%	68,097
2000	300,884	357,501	47,001	13.1%	310,500	231.0%	56,617	18.2%	103,618
2001	279,187	348,639	49,239	14.1%	299,400	-3.6%	69,452	23.2%	118,691
2002	287,536	367,423	47,875	13.0%	319,548	6.7%	79,887	25.0%	127,762
2003	303,348	386,430	54,100	14.0%	332,330	4.0%	83,082	25.0%	137,183
2004	323,289	410,525	61,579	15.0%	348,946	5.0%	87,237	25.0%	148,815
2005	346,225	438,260	70,122	16.0%	368,138	5.5%	92,035	25.0%	162,156
2006	372,596	470,153	79,926	17.0%	390,227	6.0%	97,557	25.0%	177,483
2007	401,029	504,439	90,799	18.0%	413,640	6.0%	103,410	25.0%	194,209
2008	431,692	541,307	102,848	19.0%	438,459	6.0%	109,615	25.0%	212,463
2009	464,766	580,958	116,192	20.0%	464,766	6.0%	116,192	25.0%	232,383
2010	492,652	615,815	123,163	20.0%	492,652	6.0%	123,163	25.0%	246,326
2011	522,211	652,764	130,553	20.0%	522,211	6.0%	130,553	25.0%	261,106
2012	553,544	691,930	138,386	20.0%	553,544	6.0%	138,386	25.0%	276,772

Source: GAIKINDO (Vehicle Manufacturing Association)

Import/Export Volume in the past years includes CKD parts.



**Table 7-C-12 Import/Export Volume of CBU (Finished Cars) by Companies**

Import/Export Volume of CBU in Coming Years

Car Manufacturing Company	Import		Export		Units	
	2003	2004~6	2003	2004~6	2003	2004~6
Company A	10,000	19,000	3,000	12,000	13,000	31,000
Company B	1,000	1,000	0	0	1,000	1,000
Company C	1,000	1,000	0	0	1,000	1,000
Company D	0	0	0	0	0	0
Company E	0	0	0	0	0	0
Company F	3,000	6,000	0	0	3,000	6,000
Company G	1,000	1,000	0	0	1,000	1,000
Company H	11,000	18,000	0	27,000	11,000	45,000
Company I	0	0	0	10,000	0	10,000
Company J	0	0	0	0	0	0
Company K	0	0	0	0	0	0
Company L	0	0	0	0	0	0
Total	27,000	46,000	3,000	49,000	30,000	95,000

Source: JICA Survey

**158.** As the market share of the four companies with big volume of domestic sales and/or import/export volume makes up to 60 % of the total domestic sales in Indonesia, the total export/import volume of CBU to/from Indonesia is estimated around 105,000 units. If the domestic sales will increase with an annual economic growth rate in Indonesia, number of CBU cars exported and imported through the Metropolitan port in Indonesia can be estimated as follows;

**Table 7-C-13 Estimate of Total Import/Export Volume of CBU**

Car Manufacturing Company	2004~6	Units	
		Market Share (July 2002)	
Company A	31,000	1,465	5.4%
Company C	1,000	6,002	22.3%
Company H	45,000	6,546	24.3%
Company I	10,000	1,982	7.4%
Sub Total	87,000	15,995	59.5%
Total (Estimate)	146,271	26,892	100.0%

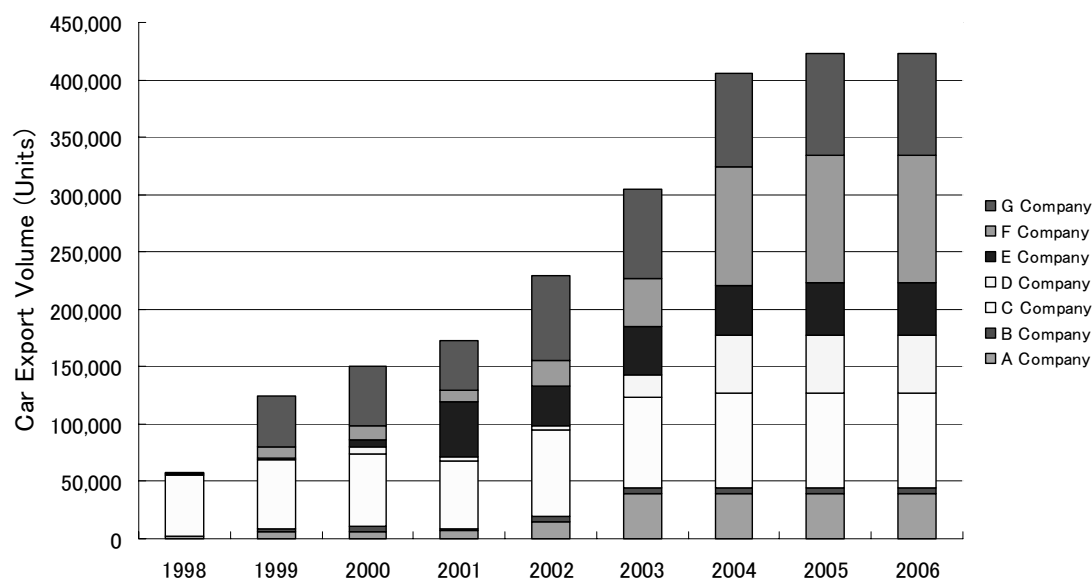
	Im/Ex Volume	Units	
		Growth Rate	
2006	146,271		
2007	155,047	6.0%	
2008	164,350	6.0%	
2009	174,211	6.0%	
2010	184,664	6.0%	
2011	195,744	6.0%	
2012	207,488	6.0%	
2025	391,250	5.0%	

