

3.5 International Competitiveness of Container Cargo Transportation

3.5.1 Necessity of Effective Container Transportation System

Today, globalization and internationalization are important factors in the world trade and commerce. The evolution of communication technology using computer network systems is contributing significantly to such activities. And regional cooperation agreements such as EU (European Union), NAFTA (North America Free Trade Agreement), SAARC (South Asian Association for Regional Cooperation), CER (Australia-New Zealand Closer Economic Relations Trade Agreement), AFTA (ASEAN Free Trade Area) and so on will facilitate the trade and interdependence between each countries in a certain region. In this era, it is a prerequisite for all nations to cooperate and coexist with one another to ensure steady development in future.

The globalization of trade involves the challenge of competition and the need for effective and attractive products. And internationalization calls for maintaining international standards and compliance with international conventions for mutual cooperation. New values and ideas are born through multi-layered communication and exchanges of people, goods and information: nation to nation, region to region and individual to individual.

The necessity of effective container transportation system is indicated below under the three major objectives for port development.

(1) Supporting Social and Economical Activities in Indonesia

In an industrial field, searching for higher efficiency to minimize a total production cost is important to sustain competitiveness of merchandise. For that purpose, not only raw materials and finished-products but also semi-products are moving through several countries. Similarly, consumers are also looking for better quality products at low prices around the world using worldwide information systems such as WWW (World Wide Web).

This globalization and internationalization of industrial activities requires an optimal mass transportation system based on international standards. For the sea transportation sector, containerization is the most effective, economical and reliable procedure to satisfy such a requirement at present. The importance of containerization in international sea transportation is expected to be even greater in future.

In Indonesia, continued rapid development of export-oriented manufacturing and processing industries, as envisaged in Second Long Term Development Plan (PJP II) and Sixth Five Year Development (REPELITA VI), will necessitate improvement of the container transportation system to ensure international competitiveness. The system includes not only appropriate port facilities (hardware) but also dynamic management (software and human-ware). In fact,

dynamism of management may be more important than port facilities, because a well managed organization can often overcome problems caused by inadequate hardware.

(2) Securing Reliability of Sea Transportation

While Indonesian industries have been extending their activities on an international non-oil/gas trade in the recent decade, industrial products as well as daily consumption goods are increasingly imported/exported under the international interdependence situation. Ports play an important role in securing the reliability of international transportation and thereby sustain international trade.

The majority of international container trade in Indonesia has been depending on the feeder service from Singapore these days. If international sea transportation would be adequately divided among the several kinds of service patterns, the reliability and competitiveness of this sector could be improved. For this purpose, it is essential that port facilities should be developed systematically as gateways, which could be called by several kinds of international container trunk route services such as Transpacific service and Europe/East-Asia service.

(3) Promoting Attractive Transport System for Shipper

Indonesia, as a large archipelago country, could overcome its geographical shortcomings by taking full advantage of sea-borne transportation. As the majority of foreign trade is borne by sea, it is essential to offer an attractive sea transportation system for shippers in terms of, handling cost and door-to-door delivery time. In a mature transportation system where door-to-door delivery time is reliable, the volume of stored goods can be reduced and inventory control becomes much easier. As a result, the investment for storage facilities, materials and product is also reduced.

In order to minimize the total production cost and improve competitiveness of the merchandise, it is important to reduce the transportation cost and door-to-door delivery time, especially in areas located far away from international trunk service route.

3.5.2 Present Situation and Future Trend of Container Transportation in East Asia

(1) Present Situation of Container Service

1) Container Service in the world

Container shipping services connect several ports in one or more regions or sub-regions. Each service route with a liner or rotation itinerary is, in general, calling at fixed ports at fixed frequency. There are numerous options for service route but several types of service are well recognized as the dominant service routes. The dominant global container service routes are Transpacific, Europe/East-Asia, Intra-Asia and Inter Europe. (For the volume and share of each route, see Table 3.5.1)

Even in such routes, visiting port in one region may change frequently due to several reasons such as competition of shipping lines, increasing cargo volume at the new port, shipper's requirement and so on.

Table 3.5.1 Global Container Trade in 1996 (Estimation)

Service		Container Volume (TEUs)	Share (%)
Transpacific	East / West	4,400,000	11.83
	West / East	3,400,000	9.14
	(Total)	(7,800,000)	(20.97)
Europe / East-Asia	East / West	3,100,000	8.33
	West / East	2,500,000	6.72
	(Total)	(5,600,000)	(15.05)
Transatlantic	East / West	1,600,000	4.30
	West / East	1,300,000	3.49
	(Total)	(2,900,000)	(7.79)
Intra-Asia		7,800,000	20.97
Inter Europe		7,900,000	21.24
North and South America		2,300,000	6.18
Others		2,900,000	7.79
(Total)		(37,200,000)	(100.00)
Subtotal from/to and internal Asia		21,200,000	56.99

Note : Estimated as of July 1997

Source : Research Cooperation Office, Mitsui O.S.K.Line

2) Transpacific Service

The main ports, at which ships call more than ten times a week, are Tokyo/Yokohama, Nagoya, Kobe/Osaka, Busan, Keelung, Kaohsiung, Hongkong and Singapore. (See Fig. 3.5.1) More than 90% of the service lines called some ports in Japan in 1987, but less than 80% do so at present. Simizu, Hakata, Xingang, Qingdao, Shanghai, Manila, Leam Chabang and Port Klang are receiving direct service several times a week these days.

3) North and South Europe / Asia Service

The main ports are Hongkong and Singapore. Every service line includes calls on these two ports. In 1987, 90% of vessels on this service route made calls Japanese ports, but that figure has dropped to less than 60% at present. Tokyo/Yokohama, Nagoya, Kobe/Osaka, Busan, Kaohsiung and Shanghai are receiving the service several times in a week. Shimizu, Hakata, Keelung, Xingang, Qingdao, Manila and Port Klang are receiving direct service these days. (See Fig. 3.5.2)

4) Intra-Asia Service

Intra-Asia service consists of three service patterns. The primary is 28days or 35days itinerary service, which calls more than 10 ports all over East Asia. The secondary is 14days or 21days itinerary service, which calls less than 10 ports in several East Asia countries. The last is about 7days itinerary for local service such as Japan-China, Korea-Japan, Korea-China, Singapore feeder and so on.

The main ports in this service are Tokyo, Yokohama, Nagoya, Kobe, Osaka, Busan, Keelung, Kaohsiung and Hongkong on one route and Singapore, Xingang, Qingdao, Shanghai, Manila, Leam Chabang, Port Klang, Jakarta and Surabaya on another route.

5) Others

Other services from or through Asia are Round-the-World Service, Oceania (Australia and New Zealand, South Pacific, Micronesia), Middle East and West Asia (India-Pakistan-Gulf, Bay of Bengal, Sri Lanka) and Africa.

(2) Major Container ports

1) Major Container ports

Port facilities, container handling volume, calling shipping lines and maximum vessel size of major container ports in East Asia in 1995 are summarized in Table 3.5.2.

Europe and Transpacific Service called all ports in which more than 500,000 TEUs/year containers were handled except Bangkok and Tg.Priok. The container volume handled in Shimizu and Hakata in Japan is less than 300,000 TEUs/year, but these ports were also called. Tomakomai in Japan and Fremantle in Australia handled less than 250,000 TEUs/year, however they are included in the Transpacific route.

Vessels with a capacity greater than 1,000TEUs for Intra Asia Service called the ports in which more than 200,000 TEUs/year were handled, and the ports handling less than 100,000TEUs were called by small capacity feeder vessels.

Figure 3.5.1 Transpacific Container Service Route in 1995

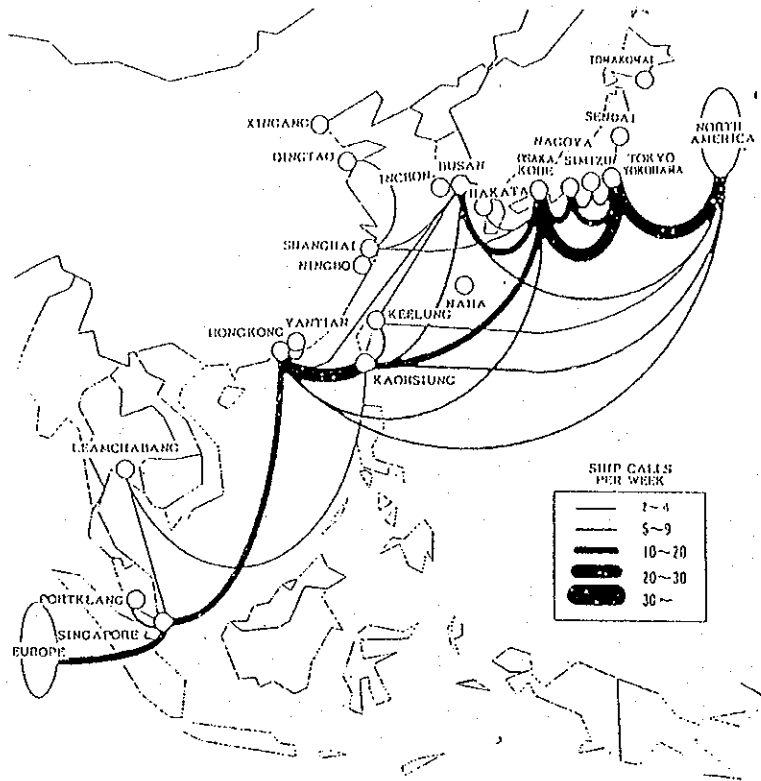
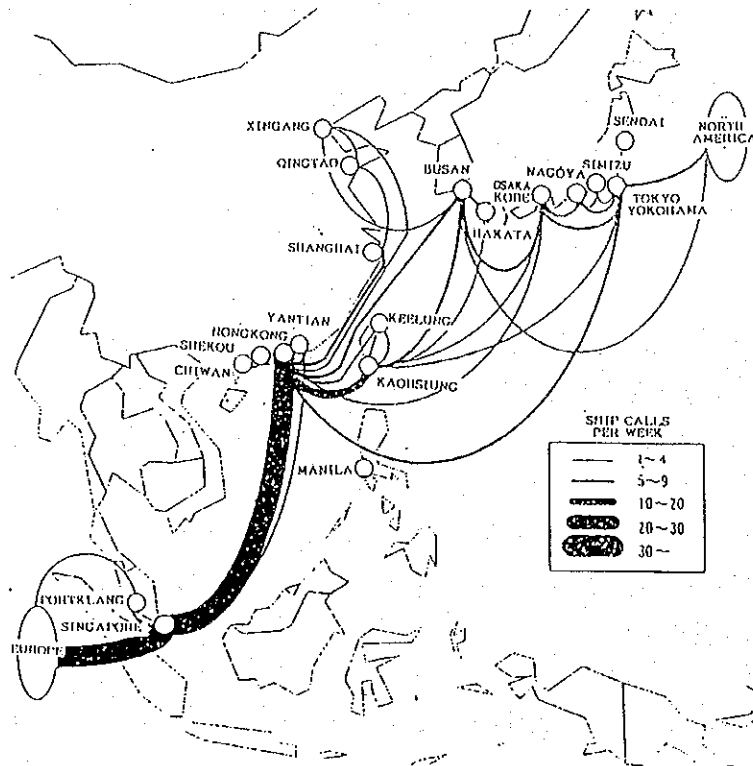


Figure 3.5.2 Europe/East-Asia Container Service Route in 1995



Source : Effect of large scale container terminal improvement to the regional economic development (in Japanese) Japan Transport Economic Research Center

Table 3.5.2 Major Container Port in East Asia in 1995

Name of Country	Name of Port	Port Facilities	Container Volume (TEUs/Year)	Shipping Line and Maximum Size(TEU) of Calling Vessel			
				Inter Asia	Europe	Transpacific	
Japan	Tomakomai	L1,130, D7.5-12m	234,000	ADVANCE		West Wood	2,029
	Niigata	L3,15m, D10m, 1gantries	34,000	ADVANCE			
	Tokyo		2,177,000	MOL-K LINE	OOCL	Evergreen	5,364
	Yokohama		2,756,000	MOL-K LINE	MEARSK	APL	4,960
	Sirizu	L1,160m, D12m, 5gantries	252,000	NYK-TSK	OOCL	NYK	2,977
	Nagoya		1,477,000	MOL-K LINE	MEARSK	Evergreen	5,364
	Yokohata	L600m, D12m, 1gantries	36,000	WANFAI			
	Osaka		1,351,000	MOL-K LINE	Hapag	Evergreen	5,364
	Kobe		1,457,000	MOL-K LINE	MEARSK	APL	4,960
	Mitajiri	L520m, D7.5m, 1gantries	13,000	CNC-YMTC-KMTC			
	Kitakyushu	L620m, D12m, 4gantries	417,000	CNC-YMTC-KMTC			
	Hakata	L580m, D12m, 3gantries	255,000	WANFAI	MISC	NYK	2,977
	Inchon	L1,170m, D14m		HANJIN-DONG			
	Busan	L2,161m, D12.5-14m	4,502,000	HANJIN-DONG	MISC	Hyundai	5,551
PRC	Dalian	L555m, D10m, 2gantries	370,000	COSCO			
	Qinhuangdao	L921, D11-12.5	6,000	(COSCO)			
	Xingang	L397m, D12m, 3gantries	702,000	COSCO	COSCO	COSCO	2,761
	Yantai	L180m, D9.2m, 2gantries	60,000	(Dalian)			
	Qingdao	2Berths, 2Gantries	600,000	COSCO	COSCO	OOCL	2,912
	Lianyungang	L540m, D11m, 2gantries		COSCO			
	Nanjing	L186m, D11m, 1gantries	150,000	(COSCO)			
	Zhanjiang	L396m, 1gantries	25,000	(COSCO)			
	Shanghai	L2,281, D9.4-12.5m	1,570,000	COSCO	MOL	OOCL	2,912
	Fuzhou	11Berths, Floating Crane	150,000	(COSCO)			
	Xiamen	L142m, D9.9m, 2gantries	329,000	COSCO			
	Shantou		83,000	(RCL)			
	Hong Kong		12,550,000	MOL-K LINE	MEARSK	Evergreen	5,364
	Zhanjiang	11Berth, 1Gantry	95,000	(COSCO)			
Taiwan	Keelung	L3,192m, D12m	1,506,000	NYK-TSK	Evergreen	NOL	3,821
	Taichung	L1,560m, D13-14m	446,000	WANHAI			
	Kaohsiung		5,232,000	WANHAI	MEARSK	Evergreen	5,364
Thailand	Bangkok	L1,240m, D8.5-11m	1,432,000	WANHAI			
	Laem Chabang	L1,700m, D14m	529,000	WANHAI		NOL	3,821

Note: TEUs in () means local service only

Source: Containerization International and International transportation Handbook '97

Table 3.5.2(Cont.) Major Container Port in East Asia in 1995

Country/Name	Name of Port	Port Facilities	Container Volume (TEUs/Year)	Shipping Line and Maximum Size(TEU) of Calling Vessel		
				Inter Asia	Europe	Transpacific
Philippines	Manila	L2,047m, D11-14.5m, Others	1,687,000	NYK-TSK	CMA	4,000
	Iloilo	Ro-Ro, L400m, D10.5m		(WGA)		
	Cebu	L451m, D8-8.5m		(RCL)		584
	Davao	Container/Ro-Ro, L250m, D11m		(RCL)		584
	Zamboanga	Multipurpose L110m, D8-10m		(RCL)		584
Malaysia	Penang	L847m, D9m, 4gantries	433,000	WANHAI		1,320
	Kuantan	Ro-Ro, L220m, D11.2m	22,500	(RCL)		582
	Johor	L710m, D14m, 5gantries	302,000	WANHAI		1,320
	Port Klang	L2,745m, D13-14m	1,133,000	MOL-K LINE	NYK	4,812 APL
	Kuching	Multipurpose, L982m, D5.2-9m	70,600	(MISC)		518
	Sibu	Multipurpose, L448m, D8.5m	31,400	(MISC)		518
	Kota Kinabalu	Multipurpose, L689m, D6.1-7.6m	63,000	(MISC)		518
	Sandakan	Multipurpose, L500m, D7-11m	18,800	(MISC)		518
	Marau	Multipurpose L515m, D10m	71,000	(MISC)		292
	Singapore	L500m, D11m, 2gantries	10,800,000	MOL-K LINE	MEARSK	6,000 APL
Indonesia	Belawan	L1,180m, m, 10gantrie	197,000	COSCO		1,152
	Tg. Priok	L500m, D13m, 3gantries	1,465,000	NYK-TSK		1,688
	Tg. Preak	Conventional	447,000	HANJIN-DONG		1,599
	Ujung Pandang	Conventional L D9m	72,000	MFSL		400
	Yangon	Conventional L450	70,000	(ACL)		800
Myanmar Bangladesh India	Chittagong	Multipurpose L802m, D8m	118,000	(Everest)		
	Calcutta	L219m, D13.7m, 1gantries	5,700			
	Visakhapatnam	Multipurpose L168m, D10m	11,100			
	Madras	L600m, D13m, 4gantries	200,000	SCI		412
	Tuticorin		57,000	SCI		412
	Cochin	L414m, D10.7m, 2gantries	86,000	SCI		412
	Jawaharlal Nehru	L680m, D13.5m, 4gantries	244,000			
	Mumbai	L244m, D9.1m, 2gantries	487,000	ACL		938
	Kandla	Multipurpose L m, D9.8m	51,000	NYK		
	Colombo	L2,076m, D9.5-14m	1,0490,000	APL	Flapag	4,422
Sri Lanka	Karachi	Conventional L D9.7m	513,000	NOL		
	Darwin	L m, D12m, 1gantries	4,000	(AAL, Bank, K-line)		
Pakistan	Freemantle	L1,800m, D11-13m, 3gantries	189,000	K-LINE		956
						**Wilhelmsen

Note: TEUs in () means local service only

* South America Service

** Round World Service

Source: Containerization International and International transportation Handbook '97

2) Large Scale Container Terminal Development Plan

In order to remain competitive as an International container hub port for Transpacific and Europe Service, it is essential to prepare for receiving large container ships known as Over-Panamax type, which can transport more than 5,000TEUs of container cargo. As of 1995, there were 12 container terminal berths with a depth of at least 15m to accommodate for such vessel in Japan, Hongkong and Singapore. Construction of additional 41 berths with more 15m deep are planned in Japan, South Korea, Taiwan, Hongkong and Singapore by the year 2000.

(See Table 3.5.3)

Table 3.5.3 Development Plan for 15m deep Berth in Asia (Unit Number of Berth)

Name of Country	Name of Port	Until 1995	By 2000 (plan)
Japan	Tokyo		3
	Yokohama		2
	Osaka		3
	Kobe	2	5
South Korea	Busan		4
	Inchon		4
Taiwan	Kaohsiung		3
Hongkong	Hongkong	4	16
Singapore	Singapore	6	13
Total		12	53

Note : The number by the year 2000 include the number until 1995

Source : Effect of large scale container terminal improvement to the regional economic development (in Japanese) ;

Japan Transport Economic Research Center

(3) Container Cargo Share by Shipping Line

1) Total Capacity of National Flag Ship

The container ship slots of the world's top 20 operators in 1996 and that of the top 20 container liner service operators in Intra Asia are summarized by each national flag. (See Table 3.5.4 and 3.5.5, respectively)

The world's top 20 operators are the main members of the alliances which operate major international container service, namely Transpacific, Europe/East-Asia and Transatlantic. The operators in the alliance collaborate with each other not only in shipping operation but also in sales activities, such as feeder service and terminal operation.

The operators of Asian country flag, such as Japan, Taiwan, Korea and China, are ranked in the top four. A Singapore flag ship company (NOL) acquired with a US flag ship company (APL) in 1998 and now Singapore occupies the eighth position. The share of total slots of the world's top 20 operators and total world capacity by the five Asian country flags is about 54% and 27% respectively.

Table 3.5.4 Capacity of Shipping Line by National Flag in 1996

Name of Country	Container Volume (TEUs)	Total Slots of Flag Ship (TEUs)	Operator	
Korea	4,725,206 (8)	343,366	Hanjin,Hyundai,ChoYang	
Japan	12,943,900 (4)	328,115	NYK,MOL,K-Line	
Taiwan	8,078,251 (5)	324,393	Evergreen, Yangming	
China	17,926,798 (2)	287,533	COSCO,OOCL	
Denmark	475,798 (45)	232,257	Mearsk	
UK	5,090,248 (6)	221,531	P&O Nedlloyd	
USA	20,587,593 (1)	215,114	Sea-Land	
Singapore	12,943,900 (3)	165,582	NOL/APL	
Swiss		154,185	MSC	
Israel	959,824 (27)	98,086	ZIM	
France	1,803,079 (19)	89,658	CMA-CGM	
Canada	1,995,843 (18)	85,016	CP Ships	
German	4,656,952 (9)	73,372	Hapag	
Belgium	3,211,476 (13)	51,002	SCL	
(A) Grand Total		2,669,210	100%	
(B) 5 Asian Flag Total		1,448,989	54.2%(B/A)	27.5%(B/C)
(C) Total World capacity		5,265,745		100%

Note : Number in parenthesis indicates ranking of container volume in the countries

Source : Containerisation International 1998

Intra-Asia Service is almost monopolized by the flag ships of Taiwan, Japan, Korea, Singapore and China, which have a collective share of 90% of the service market.

