5.3.1.6 Procedure to Formulate International Container Port System

(1) General

For the purpose of formulating international container port system, the Study Team proposed to classify the container cargo handling ports in Indonesia into three categories : International Container Hub Port, Major Container Port and Feeder Container Port. The calling service routes and frequency for each classification are summarized in Table 5.3.1.7.

Table 5.3.1.7 Calling Service Routes and Frequency for Each Port Classification

Classification	Service Route				
	Europe/Asia	Transpacific	North/South	Intra-Asia	Feeder
International Hub Port	○	○	○	○	○*
Major Port		△	○	○	○*
Feeder Port					○**

Note : ○ More than twice a week call

△ Less than twice a week call

* Mother port of feeder service

** Receiving feeder service from Singapore or port in Indonesia

The Study Team also suggested that International Hub Port could be characterized as "Mother Port Type" and "Transshipment Port Type" according to share of transshipment container handled in the port. It is proposed that the share in "Mother Port Type" is less than 40% and that of "Transshipment Port Type" is more than 40%.

The possibility of direct call by international container service to a port in Indonesia is examined and required volume of container in International Hub port and Major port is estimated in Section 5.3.1.4. The location of International Hub Port is critical in this system and the criteria for selection is shown in Section 5.3.1.5.

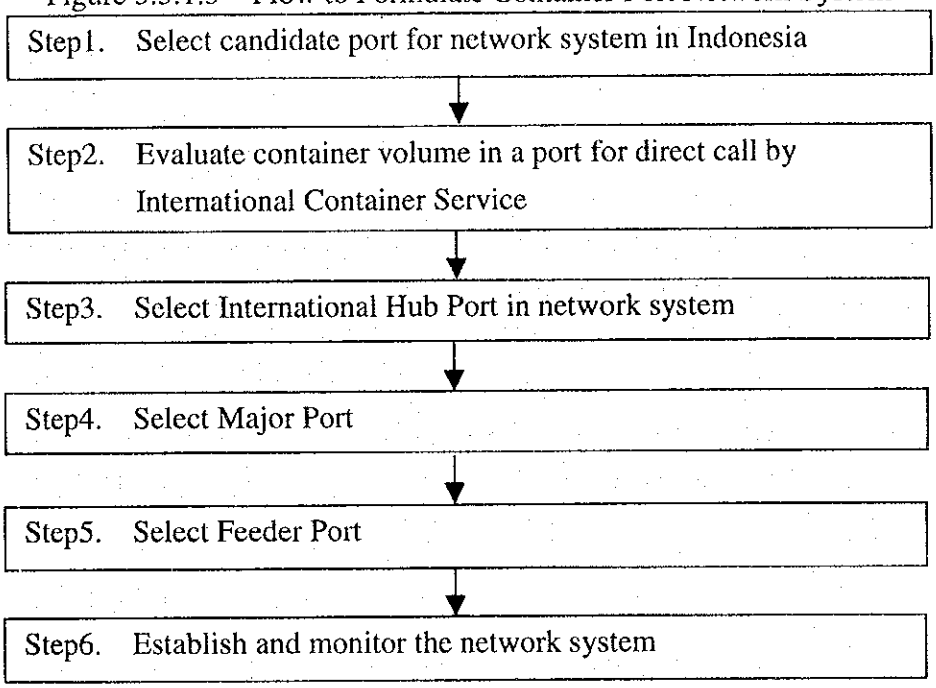
In this section, we introduce a procedure to formulate the container port network system in Indonesia and propose a conceptual network system.

(2) Procedure to Formulate Container Port Network System

1) Flow to Formulate Container Port Network System

In order to formulate the container port network system in Indonesia, the Study Team proposes the following flow. "Selection of International Hub Port" is the most important to formulate this system, because International Hub Port is substantial in the system and it takes a long time to establish such function and requires large investment.

Figure 5.3.1.3 Flow to Formulate Container Port Network System



2) Selection of Candidate Container Port in Indonesia

The candidate ports are to be selected considering geographical condition, cargo condition, port development condition, port service condition and national and regional policy.

At least one port in one province should be selected as a candidate port to represent the present condition of each province (See Table 5.3.1.8)

3) Evaluation of Container Volume in a Port for International Direct Call

In conformity with the examination shown in Section 5.3.1.4, we propose the required container volume of each classification in international container port network system.

The required container volume for port classification is summarized in Table 5.3.1.9 and Table 5.3.1.10.