**Table 7-C-14 Exported/Imported CBU Cars**

(000 Units)				
Year	2000	2005~6	2012	2025
Total	-	146	207	391

Source: JICA Study Team

159. For reference, Figure 7-C-12 shows the trend of automobile export from Laem Chabang port in Thailand, which volume has already reached to the level of 200,000 CBU units per year in 2002 and will be estimated over 400,000 CBU units in a few years due to rapid increase of trade.

**Figure 7-C-12 Trend of Automobile Export from Laem Chabang Port in Thailand**

### 7-C-9 Passenger

160. Tanjung Priok Port has a passenger terminal and about 1.7 million passengers embarked and disembarked at this port in 2001. As of many seaports in Indonesia, number of passengers increased rapidly after the economic crisis, which occurred in 1998 in this nation. It is widely believed that many passengers shifted from air transport to sea transport because fare of the latter is lower than that of the former.

161. Presently one hundred per cent of passengers are inter-island passengers. In the middle of the 1990's, however, nearly 20 % of the total passengers were international tourists who arrived at Tanjung Priok Port aboard cruise vessels.

162. PELNI has a total of 17 pure passenger or Ro/Ro passenger vessels that call this port regularly. Scheduled shipping routes of PELNI are shown in Figure 7-C-13.

**Figure 7-C-13 Shipping Routes of PELNI**

163. Domestic and international passengers are forecast separately. Number of passengers may be influenced by many factors such as fare, trip time, and comfort of the means of transportation. JICA study team constructed a multiple regression model with three

independent variables; population, GRDP per capita, and a dummy variable. This model was applied to forecast the number of domestic passengers. Historical trend of number of passengers from 1991 through 2001 was fitted well to this model with coefficient of determination (R<sup>2</sup>) of 0.956.

**164.** It is forecast by this model that the number of domestic passengers will reach 2 million in 2004, and then decrease gradually. JICA study team assumes that with the introduction of faster and more comfortable passenger vessels into the domestic market, the number of passenger will continue even after 2005. Annual increase rate of passengers after 2005 is assumed same as annual population growth rate.

**165.** International passengers should be also taken into consideration. Asia is one of the cruise destinations in the world, and a world famous cruise company locates its headquarters in Malaysia. Before the Asian economic crisis, about 100,000 international tourists visited Tanjung Priok Port aboard cruise vessels. It can be forecast that after Indonesia recovers from the economic recession, international cruise passengers will visit Tanjung Priok Port again.

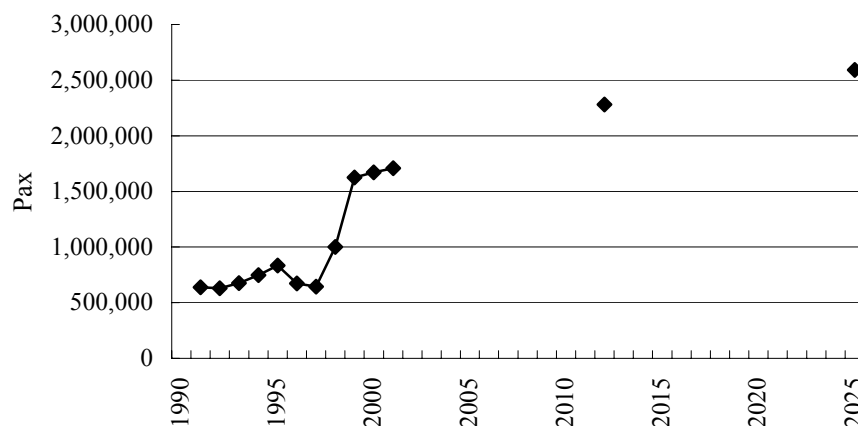
**166.** Resulting number of passengers is summarized in Table 7-C-15 and Figure 7-C-14.