Indonesia is ranked in the eighth position with PT Samudera Indonesia, but the capacity is less than 3% of the total capacity of top 20 in Intra Asia.

Table 3.5.5 Capacity of Shipping Line by National Flag in Intra Asia Service in 1996

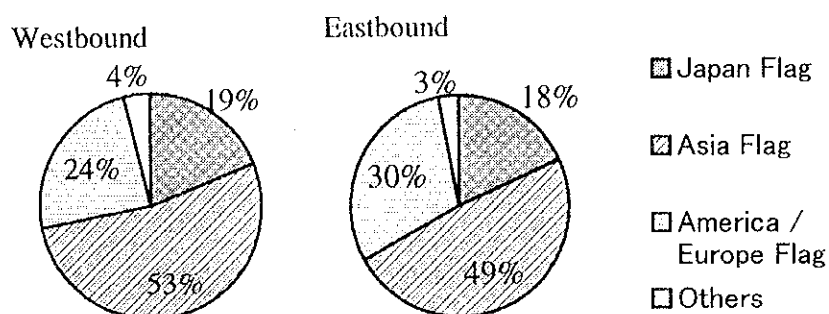
Rank	Name of Country	Total Capacity of Flag Ship		Operator
		TEUs	Share	
1	Taiwan	77,237	30.3%	WanHai,Uniglory,ChengLie,YMTC
2	Japan	44,364	17.4%	NYK,MOL,K-Line,TKS
3	Korea	43,993	17.2%	Heung-A,Hanjin,Hyundai,KMTC,DongNa
4	Singapore	31,655	12.4%	RCL,APL,Advance
5	China	31,247	12.3%	COSCO
6	Denmark	12,529	4.9%	Mearsk
7	USA	10,776	4.2%	Sea-Land
8	Indonesia	6,009	2.3%	Samudera Indonesia
Total		254,810	100%	

Source : NYK research and Containerisation International

2) Container Volume Share in Transpacific Service

Total share of Japanese flag and Asian flag in Transpacific service is 67% for Eastbound and 72% for Westbound respectively. The share of Asian flag for Eastbound increased to 49% from 41% and in Westbound to 53% from 43% during the last 5 years.

Fig.3.5.3 Container share of Transpacific Service in 1995



Source : Present situation of sea transportation in Japan (1997, in Japanese); MOT of Japan

(4) Present Situation and Future Share of Container Volume

1) Container Volume Estimating Procedure

To grasp the future situation and requirements of Indonesia for container trade in Asian countries, the share of container volume in this area should be estimated. But a precise forecast is very difficult because the economic activities of each countries depend on a variety of factors, such as political matters, private activities, environmental conservation and so on. Hereunder, the share will be estimated using a very rough procedure. However it could serve as a useful guideline in understanding future trends of container transportation.

In general, there is a linear relationship between the growth rates of container volume and the growth rates of GDP in the short term. Although this relationship is not necessarily reliable in the long term, it is assumed that the growth rate of container volume is the same as GDP growth rate through study period. (See Table 3.5.6) It is meaningful to grasp the container volume share of Indonesia in Asian countries comparatively.

Table 3.5.6 Presumed GDP Growth rate per year for Each Region in Asia (%)

	1995 – 2000	2001 – 2010	2011 - 2020
Japan	2.6	2.6	2.1
China	8.7	7.8	7.0
NIEs	6.1	5.2	4.3
ASEAN	7.2	6.8	6.4

Note : NIEs countries are South Korea, Taiwan, Hongkong and Singapore

ASEAN represents only Indonesia, Thailand, Malaysia and Vietnam on this Table

Source : NRI(Nomura Research Institute)

2) Transpacific Trade

Based on the container volume of the Transpacific Trade in 1996 given in “Journal of Commerce”, the estimated share of each country in 2008 and 2018 is shown in Table 3.5.7.

In 2018, Japan’s share will decrease by more than 10%, Korea, Taiwan and Hongkong will maintain more or less their present shares, while China’s share will increase by more than 10%. The total share of these five countries is 81% in 1996, 79% in 2008 and 77% in 2018. This shows that Northeast Asia will continue to be the main market of the Transpacific service. It is anticipated that China will be the more important market for operator in the Transpacific service and some container transshipment ports to China will be developed in Japan, Taiwan, Korea and Philippines.

The share of export/import loaded container from/to the hinterland of Singapore is 2.5% in 1996 and 2.3% in 2018, even though the port is one of the largest container ports in the world. The total share of Southeast Asian countries, Thailand, Singapore, Malaysia, Indonesia and Vietnam, is 19% in 1996, 21% in 2008 and 23% in 2018. Southeast Asian countries are less competitive than Northeast Asian countries in term of container cargo volume.

Table 3.5.7 The Share of Transpacific service

	1996				2008		2018	
	Export (1,000TEU)	Import (1,000TEU)	E/I Total (1,000TEU)	Share (%)	Growth	Share (%)	Growth	Share (%)
Japan	670	1,113	1,783	24.0	1.36	16.7	1.69	12.3
Taiwan	578	415	993	13.3	1.90	13.0	2.95	11.9
Hongkong	570	481	1,051	14.1	1.90	13.7	2.95	12.6
Philippines	88	116	204	2.7	2.23	3.1	4.19	3.5
Thailand	223	135	358	4.8	2.23	5.5	4.19	6.1
Singapore	77	115	192	2.5	1.90	2.5	2.95	2.3
Malaysia	171	82	253	3.4	2.23	3.9	4.19	4.3
Indonesia	178	162	340	4.6	2.23	5.2	4.19	5.8
Korea	284	425	709	9.5	1.90	9.3	2.95	8.5
Vietnam	10	9	19	0.3	2.23	0.3	4.19	0.3
China	1,198	341	1,539	20.7	2.54	26.9	5.17	32.0
Total	4,047	3,394	7,441	100		100		100

Source : prepared by the Study Team

3) Intra-Asia Trade

Based on the container volume of Intra-Asia Trade in 1996 given in “International Transportation Handbook” published by Ocean Commerce Ltd., the share of each country in 2008 and 2018 is estimated. (See Table 3.5.8) However China was excluded from this estimation.

In 2018, Japan’s share will drop by approximately 10%, while Taiwan and Hong Kong maintain more or less their present share through this period. But the growth rate of container might decline if economies of these countries would have been well matured. The values, therefore, might be smaller than forecast.

It is understood that Intra-Asia container trade will be generated all over the Asian countries and there is no doubt that the container cargo share will redistribute steadily. Preparing facilities and services to support such activities is essential for these countries to maintain the competitiveness on container transportation.

Table 3.5.8 The Share of Intra-Asia service

	1996				2008		2018	
	Export (1,000TEU)	Import (1,000TEU)	E/I Total (1,000TEU)	Share (%)	Growth	Share (%)	Growth	Share (%)
Japan	1,157	1,163	2,320	21.8	1.36	15.9	1.69	12.3
Taiwan	643	997	1,640	15.4	1.90	15.7	2.95	15.2
Hongkong	1,241	636	1,877	17.6	1.90	17.9	2.95	17.4
Philippines	264	94	358	3.4	2.23	4.0	4.19	4.7
Thailand	365	389	754	7.4	2.23	8.5	4.19	9.9
Singapore	484	465	949	8.9	1.90	9.1	2.95	8.8
Malaysia	337	385	722	6.8	2.23	8.1	4.19	9.5
Indonesia	355	337	692	6.5	2.23	7.8	4.19	9.1
Korea	383	778	1,161	10.9	1.90	11.1	2.95	10.8
Vietnam	96	81	177	1.7	2.23	2.0	4.19	2.3
Total	5,325	5325	10,650	100		100		100

Source : prepared by the Study Team

3.5.3 Example of International Hub Port

(1) Algeciras, Marsaxlokk and Gioia Tauro in Mediterranean Sea

Algeciras port, Marsaxlokk port and Gioia Tauro port are situated in Mediterranean Sea, in which there is a major sea-lane connecting the Suez Canal and the Gibraltar Strait. Europe/Asia service route and Mediterranean & Black Sea route run this sea-lane. The hinterland is not large but the ports are facing the international sea-lane and offer good services, quick and punctual terminal operation at low competitive cost and well organized feeder system. (See table 3.5.9 and Fig. 3.5.4) Location and good service are the reasons that the ports are directly called by 4,000TEU container ships as an international hub port.

Recently these ports entered fierce competition to invite calling of large container vessels operated by big international consortium. HMM strengthened feeder service route from Marsaxlokk and MSC/Norasia moved the Hub port in Mediterranean Sea from Marsaxlokk to Piraeus. Evergreen selected Gioia Tauro as Hub port in Mediterranean Sea and Meask/Sea-Land group set up the trunk route to call their private terminal in Algeciras and priority berth in Gioia Tauro.

(2) Singapore and Hong Kong

Singapore situated near the major sea-lane, Malacca Strait, and role of the port was a supply base for long voyages to Europe, originally. Europe/Asia service route and Round World service route run this sea-lane. The hinterland of the port and container volume from the hinterland is very small compared to the handling volume at the port, 13 million TEUs in 1996. But the port face the international sea-lane and offer rational services, quick and punctual port operation with low cost and well organized feeder system to wide neighboring area. (See table 3.5.9 and Fig. 3.5.5) The capacity of container ships has been rapidly increasing and the port facilities and services in Singapore have been developed to satisfy the requirement of ships and operators continuously. Neighboring countries have not been able to develop such facilities and services sufficiently.

Hong Kong situated at the southern end of China, a country which is experiencing high economic growth. The port has been connected over the country with road and railway as national gate port of import/export cargo. The port occupies an important position in world container transportation at present and the handling volume reached 13 million TEUs in 1996. Several new port facilities are being developed in the northern part of the country and the service area of the port will decrease gradually in future.

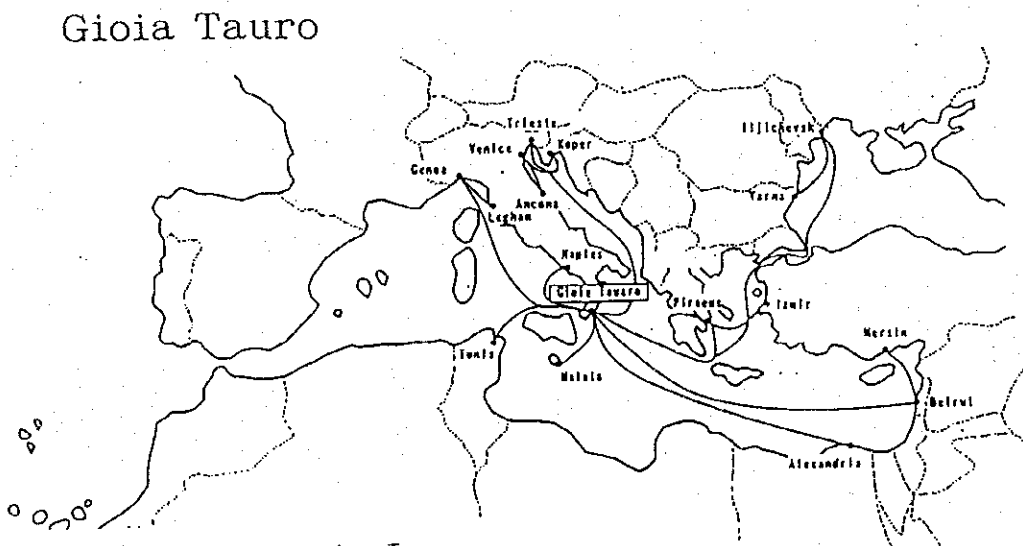
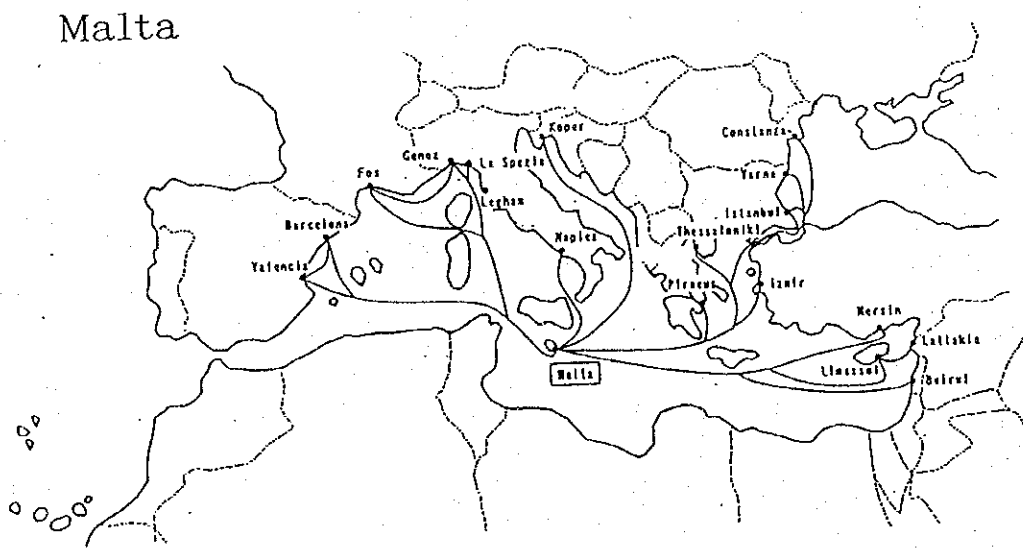
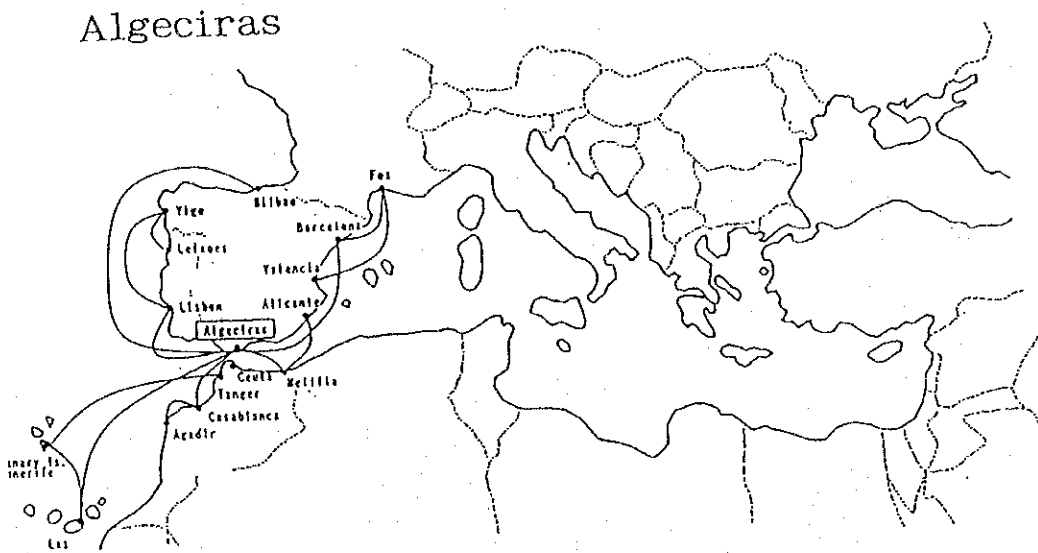
Location and provision of advanced port facilities are the reasons that the port occupies an important position in the world container transportation.

Table 3.5.9 Examples of International Hub Port

Items	Algeciras	Marsaxlokk	Gioia Tauro	Singapore	Hongkong
Hinterland	Southern part of Spain	Malta	Southern part of Italy	Singapore	Hongkong
Feeder Area	Spain Portugal Morocco	Malta Italy Greece	Italy Greece	Malaysia, Vietnam Indonesia, Philippines Thailand, Cambodia	China with roads and railways
Location	Near the Europe/Asia, Mediterranean and Black Sea service route	Near the Europe/Asia, Mediterranean and Black Sea service route	Near the Europe/Asia, Mediterranean and Black Sea service route	Near the Europe/Asia service route, End port of Transpacific service	End port of Europe/Asia and Transpacific service
Competitor	Malta Gioia Tauro	Algeciras Gioia Tauro	Malta Algeciras	Colombo, in future Port Klang, Leam chabang	in future Yantuan, Shekou, Chiwan, Shenzhen
Calling Line	Maersk/Sea-Land	Grande Alliance	Maersk/Sea-Land Evergreen	Maersk/Sea-Land Grande Alliance Global Alliance & Othres	Maersk/Sea-Land Grande Alliance Global Alliance & Othres
Transshipment Cost	N/A	\$50~70/Box	\$50~70/Box	Sp\$100~150/TEU	HK\$200~250/TEUs
Time	1~2 days	1~2 days	1~2 days	0.5~2 days	0.5~2 days
Frequency				(calls/week) Eastbound 10, Westbound 8 East 23, West 24	(calls/week) Eastbound 19, Westbound 15 East 17, West 22
Transpacific Europe					
Handling Volume					
Total in 1995	1,154,000TEUs	514,000TEUs	15,830TEUs		
in 1996	1,306,000TEUs	575,000TEUs	555,000TEUs	12,940,000TEUs	13,300,000TEUs
Transshipment	100%	100%	100%	2/3	20%

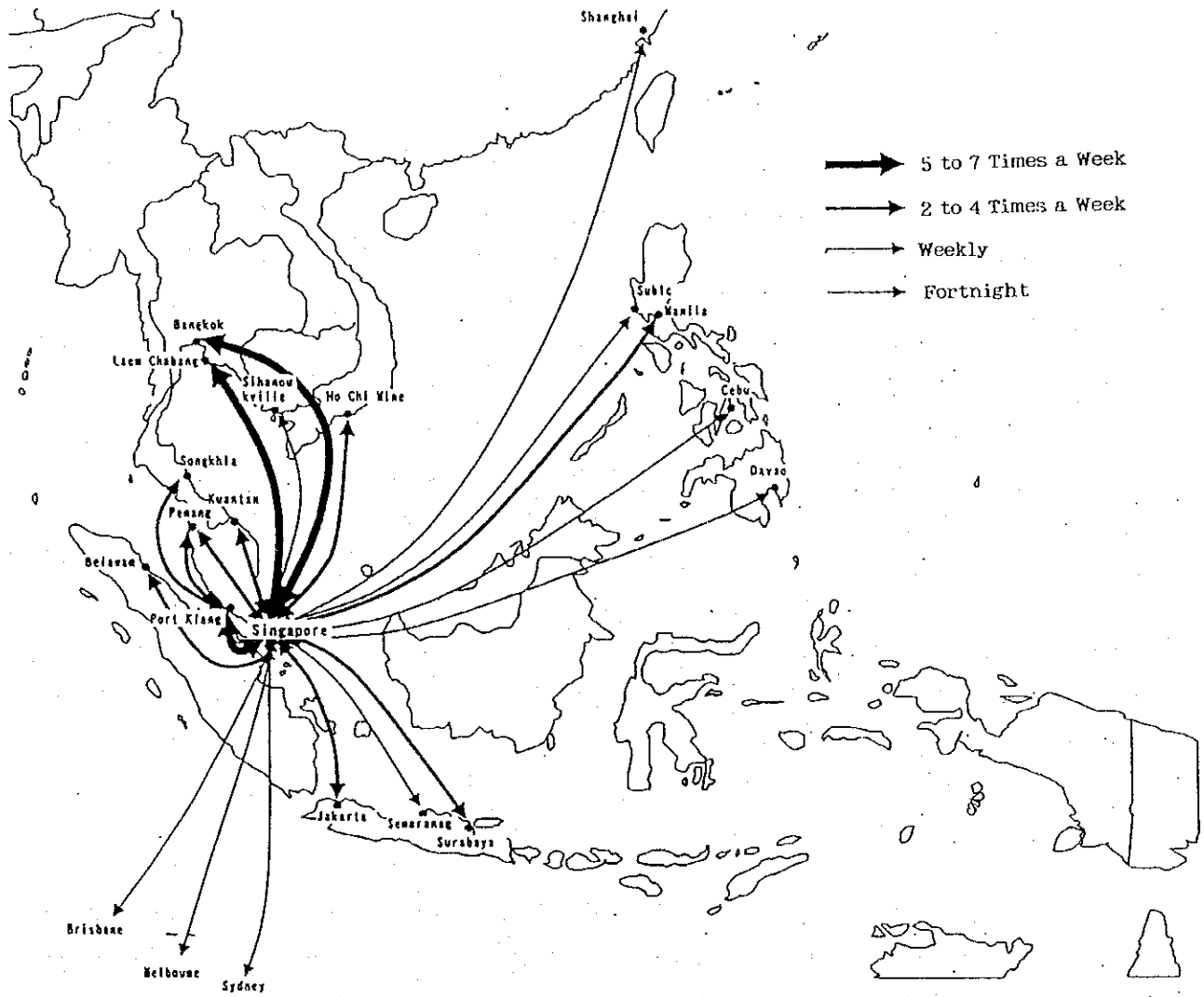
Source : Study of MOT in Japan

Figure 3.5.4 Feeder Service Route in Europe



Source: Study of MOT in Japan

Figure 3.5.5 Feeder Service Route in Singapore by RCL



Source: Study of MOT in Japan

3.5.4 Selecting Direct Call Port

(1) Viewpoint of Ship Operator

Ship operator, in general, decides the itinerary by evaluating two factors.