Table 5.3.1.8 Factors to Select Candidates for Container Cargo Handling Port

Items	Factors	Representative Data
1. Geographical Condition	• Location in relation to International Trunk Container Route, Intra-Asia Trunk Container Route and International Sea-Lane • For International Hub Port, location in relation to distributing and collecting cargoes to/from feeder area and competitive International Hub Ports. • Promoting Regional Development	• Distance from service route • Distance from feeder area and competitive ports • Potential of hinterland
2. Cargo Condition	• Volume of O/D container cargo at present and forecasted in future • Container cargo flow in hinterland and neighboring area • For International Hub Port, volume of transshipment container cargo in neighboring area	• Volume of O/D container cargo • GRDP, population in hinterland • Volume and OD of transship container in the area
3 Port Development Condition	• Existing and possibility for developing port facilities and areas which are suitable for receiving International Trunk or Inter-Asia Long Distance Container Service vessels • Safety of the calling vessels in the port	• Length and depth of access channel • Area of the cargo handling yard • Future development area for terminal • Navigational aid facilities and equipment
4. Port Service Condition	• Level of service in port for container cargo handling	• Productivity of container handling • Data information system • Documentation • Service standard
5. National and Regional Development Policy	• National policy for regional development and transportation network system • Local government development policy	• Land use plan • Industrial Development plan • Road network plan • Environmental Conservation

Table 5.3.1.9 Required Container Volume for International Hub Port

(Unit TEU/Year)

Classification	Location	Kind of Container	Europe/East-Asia Service
Mother Port Type	Northern part of Jawa Island	O/D Container	3,000,000
Transshipment Port Type*	Facing Malacca Strait	O/D Container	1,400,000
		Transshipment	2,100,000
		Total	3,500,000
	Others	O/D Container	1,680,000
		Transshipment	2,520,000
		Total	4,200,000

Note : * Share of transshipment container is assumed to be 60%

Table 5.3.1.10 Required O/D Container Volume for Major and Feeder Container Port

(Unit TEU/Year)

Classification	Location	Transpacific Service	Intra-Asia and North-South
Major Container Port	Northern part of Jawa and the area facing Makassar Strait	1,500,000	450,000
	Eastern part of Sumatra	1,500,000	300,000
Feeder Container Port	All Indonesia	-	100,000

The volume of transshipment container in International Hub Port should be estimated considering competition with neighboring hub ports, market price and least operation cost.

The distance between international hub ports at present, in general, is more than 1,000miles as described in Section 3.5.4. This distance is especially important in selecting new "Transshipment Port Type" port. That is because 500mile distance is very reasonable for feeder service operator in terms of cost and service frequency.

The figures in Table 5.3.1.9 and 5.3.1.10 may serve as a useful guideline, however candidate ports are not selected solely on the basis of these figures. National and regional transportation plan supporting nationwide development should be also considered.

4) Selection International Hub Port in Network System

Today, Singapore is one of the largest International Hub Ports in the world and has the function as main "Transshipment Port Type" Hub Port of container transportation system in Indonesia. It is inevitable that Singapore will be one of the largest International Hub Ports in this network system in future and therefore the function of Singapore port should be defined clearly to formulate the network system.

"Mother Port Type" and "Transshipment Port Type" International Hub Ports have different characters. For reducing total shipping cost, it is more effective to develop "Mother Port Type" based on volume of O/D container. On the other hand, for promoting regional development, rectifying regional disparity and improving the economic relations among neighboring countries, the development of "Transshipment Port Type" is more effective. These different factors should be weighed in deciding the location of International Hub Port in Indonesia.

The criteria to select an international hub port are shown in Section 5.3.1.5.

5) Selection of Major Port and Feeder Port

Basically, Major Container Ports will be selected by evaluating the volume of O/D container in the port referring to the required volume given in Table 5.3.1.10, but national and regional development policy should be also considered.

The service pattern of Intra-Asia Long Distance Route is, in general, round trip type at present and it is anticipated that similar pattern will continue in future. If a port situated near these service routes, the port has a higher possibility to be called by these services.

Feeder Container Port will be selected by referring to required volume given in Table 5.3.1.10. The volume is estimated from the viewpoint of the financial condition of a terminal.

6) Establishment International Container Port Network

In accordance with the result of foregoing examination, a master plan for international container port network will be established and the master plan of designated ports should be revised to satisfy the required condition of each port classification.

During implementation, the plan should be reviewed periodically and, if necessary, revised based on related data for container transportation, international trend and application of new technology.

5.3.1.7 Conceptual Scenario for International Container Port Network System

The Study Team proposes a conceptual scenario for international container port network system in accordance with the before-mentioned procedure and the result of demand forecast (Case 3 Scenario 2 (See Section 3.6)).