**Table 7-C-15 Historical Trend and Forecast of Passengers, Tanjung Priok**

(Unit: Pax)

	1991	1993	1995	1997	1999	2000	2001	2012	2025
Domestic	637,158	674,054	833,501	645,098	1,626,858	1,671,920	1,708,932	2,282,000	2,592,000
Internation	41,491	33,020	189,089	140,343	1,332	0	436	200,000	400,000
Total	678,649	707,074	1,022,590	785,441	1,628,190	1,671,920	1,709,368	2,482,000	2,992,000

Source: IPC 2, JICA Study Team



**Figure 7-C-14 Historical Trend and Forecast of Domestic Passengers, Tanjung Priok**

#### 7-C-10 Ro/Ro Traffic

**167.** Merak–Bakauheni ferry service is a vital link to connect Java and Sumatra islands, and has been playing part of national trunk routes since the inception of this service in 1981. Currently each terminal has four berthing facilities which can accommodate ferry vessels ranging between 1,000 GRT and 5,000 GRT. This ferry service is operational for 24 hours a day, and was seldom hampered by bad weather.

**168.** With the innovation and expansion of infrastructure such as berthing facility, ferry traffic on this route has been increasing steadily since the service started. More than 2.2

million vehicles, 6.8 million tons of cargo and over 10 million passengers crossed the Sunda Strait aboard the ferry vessels in 2001.

169. The Study of the long term development plan for the ferry terminals and routes connecting Sumatra/Java/Bali Islands, which was financed by Directorate General of Land Communications, Ministry of Communication, was finalized in August 2002. Historical trend of freights, vehicles and passengers are shown in Table 7-C-16.

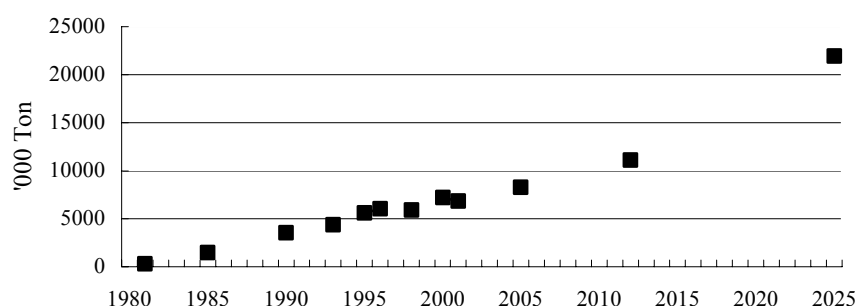
**Table 7-C-16 Historical Trend of Ro/Ro Traffic on the Merak - Bakauheni**

(Unit: ' 000)

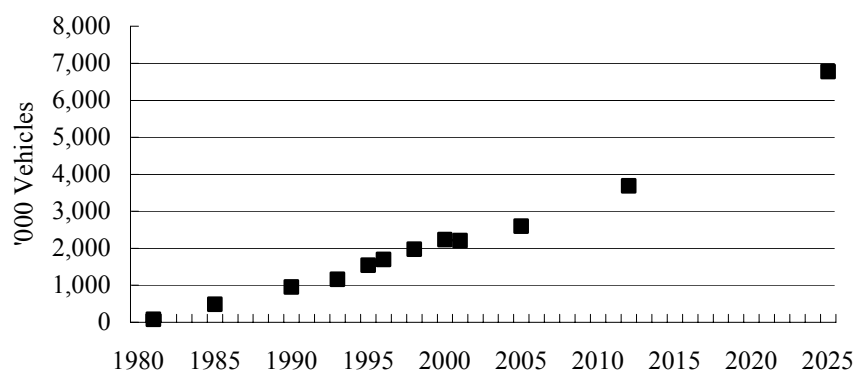
	1981	1985	1990	1993	1995	1996	1998	2000	2001
Freight	315	1,474	3,537	4,370	5,600	6,030	5,900	7,180	6,830
Vehicle	79	486	954	1,160	1,540	1,690	1,970	2,230	2,200
Passenger	1,222	3,890	7,509	9,580	12,300	13,600	13,970	12,900	10,600

Source : The Study of the Long Term Development Plan for the Ferry Terminals and Routes connecting Sumatra/Java/ Bali Islands

170. According to the study mentioned above, main origins and destinations of vehicles are Jakarta and West Java Province, which account for more than 90 % of the total. A multiple regression model with GRDP of DKI. Jakarta/West Java as one of the independent variables was constructed in order to forecast future demand. High values of coefficient of determination were obtained; 0.9412 for Freight and 0.9822 for all vehicles. Historical trend and future demand for freight and vehicles are shown in Figure 7-C-15 and Figure 7-C-16.