One is limitation of a round trip period. The service, basically, has to provide port calls on weekly basis, every same day of a week. If the round period of the service is 28days(4weeks), four ships with similar capacity have to be assigned. For an effective and efficient service with smaller number of ships, the number of port calls should be minimized to shorten the round period of the service and the transit-time of cargo.

The other is volume of cargo in the service. In order to obtain a sufficient volume of cargo, the ship has to call many ports during the round trip. On the contrary, the larger number of ports is called, the longer period takes a round trip service is.

Ship operator will select the direct call ports where it is easy to obtain a sufficient volume of cargo without competition, for example the port in flag country where the operator has an advantage for cargo collection. If there were some candidate ports in an area with keen competition, a port with certain volume of cargo which is relatively less competitive would be selected by a ship operator as a direct call port.

As described in the example of hub port in Mediterranean Sea, ship operator easily move the location of hub port in fierce competition to get profit.

(2) Viewpoint of Shipper

Shipper will select a port for shipment by evaluating two factors. One is door-to-door cost and the other is total transport time. The door-to-door transportation cost includes not only sea and land transportation but also storage and insurance. The total transport time is estimated by taking account of delivery days, service frequency, customs clearance, operation and acceptance time in port and other facilities.

Damage of cargo due to transshipment, lost and stolen cargo, cancellation and delay of the service and reliability of schedule are also factors in deciding the total cost and total time.

For LCL cargo shipper, reliable CFS service and safety of cargo are important factors to be considered. LCL service is essential to increase the container volume at a port.

(3) Geographical Condition

In order to occupy a position as an international container hub port in a certain area, a port should be situated near a major international sea-lane and feeder service ports should be located at an appropriate distance from the sea-lane with proper container volume. For example, Colombo

was one of ports receiving feeder service from Singapore, and the distance from Singapore is more than 1,500 miles. Now Colombo is an international container hub port in the Bay of Bengal and Arabia Sea area. While the distance between Algeciras and Marsaxlokk is about 1,000 miles, but it is only 200 miles to Gioia Tauro from Marsaxlokk. The container volumes in these ports are still very small compare to other international hub port because there are a lot of historical ports in neighboring countries and several ports introduced incentive tariff to invite major service.

There is fair possibility that a port will receive direct service, if the port has a sufficient volume of container from the hinterland and is situated around 500 mile or less from the international sea-lane. The service ship navigating 500miles is able to call the port within one day from the sea-lane. It is, therefore, reasonable for operator to reschedule the itinerary to call the port. For example, Leam Chabang is called by transpacific direct service at present, since the port is located around 450 miles from international sea-lane.

(4) Port Facilities

In an international container hub port, facilities of 15m deep and 350m long berth with more than 4 large (17 rows) quay-cranes and sufficient container terminal area (15Ha) under well organized operation system have been developed to satisfy the requirements of major ship operators.

As an ordinary container terminal called by international service with more than 1,000 TEUs capacity ship, facilities of 12m deep 250m long berth with more than 2 quay-cranes and sufficient container terminal area (10Ha) under well organized operation system should be prepared.

(5) Container Volume

The container volume handled at the port is one of the important factors to receive international direct service. At least 30% of full capacity of a calling ship should be loaded and unloaded at one time. And the difference between the volume of loaded and unloaded is another important factor. If the difference is too large, empty containers have to be exported/imported by operator's expense. For example, due to the imbalance of export and import cargo, transportation cost of export from Japan to Singapore costs about US\$800, while import to Japan from Singapore costs about US\$400.

3.5.5 Port Service and Management

(1) Quality of service

A port should have high quality services for customers. The port should provide customers with high safety, security and reliable services, smooth procedure of documentation and high productivity of cargo handling at low cost. Safety and security systems, best quality/price ratio, wide ranging services, efficient procedure, highly skilled labor force, and computerized port control system including EDI should be available at ports. Punctual operation according to fixed schedule and keeping first-come/first-served theory is the most important factors to achieve high quality managing/operation in ports.

International shipping lines operate on extremely tight schedules. Delays on the schedule cause a heavy burden to shipping lines. As a consequence, the terminal manager/operator must be ready to provide services as soon as a vessel arrives at the port. Preparation for vessel's arrival should be done long before her berthing at the port. Planning for loading and unloading sequence and allocation of cargo handling equipment should be prepared prior to her arrival.

1) Highly skilled labor

High skilled labor are important for high quality management and operation of ports, in addition to reasonable procedure(regulations) and well equipped facilities. So, well designed labor training courses should be provided for port management and operation bodies.

Staff training program is indispensable for high quality management and operation at the port. In addition to staff training program, port sector should provide on the job training, job rotation within the sectors and with other organizations to provide staffs who has high skill and mindset to meet the rapidly changing needs of the port services. Staff training programs of port sector should have many courses such as port management & operation, port equipment management, management of container operation, management & operation of a break bulk terminal, management of port security, cargo handling, transportation and storage of dangerous goods, quay crane operation, rubber tyred gantry crane operation, practical pilotage attachment and ship handling simulation training and etc.

2) Safety and Security

Ports should have good safety and security systems. They are pilotage, towage, buoys and signals, fire and police station etc. Round the clock pilotage and towage at channels with buoys and signals make the port safety. Vessel monitor system with VHF radio and radar system ensures safe entry of vessels. Differential GPS (DGPS) signal broadcasting system provides data of fixed reference station's position at high accuracy achievable ranges from $\pm 5m$ to sub-meter accuracy, depending on the type of receiver used. The electronic chart display and information system used

with electronic navigational chart will further enhance safe navigation providing with real-time information such as a position of the vessel, 24 hour and all-weather information, anti-grounding warnings, anti-collision warnings. And the system provides with information for easier navigation such as route planning, route monitoring and estimated time of arrival (ETA).

Police station or guard man office will prevent the cargoes from damage and pilferage.

3) Procedure and EDI system

Ports should offer a package of services that caters to all needs of the port users. Ports should have agency who co-ordinate all integrated services relieving bothersome involved in dealing with multiple agencies. Computerized ship planning and ready accessibility to stowage plans gives the agents adequate time to plan shipment schedules. Labor saving and simplified procedures should be realized in order to provide high quality port service to users.

If a port offers a single window service for documentation, users can eliminate the cumbersome procedure of bringing papers from one department to another. Introduction of the EDI system makes the procedure at the port more reliable and easier without many kind of papers. The EDI system linked with customers and relevant government agencies can minimize paper flow resulting elimination of errors in communications and faster response. After installation of the EDI system, preparation and submission of permits, declarations, negotiations of bills and generation of proforma statements become easy, and accurate and timely.

4) Productivity and Price

There are three basic elements in cargo handling performance. The first is the rated productivity, defined as the number of tons or TEUs, handled by each gang, crane, ship-loader etc., when they work for one hour without interruption. The second element is the interruption, which tend to happen any time, and is the consequent idle time that reduces the shift output. As a result of this idle time, the average hourly performance is reduced to what may be termed the effective productivity. The third element is the manner in which gangs and appliances are used, for example, how many gangs are used per hatch and per ship, how many shifts there are, how much overtime working there is. This last element is termed the working intensity. It determines how much total effort is used and this combined with the effective productivity produces the long-term performance. Higher productivity of cargo handling will reduce time and cost of cargo transportation. High productivity with low price in cargo handling should be realized to invite direct calls of international shipping lines.

5) Information system for users

For convenience of users, cargo and ship information should be provided as soon as possible through the Internet service etc. The information should include details of services, procedures, facilities, performance, schedule of vessels and cargoes, etc. A port specialist should plan cargo

movements prior to vessel arrival, so cargo moves rapidly to its destination. Vessels and cargoes location should be traced, received, documented and forwarded to vessel operators. Real-time information should be provided to customers and agents. Customer service should provide customer's office with forwarding information. Such information should include container numbers, rail car numbers, truck numbers, date departed, routing, daily tracing and destination delivery information.

6) Other service

For documentation and administrative purpose, all services including Banks, communication measures with TELEX/FAX/INTERNET should be made available.

Ports should have special service berth for ship repair and maintenance with well equipped workshop and auto garage. Other facilities like fuel bunkering, fresh water supply are also needed.

(2) Accessibility with railways and roads

Shippers and consignee of cargoes want to be provided with the total services including warehousing, distribution, sea and land transportation.

A port should be connected to a large fleet of prime movers, trailers and trucks for a variety of services. Truckers haul the largest number of containers among prime movers to and from the port. A vehicular scheduling system for the optimum logistics of the fleet of prime movers should be installed. Door to door services, and urgent deliveries at short notice for customers should be realized. In addition to storage area in container terminal, warehouse space should be available near the port with easy reach of railways and roads. A port should have a distribution center, which caters to requests of manufacturers, traders, forwarders and others.

A port, with their excellent infrastructure, good communication network and well established financial services, should have connection with land transportation companies. Such companies serve their regional markets through the port. They will deliver goods to the end consumers on schedule, without damage, without pilferage at appropriate costs always. A port should have a forwarding network, which enables the shipping line to deliver the goods in the shortest possible time at competitive rates. Reduction of traffic congestion around the port area needs tight co-operation with other administrative organization related to road traffic.

3.6 Sea Traffic Demand

The purpose of this section is to forecast the cargo volume and number of passenger in the target years of 2003, 2008 and 2018 for establishment of the Port Development Strategy.

The cargo volume in each province is estimated by macroscopic forecast method since the purpose of this study is not to examine a feasibility of a certain port development which requires precise forecast, but to prepare a nationwide strategy for port development and management/operation which is enough to use only macroscopic estimation.

The number of calling vessels, which is one of the important demand indicators of a port, is mentioned in Section 3.4 of Chapter 3.

The cargo and passenger volumes of ferry transportation are not forecast in this study as those are being forecast in a concurrent JICA study THE DEVELOPMENT STUDY ON THE NATIONWIDE FERRY SERVICE ROUTES. (Results of the forecast are shown in Appendix 3.6)

3.6.1 Socio-economic Framework

The socio-economic frameworks such as GDP, GRDP and the population of Indonesia drafted herein by the study team will be used as the preconditions of the projection of cargo and passenger traffic forecast at Indonesian public ports.

The frameworks are estimated with consideration of the economic crisis in 1998 and based on PJPII which is included in the five-year development plans (from REPELITA VI to REPELITA X) from 1994 to 2018. (Table A 3.6.1.1 in Appendix 3.6)

One framework is set up for population and three alternative frameworks for GDP. The number of alternatives of GRDP is six altogether: two GRDP distribution scenarios for each of the three alternatives of GDP.

(1) Population

According to the Central Bureau of Statistics (BPS), the Indonesian population and the population density in 1996 are estimated at around 198.3 million and 102 persons/km². The average population growth rate from 1990 to 1996 was about 1.6% per year.

The population in target years(2003, 2008 and 2018) is estimated by the growth rates in PJPPII which are 1.37% in REPELITA VII(from 1999 to 2003), 1.20% in REPELITA IIX(from 2004 to 2008), 1.01% in REPELITA IX and 0.88% in REPELITA X. Result of the estimation is shown in Table 3.6.1.1.

Table 3.6.1.1 Population in 2003, 2008 and 2018

(Thousand)

Province	2003	2008	2018
ACEH	4530.3	4920.8	5567.1
SUMATERA UTARA	12405.7	13128.9	14241.9
SUMATERA BARAT	4811.6	5085.7	5505.4
RIAU	4977.4	5593.1	6657.5
JAMBI	2980.2	3328.6	3927.2
SUMATERA SELATAN	8656	9486.3	10880.8
BENGKULU	1805.6	2033.6	2428.5
LAMPUNG	7669.1	8240.5	9164.5
Sumatera Total	47835.9	51817.5	58372.9
DAERAH JAKARTA	10592.1	11455.5	13034.7
JAWA BARAT	45534.1	49252.9	56055.6
JAWA TENGAH	31188.5	32070.8	33482.8
DAERAH YOGYAKARTA	2867	2826	2810.8
JAWA TIMUR	35740	36830.2	38602.4
BALI	3075.2	3176.5	3343.3
Jawa Total	128996.9	135611.9	147329.6
KALIMANTAN BARAT	4287	4660.5	5297.4
KALIMANTAN TENGAH	2022.8	2249.9	2647.7
KALIMANTAN SELATAN	3373.1	3648.9	4115.5
KALIMANTAN TIMUR	3115.4	3576.5	4401.8
KALIMANTAN Total	12798.3	14135.8	16462.4
SULAWESI UTARA	2917.2	3065.6	3289.4
SULAWESI TENGAH	2339.1	2566.9	2953
SULAWESI TENGGARA	1986.2	2216.3	2613.8
SULAWESI SELATAN	8480.7	8995.8	9805.2
SULAWESI Total	15723.2	16844.6	18661.4
NUSATENGGARA BARAT	4072.9	4324	4772.9
NUSATENGGARA TIMUR	4043	4321.5	4823.8
TIMOR TIMUR	974.7	1055.6	1203.9
MALUKU	2467.9	2693.1	3107.8
IRIANJAYA	2471.5	2784	3368.8
Other EAST PART Total	14030	15178.2	17277.2
TOTAL(all Indonesia)	219384.3	233588	258103.5

(2) Gross Domestic Product(GDP)

According to the BPS, GDP in 1996 reached approximately 26.9 trillion rupiahs at 1983 constant price. The growth rate of GDP from 1994 to 1996 is about 7.1% per year. The GDP at 1983 constant prices from 1980 to 1996 is shown in Table A3.6.1.2 in Appendix 3.6.

The GDP in the target years(2003, 2008 and 2018) is estimated based on the growth rates of GDP during each REPELITA(five year development plan) in which the growth rate was set and in consideration of the economic crisis in 1998.

The three alternatives of GDP in the target years are set with the following preconditions:

Alternative-1: It is assumed that the growth rate of GDP after the economic crisis in 1998 is approximately minus five percent. Then, the growth rate will be restored to the original estimated value of GDP of PJPII from the year 2006.

Alternative-2: It is assumed that the growth rate of GDP after the economic crises in 1998 is approximately minus five percent, and that there will be zero growth in 1999. Then, the growth rate will be gradually restored to the original growth rate estimated in PJP2.

Alternative-3: It is assumed that the growth rate of GDP after the economic crisis in 1998 is approximately minus five percent, after that the value is set at the middle position between alternative-1 and 2.

Figure 3.6.1.1 and Table 3.6.1.2 shows the estimated GDP from 1994 to 2018.(Period of PJPII.)

The GRDP by each region namely Sumatra, Java, Kalimantan Sulawesi and the other eastern islands in the target years is calculated based on the share of the growth rate of GDP during PJPII period in the interim report of Technical Assistance Service for Port Development Strategy Study for the Southern Sumatra and Western Java Region prepared by Louis Berger International, Inc. Two GRDP distribution scenarios are assumed under the three alternative GDPs so that six cases of GRDP for each region are drafted. The two scenarios of GRDP distribution are as follows:

Scenario I: This scenario, R1, is largely based on a continuation of the trends which started in the mid-eighties, namely concentration of the economic activities in Java Region.

Scenario II: This scenario, R2, is based on an active regional development policy aiming at attaining equal distribution of activities throughout Indonesia. This scenario places more emphasis on the development of the eastern provinces.

Table 3.6.1.2 GDP from 1994 to 2018
(1983 constant price)

(Billion Rp.)

Year	Alternative-1	Alternative-2	Alternative-3
1994	149,715	149,715	149,715
1995	161,474	161,474	161,474
1996	171,663	171,663	171,663
1997	181,619	181,619	181,619
1998	171,840	171,840	171,840
1999	171,840	171,840	179,744
2000	176,995	171,840	188,013
2001	196,287	182,150	196,661
2002	217,683	193,079	205,708
2003	241,410	204,664	215,170
2004	267,724	219,195	229,802
2005	296,906	234,758	245,428
2006	317,986	251,426	262,117
2007	340,563	269,277	279,941
2008	364,743	288,396	298,977
2009	393,193	310,890	324,689
2010	423,862	335,140	352,613
2011	456,923	361,281	382,937
2012	492,563	389,461	415,870
2013	530,983	419,839	451,635
2014	577,179	456,365	497,250
2015	627,393	496,068	547,472
2016	681,976	539,226	602,767
2017	741,308	586,139	663,646
2018	805,802	637,133	730,675

Note: GDP from 1994 to 1996: Actual
GDP from 1997 to 2018: Estimated

Figure 3.6.1.1 GDP at 1983 Constant Price from 1994 to 2018

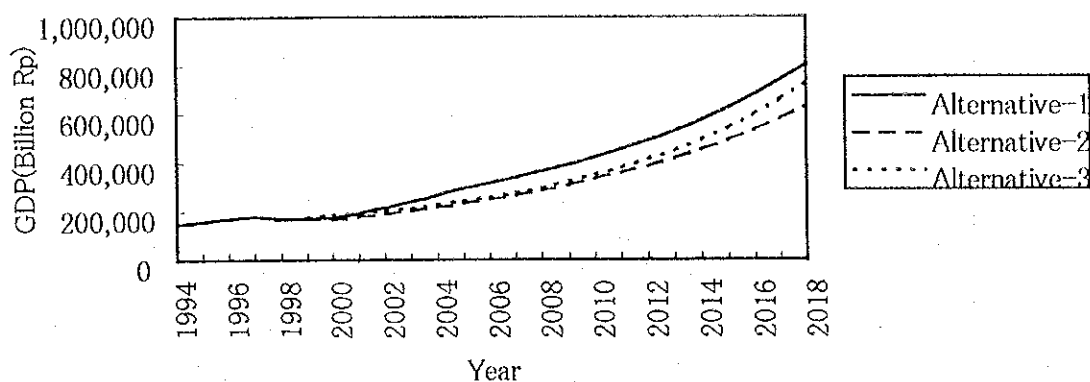


Table 3.6.1.3 shows the GRDP in the target years in each region for Scenario 1 in Alternative-3 in the target years. (See Table A3.6.1.3 to A3.6.1.7)

Table 3.6.1.3 GRDP in Each Region in the Target Years
(Scenario 1, Alternative-3)

Year	(Billion RP.)		
	2003	2008	2018
Sumatra	44,175	58,842	132,536
Jawa+Bali	132,650	189,555	487,805
Kalimantan	18,756	25,042	55,997
Sulawesi	8,618	11,635	26,744
Eastern Part	8,452	11,385	25,073

The cargo forecast in this study should be conducted for each province so that GRDP should be drafted by province. The GRDP of each province is calculated by the same growth rate of the estimated GDP in each region.

Table 3.6.1.4 shows GRDP in each province for Scenario 1 in Alternative-3 in the target years. (See Table A3.6.1.8 to A3.6.1.9)

Table 3.6.1.4 GRDP in each Province in 2003, 2008 and 2018
(Scenario 1 in Alternative-3)

(Billion Rp.)

Year	Scenario-1			Scenario-2		
	2003	2008	2018	2003	2008	2018
Aceh	5,703	7,479	15,841	6,523	9,711	20,616
Sumatra Utara	11,783	15,452	32,731	13,478	20,065	42,598
Sumatra Barat	3,780	4,957	10,499	4,323	6,436	13,664
Riau	9,842	12,907	27,340	11,258	16,760	35,582
Jambi	1,561	2,048	4,338	1,786	2,659	5,645
Sumatra Selatan	6,741	8,841	18,726	7,711	11,480	24,372
Bengkulu	858	1,125	2,383	981	1,461	3,101
Lampung	3,434	4,504	9,540	3,929	5,848	12,416
Sumatera (total)	43,702	57,312	121,397	49,989	74,420	157,995
DKI.Jakarta	34,481	48,114	114,069	36,805	52,897	107,280
Jawa Barat	35,169	49,074	116,344	37,540	53,952	109,420
Jawa Tengah	21,750	30,350	71,954	23,217	33,367	67,672
D.I.Yogyakarta	2,662	3,715	8,807	2,842	4,084	8,283
Jawa Timur	32,185	44,911	106,475	34,355	49,375	100,138
Bali	3,720	5,190	12,305	3,970	5,706	11,573
Jawa (total)	129,967	181,353	429,955	138,729	199,383	404,367
Kalimantan Barat	3,335	4,383	9,227	3,889	5,932	13,012
Kalimantan Tengah	2,005	2,635	5,548	2,338	3,567	7,824
Kalimantan Selatan	2,932	3,854	8,113	3,419	5,216	11,441
Kalimantan Timur	10,316	13,557	28,541	12,029	18,350	40,249
Kalimantan (total)	18,589	24,430	51,430	21,675	33,065	72,526
Sulawesi Utara	1,807	2,398	5,169	2,221	3,649	9,188
Sulawesi Tengah	1,118	1,485	3,200	1,375	2,259	5,687
Sulawesi Selatan	4,785	6,351	13,687	5,881	9,663	24,327
Sulawesi Tenggara	789	1,047	2,257	970	1,594	4,012
Sulawesi (total)	8,499	11,281	24,313	10,447	17,164	43,214
Nusa Tenggara Barat	1,612	2,136	4,438	1,774	2,532	5,066
Nusa Tenggara Timur	1,352	1,791	3,721	1,488	2,123	4,248
Timor Timur	347	459	955	382	544	1,090
Maluku	1,499	1,985	4,125	1,649	2,353	4,709
Irian Jaya	3,526	4,670	9,705	3,880	5,535	11,078
Other islands (total)	8,335	11,042	22,945	9,173	13,087	26,190
GRDP (total)	209,092	285,418	650,039	230,012	337,119	704,292

3.6.2 Cargo Volume

(1) Foreign Trade Cargo

1) Methodology

At present, almost all foreign trade cargo is transported by sea. In this study, it is assumed that all forecast cargo is transported by sea.