1) Candidate of Container Port in Indonesia

One candidate port in one province is tentatively selected based on present port activities and the existing port facilities. Singapore port is added to one of the candidate ports considering the function of the port in present condition of container transportation. The several factors to select the candidate port given in Table 5.3.1.8 are summarized in Table 5.3.1.11. It may be understood that the distance from Singapore in this Table indicates the distance from the International Trunk Sea-lane.

2) Evaluate Container Volume in a Port

(a) Middle Term

Based on the forecasted container volume in 2008, no port has a container volume large enough to quality as an International Hub Port. The container volume in Tg.Priok is sufficient for receiving Intra-Asia Long Distance Service and will be sufficient for Transpacific service in the near future, while the container volumes in Belawan, Tg.Emas and Tg.Perak are sufficient for receiving Intra-Asia Long Distance service.

(b) Long Term

Based on the forecasted volume in 2018, the container volume in Tg.Priok satisfies the required volume for "Mother Port type" International Hub Port and the volume in Tg.Perak almost satisfies that of "Transshipment Port Type" International Hub Port.

The container volume in Aceh, Reau, South Sumatra, East Kalimantan and Irian Jaya Province, in addition to Belawan, Tg.Priok, Tg.Emas and Tg.Perak, satisfy the required volume for receiving Intra-Asia Long Distance service.

3) Selecting International Hub Port

(a) Middle Term

Based on the forecasted container volume in 2008, it is anticipated that Singapore is the main International Hub Port for Indonesia. The feeder service between Singapore and many ports in Indonesia should be well organized to strengthen port network system by improving

level of service in port and door-to-door delivery service in hinterland.

(b) Long Term

The International Hub Port and Major Container Port are selected from two points of view. One is based on volume of O/D container (result of demand forecast) and the other is considering national and regional development policies.

In this Study, from the former point of view, rough transport cost estimation method, which calculates total transportation cost of container in Indonesia, is applied to evaluate the feasibility of International Hub Port development.

From the latter point of view, the national policy in PJP II "Great emphasis is placed on the need for more equitable development" and in REPELITA VI "To accelerate the development of Eastern part and less-developed regions in Indonesia" are regarded as a guidelines selecting an International Hub Port.

Based on the result of demand forecast, Tg.Priok/Bojonegara area and Tg.Perak/Gresik area have potential to become "Mother Port Type" and "Transshipment Port Type" International Hub Ports, respectively. And considering the national development policies, Batam port and a port in eastern part of Indonesia are selected (Bitung port is tentatively selected) as a "Transshipment Port Type" candidate ports.

(c) Result of Rough Transport Cost Estimation

The Study Team evaluates above-mentioned alternatives for long term International Hub Port development, using rough transport cost estimation method. (See Appendix 5.3.2)

The result of the estimation showed that Tg.Priok/Bojonegara and Tg.Perak/Gresik development combined with Singapore would reduce about 39% of feeder cost in Indonesia compared to all Singapore feeder case and about 14% of Transpacific Service cost. The volume of loaded container in Tg.Perak/Gresik will be 5,600,000TEU, which satisfies the required volume for "Transshipment Port Type" development. Supplementary development of Bitung port will reduce about 2% and 1%, respectively. On the other hand, Tg.Priok/ Bojonegara and Bitung development would reduce about 27% and 11%, respectively and the volume of loaded container in Bitung will be 1,160,000TEU.

And Batam and Bitung development as international transshipment hub port would reduce about 16% of feeder cost and 6% of Transpacific cost and the volume of loaded container in Bitung will be 1,400,000TEU. (See Table 5.3.1.12)

(d) Selection of International Hub Port

a) Batam port : The Study Team evaluated Batam port development scenario and concluded that the port should be developed in cooperation with Singapore and based on increase in

the volume of O/D container. (See Appendix 5.3.4)

b) Tg.Priok/Bojonegara : The port is very effective in reducing total shipping cost and the volume of O/D container is sufficient to support activity of "Mother Port Type" port, which is more reasonable to realize International Trunk Service Calling than "Transshipment Type" port.

c) Tg.Perak/Gresik : The container volume in the port satisfies the required volume for sustaining development of "Transshipment Port Type" port and the total shipping cost is reduced properly. But the distance between Tg.Priok/ Bojonegara and Tg.Perak/Gresik is only 389miles and therefore it is anticipated that Tg.Perak is not competitive with Tg.Priok as a "Transshipment Type" port.

d) Bitung port : The container volume in the port does not satisfy the required volume for "Transshipment Port Type" port and the total shipping cost can not be reduced effectively. But the distance between Tg.Priok/ Bojonegara and Bitung is 1,575miles and therefore it is necessary to develop one port in this area in the proper time when the sufficient cargo volume is generated from the area.