**Figure 7-C-15 Forecast of Freight on Merak-Bakauheni Ferry Route**



**Figure 7-C-16 Forecast of Vehicles on Merak-Bakauheni Ferry Route**

**171.** Passenger demand has been volatile and possibly most difficult to forecast due to the impact of the economic crisis. It is widely believed, however, that future passenger traffic is not the determining factor in the facility planning in this type of traffic. Hence, a growth model was adapted for the passenger traffic demand. Annual growth rate of 4.0 % was adapted for 2001-2011, and 3.0 % for 2012-2025, which are consistent with the Study mentioned above.

**172.** According to the DGLC's Study mentioned above, capacities of the existing facilities of Ro/Ro ferry at the terminals are estimated at 2.3 million vehicle and 30.6 million passengers annually. JICA study team forecasts that vehicle traffic in 2003 will reach the maximum vehicle capacity of 2.3 million. Table 7-C-17 shows differences between 2003 traffic and target year's traffic, which may overflow from the existing facilities.

**Table 7-C-17 Forecast, Ro/Ro Traffic (overflow from existing capacity)**

(Unit: '000)

	2012	2025
Freight	4,801	15,442
Vehicle	1,391	4,475

Source : JICA Study Team

**173.** It is possible to increase capacities of Ro/Ro traffic by renovating and adding new facilities at the existing site of Merak. Therefore, figures in the above table do not guarantee the future Ro/Ro traffic generated at a new site, say Bojonegara. As traffic at Merak has almost reached the maximum capacity, it is necessary to study way to meet the future demand. Expansion at the existing site is one alternative, and development of another Ro/Ro port is another alternative. Detailed analysis is needed before making final decision.

#### **7-C-11 Summary**

**174.** Demand forecast for major cargoes, which corresponds to the basic case, is summarized in Table 7-C-18.

**Table 7-C-18 Summary of Demand Forecast by Major Commodity/Traffic Type**

			(Unit: ' 000 Ton, Vehicle, Pax)		
				2012	2025
Cargo	By Packing Type	Y 2000			
		Liquid Bulk	9,726	11,644	14,046
		Dry Bulk	6,929	11,004	20,129
		Container	20,951	41,933	78,326
		Bag + General	10,357	16,246	20,389
		Total	47,963	80,827	132,890
	By Major Commodity	Y 1999			
		Container	19,419	41,933	78,326
		Rice	1,027	1,500	1,500
		Wheat	1,426	3,976	6,847
		Other Grain	1,331	2,188	3,782
		Crude Palm Oil	1,402	2,386	3,480
		Cement	4,514	6,909	9,473
		Gasoline and Other Fuel	6,557	8,060	9,907
		Steel and Steel Products	1,554	4,167	9,233
		Stone, Sand and Clay	535	1,727	4,089
		Exported/Imported Cars		207	391
		Others	5,672	7,981	6,253
		Total	43,437	80,827	132,890
Passenger		Y 2000			
		Domestic	1,672	2,282	2,592
		International	0	200	400
Ro/Ro (Overflow from Existing Capacity)					
	Freight	-	4,801	15,442	
	Vehicle	-	1,391	4,475	

#### **7-D. POTENTIAL DEMAND FOR CONTAINER TRANSSHIPMENT (INTERNATIONAL – INTER-ISLAND)**

##### **7-D-1 Trend of International Container Transshipment**

**175.** In the history of shipping, “ transshipment of cargo ” was considered as an unwelcome operation which should be avoided if possible. Transshipment operation meant a greater possibility of cargo damage to shippers and to shipping line it meant an additional arrangement with little earnings. In conventional days, a direct call service was much appreciated by most shippers in any trade and transshipment service was considered as a necessary second choice by shippers. Therefore, any transshipment arrangement was accepted by shippers only through necessary advanced application to a shipping line by a shipper. All necessary information such as transshipment port, second ship freight and total freight were typed on the face of bills of lading as a part of the shipping contract.