The foreign trade cargo by sea transportation is estimated based on the past records of foreign trade by the following steps:

(A) Regional Forecast

- ① Indonesia is divided into five regions, namely Sumatra, Java, Kalimantan, Sulawesi and other eastern areas (hereinafter called the East part).
- ② Based on the actual records, Indonesian foreign trade volume (both import and export) from 1990 to 1996 is summed up by packing style, namely containerizable cargo, conventional general cargo (hereinafter called conventional cargo), dry bulk cargo and liquid bulk cargo. Conventional cargo refers to cargo which is not suitable for containerization.
- ③ The cargo volume in the target years in each region is estimated using correlation with GRDP or time trend or average of the past data by each packing style.

(B) National Forecast (Indonesia as a whole)

Total foreign trade cargo volume of sea transportation in Indonesia for export and import is estimated by correlation between the cargo volume and GRDP.

(C) Adjustment

If there is not a large difference between the results of the above (A) and (B), the result of (A) is adopted as the foreign trade cargo volume of sea transportation in Indonesia.

If there is a large difference between the results of (A) and (B), the difference between (A) and (B) is added to the result of (A) by each packing style in proportion to the share of estimated cargo volume by packing style in each region in (A).

(D) Cargo Volume at Public Ports and Special Ports

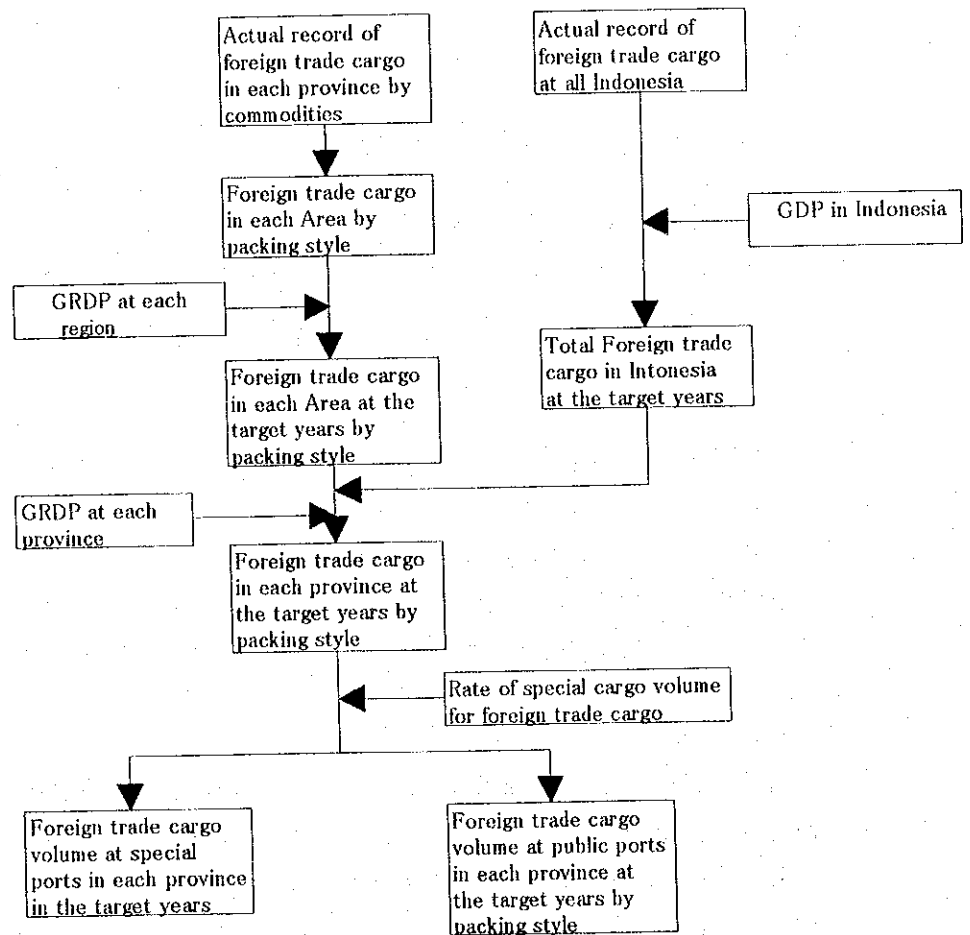
According to the information from DGSC, the major function of non-commercial public ports is to support regional livelihood. Therefore, almost all handling cargo at non-commercial public ports is considered as domestic cargo.

Foreign trade cargo volume at public ports (IPC ports) is calculated by deducting the foreign trade cargo volume at special ports from the total foreign trade cargo volume in Indonesia.

At the special ports, the foreign trade cargo volume is estimated using the ratio of foreign trade cargo volume at special ports to foreign trade cargo volume at IPC ports.

Figure 3.6.2.1 shows the forecast procedure for foreign trade cargo by sea.

Figure 3.6.2.1 Procedure of Forecast for Foreign Trade Cargo Volume



The data of foreign trade cargo is obtained from the statistics of foreign trade in Indonesia.

The transshipment container cargo of foreign trade cargo which is transported by internal sea transportation is included in the result of this estimation.

2) Export Cargo Volume in 2003, 2008 and 2018

(A) Regional Forecast

The export cargo volume in the target years by packing style is estimated using the correlation between the cargo volume and GRDP in general. However, if there is no close relationship with GRDP, the cargo volume in the target years is estimated using time trend analysis or the average of the past data. If the past records reveal an increasing tendency, the future cargo volume is estimated by time trend analysis. If there is no clear tendency, (where the volume remains almost constant) the cargo volume in future is estimated using the average volume of the past records.

The export cargo volume in each region in the target years for Scenario 1 and 2 in Alternative-3 is shown in Tables 3.6.2.1 and 3.6.2.2.

(B) National Forecast

Export cargo volume in all Indonesia in the target years is estimated using the correlation between the total export cargo volume in Indonesia from 1989 to 1995 and GRDP.

The result of the estimation is shown in Table 3.6.2.3.

(C) Export Cargo Volume in the Target Years

There is a large difference between the results of (A) and (B). Therefore, the difference is distributed by the ratio of the estimated cargo volume by packing style in each region. Then, the export cargo volume by packing style in each region is estimated by adding the difference and the result of (A)

The export cargo volume of sea transportation by packing style in each province is estimated using the distribution of the rate of estimated GRDP in each province in the target years.

The export cargo volume in each province in the target years (Alternative-3, Scenario 1 and 2) is shown in Tables 3.6.2.4 and 3.6.2.5 (See Table A3.6.2.1 to A3.6.2.4)

Table 3.6.2.1 Export Cargo Volume in Each Area
in the Target Years (Scenario 1, Alternative3)

		(Million ton)		
Area	Packing Style	2003	2008	2018
Sumatra	Container cargo	3.71	6.52	14.47
	Conventional G.C.	15.01	19.02	30.97
	Dry bulk	166.41	342.42	1355.91
	Liquid bulk	75.23	86.81	126.92
	Total	260.36	454.77	1528.27
Jawa	Container cargo	2.89	5.45	18.05
	Conventional G.C.	11.68	15.89	38.63
	Dry bulk	1.91	2.13	2.64
	Liquid bulk	18.76	27.35	72.07
	Total	35.24	50.81	131.38
Kalimantan	Container cargo	1.86	3.67	13.15
	Conventional G.C.	7.54	10.71	28.14
	Dry bulk	80.68	153.71	573.50
	Liquid bulk	49.78	77.87	231.50
	Total	139.86	245.96	846.28
Sulawesi	Container cargo	0.39	0.86	3.87
	Conventional G.C.	1.56	2.50	8.28
	Dry bulk	0.73	0.99	1.68
	Liquid bulk	0.00	0.00	0.00
	Total	2.67	4.35	13.83
Other Islands	Container cargo	1.64	3.03	9.64
	Conventional G.C.	6.65	8.85	20.62
	Dry bulk	0.07	0.11	0.34
	Liquid bulk	1.29	1.43	1.77
	Total	9.65	13.42	32.37
Total	Container cargo	10.49	19.53	59.18
	Conventional G.C.	42.44	56.97	126.64
	Dry bulk	249.80	499.36	1934.07
	Liquid bulk	145.05	193.46	432.25
	Total	447.78	769.32	2552.14

Table 3.6.2.2 Export Cargo Volume in Each Area
in the Target Years (Scenario 2, Alternative3)

		(Million ton)		
Area	Packing Style	2003	2008	2018
Sumatra	Container cargo	4.77	9.70	18.82
	Conventional G.C.	19.30	28.29	40.27
	Dry bulk	194.76	431.63	1409.22
	Liquid bulk	95.38	126.35	157.90
	Total	314.21	595.96	1626.21
Jawa	Container cargo	3.77	8.56	27.04
	Conventional G.C.	15.24	24.96	57.85
	Dry bulk	2.21	2.84	3.11
	Liquid bulk	24.48	42.92	107.84
	Total	45.70	79.28	195.85
Kalimantan	Container cargo	2.26	4.81	13.26
	Conventional G.C.	9.16	14.02	28.38
	Dry bulk	93.74	188.08	548.84
	Liquid bulk	60.20	101.19	231.69
	Total	165.36	308.10	822.17
Sulawesi	Container cargo	0.45	1.00	3.01
	Conventional G.C.	1.80	2.90	6.44
	Dry bulk	0.92	1.46	2.19
	Liquid bulk	0.00	0.00	0.00
	Total	3.17	5.36	11.64
Other Islands	Container cargo	2.09	4.43	11.96
	Conventional G.C.	8.44	12.93	25.60
	Dry bulk	0.08	0.16	0.42
	Liquid bulk	1.64	2.10	2.31
	Total	12.24	19.63	40.29
Total	Container cargo	13.33	28.49	74.09
	Conventional G.C.	53.95	83.10	158.54
	Dry bulk	291.72	624.17	1963.79
	Liquid bulk	181.69	272.56	499.74
	Total	540.70	1008.32	2696.16

Table 3.6.2.3 Export Cargo Volume
in All Indonesia in The Target Years
(Alternative 3)

Year	Export (Million ton)	GRDP (Million Rp.)
2003	405	215
2008	654	299
2018	1,932	731

Table 3.6.2.4 Export Cargo Volume in Each Province in The Target Years (Scenario 1, Alternative 3)

Unit: Million ton

Province	Ratio of GRDP	Cargo Volume														
		2003				2008				2018						
		Container	Conventional	Dry bulk	Liquid bulk	Container	Conventional	Dry bulk	Liquid bulk	Container	Conventional	Dry bulk	Liquid bulk	Total		
Aceh	0.13	0.48	1.96	21.71	9.82	33.97	0.85	2.48	44.68	11.33	59.34	1.89	4.04	176.93	16.56	199.42
Sumatra Utara	0.27	1.00	4.05	44.87	20.28	70.20	1.76	5.13	92.32	23.41	122.61	3.90	8.35	365.58	34.22	412.05
Sumatra Barat	0.09	0.32	1.30	14.39	6.51	22.52	0.56	1.64	29.61	7.51	39.33	1.25	2.68	117.27	10.98	132.17
Reau	0.23	0.84	3.38	37.48	16.94	58.63	1.47	4.28	77.12	19.55	102.42	3.26	6.97	305.36	28.58	344.18
Jarabi	0.04	0.13	0.54	5.95	2.69	9.30	0.23	0.68	12.23	3.10	16.25	0.52	1.11	48.45	4.53	54.61
Sumatra Selatan	0.15	0.57	2.32	25.67	11.60	40.16	1.01	2.93	52.82	13.39	70.15	2.23	4.78	209.16	19.58	235.74
Bengkulu	0.02	0.07	0.29	3.27	1.48	5.11	0.13	0.37	6.72	1.70	8.93	0.28	0.61	26.61	2.49	30.00
Lampung	0.08	0.29	1.18	13.08	5.91	20.46	0.51	1.49	26.91	6.82	35.74	1.14	2.43	106.56	9.97	120.10
Sumatera (total)	1.00	3.71	15.01	166.41	75.23	260.36	6.52	19.02	342.42	86.81	454.77	14.47	30.97	1355.91	126.92	1528.27
DKI Jakarta	0.27	0.77	3.10	0.51	4.98	9.35	1.45	4.22	0.56	7.26	13.48	4.79	10.25	0.70	19.12	34.86
Jawa Barat	0.27	0.78	3.16	0.52	5.08	9.54	1.47	4.30	0.58	7.40	13.75	4.88	10.45	0.71	19.50	35.55
Jawa Tengah	0.17	0.48	1.95	0.32	3.14	5.90	0.91	2.66	0.36	4.58	8.50	3.02	6.46	0.44	12.06	21.99
D.I.Yogyakarta	0.02	0.06	0.24	0.04	0.38	0.72	0.11	0.33	0.04	0.56	1.04	0.37	0.79	0.05	1.48	2.69
Jawa Timur	0.25	0.71	2.89	0.47	4.65	8.73	1.35	3.93	0.53	6.77	12.58	4.47	9.57	0.65	17.85	32.54
Bali	0.03	0.08	0.33	0.05	0.54	1.01	0.16	0.45	0.06	0.78	1.45	0.52	1.11	0.08	2.06	3.76
Jawa (total)	1.00	2.89	11.68	1.91	18.76	35.24	5.45	15.89	2.13	27.35	50.81	18.05	38.63	2.64	72.07	131.38
Kalimantan Barat	0.18	0.33	1.35	14.48	8.93	25.09	0.66	1.92	27.58	13.97	44.13	2.36	5.05	102.89	41.53	151.83
Kalimantan Tengah	0.11	0.20	0.81	8.70	5.37	15.09	0.40	1.16	16.58	8.40	26.53	1.42	3.04	61.87	24.97	91.30
Kalimantan Selatan	0.16	0.29	1.19	12.73	7.85	22.06	0.58	1.69	24.25	12.28	38.80	2.07	4.44	90.47	36.52	133.50
Kalimantan Timur	0.55	1.03	4.19	44.77	27.62	77.62	2.04	5.94	85.30	43.22	136.50	7.30	15.62	318.27	128.47	469.65
Kalimantan (total)	1.00	1.86	7.54	80.68	49.78	139.86	3.67	10.71	153.71	77.87	245.96	13.15	28.14	573.50	231.50	846.28
Sulawesi Utara	0.21	0.08	0.33	0.15	0.00	0.57	0.18	0.53	0.21	0.00	0.93	0.82	1.76	0.36	0.00	2.94
Sulawesi Tengah	0.13	0.05	0.21	0.10	0.00	0.35	0.11	0.33	0.13	0.00	0.57	0.51	1.09	0.22	0.00	1.82
Sulawesi Selatan	0.56	0.22	0.88	0.41	0.00	1.50	0.48	1.41	0.56	0.00	2.45	2.18	4.66	0.95	0.00	7.78
Sulawesi Tenggara	0.09	0.04	0.14	0.07	0.00	0.25	0.08	0.23	0.09	0.00	0.40	0.36	0.77	0.16	0.00	1.28
Sulawesi (total)	1.00	0.39	1.56	0.73	0.00	2.67	0.86	2.50	0.99	0.00	4.35	3.87	8.28	1.68	0.00	13.83
Nusa Tenggara Barat	0.19	0.32	1.29	0.01	0.25	1.87	0.59	1.71	0.02	0.28	2.60	1.86	3.99	0.07	0.34	6.26
Nusa Tenggara Timur	0.16	0.27	1.08	0.01	0.21	1.56	0.49	1.44	0.02	0.23	2.18	1.56	3.35	0.06	0.29	5.25
Timor Timur	0.04	0.07	0.28	0.00	0.05	0.40	0.13	0.37	0.00	0.06	0.56	0.40	0.86	0.01	0.07	1.35
Maluku	0.18	0.30	1.20	0.01	0.23	1.73	0.55	1.59	0.02	0.26	2.41	1.73	3.71	0.06	0.32	5.82
Irian Jaya	0.42	0.70	2.81	0.03	0.54	4.08	1.28	3.74	0.05	0.60	5.68	4.08	8.72	0.14	0.75	13.69
Other islands (total)	1.00	1.64	6.65	0.07	1.29	9.65	3.03	8.85	0.11	1.43	13.42	9.64	20.62	0.34	1.77	32.37
Total	-	10.49	42.44	249.80	145.05	447.78	19.53	56.97	499.36	193.46	769.32	59.18	126.64	1934.07	432.25	2552.14

Table 3.6.2.5 Export Cargo Volume in Each Province in The Target Years(Scenario 2, Alternative 3)

Unit:Million ton

Province	Ratio of GRDP	Cargo Volume														
		2003					2008					2018				
		Container	Conventional	Dry bulk	Liquid bulk	Total	Container	Conventional	Dry bulk	Liquid bulk	Total	Container	Conventional	Dry bulk	Liquid bulk	Total
Aceh	0.13	0.62	2.52	25.41	12.45	41.00	1.27	3.69	56.32	16.49	77.77	2.46	5.25	183.89	20.60	212.20
Sumatra Utara	0.27	1.29	5.20	52.51	25.72	84.72	2.61	7.63	116.37	34.07	160.88	5.07	10.86	379.95	42.57	438.46
Sumatra Barat	0.09	0.41	1.67	16.84	8.25	27.17	0.84	2.45	37.33	10.93	51.54	1.63	3.48	121.88	13.66	140.64
Reau	0.23	1.07	4.35	43.86	21.48	70.76	2.18	6.37	97.21	28.45	134.22	4.24	9.07	317.37	35.56	366.24
Jambi	0.04	0.17	0.69	6.96	3.41	11.23	0.35	1.01	15.42	4.51	21.29	0.67	1.44	50.35	5.64	58.10
Sumatra Selatan	0.15	0.74	2.98	30.04	14.71	48.47	1.50	4.36	66.58	19.49	91.93	2.90	6.21	217.38	24.36	250.85
Bengkulu	0.02	0.09	0.38	3.82	1.87	6.17	0.19	0.56	8.47	2.48	11.70	0.37	0.79	27.66	3.10	31.92
Lampung	0.08	0.37	1.52	15.31	7.50	24.69	0.76	2.22	33.92	9.93	46.84	1.48	3.16	110.75	12.41	127.80
Sumatera (total)	1.00	4.77	19.30	194.76	95.38	314.21	9.70	28.29	431.63	126.35	595.96	18.82	40.27	1409.22	157.90	1626.21
DKI.Jakarta	0.27	1.00	4.04	0.59	6.49	12.12	2.27	6.62	0.75	11.39	21.03	7.17	15.35	0.83	28.61	51.96
Jawa Barat	0.27	1.02	4.13	0.60	6.62	12.37	2.32	6.75	0.77	11.61	21.45	7.32	15.66	0.84	29.18	53.00
Jawa Tengah	0.17	0.63	2.55	0.37	4.10	7.65	1.43	4.18	0.48	7.18	13.27	4.52	9.68	0.52	18.05	32.78
D.I.Yogyakarta	0.02	0.08	0.31	0.05	0.50	0.94	0.18	0.51	0.06	0.88	1.62	0.55	1.19	0.06	2.21	4.01
Jawa Timur	0.25	0.93	3.78	0.55	6.06	11.32	2.12	6.18	0.70	10.63	19.63	6.70	14.33	0.77	26.71	48.50
Bali	0.03	0.11	0.44	0.06	0.70	1.31	0.24	0.71	0.08	1.23	2.27	0.77	1.66	0.09	3.09	5.61
Jawa (total)	1.00	3.77	15.24	2.21	24.48	45.70	8.56	24.96	2.84	42.92	79.28	27.04	57.85	3.11	107.84	195.85
Kalimantan Barat	0.18	0.41	1.64	16.82	10.80	29.67	0.86	2.52	33.74	18.16	55.28	2.38	5.09	98.47	41.57	147.51
Kalimantan Tengah	0.11	0.24	0.99	10.11	6.49	17.84	0.52	1.51	20.29	10.92	33.24	1.43	3.06	59.21	25.00	88.70
Kalimantan Selatan	0.16	0.36	1.45	14.79	9.50	26.09	0.76	2.21	29.67	15.96	48.60	2.09	4.48	86.58	36.55	129.70
Kalimantan Timur	0.55	1.26	5.08	52.02	33.41	91.77	2.67	7.78	104.38	56.16	170.98	7.36	15.75	304.58	128.58	456.27
Kalimantan (total)	1.00	2.26	9.16	93.74	60.20	165.36	4.81	14.02	188.08	101.19	308.10	13.26	28.38	548.84	231.69	822.17
Sulawesi Utara	0.21	0.09	0.38	0.20	0.00	0.67	0.21	0.62	0.31	0.00	1.14	0.64	1.37	0.47	0.00	2.48
Sulawesi Tengah	0.13	0.06	0.24	0.12	0.00	0.42	0.13	0.38	0.19	0.00	0.70	0.40	0.85	0.29	0.00	1.53
Sulawesi Selatan	0.56	0.25	1.02	0.52	0.00	1.79	0.56	1.63	0.82	0.00	3.02	1.69	3.63	1.23	0.00	6.55
Sulawesi Tenggara	0.09	0.04	0.17	0.09	0.00	0.29	0.09	0.27	0.14	0.00	0.50	0.28	0.60	0.20	0.00	1.08
Sulawesi (total)	1.00	0.45	1.80	0.92	0.00	3.17	1.00	2.90	1.46	0.00	5.36	3.01	6.44	2.19	0.00	11.64
Nusa Tenggara Barat	0.19	0.40	1.63	0.02	0.32	2.37	0.86	2.50	0.03	0.41	3.80	2.31	4.95	0.08	0.45	7.79
Nusa Tenggara Timur	0.16	0.34	1.37	0.01	0.27	1.99	0.72	2.10	0.03	0.34	3.18	1.94	4.15	0.07	0.37	6.53
Timor Timur	0.04	0.09	0.35	0.00	0.07	0.51	0.18	0.54	0.01	0.09	0.82	0.50	1.07	0.02	0.10	1.68
Maluku	0.18	0.38	1.52	0.01	0.29	2.20	0.80	2.33	0.03	0.38	3.53	2.15	4.60	0.08	0.41	7.24
Irian Jaya	0.42	0.88	3.57	0.04	0.69	5.18	1.88	5.47	0.07	0.89	8.30	5.06	10.83	0.18	0.98	17.04
Other islands (total)	1.00	2.09	8.44	0.08	1.64	12.24	4.43	12.93	0.16	2.10	19.63	11.96	25.60	0.42	2.31	40.29
Total		13.33	53.95	291.72	181.69	540.70	28.49	83.10	624.17	272.56	1008.32	74.09	158.54	1963.79	499.74	2696.16

(D) Rate of Containerization

In this study, container cargo volume(Cv) is estimated by the following procedure:

① $(A) = (\text{Containerizable cargo}) + (\text{Conventional Cargo})$

(In the statistical data obtained from DGSC, containerizable cargo is not separated from the general cargo.)

② $(Cv) = (A) \times (\text{Rate of containerization})$

In this study, the rate of containerization for foreign trade is explained by the following formula:

$$\text{Rate of containerization} = (\text{Container cargo volume}) / \{(\text{Containerizable cargo}) + (\text{Conventional cargo})\}$$

The rate of containerization is estimated using a logistic curve in general. In this study, the rate is estimated by the following formula:

$$T = 1 / \{0.0292 + (0.1524 \times 0.7385^{(t)})\}$$

T: Rate of containerization

(t): Years from the start of containerization

The result of the estimation in the target years is shown in Table 3.6.2.6.

Table 3.6.2.6 Rate of Containerization
Export

(%)

Year	Containerization rate	
	Actual	Estimate
1988	3.8	4.2
1989	4.5	4.8
1990	5.4	5.5
1991	6.6	6.2
1992	7.7	7.1
1993	7.7	7.9
1994	10.1	8.9
1995	11.6	9.9
2003		19.82
2008		25.53
2018		31.85

3) Import Cargo Volume in 2003, 2008 and 2018

The methodology to forecast the import cargo volume in each province in 2003, 2008 and 2018 is the same as that employed for the export cargo volume.

The results of the estimation of import cargo volume in each region by packing style for Scenario 1 and 2 in alternative-3 and the estimation of import cargo volume in all Indonesia for alternative-3 are shown from Tables 3.6.2.7 to 3.6.2.8.

There is no large difference between the results of the estimation of import cargo by packing style and the estimation of import cargo volume in whole Indonesia. Therefore, the import cargo volume by packing style in each province in 2003, 2008 and 2018 is estimated from the results of the estimation of import cargo by packing style.

The results of the estimation for scenario 1 and 2 in Alternative-3 are shown from Table 3.6.2.9 to 3.6.2.10. (See Table A3.6.2.5 to Table A3.6.2.8 in Appendix 3.6)

Table 3.6.2.7 Import Cargo Volume in Each Region in the Target Years (Scenario 1, Alternative 3)

(Unit: Million ton)

Area	Packing Style	2003	2008	2018
Sumatra	Container Cargo	1.0	1.9	6.1
	Conventional G.C.	1.2	1.8	4.5
	Dry bulk	3.6	6.1	17.6
	Liquid bulk	10.8	14.8	33.8
	Total	16.7	24.6	62.0
Jawa	Container Cargo	8.4	14.1	41.0
	Conventional G.C.	9.4	12.8	29.9
	Dry bulk	26.7	40.2	105.2
	Liquid bulk	10.8	19.1	59.6
	Total	55.3	86.2	235.7
Kalimantan	Container Cargo	0.1	0.1	0.3
	Conventional G.C.	0.1	0.1	0.2
	Dry bulk	0.3	0.5	1.2
	Liquid bulk	4.7	7.1	18.6
	Total	5.2	7.9	20.3
Sulawesi	Container Cargo	0.1	0.1	0.3
	Conventional G.C.	0.1	0.1	0.2
	Dry bulk	0.7	1.0	2.4
	Liquid bulk	0.4	0.6	1.3
	Total	1.2	1.8	4.3
Other	Container Cargo	0.1	0.2	0.4
	Conventional G.C.	0.1	0.2	0.3
	Dry bulk	0.1	0.1	0.2
	Liquid bulk	0.5	0.7	1.8
	Total	0.8	1.2	2.7

Table 3.6.2.8 Import Cargo Volume in Each Region in The Target Years (Scenario 2, Alternative 3)

(Unit: Million tons)

Area	Packing Style	2003	2008	2018
Sumatra	Container Cargo	1.1	2.2	7.7
	Conventional G.C.	1.3	2.0	5.6
	Dry bulk	3.9	7.1	22.0
	Liquid bulk	11.3	16.5	41.0
	Total	17.6	27.8	76.2
Jawa	Container Cargo	8.1	13.0	35.1
	Conventional G.C.	9.1	11.8	25.6
	Dry bulk	25.8	37.1	90.2
	Liquid bulk	10.2	17.2	50.3
	Total	53.2	79.0	201.2
Kalimantan	Container Cargo	0.1	0.2	0.4
	Conventional G.C.	0.1	0.1	0.3
	Dry bulk	0.4	0.6	1.7
	Liquid bulk	5.1	8.5	25.2
	Total	5.7	9.4	27.5
Sulawesi	Container Cargo	0.1	0.1	0.6
	Conventional G.C.	0.1	0.1	0.4
	Dry bulk	0.8	1.3	4.1
	Liquid bulk	0.4	0.7	2.3
	Total	1.4	2.3	7.4
Other	Container Cargo	0.1	0.2	0.5
	Conventional G.C.	0.1	0.2	0.3
	Dry bulk	0.1	0.1	0.2
	Liquid bulk	0.5	0.7	1.9
	Total	0.8	1.2	2.9

4) Cargo Volume at Public Ports and Special Ports

The estimated foreign trade cargo volume consists of the cargo volumes at public ports and special ports.

Future cargo volume at special ports can not be estimated by the past data of those ports due to a lack of data. Therefore, the cargo volume at special ports (except ports in IPC III area) in the target years is estimated using the ratio of foreign trade cargo volume at special ports in 1997 to the foreign trade cargo volume at IPC ports in the same year. (See Table A3.6.2.9)

As already mentioned in (C) of 2) in this section, almost all handling cargo at non-commercial public ports is domestic trade cargo.

Table 3.6.2.9 Import Cargo Volume in Each Province in the Target Years (Scenario 1, Alternative 3)

(Unit: Million tons)

Province	Ratio of GRDP	Cargo Volume														
		2003				2008				2018						
		Container	Conventio	Dry bulk	Liquid bul	Total	Container	Conventio	Dry bulk	Liquid bul	Total	Container	Conventio	Dry bulk	Liquid bul	Total
Aceh	0.13	0.14	0.15	0.47	1.41	2.17	0.25	0.23	0.79	1.94	3.21	0.80	0.58	2.30	4.41	8.09
Sumatra Utara	0.27	0.28	0.32	0.97	2.92	4.49	0.52	0.47	1.64	4.00	6.63	1.65	1.20	4.75	9.11	16.72
Sumatra Barat	0.09	0.09	0.10	0.31	0.94	1.44	0.17	0.15	0.52	1.28	2.13	0.53	0.39	1.52	2.92	5.36
Reau	0.23	0.23	0.26	0.81	2.44	3.75	0.43	0.39	1.37	3.34	5.54	1.38	1.01	3.97	7.61	13.96
Jambi	0.04	0.04	0.04	0.13	0.39	0.60	0.07	0.06	0.22	0.53	0.88	0.22	0.16	0.63	1.21	2.22
Sumatra Selatan	0.15	0.16	0.18	0.56	1.67	2.57	0.30	0.27	0.94	2.29	3.79	0.95	0.69	2.72	5.21	9.56
Bengkulu	0.02	0.02	0.02	0.07	0.21	0.33	0.04	0.03	0.12	0.29	0.48	0.12	0.09	0.35	0.66	1.22
Lampung	0.08	0.08	0.09	0.28	0.85	1.31	0.15	0.14	0.48	1.17	1.93	0.48	0.35	1.38	2.66	4.87
Sumatera (total)	1.00	1.04	1.17	3.62	10.83	16.65	1.93	1.75	6.07	14.85	24.59	6.13	4.47	17.62	33.79	62.01
DKI Jakarta	0.27	2.22	2.50	7.09	2.86	14.66	3.73	3.39	10.66	5.07	22.86	10.87	7.92	27.92	15.81	62.52
Jawa Barat	0.27	2.26	2.55	7.23	2.91	14.95	3.81	3.46	10.87	5.18	23.32	11.09	8.08	28.48	16.12	63.77
Jawa Tengah	0.17	1.40	1.58	4.47	1.80	9.25	2.36	2.14	6.72	3.20	14.42	6.86	5.00	17.61	9.97	39.44
D.I.Yogyakarta	0.02	0.17	0.19	0.55	0.22	1.13	0.29	0.26	0.82	0.39	1.77	0.84	0.61	2.16	1.22	4.83
Jawa Timur	0.25	2.07	2.33	6.62	2.67	13.69	3.49	3.17	9.95	4.74	21.34	10.15	7.40	26.06	14.76	58.36
Bali	0.03	0.24	0.27	0.77	0.31	1.58	0.40	0.37	1.15	0.55	2.47	1.17	0.85	3.01	1.71	6.74
Jawa (total)	1.00	8.36	9.41	26.73	10.76	55.26	14.07	12.79	40.18	19.13	86.17	40.97	29.87	105.24	59.59	235.67
Kalimantan Barat	0.18	0.02	0.02	0.06	0.84	0.94	0.02	0.02	0.09	1.28	1.42	0.05	0.04	0.22	3.33	3.65
Kalimantan Tengah	0.11	0.01	0.01	0.04	0.51	0.56	0.01	0.01	0.05	0.77	0.85	0.03	0.02	0.13	2.00	2.19
Kalimantan Selatan	0.16	0.02	0.02	0.05	0.74	0.82	0.02	0.02	0.08	1.13	1.25	0.05	0.04	0.19	2.93	3.21
Kalimantan Timur	0.55	0.05	0.06	0.18	2.60	2.90	0.08	0.07	0.27	3.96	4.38	0.17	0.12	0.69	10.30	11.28
Kalimantan (total)	1.00	0.10	0.11	0.33	4.69	5.23	0.14	0.13	0.49	7.14	7.90	0.31	0.22	1.23	18.56	20.32
Sulawesi Utara	0.21	0.01	0.01	0.15	0.09	0.26	0.02	0.02	0.21	0.12	0.38	0.07	0.05	0.51	0.29	0.92
Sulawesi Tengah	0.13	0.01	0.01	0.09	0.05	0.16	0.01	0.01	0.13	0.07	0.23	0.04	0.03	0.32	0.18	0.57
Sulawesi Selatan	0.56	0.03	0.04	0.39	0.23	0.69	0.06	0.05	0.56	0.32	1.00	0.19	0.14	1.35	0.76	2.42
Sulawesi Tenggara	0.09	0.01	0.01	0.06	0.04	0.11	0.01	0.01	0.09	0.05	0.16	0.03	0.02	0.22	0.12	0.40
Sulawesi (total)	1.00	0.06	0.07	0.70	0.40	1.22	0.11	0.10	1.00	0.57	1.77	0.33	0.24	2.39	1.34	4.31
Nusa Tenggara Barat	0.19	0.02	0.03	0.01	0.09	0.15	0.04	0.03	0.02	0.14	0.22	0.09	0.06	0.03	0.34	0.52
Nusa Tenggara Timur	0.16	0.02	0.02	0.01	0.08	0.13	0.03	0.03	0.01	0.11	0.19	0.07	0.05	0.03	0.29	0.44
Timor Timur	0.04	0.01	0.01	0.00	0.02	0.03	0.01	0.01	0.00	0.03	0.05	0.02	0.01	0.01	0.07	0.11
Maluku	0.18	0.02	0.02	0.01	0.08	0.14	0.03	0.03	0.02	0.13	0.21	0.08	0.06	0.03	0.32	0.49
Irian Jaya	0.42	0.05	0.06	0.03	0.20	0.34	0.08	0.07	0.04	0.30	0.49	0.19	0.14	0.07	0.75	1.14
Other islands (total)	1.00	0.12	0.14	0.08	0.46	0.80	0.18	0.17	0.09	0.71	1.15	0.44	0.32	0.16	1.77	2.70
Total	-	9.67	10.90	31.45	27.15	79.16	16.43	14.93	47.83	42.39	121.58	48.17	35.12	126.66	115.05	325.00

Table 3.6.2.10 Import Cargo Volume in Each Province in the Target Years (Scenario 2, Alternative 3)

(Unit: Million tons)

Province	Ratio of GRDP	Cargo Volume													
		2003						2008							
		Container	Conventional	Dry bulk	Liquid bulk	Total	Container	Conventional	Dry bulk	Liquid bulk	Total				
0.13	0.15	0.16	0.51	1.47	2.30	0.29	0.27	0.92	2.15	3.63	1.00	0.73	2.87	5.35	9.95
0.27	0.30	0.34	1.05	3.05	4.74	0.60	0.55	1.90	4.44	7.50	2.06	1.50	5.94	11.05	20.56
0.09	0.10	0.11	0.34	0.98	1.52	0.19	0.18	0.61	1.42	2.40	0.66	0.48	1.90	3.55	6.59
0.23	0.25	0.28	0.88	2.55	3.96	0.50	0.46	1.59	3.71	6.26	1.72	1.26	4.96	9.23	17.17
0.04	0.04	0.05	0.14	0.40	0.63	0.08	0.07	0.25	0.59	0.99	0.27	0.20	0.79	1.46	2.72
0.15	0.17	0.19	0.60	1.74	2.71	0.35	0.31	1.09	2.54	4.29	1.18	0.86	3.40	6.32	11.76
0.02	0.02	0.02	0.08	0.22	0.35	0.04	0.04	0.14	0.32	0.55	0.15	0.11	0.43	0.80	1.50
0.08	0.09	0.10	0.31	0.89	1.38	0.18	0.16	0.55	1.29	2.18	0.60	0.44	1.73	3.22	5.99
1.00	1.12	1.26	3.90	11.30	17.59	2.24	2.03	7.06	16.47	27.80	7.65	5.58	22.02	41.00	76.25
0.27	2.14	2.41	6.85	2.70	14.10	3.44	3.13	9.83	4.56	20.96	9.31	6.79	23.94	13.34	53.38
0.27	2.18	2.46	6.99	2.76	14.38	3.51	3.19	10.03	4.65	21.38	9.50	6.93	24.42	13.60	54.45
0.17	1.35	1.52	4.32	1.71	8.90	2.17	1.97	6.20	2.88	13.22	5.88	4.28	15.10	8.41	33.67
0.02	0.17	0.19	0.53	0.21	1.09	0.27	0.24	0.76	0.35	1.62	0.72	0.52	1.85	1.03	4.12
0.25	2.00	2.25	6.39	2.52	13.16	3.21	2.92	9.18	4.26	19.57	8.69	6.34	22.35	12.45	49.83
0.03	0.23	0.26	0.74	0.29	1.52	0.37	0.34	1.06	0.49	2.26	1.00	0.73	2.58	1.44	5.76
1.00	8.07	9.08	25.81	10.19	53.16	12.97	11.78	37.07	17.19	79.02	35.11	25.59	90.25	50.26	201.21
0.18	0.02	0.02	0.06	0.92	1.02	0.03	0.03	0.10	1.53	1.69	0.07	0.05	0.30	4.51	4.93
0.11	0.01	0.01	0.04	0.55	0.61	0.02	0.02	0.06	0.92	1.02	0.04	0.03	0.18	2.71	2.97
0.16	0.02	0.02	0.06	0.81	0.90	0.02	0.02	0.09	1.35	1.49	0.06	0.05	0.26	3.97	4.34
0.55	0.06	0.06	0.20	2.84	3.16	0.09	0.08	0.32	4.74	5.23	0.22	0.16	0.92	13.96	15.26
1.00	0.10	0.11	0.36	5.11	5.69	0.15	0.14	0.58	8.54	9.42	0.39	0.29	1.66	25.16	27.50
0.21	0.01	0.02	0.17	1.0	0.29	0.03	0.03	0.28	0.16	0.50	0.13	0.09	0.87	0.49	1.58
0.13	0.01	0.01	0.10	0.06	0.18	0.02	0.02	0.17	0.10	0.31	0.08	0.06	0.54	0.30	0.98
0.56	0.04	0.04	0.44	0.25	0.78	0.08	0.08	0.74	0.42	1.31	0.33	0.24	2.32	1.29	4.18
0.09	0.01	0.01	0.07	0.04	0.13	0.01	0.01	0.12	0.07	0.22	0.05	0.04	0.38	0.21	0.69
1.00	0.07	0.08	0.78	0.45	1.38	0.15	0.14	1.31	0.74	2.33	0.59	0.43	4.11	2.29	7.43
0.19	0.02	0.03	0.01	0.09	0.16	0.04	0.03	0.02	0.14	0.22	0.09	0.07	0.03	0.36	0.55
0.16	0.02	0.02	0.01	0.08	0.13	0.03	0.03	0.02	0.12	0.19	0.08	0.05	0.03	0.31	0.46
0.04	0.01	0.01	0.00	0.02	0.03	0.01	0.01	0.00	0.03	0.05	0.02	0.01	0.01	0.08	0.12
0.18	0.02	0.03	0.01	0.08	0.15	0.03	0.03	0.02	0.13	0.21	0.08	0.06	0.03	0.34	0.51
0.42	0.05	0.06	0.03	0.20	0.34	0.08	0.07	0.04	0.30	0.49	0.20	0.14	0.07	0.80	1.21
1.00	0.12	0.14	0.08	0.47	0.81	0.19	0.17	0.09	0.71	1.16	0.46	0.34	0.17	1.88	2.86
-	9.48	10.68	30.94	27.53	78.62	15.70	14.26	46.11	43.66	119.73	44.21	32.23	118.21	120.59	315.24

Suitable data for forecast of future foreign trade cargo volume at special ports in the area of IPC III is lacking. The future foreign trade cargo volume at special ports in the area of IPC III in the target years is estimated using the ratio of foreign trade cargo volume at special ports to the foreign trade cargo volume at IPC ports in 1995.

After estimation, the estimated cargo volume at special ports in each IPC area is distributed to each province in the same area by the rate of estimated GRDP in each province in the same years.

The distributed cargo volume at special ports in each province in the target years is divided into export cargo volume and import cargo volume by the rate of export and import foreign trade cargo volume in each province in the target years. The results of the calculation for Scenario 1 and 2 in Alternative 3 are shown from Table 3.6.2.11 to 3.6.2.12.

The foreign trade cargo volume for export and import at commercial ports in each province in the target years is calculated by deducting the foreign trade cargo volume at special ports from total foreign trade cargo volume in the same province in those years.

The results of the calculation for Scenario 1 and 2 in Alternative 3 are shown from Table 3.6.2.13 to 3.6.1.2.16. (See Table A3.6.2.10 to Table A3.6.2.17 in Appendix 3.6.)

(2) Domestic Cargo Volume

1) Methodology

Domestic trade cargo volume for loading and unloading by packing style in the target years in each province is estimated based on the past data of IPC Ports.

According to the interviews at the head offices of IPCII and IPCIII, almost all container cargoes are for foreign trade, therefore it is assumed that the past records of container cargoes at each IPC ports are only foreign trade cargoes.

Cargo handling volumes for domestic trade at commercial ports and non-commercial ports in the target years are estimated, respectively.