**176.** Even in the early days of Containerization, this trade tradition changed little. However, as Containerization proceeded, a new concept of transshipment was borne. The “ new transshipment ” is a by-product of the “ Hub and Spoke ” concept. In this concept, transshipment is not an unwelcome operation, rather, it is a necessary part of the total container transportation system. After a long trial and error period, Containerization has entered a new era of mass/multi modal transportation. Transshipment of containers can be defined as an indispensable tool to connect “ Trunk Line ” to “ Feeder Line ” and to make full use of onboard space of container ship.



**177.** New “Transshipment Service” is carried out without any particular agreement by shippers. It is solely done for the convenience of shipping lines. Shippers/consignees do not complain about transshipment as it is advertised in sailing schedules. For example, there is no direct service from Australian main ports to the UK or main North European ports any more.

**178.** Those routes are faster and cheaper than direct service from Australia, and even with better frequency. Containers destined to the UK and Europe are transshipped at Singapore in most cases. As transshipped containers are unloaded from the first vessel and loaded to the second vessel, and thus counted twice, throughput of ports where transshipment operation dominates increase more quick than ordinary ports. The typical transshipment container ports are: Singapore, Colombo, Dubai, Algeciras, Gioia Tauro, Marsaxlokk, Salalah

**Table 7-D-1 Transshipment Ports/Hubs and Transshipment %**

Port	1998 Throughput ( TEU )	1998 Transshipment handling ( TEU )	Transshipment %
Far East and South East Asia			
Singapore	15,100,000	*	-
Hong Kong	14,582,000	3,870,000	26.7
Kaohsiung	6,271,053	**	-
Pusan	5,752,955	1,213,864	21.1
Kobe	2,100,000	131,721	6.3
South Asia and the Middle East			
Dubai	2,804,104	1,439,347	51.3
Colombo	1,714,077	1,235,379	72.1
Khor Fakkan	783,352	498,876	63.7
Fujirah	480,000	*	-
Salalah	640,000( 1999 )	633,300( 1999 )	99.0
Northern Europe			
Rotterdam	6,010,000	1,502,500	25.0
Hamburg	3,546,940	1,284,000	36.2
Antwerp	3,265,000	374,000	11.5
Felixtowe	2,461,823	765,341	31.4
Bremerhaven	1,812,000	810,000	44.7
Southern Europe			
Gioia Tauro	2,100,000	**	-
Algeciras	1,825,614	1,541,638	84.4
Marsaxlokk	1,071,669	**	-
Piraeus	933,096	366,142	39.2
Damietta	309,671	247,294	79.8
Limasol	213,400	49,200	23.1
North America			
NY/NJ	2,465,993	-	-
Long Beach	4,100,000	76,764	1.9
Caribbean Basin			
Kingston	670,858	577,500	86.1

Source: JICA Study Team based on OCDI data

\*Figures not available but a reliable source indicates about 85 % containers are either transshipped or trans-landed to inland countries.

\*\*Port does not keep transshipment figures separately

**179.** The port industry of the world responded to the transshipment strategy of shipping lines by providing more transshipment hubs, particularly in the Middle East, Asia and Mediterranean. Under these circumstances, it is necessary to have a clear definition of “ Transshipment ” to distinguish between the new type of transshipment solely planned for shipping lines operation necessity ( it is often called a relay transshipment ) and the traditional type transshipment.

**7-D-2 Domestic Inter-Island Transshipment**

**180.** To a country like Indonesia which consists of more than 1,3000 islands, an effective sea route network is a lifeline for both the national economy and society.

**181.** The feeder network of this country consists of two different transportation systems. One is a standard Lo-Lo system and the other is Ro-Ro system. Generally, Lo-Lo system is more expensive than Ro-Ro. The main difference of the two systems is the initial investment. In a Lo-Lo system, container handling facilities equipped with a quay with a gantry crane and a container yard with container handling machine are required. On the other hand, Ro-Ro system needs just a ramp-way. If a Ro-Ro ship itself is equipped with one or two ramp-ways, any truck can roll on or roll off the ship. In other words, Lo-Lo system is capital concentrated system while Ro-Ro is a labor concentrated system. To connect two points A and B by Lo-Lo, both ports must have container handling facilities. On the other hand, Ro-Ro system can connect two ports without any container facilities.

**182.** Jakarta International Container Terminal ( JICT ) at Tanjung Priok Port is a standard Lo-Lo terminal. Basically, the terminal is designed for container ships without gears. As of the end of July 2002, the national inter-island transshipment traffic is for the most part realized by conventional type vessels or small Ro-Ro ships. Table 1-2 and 3 show the latest throughput date of JICT. The share of Inter Island Transshipment containers is shown in the Tables.