Table 3.6.2.11 Foreign Cargo Volume at Special Ports for in Each Province in The Target Years (Scenario 1, Alternative 3)

(Million ton)

	2003			2008			2018		
	Export	Import	Total	Export	Import	Total	Export	Import	Total
Acch	27.29	1.63	28.92	47.72	2.32	50.04	160.45	5.56	166.01
Sumatra Utara	56.38	3.37	59.75	98.59	4.80	103.40	331.52	11.49	343.01
Sumatra Barat	18.08	1.08	19.17	31.63	1.54	33.17	106.34	3.69	110.03
Riau	47.09	2.81	49.91	82.35	4.01	86.37	276.92	9.60	286.52
Jambi	4.67	0.28	4.95	8.17	0.40	8.56	27.46	0.95	28.41
Sumatra Selatan	20.16	1.21	21.37	35.25	1.72	36.97	118.54	4.11	122.65
Bengkulu	2.57	0.15	2.72	4.49	0.22	4.70	15.08	0.52	15.61
Lampung	10.27	0.61	10.88	17.96	0.88	18.84	60.39	2.09	62.49
Sumatera (total)	186.51	11.15	197.66	326.15	15.89	342.04	1,096.71	38.02	1,134.73
DKI.Jakarta	4.27	7.74	12.01	6.03	12.14	18.17	15.18	33.50	48.69
Jawa Barat	4.35	3.16	7.51	6.15	12.38	18.53	15.49	34.17	49.66
Jawa Tengah	2.26	3.48	5.75	3.20	6.43	9.63	8.05	17.75	25.80
D.I.Yogyakarta	0.28	0.43	0.70	0.39	0.79	1.18	0.98	2.17	3.16
Jawa Timur	3.35	5.16	8.50	4.73	9.52	14.25	11.91	26.27	38.18
Bali	0.39	0.60	0.98	0.55	1.10	1.65	1.38	3.04	4.41
Jawa (total)	14.89	20.56	35.45	21.05	42.36	63.41	52.99	116.91	169.90
Kalimantan Barat	12.53	0.48	13.02	22.05	0.73	22.77	75.87	1.87	77.74
Kalimantan Tengah	6.33	0.24	6.57	11.14	0.37	11.50	38.32	0.94	39.27
Kalimantan Selatan	9.26	0.36	9.61	16.28	0.54	16.82	56.04	1.38	57.42
Kalimantan Timur	65.90	2.54	68.44	115.93	3.82	119.75	398.98	9.81	408.79
Kalimantan (total)	94.03	3.62	97.65	165.39	5.45	170.84	569.22	14.00	583.21
Sulawesi Utara	0.03	0.05	0.08	0.05	0.08	0.13	0.12	0.27	0.39
Sulawesi Tengah	0.02	0.03	0.05	0.03	0.05	0.08	0.07	0.16	0.24
Sulawesi Selatan	0.09	0.13	0.22	0.13	0.21	0.34	0.32	0.70	1.02
Sulawesi Tenggara	0.01	0.02	0.04	0.02	0.03	0.06	0.05	0.12	0.17
Sulawesi (total)	0.15	0.23	0.39	0.24	0.37	0.61	0.56	1.25	1.81
Nusa Tenggara Barat	0.14	0.06	0.20	0.19	0.10	0.28	0.35	0.32	0.68
Nusa Tenggara Timur	0.12	0.05	0.17	0.16	0.08	0.24	0.30	0.27	0.57
Timor Timur	0.03	0.01	0.04	0.04	0.02	0.06	0.08	0.07	0.15
Maluku	0.13	0.05	0.19	0.17	0.09	0.26	0.33	0.30	0.63
Irian Jaya	0.32	0.13	0.44	0.41	0.21	0.62	0.77	0.71	1.48
Eastern Part (total)	0.75	0.30	1.04	0.96	0.50	1.46	1.83	1.68	3.51
Total	295.58	35.56	331.14	512.83	64.07	576.91	1719.47	170.18	1889.65

Table 3.6.2.12 Foreign Cargo Volume at Special Ports for in Each Province in The Target Years (Scenario 2, Alternative 3)

(Million ton)

	2003			2008			2018		
	Export	Import	Total	Export	Import	Total	Export	Import	Total
Aceh	32.91	1.72	34.64	62.48	2.63	65.11	170.85	6.87	177.72
Sumatra Utara	68.00	3.56	71.57	129.10	5.44	134.54	353.02	14.20	367.21
Sumatra Barat	21.81	1.14	22.96	41.41	1.75	43.16	113.24	4.55	117.79
Riau	56.80	2.98	59.78	107.83	4.55	112.38	294.87	11.86	306.73
Jambi	5.63	0.30	5.93	10.69	0.45	11.14	29.24	1.18	30.41
Sumatra Selatan	24.32	1.27	25.59	46.16	1.95	48.11	126.23	5.08	131.31
Bengkulu	3.09	0.16	3.26	5.87	0.25	6.12	16.06	0.65	16.71
Lampung	12.39	0.65	13.04	23.52	0.99	24.51	64.31	2.59	66.90
Sumatera (total)	224.96	11.79	236.75	427.07	18.01	445.08	1,167.81	46.96	1,214.77
DKI.Jakarta	5.58	7.53	13.11	9.61	11.39	21.00	23.24	29.43	52.67
Jawa Barat	5.69	3.45	9.14	9.80	11.62	21.42	23.70	30.02	53.72
Jawa Tengah	2.96	3.81	6.76	5.09	6.04	11.13	12.31	15.59	27.91
D.I.Yogyakarta	0.36	0.47	0.83	0.62	0.74	1.36	1.51	1.91	3.42
Jawa Timur	4.38	5.63	10.01	7.53	8.93	16.46	18.22	23.08	41.30
Bali	0.51	0.65	1.16	0.87	1.03	1.90	2.11	2.67	4.77
Jawa (total)	19.48	21.54	41.02	33.52	39.75	73.27	81.09	102.69	183.79
Kalimantan Barat	14.82	0.53	15.34	27.61	0.87	28.48	73.69	2.53	76.22
Kalimantan Tengah	7.48	0.27	7.75	13.95	0.44	14.39	37.22	1.28	38.50
Kalimantan Selatan	10.94	0.39	11.33	20.39	0.64	21.04	54.43	1.87	56.30
Kalimantan Timur	77.92	2.77	80.69	145.20	4.58	149.78	387.48	13.31	400.80
Kalimantan (total)	111.16	3.95	115.12	207.15	6.53	213.68	552.82	19.00	571.81
Sulawesi Utara	0.04	0.06	0.10	0.07	0.10	0.16	0.10	0.30	0.41
Sulawesi Tengah	0.03	0.03	0.06	0.04	0.06	0.10	0.06	0.19	0.25
Sulawesi Selatan	0.11	0.15	0.26	0.18	0.25	0.43	0.27	0.80	1.07
Sulawesi Tenggara	0.02	0.02	0.04	0.03	0.04	0.07	0.05	0.13	0.18
Sulawesi (total)	0.20	0.26	0.46	0.32	0.45	0.77	0.49	1.42	1.91
Nusa Tenggara Barat	0.19	0.06	0.25	0.30	0.11	0.40	0.48	0.36	0.83
Nusa Tenggara Timur	0.16	0.05	0.21	0.25	0.09	0.34	0.40	0.30	0.70
Timor Timur	0.04	0.01	0.05	0.06	0.02	0.09	0.10	0.08	0.18
Maluku	0.18	0.06	0.23	0.28	0.10	0.37	0.44	0.33	0.78
Irian Jaya	0.42	0.13	0.55	0.65	0.23	0.88	1.04	0.78	1.82
Eastern Part (total)	0.99	0.32	1.31	1.53	0.55	2.08	2.46	1.85	4.31
Total	355.80	37.54	393.34	668.06	64.74	732.80	1802.21	170.07	1972.28

Table 3.6.2.13 Import Cargo Volume at Commercial Ports in Each Province in The Target Years
(Scenario 1, Alternative 3)

(Unit: Million tons)

Province	Ratio of G	Cargo Volume														
		2003				2008				2018						
		Container	Conventional	Dry bulk	Liquid bulk	Total	Container	Conventional	Dry bulk	Liquid bulk	Total	Container	Conventional	Dry bulk	Liquid bulk	Total
Aceh	0.13	0.14	0.15	0.17	0.08	0.54	0.25	0.23	0.17	0.23	0.88	0.80	0.58	0.59	0.56	2.55
Sumatra Utara	0.27	0.28	0.32	0.36	0.17	1.12	0.52	0.47	0.35	0.48	1.83	1.65	1.20	1.22	1.15	5.22
Sumatra Barat	0.09	0.09	0.10	0.11	0.05	0.36	0.17	0.15	0.11	0.15	0.59	0.53	0.39	0.39	0.37	1.68
Riau	0.23	0.23	0.26	0.30	0.14	0.94	0.43	0.39	0.30	0.40	1.53	1.38	1.01	1.02	0.96	4.36
Jambi	0.04	0.04	0.04	0.13	0.11	0.32	0.07	0.06	0.22	0.13	0.48	0.22	0.16	0.63	0.26	1.26
Sumatra Selatan	0.15	0.16	0.18	0.56	0.47	1.36	0.30	0.27	0.94	0.57	2.08	0.95	0.69	2.72	1.10	5.45
Bengkulu	0.02	0.02	0.02	0.07	0.06	0.17	0.04	0.03	0.12	0.07	0.26	0.12	0.09	0.35	0.14	0.69
Lampung	0.08	0.08	0.09	0.28	0.24	0.69	0.15	0.14	0.48	0.29	1.06	0.48	0.35	1.38	0.56	2.78
Sumatera (total)	1.00	1.04	1.17	1.98	1.31	5.51	1.93	1.75	2.68	2.34	8.70	6.13	4.47	5.09	23.98	
DKI.Jakarta	0.27	2.22	2.50	1.44	0.77	6.92	3.73	3.39	2.38	1.21	10.72	10.87	7.92	6.88	3.35	29.02
Jawa Barat	0.27	2.26	2.55	6.67	0.32	11.80	3.81	3.46	2.43	1.24	10.94	11.09	8.08	7.01	3.42	29.60
Jawa Tengah	0.17	1.40	1.58	2.44	0.35	5.76	2.36	2.14	2.85	0.64	7.99	6.86	5.00	8.06	1.78	21.69
D.I.Yogyakarta	0.02	0.17	0.19	0.30	0.04	0.71	0.29	0.26	0.35	0.08	0.98	0.84	0.61	0.99	0.22	2.65
Jawa Timur	0.25	2.07	2.33	3.61	0.52	8.53	3.49	3.17	4.22	0.95	11.82	10.15	7.40	11.92	2.63	32.09
Bali	0.03	0.24	0.27	0.42	0.06	0.99	0.40	0.37	0.49	0.11	1.37	1.17	0.85	1.38	0.30	3.71
Jawa (total)	1.00	8.36	9.41	14.88	2.06	34.70	14.07	12.79	12.72	4.24	43.82	40.97	29.87	36.23	11.69	118.76
Kalimantan Barat	0.18	0.02	0.02	0.06	0.36	0.46	0.02	0.02	0.09	0.55	0.69	0.05	0.04	0.22	1.46	1.78
Kalimantan Tengah	0.11	0.01	0.01	0.04	0.26	0.32	0.01	0.01	0.05	0.40	0.48	0.03	0.02	0.13	1.06	1.25
Kalimantan Selatan	0.16	0.02	0.02	0.05	0.38	0.47	0.02	0.02	0.08	0.59	0.71	0.05	0.04	0.19	1.55	1.83
Kalimantan Timur	0.55	0.05	0.06	0.18	0.07	0.36	0.08	0.07	0.27	0.14	0.56	0.17	0.12	0.69	0.49	1.47
Kalimantan (total)	1.00	0.10	0.11	0.33	1.07	1.61	0.14	0.13	0.49	1.69	2.45	0.31	0.22	1.23	4.56	6.33
Sulawesi Utara	0.21	0.01	0.01	0.15	0.04	0.21	0.02	0.02	0.21	0.04	0.30	0.07	0.05	0.51	0.02	0.65
Sulawesi Tengah	0.13	0.01	0.01	0.09	0.02	0.13	0.01	0.01	0.13	0.03	0.18	0.04	0.03	0.32	0.01	0.40
Sulawesi Selatan	0.56	0.03	0.04	0.39	0.09	0.56	0.06	0.05	0.56	0.11	0.78	0.19	0.14	1.35	0.05	1.72
Sulawesi Tenggara	0.09	0.01	0.01	0.06	0.02	0.09	0.01	0.01	0.09	0.02	0.13	0.03	0.02	0.22	0.01	0.28
Sulawesi (total)	1.00	0.06	0.07	0.70	0.17	0.99	0.11	0.10	1.00	0.19	1.39	0.33	0.24	2.39	0.09	3.06
Nusa Tenggara Barat	0.19	0.02	0.03	0.01	0.03	0.10	0.04	0.03	0.02	0.04	0.13	0.09	0.06	0.03	0.02	0.20
Nusa Tenggara Timur	0.16	0.02	0.02	0.01	0.03	0.08	0.03	0.03	0.01	0.03	0.11	0.07	0.05	0.03	0.02	0.17
Timor Timur	0.04	0.01	0.01	0.01	0.00	0.02	0.01	0.01	0.00	0.01	0.03	0.02	0.01	0.01	0.00	0.04
Maluku	0.18	0.02	0.02	0.01	0.03	0.09	0.03	0.03	0.02	0.04	0.12	0.08	0.06	0.03	0.02	0.18
Irian Jaya	0.42	0.05	0.06	0.03	0.07	0.21	0.08	0.07	0.04	0.09	0.28	0.19	0.14	0.07	0.04	0.43
Other islands (total)	1.00	0.12	0.14	0.08	0.16	0.50	0.18	0.17	0.09	0.21	0.65	0.44	0.32	0.16	0.10	1.02
Total	-	9.67	10.90	17.97	4.77	43.30	16.43	14.93	16.98	8.67	57.01	48.17	35.12	48.32	21.53	153.14

Table 3.6.2.14 Export Cargo Volume at Commercial Ports in Each Province in The Target Years
(Scenario 1, Alternative 3)

Unit: Million ton

Province	Ratio of GRDP	Cargo Volume														
		2003				2008				2018						
		Container	Conventional	Dry bulk	Liquid bulk	Container	Conventional	Dry bulk	Liquid bulk	Container	Conventional	Dry bulk	Liquid bulk	Total		
Aceh	0.13	0.48	1.96	2.88	1.36	6.69	0.85	2.48	3.52	4.77	11.63	1.89	4.04	17.00	16.04	38.97
Sumatra Utara	0.27	1.00	4.05	5.95	2.82	13.82	1.76	5.13	7.28	9.86	24.02	3.90	8.35	35.13	33.15	80.53
Sumatra Barat	0.09	0.32	1.30	1.91	0.90	4.43	0.56	1.64	2.33	3.16	7.71	1.25	2.68	11.27	10.63	25.83
Riau	0.23	0.84	3.38	4.97	2.35	11.54	1.47	4.28	6.08	8.24	20.07	3.26	6.97	29.34	27.69	67.27
Jambi	0.04	0.13	0.54	3.50	0.47	4.63	0.23	0.68	6.35	0.82	8.08	0.52	1.11	22.78	2.75	27.15
Sumatra Selatan	0.15	0.57	2.32	15.10	2.02	20.00	1.01	2.93	27.43	3.53	34.90	2.23	4.78	98.33	11.85	117.20
Bengkulu	0.02	0.07	0.29	1.92	0.26	2.54	0.13	0.37	3.49	0.45	4.44	0.28	0.61	12.51	1.51	14.91
Lampung	0.08	0.29	1.18	7.69	1.03	10.19	0.51	1.49	13.98	1.80	17.78	1.14	2.43	50.10	6.04	59.71
Sumatera (total)	1.00	3.71	15.01	43.92	11.21	73.85	6.52	19.02	70.46	32.62	128.62	14.47	30.97	276.45	109.67	431.57
DKI Jakarta	0.27	0.77	3.10	0.51	0.71	5.08	1.45	4.22	0.56	1.22	7.45	4.79	10.25	0.70	3.94	19.67
Jawa Barat	0.27	0.78	3.16	0.52	0.72	5.18	1.47	4.30	0.58	1.25	7.60	4.88	10.45	0.71	4.01	20.06
Jawa Tengah	0.17	0.48	1.95	0.32	0.88	3.64	0.91	2.66	0.36	1.38	5.31	3.02	6.46	0.44	4.01	13.94
D.I.Yogyakarta	0.02	0.06	0.24	0.04	0.11	0.45	0.11	0.33	0.04	0.17	0.65	0.37	0.79	0.05	0.49	1.71
Jawa Timur	0.25	0.71	2.89	0.47	1.30	5.38	1.35	3.93	0.53	2.04	7.85	4.47	9.57	0.65	5.94	20.63
Bali	0.03	0.08	0.33	0.05	0.15	0.62	0.16	0.45	0.06	0.24	0.91	0.52	1.11	0.08	0.69	2.38
Jawa (total)	1.00	2.89	11.68	1.91	3.87	20.35	5.45	15.89	2.13	6.30	29.76	18.05	38.63	2.64	19.08	78.40
Kalimantan Barat	0.18	0.33	1.35	9.62	1.25	12.56	0.66	1.92	17.30	2.20	22.08	2.36	5.05	60.96	7.59	75.96
Kalimantan Tengah	0.11	0.20	0.81	7.11	0.63	8.76	0.40	1.16	12.73	1.11	15.40	1.42	3.04	44.69	3.83	52.97
Kalimantan Selatan	0.16	0.29	1.19	10.40	0.93	12.81	0.58	1.69	18.62	1.63	22.52	2.07	4.44	65.35	5.60	77.46
Kalimantan Timur	0.55	1.03	4.19	-0.10	6.59	11.71	2.04	5.94	1.00	11.59	20.57	7.30	15.62	7.86	39.90	70.67
Kalimantan (total)	1.00	1.86	7.54	27.03	9.40	45.84	3.67	10.71	49.66	16.54	80.57	13.15	28.14	178.86	56.92	277.07
Sulawesi Utara	0.21	0.08	0.33	0.12	0.00	0.54	0.18	0.53	0.16	0.00	0.87	0.82	1.76	0.24	0.00	2.82
Sulawesi Tengah	0.13	0.05	0.21	0.08	0.00	0.33	0.11	0.33	0.10	0.00	0.54	0.51	1.09	0.15	0.00	1.75
Sulawesi Selatan	0.56	0.22	0.88	0.32	0.00	1.42	0.48	1.41	0.42	0.00	2.32	2.18	4.66	0.63	0.00	7.47
Sulawesi Tenggara	0.09	0.04	0.14	0.05	0.00	0.23	0.08	0.23	0.07	0.00	0.38	0.36	0.77	0.10	0.00	1.23
Sulawesi (total)	1.00	0.39	1.56	0.57	0.00	2.52	0.86	2.50	0.75	0.00	4.12	3.87	8.28	1.12	0.00	13.26
Nusa Tenggara Barat	0.19	0.32	1.29	0.01	0.10	1.72	0.59	1.71	0.02	0.09	2.41	1.86	3.99	0.02	0.04	5.91
Nusa Tenggara Timur	0.16	0.27	1.08	0.01	0.09	1.44	0.49	1.44	0.02	0.08	2.02	1.56	3.35	0.02	0.03	4.95
Timor Timur	0.04	0.07	0.28	0.00	0.02	0.37	0.13	0.37	0.00	0.02	0.52	0.40	0.86	0.00	0.01	1.27
Maluku	0.18	0.30	1.20	0.01	0.10	1.60	0.55	1.59	0.02	0.08	2.24	1.73	3.71	0.02	0.03	5.49
Irian Jaya	0.42	0.70	2.81	0.03	0.23	3.76	1.28	3.74	0.05	0.20	5.27	4.08	8.72	0.04	0.08	12.92
Other islands (total)	1.00	1.64	6.65	0.07	0.54	8.90	3.03	8.85	0.11	0.47	12.46	9.64	20.62	0.10	0.18	30.55
Total	-	10.49	42.44	73.50	25.02	151.45	19.53	56.97	123.10	55.92	255.53	59.18	126.64	459.17	185.86	830.84

Table 3.6.2.15 Import Cargo Volume at Commercial Ports in Each Province in The Target Years
(Scenario 2, Alternative 3)

(Unit: Million tons)