**Table 7-D-2 Details of Loading Containers at JICT ( Terminal 1&2 )**

	20'			Transship		40'			45'	Reefer		Total	
	FCL	MT	OH	20'	40'	FCL	MT	OH	FCL	20'	40'	Box	TEU (Ship Calls )
Jan	18,770	592	90	575	92	18,440	740	25	323	81	96	39,325	59,623 ( 142 )
Feb	16,679	602	70	591	75	16,777	807	23	277	87	98	36,086	54,212 ( 127 )
Mar	20,763	399	76	758	47	19,326	1,033	14	299	92	117	42,924	63,835 ( 140 )
Apr	20,263	711	84	718	196	20,316	917	18	372	68	70	43,733	65,715 ( 141 )
May	20,611	1,269	64	462	70	20,518	1,203	15	315	93	134	44,754	67,088 ( 140 )
Jun	20,076	1,170	99	206	54	20,327	964	4	340	82	119	43,447	65,346 ( 130 )
Total	117,162	4,743	463	3,310	534	115,704	5,664	99	1,926	503	634	250,769	375,819 ( 950 )

**Table 7-D-3 Details of Unloading Containers at JICT ( Terminal 1&2 )**

	20'				Transship		40'				Reefer		Total	
	FCL	LCL	MT	OH	20'	40'	FCL	LCL	MT	OH	20'	40'	Box	TEU
Jan	19,279	82	3,807	27	143	74	13,624	29	3,486	65	250	930	42,052	60,580
Feb	17,796	57	3,505	26	265	74	14,388	27	4,339	34	256	976	42,093	62,368
Mar	22,162	81	2,878	35	679	27	17,234	29	3,736	43	339	962	48,483	70,862
Apr	21,911	86	2,313	27	714	289	17,451	42	2,561	43	353	1,387	47,408	69,465
May	21,917	65	1,918	30	339	133	17,875	31	3,673	59	352	981	47,662	70,077
Jun	22,053	72	2,342	55	164	56	17,056	30	3,462	59	373	967	46,982	68,978
Total	125,118	443	16,763	200	2,304	653	97,628	188	21,257	303	1,923	6,203	274,680	403,027

Source: JICT ( Jakarta International Container Terminal )

Remarks: FCL – Full Container Load, LCL – less Than Container Load, MT – empty Container,  
OH – Open Head Flat Container for Bulky Cargo, Box – Actual Number of containers  
Regardless sizes, Transship – Domestic Inter-Island Transship Containers

**183.** Some noticeable points which Table 7-D-2 and Table 7-D-3 demonstrate are:

- Inter-Island Transshipment Ratio at JICT ( Jan./June 2002 )

Unloaded 20'	2,304	
Unloaded 40'	653	
Unloaded TEU	3,610	
Total Unloaded TEU	403,027	Ratio = 0.9 %

Loaded	20'	3,310	
Loaded	40'	534	
Loaded	TEU	4,386	
<u>Total Loaded TEU</u>		<u>375,819</u>	Ratio = 1.17 %

Total Inter-Island T'ship TEU		7,996	
<u>Total Loaded/Unloaded TEU</u>		<u>778,846</u>	Ratio = 1.03 %

**184.** The Inter-Island Transshipment Ratio at JICT is far below expectations. According to the port planning policy of the Indonesian Government, Tanjung Priok and some major ports are expected to become international hub ports but in order to become an “ International Hub Port ”, a port must be the center of the domestic and international feeder networks. However, the above ratio shows the port is still in its primitive stage, functioning independently with a limited feeder network.

- LCL Cargo

Unloaded LCL Containers	20'	443	
Unloaded LCL Containers	40'	188	
Unloaded LCL	TEU	819	
<u>Total Unloaded TEU</u>		<u>403,027</u>	LCL Container Ratio = 0.2 %

**185.** There was no LCL containers among the loaded containers during the period. In analyzing the development process of the containerization, it is a general tendency that LCL cargo share higher percentage of the total, because only a limited numbers of shippers were aware of the merit of FCL containers. Nowadays, as containerization develops, some new ventures such as NVOCC, 3PL are borne and actively doing business in the field of cargo consolidation. LCL Container Ratio is an index of the degree of cargo consolidation and shows how high the logistical situation is developed in a regional economy. The above ratio shows that the Indonesian business world is still at the dawn of the logistic revolution.