Province	Ratio of G	Cargo Volume														
		2003				2008				2018						
		Container	Conventio	Dry bulk	Liquid bul	Total	Container	Conventio	Dry bulk	Liquid bul	Total	Container	Conventio	Dry bulk	Liquid bul	Total
Aceh	0.13	0.15	0.16	0.17	0.09	0.57	0.29	0.27	0.17	0.26	0.99	1.00	0.73	0.67	0.69	3.08
Sumatra Utara	0.27	0.30	0.34	0.36	0.18	1.18	0.60	0.55	0.36	0.54	2.05	2.06	1.50	1.38	1.42	6.36
Sumatra Barat	0.09	0.10	0.11	0.11	0.06	0.38	0.19	0.18	0.11	0.17	0.66	0.66	0.48	0.44	0.46	2.04
Riau	0.23	0.25	0.28	0.30	0.15	0.98	0.50	0.46	0.30	0.45	1.71	1.72	1.26	1.15	1.19	5.31
Jambi	0.04	0.04	0.05	0.14	0.11	0.33	0.08	0.07	0.25	0.14	0.54	0.27	0.20	0.79	0.29	1.55
Sumatra Selatan	0.15	0.17	0.19	0.60	0.47	1.44	0.35	0.31	1.09	0.59	2.34	1.18	0.86	3.40	1.25	6.69
Bengkulu	0.02	0.02	0.02	0.08	0.06	0.18	0.04	0.04	0.14	0.08	0.30	0.15	0.11	0.43	0.16	0.85
Lampung	0.08	0.09	0.10	0.31	0.24	0.73	0.18	0.16	0.55	0.30	1.19	0.60	0.44	1.73	0.64	3.41
Sumatera (total)	1.00	1.12	1.26	2.07	1.35	5.80	2.24	2.03	2.97	2.55	9.79	7.65	5.58	9.98	6.08	29.29
DKI Jakarta	0.27	2.14	2.41	1.27	0.75	6.57	3.44	3.13	1.87	1.14	9.57	9.31	6.79	4.90	2.94	23.95
Jawa Barat	0.27	2.18	2.46	5.95	0.34	10.93	3.51	3.19	1.90	1.16	9.76	9.50	6.93	5.00	3.00	24.43
Jawa Tengah	0.17	1.35	1.52	1.84	0.38	5.09	2.17	1.97	2.44	0.60	7.19	5.88	4.28	6.36	1.56	18.08
D.I. Yogyakarta	0.02	0.17	0.19	0.23	0.05	0.62	0.27	0.24	0.30	0.07	0.88	0.72	0.52	0.78	0.19	2.21
Jawa Timur	0.25	2.00	2.25	2.72	0.56	7.53	3.21	2.92	3.61	0.89	10.64	8.69	6.34	9.41	2.31	26.75
Bali	0.03	0.23	0.26	0.31	0.07	0.87	0.37	0.34	0.42	0.10	1.23	1.00	0.73	1.09	0.27	3.09
Jawa (total)	1.00	8.07	9.08	12.32	2.15	31.62	12.97	11.78	10.54	3.97	39.27	35.11	25.59	27.55	10.27	98.52
Kalimantan Barat	0.18	0.02	0.02	0.06	0.39	0.49	0.03	0.03	0.10	0.66	0.82	0.07	0.05	0.30	1.98	2.40
Kalimantan Tengah	0.11	0.01	0.01	0.04	0.29	0.35	0.02	0.02	0.06	0.48	0.58	0.04	0.03	0.18	1.43	1.69
Kalimantan Selatan	0.16	0.02	0.02	0.06	0.42	0.51	0.02	0.02	0.09	0.70	0.84	0.06	0.05	0.26	2.10	2.47
Kalimantan Timur	0.55	0.06	0.06	0.20	0.07	0.39	0.09	0.08	0.32	0.16	0.65	0.22	0.16	0.92	0.65	1.95
Kalimantan (total)	1.00	0.10	0.11	0.36	1.16	1.74	0.15	0.14	0.58	2.01	2.89	0.39	0.29	1.66	6.16	8.51
Sulawesi Utara	0.21	0.01	0.02	0.17	0.04	0.24	0.03	0.03	0.28	0.06	0.40	0.13	0.09	0.87	0.19	1.28
Sulawesi Tengah	0.13	0.01	0.01	0.10	0.02	0.15	0.02	0.02	0.17	0.04	0.25	0.08	0.06	0.54	0.11	0.79
Sulawesi Selatan	0.56	0.04	0.04	0.44	0.11	0.63	0.08	0.08	0.74	0.16	1.06	0.33	0.24	2.32	0.49	3.38
Sulawesi Tenggara	0.09	0.01	0.01	0.07	0.02	0.10	0.01	0.01	0.12	0.03	0.17	0.05	0.04	0.38	0.08	0.56
Sulawesi (total)	1.00	0.07	0.08	0.78	0.19	1.12	0.15	0.14	1.31	0.29	1.88	0.59	0.43	4.11	0.87	6.01
Nusa Tenggara Barat	0.19	0.02	0.03	0.01	0.03	0.10	0.04	0.03	0.02	0.03	0.12	0.09	0.07	0.03	0.01	0.19
Nusa Tenggara Timur	0.16	0.02	0.02	0.01	0.03	0.08	0.03	0.03	0.02	0.03	0.10	0.08	0.05	0.03	0.00	0.16
Timor Timur	0.04	0.01	0.01	0.01	0.00	0.02	0.01	0.01	0.00	0.01	0.03	0.02	0.01	0.01	0.00	0.04
Maluku	0.18	0.02	0.03	0.01	0.03	0.09	0.03	0.03	0.02	0.03	0.11	0.08	0.06	0.03	0.00	0.18
Irian Jaya	0.42	0.05	0.06	0.03	0.07	0.21	0.08	0.07	0.04	0.07	0.26	0.20	0.14	0.07	0.01	0.42
Other islands (total)	1.00	0.12	0.14	0.08	0.15	0.50	0.19	0.17	0.09	0.17	0.62	0.46	0.34	0.17	0.03	1.00
Total	-	9.48	10.68	15.61	5.00	40.77	15.70	14.26	15.49	8.99	54.45	44.21	32.23	43.48	23.41	143.32

Table 3.6.2.16 Export Cargo Volume at Commercial Ports in Each Province in The Target Years
(Scenario 2, Alternative 3)

Unit:Million ton

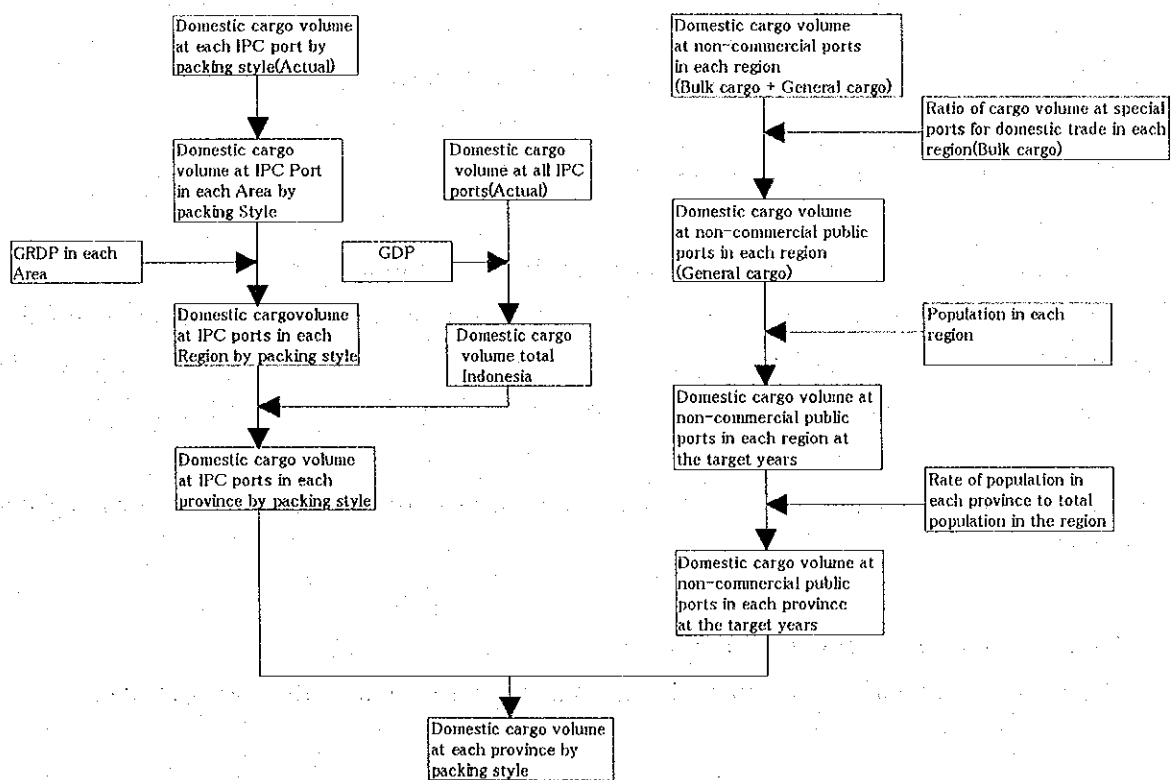
Province	Ratio of GRDP	Cargo Volume														
		2003				2008				2018						
		Container	Conventional	Dry bulk	Liquid bulk	Total	Container	Conventional	Dry bulk	Liquid bulk	Total	Container	Conventional	Dry bulk	Liquid bulk	Total
Aceh	0.13	0.62	2.52	3.30	1.65	8.09	1.27	3.69	4.08	6.25	15.29	2.46	5.25	16.56	17.08	41.35
Sumatra Utara	0.27	1.29	5.20	6.82	3.40	16.71	2.61	7.63	8.43	12.91	31.58	5.07	10.86	34.21	35.30	85.44
Sumatra Barat	0.09	0.41	1.67	2.19	1.09	5.36	0.84	2.45	2.70	4.14	10.13	1.63	3.48	10.97	11.32	27.41
Riau	0.23	1.07	4.35	5.70	2.84	13.96	2.18	6.37	7.04	10.78	26.38	4.24	9.07	28.57	29.49	71.37
Jambi	0.04	0.17	0.69	0.91	0.56	2.59	0.35	1.01	1.17	1.87	6.00	0.67	1.44	4.36	4.62	12.42
Sumatra Selatan	0.15	0.74	2.98	4.17	2.43	11.01	1.50	4.36	4.99	7.42	23.32	2.90	6.21	19.28	20.16	53.65
Bengkulu	0.02	0.09	0.38	0.52	0.31	1.30	0.19	0.56	0.64	1.00	3.32	0.37	0.79	2.36	2.42	6.34
Lampung	0.08	0.37	1.52	2.29	1.24	5.30	0.76	2.22	2.52	3.35	11.67	1.48	3.16	9.42	9.83	25.97
Sumatera (total)	1.00	4.77	19.30	26.22	13.52	58.25	9.70	28.29	32.20	47.71	168.89	18.82	40.27	122.53	127.78	339.49
DKI Jakarta	0.27	1.00	4.04	5.59	2.91	11.34	2.27	6.62	7.75	11.78	31.43	7.17	15.35	45.83	47.37	128.72
Jawa Barat	0.27	1.02	4.13	5.60	3.03	11.67	2.32	6.75	7.77	11.82	33.65	7.32	15.66	46.84	48.48	132.99
Jawa Tengah	0.17	0.63	2.55	3.37	1.74	6.69	1.43	4.18	4.48	6.29	18.18	4.52	9.68	28.52	29.73	77.46
D.I.Yogyakarta	0.02	0.08	0.31	0.41	0.24	1.00	0.18	0.51	0.56	0.81	2.96	0.55	1.19	3.46	3.61	9.57
Jawa Timur	0.25	0.93	3.78	5.05	2.69	10.44	2.12	6.18	7.00	10.00	28.10	6.70	14.33	41.77	43.48	115.38
Bali	0.03	0.11	0.44	0.60	0.31	1.30	0.24	0.71	0.78	1.10	3.80	0.77	1.66	4.99	5.14	13.50
Jawa (total)	1.00	3.77	15.24	20.21	10.00	36.22	8.56	24.96	28.84	40.40	115.75	27.04	57.85	167.31	174.75	458.75
Kalimantan Barat	0.18	0.41	1.64	2.22	1.48	6.85	0.86	2.52	2.53	3.76	13.82	2.38	5.09	14.98	15.37	41.82
Kalimantan Tengah	0.11	0.24	0.99	1.37	0.75	3.36	0.52	1.51	1.57	2.39	8.99	1.43	3.06	8.26	8.47	21.48
Kalimantan Selatan	0.16	0.36	1.45	2.05	1.09	4.14	0.76	2.21	2.30	3.40	12.21	2.09	4.48	12.26	12.54	32.27
Kalimantan Timur	0.55	1.26	5.08	7.08	3.79	13.85	2.67	7.78	8.82	12.52	45.78	7.36	15.75	46.93	48.75	126.78
Kalimantan (total)	1.00	2.26	9.16	12.66	6.12	24.20	4.81	14.02	16.41	22.72	80.95	13.26	28.38	72.43	75.28	197.35
Sulawesi Utara	0.21	0.09	0.38	0.51	0.30	1.26	0.21	0.62	0.64	0.90	3.57	0.64	1.37	3.66	3.76	9.77
Sulawesi Tengah	0.13	0.06	0.24	0.33	0.20	0.83	0.13	0.38	0.41	0.56	2.10	0.40	0.85	2.22	2.29	5.94
Sulawesi Selatan	0.56	0.25	1.02	1.41	0.80	3.68	0.56	1.63	1.64	2.34	9.00	1.69	3.63	9.96	10.28	26.28
Sulawesi Tenggara	0.09	0.04	0.17	0.24	0.14	0.58	0.09	0.27	0.30	0.41	1.56	0.28	0.60	1.66	1.70	4.44
Sulawesi (total)	1.00	0.45	1.80	2.50	1.38	5.90	1.00	2.90	3.14	4.31	16.73	3.01	6.44	17.43	18.00	47.44
Nusa Tenggara Barat	0.19	0.40	1.63	2.22	1.13	4.18	0.86	2.50	2.83	3.90	14.32	2.31	4.95	14.00	14.55	37.32
Nusa Tenggara Timur	0.16	0.34	1.37	1.91	1.00	3.83	0.72	2.10	2.30	3.19	11.94	1.94	4.15	11.00	11.44	29.14
Timor Timur	0.04	0.09	0.35	0.47	0.25	1.00	0.18	0.54	0.60	0.81	3.10	0.50	1.07	3.00	3.10	7.87
Maluku	0.18	0.38	1.52	2.01	1.12	4.02	0.80	2.33	2.63	3.60	13.25	2.15	4.60	13.00	13.64	34.80
Irian Jaya	0.42	0.88	3.57	4.76	2.27	8.76	1.88	5.47	6.07	8.24	30.65	5.06	10.83	30.01	31.10	78.00
Other islands (total)	1.00	2.09	8.44	11.25	6.65	24.93	4.43	12.93	14.16	19.57	73.39	11.96	25.60	72.02	74.25	189.83
Total	-	13.33	53.95	86.34	30.28	183.90	28.49	83.10	153.74	213.39	733.73	74.09	158.54	459.80	499.06	1291.49

The basic framework of the domestic trade cargo volume forecast at commercial ports is the same as in the forecast of the foreign trade cargo volume. The major difference is that statistics of foreign trade in Indonesia are used to forecast the foreign trade cargo volume while the past cargo volume records at ports are adopted for the domestic cargo volume forecast.

Domestic cargo volume at non-commercial ports in each IPC area is estimated using the ratio of domestic cargo volume at non-commercial port(including domestic cargo volume at special ports) to domestic cargo volume at IPC ports.

The forecast procedure for domestic trade cargo volume by packing style in each province in the target years is shown in Figure 3.6.2.2.

Figure 3.6.2.2 Procedure of Forecast for Domestic Cargo Volume



2) Forecast Cargo Volume at Commercial Ports by Region

The domestic cargo volume at commercial ports by the packing style for loading and unloading in each region is estimated by the correlation between the past cargo volume record at IPC ports in each province from 1993 to 1996 and GRDP in the same region in the same period, the time trend analysis or the average volume of the past records.

From Tables 3.6.2.17 to 3.6.2.18 show the domestic cargo volume for sea transportation by packing style in each region in the target years for scenario 1 and 2 in Alternative-3.

In this study, the domestic container cargo volume(Cv) is estimated by the following procedure:

$$\textcircled{1} (A) = (\text{General cargo}) + (\text{Unitized Cargo}) + (\text{Bagged Cargo})$$

$$\textcircled{2} (Cv) = (A) \times (\text{Rate of containerization})$$

The rate of containerization(Rc) for domestic trade is explained by the following formula:

$$(Rc) = (\text{Container cargo volume}) / \{(\text{general cargo}) + (\text{Unitized cargo}) + (\text{Bagged cargo})\}$$

The rate of containerization is estimated using a logistic curve in general. In this study, the rate for domestic container cargo is estimated by the following formula:

$$T = 1 / [2.7778 + \{0.872 \times (0.5038)^t\}]$$

T: Rate of containerization

t : Years from the start of containerization

The result of the estimation is shown in Table 3.6.2.19.

3) Forecast Cargo Volume at Commercial Port by Whole Indonesia

The total cargo volumes of domestic cargo at commercial ports for loading and unloading in the target years are estimated using the correlation between the past record of the domestic cargo volume at IPC ports from 1988 to 1995 and GDP over the same period.

The total domestic cargo volume at commercial ports in the target years is shown in Table 3.6.2.20.

4) Cargo Volume at Commercial Ports

The results of 2) and 3) are adjusted in the same manner as with the foreign trade.

From Tables 3.6.2.21 to 3.6.2.24 show the domestic cargo volume by packing style in each province in the target years for scenario 1 and 2 in Alternative-3. (See from Table A3.6.2.18 to Table A3.6.2.25.

5) Cargo Volume at Non-commercial Ports

Cargo handling volume for domestic cargo at non-commercial ports in each IPC area in

Table 3.6.2.17 Domestic Cargo Volume by Packing Style in Each Region in The Target Years
(Alternative-3, Scenario 1)

(Million ton)

Area	2,003					2,008					2,018					
	Container cargo	General cargo	Bagged cargo	Dry bulk cargo	Liquid bulk cargo	Container cargo	General cargo	Bagged cargo	Dry bulk cargo	Liquid bulk cargo	Container cargo	General cargo	Bagged cargo	Dry bulk cargo	Liquid bulk cargo	Total
Sumatra	0	13	4	2	13	0	24	8	2	19	5	84	28	0	50	167
Unloading	0	9	1	15	39	0	15	0	19	64	3	43	0	23	197	266
Loading	0	22	5	17	52	0	39	8	21	83	9	127	28	23	247	434
Total	0	35	6	34	103	0	53	8	40	147	12	170	56	46	444	700
Jawa	0	19	1	16	32	0	31	0	19	36	6	89	0	29	44	167
Unloading	0	13	3	2	1	0	23	5	2	2	5	71	3	2	1	82
Loading	0	33	4	17	33	0	54	3	21	37	11	159	5	31	45	249
Total	0	52	7	33	65	0	77	3	21	73	16	230	8	53	90	331
Kalimantan	0	9	2	2	2	0	15	2	4	3	3	47	4	16	3	73
Unloading	0	12	0	0	13	0	23	0	0	14	6	80	0	0	17	104
Loading	0	21	2	2	15	0	39	2	4	17	9	127	4	16	21	176
Total	0	30	2	4	28	0	62	2	4	31	15	207	4	16	38	280
Sulawesi	0	3	1	0	0	0	5	2	1	0	1	14	4	3	1	23
Unloading	0	1	0	3	1	0	1	0	6	1	0	4	0	7	1	12
Loading	0	4	2	3	1	0	6	2	7	1	1	18	4	10	1	35
Total	0	7	2	3	2	0	11	2	8	2	1	22	4	11	2	47
Oter Eeast	0	3	2	0	0	0	4	3	0	0	1	11	8	0	1	20
Unloading	0	1	1	0	0	0	1	0	0	0	0	1	0	0	0	2
Loading	0	3	2	0	0	0	5	3	0	0	1	12	8	0	1	22
Total	0	6	3	0	0	0	9	3	0	0	1	23	8	0	1	42
Total Indod	0	47	10	21	49	0	80	15	26	59	16	244	44	48	98	450
Unloading	0	36	4	20	53	0	63	3	27	79	15	198	3	33	216	465
Loading	0	83	14	40	101	1	143	18	53	138	31	443	48	81	314	916
Total	0	129	24	60	150	1	226	33	79	197	46	641	92	114	312	1366

Table 3.6.2.18 Domestic Cargo Volume by Packing Style in Each Region in The Target Years
(Alternative-3, Scenario 2)