- 20'/40' Ratio of Inter-Island Transshipment Containers

Unloaded	20'	2,304	
Unloaded	40'	653	<u>20'/40' Ratio = 1: 3.5</u>
Loaded	20'	3,310	
Loaded	40'	534	<u>20'/40' Ratio = 1: 6.</u>

**186.** The above figures show that 20' containers are more favorable than 40' in the inter island sea traffic. It is also noted that 20' containers are more popular in export than in import. Consignees

**187.** Likely request that their import cargoes be packed in 20' containers as the road condition at the final destination island is often poor. For export, there seem to be more cargo consolidation companies than import distribution firms. A further survey is needed to find out the cause.

### 7-D-3 Total Volume of Domestic Inter-Island Transshipment Containers

**188.** There is no immediate data which represents the total volume of containers moving inter island. However, it is possible to estimate the volume by processing the export container figures. Table 7-D-4 shows the distribution of the export containers from four major ports.

**Table 7-D-4 Export Container to All Destinations from Four Major Ports ( 2001 )**

Port	Containers ( TEU )	%	Remarks
Jakarta, West Java	698,806	51.7	Land Feeder possible
Surabaya, East Java	393,536	29.0	Land Feeder possible
Semarang, Central Java	144,599	10.7	Land Feeder possible
Java Total	1,236,941	91.4	
Medan, North Sumatra	115,932	8.6	
Four Ports Total	1,352,873	100.0	

Source: Collected through Interview with one of the Major Shipping Lines

**189.** Assuming that the land feeder within Java Island by trucks is minimal, and that all non-Jakarta containers are to be carried by feeder boat to Jakarta and that about the same volume of containers returns to each starting port as import in the long term, the maximum volume of the International Inter-Island ( not Domestic ) containers to/from Jakarta is calculated as follows:

$$1,352,873 - 698,806 = 654,067 \quad 654,000 \text{ TEU ( non Jakarta containers ) per year}$$

$$654,000 \text{ TEU} \times 2 = 1,308,000 \text{ TEU ( possible International Inter-Island containers )}$$

**190.** Some shipping lines believe that the above four ports share 90 % of the international container traffic for both export and import.

**191.** The international and domestic containers throughput is given in Table 7-D-5:

**Table 7-D-5 Container Throughput at Tanjung Priok ( TEU )**

Terminal/Berth	1999	2000	2000 Share
JICT-I Unloading	607,360	636,284	
JICT-I Loading	603,530	637,428	
JICT-II Unloading	119,772	129,153	
JICT-II Loading	135,375	124,848	
Sub Total	1,466,037	1,527,713	66.0 %
TPK (Koja) Unloading	204,936	265,189	
TPK (Koja) Loading	189,259	231,090	
Sub Total	394,195	496,279	21.5 %
JICT + Koja	1,860,232	2,023,992	87.5 %
Conventional Berth			
Unloading	29,118	178,720	
Loading	20,240	111,398	
Sub Total	49,358	290,118	12.5 %
International Container Total	1,909,590	2,314,110	100.0 %
Conventional Berth			
Inter Island Unloading	91,602	na	
Loading	117,355	na	
Sub Total	208,957	285,980*	
Grand Total	2,118,547	2,309,972	

Source: Pelindo II, Statistics Division “ PORT TRAFFIC up to December 2000 ”

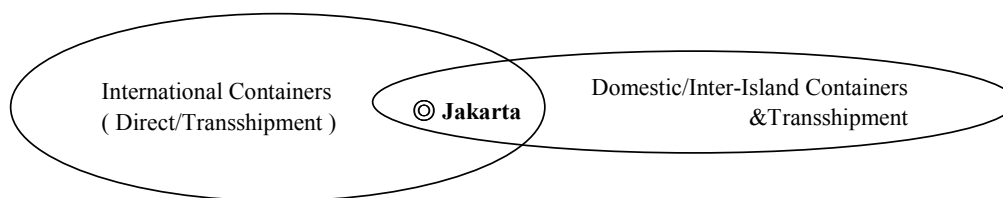
\*subject to re-confirmation with Pelindo II

**192.** In the mean time, some major shipping lines are checking the throughput of Tanjung Priok in 2001 released by Containerization International which is 2,222,000 TEU. On the basis that the actual numbers of the total export and import containers to/from Tanjung Priok were around 1,400,000 TEU ( 700,000 TEU x 2 ), the remaining balance is 822,000 TEU.

193. On the other hand, there is one small size container terminal called MTI located at NO.9 berth. The throughput of MTI in 2001 was about 60,000 TEU and they were 100 % Inter-Island moves. Another group of the 14 operators at fourteen conventional berths also handling Inter-Island boxes of around 300, 000/600,000 TEU. All in all, the throughput of Inter-Island containers handled at the conventional berths is estimated at around 600,000TEU including domestic and international. The grand total, therefore, is close to the balance of 822,000 TEU.

#### 7-D-4 Integration of International/Domestic Containers

194. Generally, the status of an ocean going container is continually changing from domestic to international and vice versa through a customs service network. In EU, a container can travel freely in and out of any member country if it is equipped with a carnet ( container's passport ). Likewise, in many countries in Asia, containers are being used as domestic containers as well as international containers. On the yard of MTI and other conventional berths, many containers are stacked and handled. Almost all of them are ISO standard ocean going containers. Those containers are used as domestic containers for a period of time and in the next occasion they are changed to an international status to be loaded to a foreign port. Domestic containers are, therefore, can be considered as potential international containers.



195. The above chart shows the inter-relation of the two categorized containers. In Singapore, this integration movement is limited because many containers are flowing out/in through transshipment butch operation. In comparison, Jakarta's only superior point against Singapore is the existence of a huge volume of “ Home Containers ( Local Containers ) ”. Jakarta ( Tanjung Priok ) is a rare container port in the world in that it has an abundant future demand of local containers with comparatively limited facilities to handle them. This fact should not be forgotten when developing a port strategy.

#### 7-D-5 Some Suggestions to stimulate Potential Inter-Island Transshipment Containers

##### 1) *Increasing Direct Calling Vessels*

196. The most effective means to increase the Inter-Island Transshipment at Tanjung Priok is to ask the user-shipping lines to increase the number of direct calling ships. As long as almost all ships are in-direct calling the shippers and consignees at other islands do not easily agree to ship their containers by those ships which unload at Jakarta and once again load them on the second ship destined to a hub port. If a mother boat calls directly at Tanjung Priok, only one transshipment is necessary, but in the present “ two bound system ”, a container has to be transshipped once at Tanjung Priok and then a second time at a hub port.

##### 2) *Bank L/C*

197. At present, Singapore is accepted as a transshipment port in the international trade world. in Recently, some Australian banks held a seminar to provide shippers and consignees with accurate information on the transship operation at Singapore. Some of the Australian

shippers are still nominating “ direct service from Australian port ” in their L/C, but there is no direct service from Australia to UK.

**198.** Likewise, in order to increase Jakarta direct calling ships, the port name of “ Jakarta ” must appear on their L/Cs. Otherwise, just appealing to shipping lines will not be effective. Trade business executives are unwilling to switch from Singapore to Jakarta unless there is a substantial improvement in the service level of Tanjung Priok.

### **3) *Custom/Container Terminal Interface***

**199.** At present, there are three separate Customs in the waterfront area of Tanjung Priok, at the new terminal area, at the old port area and at the adjacent backup area. These Customs offices have each separate responsible areas and in-office rules, thus it is difficult to clear the separate regulations in a limited time. Although there is no law prohibiting inter-island cargo or containers to use JICT or Koja Terminal as an inter-island transshipment port, it is nearly prohibitive to use the port as a feeder network port.

**200.** The fact that domestic inter-island transshipment containers make up only 1.03% of the total throughput is remarkable. This is not matter of hardware but a matter of software and human ware.

**201.** It is also important to establish a system where container status can be changed from domestic to international and vice versa in a simple manner. Jakarta needs to become convenient port to change a container status.

### **4) *Establishing More Reliable Feeder Network***

**202.** With the help of the new port regulation, a hierarchy of all ports with relevant feeder network must be established in each region of the country. It is also desired that feeder shipping enterprises shall be encouraged through some special taxation system as seen in the Port of Kwangyang of South Korea in which the Government exempted the special road tax applied in the Port of Busan for containers loaded and unloaded at the port.

### **5) *Equipping Local Ports with Appropriate Container Facilities***

**203.** In order to develop a containerized feeder network nationwide, the introduction or encouragement of Ro-Ro vessels is desired. Ro-Ro system is economical and very suited to the Indonesian Inter-Island feeder network. In a Ro-Ro system, a ship can berth at any port where there is a wharf. If it is needed, a simple ramp-way shall be added to the existing facilities. In some local hub ports, container handling machinery including gantries have to be introduced.

### **6) *Improving Port and Road Condition in Islands***

**204.** Although the main stream of the Inter-Island container traffic is 20', some improvement are desired to make it possible for 40' containers even in island port and road. The economic efficiency of 40' is prominent and thus the share of 20' is quickly decreasing in many countries of throughout world. Therefore, any difficulty in deploying 40' may become an impediment in marketing inter-island traffic.