Unit: 1000tons

Area	2003						2008						2018					
	Container cargo	General cargo	Bagged cargo	Dry bulk cargo	Liquid bulk cargo	Total	Container cargo	General cargo	Bagged cargo	Dry bulk cargo	Liquid bulk cargo	Total	Container cargo	General cargo	Bagged cargo	Dry bulk cargo	Liquid bulk cargo	Total
Sumatra	0	13	5	2	13	33	0	26	9	2	19	56	6	90	29	0	51	175
Unloading	0	9	1	1	14	64	0	15	0	17	66	99	3	45	0	20	206	273
Loading	0	22	5	17	53	97	0	42	9	19	86	155	9	134	29	20	256	449
Total	0	18	1	15	31	65	0	27	0	18	33	78	4	65	0	24	37	130
Java	0	13	3	2	1	18	0	19	3	2	1	25	4	51	2	2	1	60
Unloading	0	13	3	2	1	18	0	19	3	2	1	25	4	51	2	2	1	60
Loading	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	31	3	17	32	83	0	46	3	20	34	102	8	116	2	26	38	190
Kalimanta	0	10	2	2	2	16	0	17	2	5	3	27	3	53	4	19	3	83
Unloading	0	13	0	0	12	26	0	27	0	13	13	40	7	94	0	0	15	116
Loading	0	23	2	3	15	42	0	44	2	5	16	67	10	148	4	19	18	199
Total	0	3	1	1	0	6	0	6	2	1	0	10	1	21	6	5	0	33
Sulawesi	0	1	0	3	1	5	0	2	0	8	1	11	0	5	0	9	1	16
Unloading	0	4	2	4	1	11	0	4	2	9	1	20	2	26	6	14	1	49
Loading	0	3	2	2	0	5	0	1	0	0	0	7	1	9	7	0	0	18
Total	0	0	0	0	0	0	0	0	3	0	0	0	1	1	0	0	0	1
Other East	0	0	0	0	0	0	0	1	0	0	0	8	0	10	8	0	0	20
Unloading	0	0	0	0	0	0	0	1	0	0	0	1	1	1	1	0	0	1
Loading	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Indo	0	47	10	20	48	125	0	80	15	26	56	177	16	238	47	48	91	440
Unloading	0	36	4	20	53	114	0	64	3	27	81	176	15	196	3	31	222	466
Loading	0	83	14	40	101	238	1	144	19	53	137	353	31	434	49	79	313	906
Total	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1

Table 3.6.2.20 Total Domestic Cargo Volume at Commercial Port in the Target Years
(Unit: Million tons)

Year	2003	2008	2018
Alternative-1	273.0	441.7	1,029.9
Alternative-2	224.4	338.8	804.1
Alternative-3	238.3	353.0	929.3

Table 3.6.2.19 Rate Containerization for Domestic Cargo (%)

Year	1996	2003	2008	2018
Rate	0.0039	0.0431	0.2382	6.1294

Table 3.6.2.2.1 Domestic Unloading Cargo Volume at Commercial Ports in The Target Years

Unit: 1000tons

Province	Percent of GRDP	2003					2008					2018							
		Container cargo	General cargo	Bagged cargo	Dry bulk cargo	Liquid bulk	Total	Container cargo	General cargo	Bagged cargo	Dry bulk cargo	Liquid bulk	Total	Container cargo	General cargo	Bagged cargo	Dry bulk cargo	Liquid bulk	Total
Bengkulu	0.02	0.1	252.3	86.3	49.2	260.9	648.8	1.0	487.4	159.0	37.5	381.3	1,066.3	107.6	1,685.7	557.4	4.0	992.7	3,347.4
Aceh	0.13	0.7	1,639.8	561.2	320.0	1,695.8	4,217.4	6.3	3,168.2	1,033.7	243.9	2,478.7	6,930.8	699.4	10,957.0	3,623.2	25.9	6,452.8	21,758.3
Jambi	0.03	0.2	378.4	129.5	73.8	391.3	973.2	1.5	731.1	238.5	56.3	572.0	1,599.4	161.4	2,528.5	836.1	6.0	1,489.1	5,021.1
Lampung	0.08	0.4	1,009.1	345.3	196.9	1,043.6	2,595.3	3.9	1,949.7	636.1	150.1	1,525.3	4,265.1	430.4	6,742.8	2,229.6	16.0	3,970.9	13,389.7
North Sumatra	0.27	1.4	3,405.7	1,165.5	646.6	3,522.0	8,759.1	13.2	6,505.3	2,146.9	506.6	5,148.3	14,394.8	1,452.6	22,750.9	7,925.0	53.9	13,401.9	45,190.3
Reau	0.23	1.2	2,901.1	992.8	566.2	3,000.2	7,461.5	11.2	5,605.3	1,828.8	431.6	4,385.3	12,237.4	1,938.5	19,385.5	6,410.2	45.9	11,416.5	38,495.4
South Sumatra	0.15	0.8	1,892.0	647.5	369.2	1,956.7	4,866.2	7.3	3,655.6	1,192.7	281.5	2,860.0	7,997.1	807.0	12,642.7	4,180.6	29.9	7,445.5	25,105.7
West Sumatra	0.09	0.5	1,135.2	388.5	221.5	1,174.0	2,919.7	4.4	2,193.4	715.6	168.9	1,716.0	4,798.3	484.2	7,585.6	2,508.3	18.0	4,467.3	15,063.4
Sumatra Total	1.00	5.0	12,613.6	4,316.5	2,461.6	13,044.5	32,441.2	48.8	24,371.0	7,951.4	1,876.3	19,066.5	53,314.1	5,379.9	84,284.8	27,870.4	199.6	49,636.8	167,371.4
Bali	0.03	0.2	379.6	158	467.3	967.8	2,030.7	1.9	929.2	8.6	579.4	1,074.5	2,593.5	170.1	2,664.2	10.5	855.5	1,311.9	5,012.1
Central Jawa	0.17	1.3	3,284.6	89.4	2,647.8	5,484.4	11,507.5	10.6	5,265.7	48.6	3,283.1	6,088.7	14,696.7	963.6	15,097.1	59.3	4,847.6	7,434.0	28,401.6
DKI Jakarta	0.27	2.1	5,216.7	1,420	4,205.3	8,710.6	18,276.7	16.8	8,363.2	77.2	5,214.4	9,670.2	23,341.8	1,530.5	23,977.7	94.2	7,699.2	11,806.9	45,108.5
East Jawa	0.25	1.9	4,830.3	131.5	3,893.8	8,065.3	16,922.9	15.5	7,743.7	71.4	4,828.2	8,953.9	21,612.8	1,417.1	22,201.5	87.2	7,128.9	10,932.3	41,767.1
West Jawa	0.28	2.2	5,409.9	147.3	4,361.1	9,033.2	18,953.6	17.4	8,673.0	80.0	5,407.5	10,028.4	24,206.3	1,587.2	24,865.7	97.7	7,984.4	12,244.2	46,779.1
T. Jawa	1.00	7.7	19,321.0	526.0	15,575.3	32,261.3	67,691.4	62.1	30,975.0	285.8	19,312.6	35,815.7	86,451.1	5,668.5	88,806.2	348.9	28,515.5	43,729.3	167,068.4
Central Kalimantan	0.11	0.4	999.7	170.2	225.9	273.4	1,669.6	3.4	1,702.3	216.0	463.9	303.5	2,689.2	326.6	5,117.2	416.0	1,769.7	370.6	8,000.1
East Kalimantan	0.55	2.0	4,998.4	831.2	1,129.4	1,367.1	8,348.1	17.1	8,511.7	1,079.9	2,319.7	1,517.7	13,446.1	1,633.1	25,585.8	2,079.8	8,848.5	1,853.0	40,000.3
South Kalimantan	0.16	0.6	1,454.1	247.6	328.6	397.7	2,428.5	5.0	2,476.1	134.1	674.8	441.5	3,911.6	475.1	7,443.1	605.0	2,574.1	539.1	11,636.5
West Kalimantan	0.18	0.7	1,635.8	278.6	369.6	447.4	2,732.1	5.6	2,785.6	353.4	759.2	496.7	4,400.5	534.5	8,373.5	680.7	2,895.9	606.3	13,091.0
Kalimantan Total	1.00	3.6	9,087.9	1,547.7	2,053.5	2,485.6	15,178.3	31.0	15,475.8	1,963.4	4,217.7	2,759.5	24,447.4	2,969.3	46,519.6	3,781.5	16,088.2	3,369.2	72,727.8
Central Sulawesi	0.13	0.2	378.4	171.7	62.4	51.9	664.6	1.2	621.9	238.7	115.7	57.6	1,035.2	115.3	1,806.3	566.3	406.5	70.3	2,964.7
North Sulawesi	0.21	0.2	611.2	277.4	100.8	83.8	1,073.5	2.0	1,004.7	385.6	186.8	93.1	1,672.2	186.2	2,917.9	914.8	656.6	113.6	4,789.2
South Sulawesi	0.57	0.7	1,659.1	753.0	273.6	227.5	2,913.9	5.5	2,727.0	1,046.7	507.1	252.6	4,538.9	505.5	7,919.9	2,483.2	1,782.2	308.4	12,999.3
South East Sulawesi	0.09	0.1	262.0	118.9	43.2	35.9	460.1	0.9	430.6	165.3	80.1	39.9	716.7	79.8	1,250.5	392.1	281.4	48.7	2,052.5
Sulawesi Total	1.00	1.2	2,910.7	1,321.0	480.1	399.2	5,112.1	9.6	4,784.2	1,836.3	889.7	443.2	7,962.9	886.9	13,894.6	4,356.4	3,126.7	541.1	22,805.8
East Timor	0.04	0.0	115.5	73.9	4.6	17.1	211.2	0.4	175.2	115.5	5.3	19.0	315.4	35.5	432.9	320.5	7.1	23.2	819.1
Irian Jaya	0.42	0.5	1,212.9	776.3	481	1,797.7	2,217.5	4.0	1,839.6	1,212.8	55.9	199.5	3,311.8	372.5	4,545.0	3,365.2	74.4	243.6	8,600.7
Maluku	0.18	0.2	519.8	332.7	20.6	77.0	950.4	1.7	788.4	519.8	24.0	85.5	1,419.3	159.6	1,947.9	1,442.2	31.9	104.4	3,686.0
West Nusa Tenggara	0.20	0.2	577.6	369.7	22.9	85.6	1,056.0	1.9	876.0	577.5	26.6	95.0	1,577.0	177.4	2,164.3	1,602.5	35.4	116.0	4,095.6
East Nusa Tenggara	0.16	0.2	462.0	295.7	18.3	68.5	844.8	1.5	700.8	462.0	21.3	76.0	1,261.6	141.9	1,731.4	1,282.0	28.3	92.8	3,276.5
Total East Indonesia	1.00	1.2	2,887.8	1,848.4	114.5	427.9	5,279.8	9.6	4,379.9	2,887.5	133.1	475.1	7,885.2	886.9	10,821.5	8,012.3	177.1	580.1	20,477.9
Total Indonesia	-	18.7	46,821.0	9,559.6	20,685.0	48,618.6	125,702.9	161	79,986	14,924	26,429	58,560	180,061	15,791	244,327	44,370	48,107	97,856	450,451.3

Table 3.6.2.2.4 Domestic Loading Cargo Volume at Commercial Ports in The Target Years
Alternative-3, Scenario-2

Unit: 1000tons

Province	Percent of GRDP	2003						2008						2018					
		Container cargo	General cargo	Bagged cargo	Dry bulk cargo	Liquid bulk	Total	Container cargo	General cargo	Bagged cargo	Dry bulk cargo	Liquid bulk	Total	Container cargo	General cargo	Bagged cargo	Dry bulk cargo	Liquid bulk	Total
Bengkulu	0.02	0.4	183.1	11.3	287.5	789.2	1,271.5	1.9	307.7	0.0	348.4	1,327.5	1,985.5	67.4	895.7	0.0	390.3	4,114.7	5,468.1
Aceh	0.13	2.4	1,189.9	73.7	1,868.7	5,129.9	8,264.5	12.1	2,000.2	0.1	2,264.4	8,628.7	12,905.5	438.2	5,821.9	0.1	2,537.1	26,745.4	35,542.7
Jambi	0.03	0.6	274.6	17.0	431.2	1,183.8	1,907.2	2.8	461.6	0.0	522.6	1,991.2	2,978.2	10.1	1,343.5	0.0	585.5	6,172.0	8,202.2
Lampung	0.08	1.5	732.2	45.3	1,149.9	3,156.9	5,085.8	7.4	1,230.9	0.1	1,393.5	5,310.8	7,941.8	269.7	3,582.7	0.1	1,561.3	16,458.7	21,872.4
North Sumatra	0.27	5.0	2,471.3	153.0	3,881.1	10,694.4	17,164.7	25.1	4,154.2	0.2	4,703.1	17,921.1	26,803.7	910.1	12,091.6	0.2	5,269.5	55,548.0	73,819.4
Reau	0.23	4.2	2,105.2	130.4	3,306.1	9,076.0	14,621.8	21.4	3,538.8	0.2	4,006.3	15,266.1	22,832.7	775.3	10,900.3	0.2	4,488.8	47,318.7	62,883.3
South Sumatra	0.15	2.8	1,372.9	85.0	2,156.2	5,919.1	9,536.0	13.9	2,307.9	0.1	2,612.8	9,956.2	14,890.9	505.6	6,717.6	0.1	2,927.5	30,860.0	41,010.8
West Sumatra	0.09	1.7	823.8	51.0	1,293.7	3,551.5	5,721.6	8.4	1,384.7	0.1	1,567.7	5,973.7	8,934.6	303.4	4,030.5	0.1	1,756.5	18,516.0	24,606.5
Sumatra Total	1.00	18.3	9,182.8	568.8	14,374.4	39,460.7	63,573.1	92.9	15,386.0	0.8	17,418.7	66,374.4	99,272.8	3,370.8	44,783.8	0.9	19,516.5	205,733.5	275,405.5
Bali	0.03	0.8	376.9	86.5	51.4	18.2	533.8	3.5	583.5	80.2	54.4	19.3	740.9	115.4	1,533.0	64.2	60.9	21.6	1,795.2
Central Java	0.17	4.3	2,135.9	490.2	291.1	103.5	3,024.9	20.0	3,306.4	454.3	308.2	109.4	4,198.2	653.9	8,687.0	364.1	345.3	122.6	10,172.8
DKI Jakarta	0.27	6.8	3,392.3	778.6	462.4	164.1	4,804.2	31.7	5,251.4	721.5	489.5	173.7	6,667.8	1,038.5	13,797.1	578.2	548.4	194.6	16,156.0
East Java	0.25	6.3	3,141.0	720.9	428.2	152.0	4,448.4	29.4	4,862.4	668.0	453.2	160.9	6,173.9	961.6	12,775.1	535.4	507.8	180.2	14,961.1
West Java	0.28	7.1	3,518.0	807.4	479.5	170.2	4,987.2	32.9	5,445.9	748.2	507.6	180.2	6,914.8	1,077.0	14,308.1	599.6	568.8	201.9	16,755.3
T.Jawa	1.00	25.2	12,564.1	2,883.7	1,712.6	607.8	17,793.5	117.4	19,449.7	2,672.2	1,812.9	643.4	24,695.6	3,846.3	51,100.3	2,141.5	2,031.3	720.9	59,840.2
Central Kalimantan	0.11	2.9	1,453.3	5.2	28.3	1,361.8	2,851.6	17.9	2,966.7	5.5	0.1	1,441.6	4,431.9	779.3	10,553.2	6.2	0.1	1,615.2	12,754.0
East Kalimantan	0.55	14.6	7,266.4	26.2	141.7	6,809.1	14,258.0	89.5	14,833.6	27.7	0.6	7,207.8	22,159.3	3,896.4	51,765.9	31.1	0.7	8,075.9	63,769.9
South Kalimantan	0.16	4.2	2,113.9	7.6	41.2	1,980.8	4,147.8	26.0	4,315.2	8.1	0.2	2,096.8	6,446.3	1,133.5	15,059.2	9.0	0.2	2,349.4	18,551.3
West Kalimantan	0.18	4.8	2,378.1	8.6	46.4	2,228.4	4,666.2	29.3	4,854.6	9.1	0.2	2,358.9	7,252.1	1,275.2	16,941.6	10.2	0.2	2,643.0	20,870.2
Kalimantan Total	1.00	26.5	13,211.7	47.6	257.6	12,380.2	25,923.6	162.8	26,970.2	50.4	1.2	13,105.2	40,289.7	7,084.3	94,119.9	56.5	1.3	14,683.4	115,945.4
Central Sulawesi	0.13	0.3	132.4	40.0	439.3	70.4	683.3	1.3	222.1	9.5	1,062.3	74.5	1,369.7	52.4	695.6	10.7	1,190.2	83.4	2,032.2
North Sulawesi	0.21	0.4	213.8	64.6	709.6	113.6	1,102.2	2.2	358.8	15.4	1,716.0	120.3	2,212.6	84.6	1,123.6	17.2	1,922.6	134.8	3,282.9
South Sulawesi	0.57	1.2	580.3	175.4	1,926.2	308.5	2,991.6	5.9	973.8	41.8	4,657.6	326.5	6,005.6	229.6	3,049.8	46.8	5,218.6	365.9	8,910.6
South East Sulawesi	0.09	0.2	91.6	27.7	304.1	48.7	472.4	0.9	153.8	6.6	735.4	51.6	948.2	36.2	481.6	7.4	824.0	57.8	1,406.9
Sulawesi Total	1.00	2.0	1,018.1	307.8	3,379.3	541.2	5,248.4	10.3	1,708.3	73.3	8,171.3	572.9	10,536.1	402.7	5,550.6	82.1	9,155.4	641.9	15,632.6
East Timor	0.04	0.0	19.5	14.0	0.4	6.5	40.4	0.1	22.3	14.5	0.4	6.9	44.1	2.0	27.0	15.4	0.4	7.7	52.6
Irian Jaya	0.42	0.4	204.5	147.3	3.7	68.2	424.1	1.4	233.8	152.2	3.9	72.2	463.5	21.3	283.3	162.2	4.4	80.9	552.1
Maluku	0.18	0.2	87.6	63.1	1.6	29.2	181.8	0.6	100.2	65.2	1.7	31.0	198.7	9.1	121.4	69.5	1.9	34.7	236.6
West Nusa Tenggara	0.20	0.2	97.4	70.1	1.8	32.5	202.0	0.7	111.3	72.5	1.9	34.4	220.7	10.2	134.9	77.2	2.1	38.5	262.9
East Nusa Tenggara	0.16	0.2	77.9	56.1	1.4	26.0	161.6	0.5	89.1	58.0	1.5	27.5	176.6	8.1	107.9	61.8	1.7	30.8	210.3
Total East Indonesia	1.00	1.0	486.8	350.7	8.8	162.4	1,039.8	3.4	556.6	362.4	9.3	172.0	1,103.6	50.8	674.5	386.1	10.4	192.7	1,314.4
Total Indonesia	-	73.0	36,433.6	4,156.6	19,732.7	53,152.4	113,548.3	386.7	64,070.8	3,159.0	27,413.4	80,867.8	175,897.1	14,754.9	196,028.9	2,667.1	30,714.9	221,972.4	466,138.1

the target years is estimated using the ratio of domestic cargo volume at non-commercial port(including domestic cargo volume at special ports) to domestic cargo volume at IPC ports.

Next, the estimated cargo handling volume at non-commercial ports is distributed to each province using the share of estimated population in each province in those IPC area in the target years.

Table 3.6.2.25 shows the result of the estimation of cargo handling volume at non-commercial public ports in the target years.

(3) Passenger

1) Methodology

The number of passenger at commercial ports for international travel and domestic travel are estimated by two methods. One estimates the passenger volume by each area and the other that of Indonesia as a whole.

The passenger volume forecast at commercial ports in the each area is basically conducted in the same manner as the cargo volume forecast of domestic trade at commercial ports, namely the number of passengers in each area is estimated using correlation with GRDP, time trend or average of the past data.

The number of passenger for domestic travel in all Indonesia for sea transportation is estimated using the correlation between the past passenger volume records at commercial ports in all Indonesia and GDP over the same period.

According to the information from DGSC, almost all passenger at non-commercial ports are domestic travel passengers. Therefore, the all passengers at non-commercial ports are assumed to be domestic travel passengers in this study.

The number of passenger at non-commercial ports for domestic travel is estimated using correlation between the number of passenger at non-commercial ports and population.

The procedures to forecast passenger volume for sea transportation by international travel and domestic travel are shown in Figure 3.6.2.3.

Table 3.6.2.25 Non-commercial Public Ports
Alternative-3, Scenario-1

Million ton

Province	2003	2008	2018
Bengkulu	1.1	1.7	5.0
Aceh	3.8	6.0	17.4
Jambi	1.6	2.6	7.5
Lampung	4.4	6.9	20.0
North Sumatra	7.9	12.5	36.1
Reau	6.8	10.7	30.7
South Sumatra	8.2	13.0	37.5
West Sumara	2.6	4.2	12.0
Sumatra Total	36.5	57.7	166.3
Bali	0.1	0.1	0.2
Central Jawa	0.4	0.5	1.1
DKI Jakarta	13.5	17.9	38.7
East Jawa	0.6	0.8	1.7
West Jawa	14.0	18.6	40.2
Jawa Total	28.5	37.9	81.9
Central Kalimantan	0.1	0.2	0.5
East Kalimantan	5.7	8.7	8.7
South Kalimantan	0.2	0.3	0.8
West Kalimantan	4.2	6.5	18.3
Kalimantan Total	10.1	15.7	28.3
Central Sulawesi	0.3	0.5	0.5
North Sulawesi	0.5	0.9	0.9
South Sulawesi	1.4	2.3	2.3
South East Sulawesi	0.2	0.4	0.4
Sulawesi Total	2.5	4.1	4.1
East Timur	0.0	0.0	0.0
Irian Jaya	0.7	1.0	1.0
Maluku	0.3	0.4	0.4
West Nusa Tenggara	0.0	0.0	0.1
East Nusa Tenggara	0.0	0.0	0.1
Total East Indonesia	1.0	1.5	1.6
Total Indonesia	78.7	116.8	282.2

Figure 3.6.2.3 Procedure of Forecast for Number of Passenger