We evaluated two development scenarios of either Tg.Perak/Gresik port and Bitung port which is tentatively selected as a representing port in eastern Indonesia (See Appendix 5.3.5) and concluded that ;

- The container volume in these ports is insufficient for International Hub Port development in the middle term,
- Port facilities should be developed based on O/D container volume in the middle term accordingly,
- After container transportation in the eastern part of Indonesia matures to sustain the Hub Port development, the location of the port should be decided.

4) Selection of Major Container Port

(a) Middle Term

Based on O/D container volume, Belawan, Tg.Priok Tg.Emas and Tg.Perak satisfy the required volume for receiving Intra-Asia Long Distance service.

Makassar Strait becomes an International sea-lane and several Intra-Asia Long Distance Service vessels are using this sea-lane. A port facing this Strait, therefore, has great a possibility to be called by the Service. Population in South Sulawesi Province is almost 7.7 million and GRDP in East Kalimantan is 10,915 Billion Rp. in 1996. These figures are the largest in eastern Indonesia. Major Container Port should be developed in these two Provinces to promote economic activity in eastern Indonesia.

(b) Long Term

The container volume in Aceh, North Sumatra, Reau, South Sumatra, Central Jawa, East Jawa, East Kalimantan and Irian Jaya Province satisfy the required volume for receiving Intra-Asia Long Distance service. The northern part of Aceh Province is hinterland of Belawan at present and will continue to be in future. Irian Jaya stretches across a very wide area and it is considered that land transport will not be well organized until the target year. Sufficient Container volume will not, therefore, concentrate in any one area. A Major Container Ports should be developed in the central and southern parts of Sumatra, respectively.

5) Conceptual Scenario for International Container Port Network

(a) Basic Concept

According to the result of the foregoing examination, the following matters will be considered in formulating international container port network.

a) Tg.Priok/Bojonegara will be an International Hub Port in Indonesia.
b) Singapore, which is the main hub port of all Indonesia at present, will be an International Hub Port for eastern part of Sumatra and western part of Kalimantan in future.
c) Batam port will be developed in good cooperation with Singapore.
d) In the long term, one supplemental International Hub Port should be developed to support the economic activities in the eastern part of Indonesia, because this area is far away from the existing International Hub Port. (The distance between Tg.Priok and Jayapura and between Tg.Priok and Merauke is 2,193miles 2,130miles, respectively).

(b) Middle Term

Singapore is the main International Hub Port in the network and Batam port development, if possible, could start in cooperation with Singapore.

Tg.Priok/Bojonegara will be developed as a Major Container Port called by Transpacific Service vessel and in addition to Belawan Tg.Emas and Tg.Perak, a Major container Port should be developed in East Kalimantan and South Sulawesi, respectively.

Six locations are selected as Feeder Container Port development considering container volume in certain areas and the need to support the eastern part of Indonesia.

The conceptual scenario for international container port network in the middle term is shown Table 5.3.1.13 and Figure 5.3.1.5.

(c) Long Term

The Study Team proposed two scenarios for development of International Hub Port considering the total shipping cost and future prosperity of the eastern part of Indonesia. The former is based on O/D container volume (demand-based) to minimize total container transportation cost and the latter is based on the national development policy (supply-oriented) to promote nationwide prosperity in Indonesia.

- Scenario1

  The International Hub ports are (Singapore) +Tg.Priok/Bojonegara and Tg.Perak/Gresik

- Scenario2

  The International Hub ports are (Singapore) +Tg.Priok/Bojonegara and a port in the eastern part of Indonesia

These conceptual scenarios for international container port network in the long term are shown in Table 5.3.1.14 and Figure 5.3.1.6 and 5.3.1.7.

After container volume in the eastern part of Indonesia sufficiently increases to justify International Hub Port development, the location of the port should be selected based on concept of promoting the competitiveness of international trade and sea transport.

Table 5.3.1.11 Characteristics of Candidate Ports for Container Port Network

No	Name of Province	Name of Port	Distance between Ports (Miles)				Container Volume (1,000Ton)			Population	GRDP*
			Singapore	Tg.Priok	Tg.Perak	Bitung	1995	2008	2018	(1,000person)	(Billion Rp.)
0	Singapore	Singapore	0	532	763	1,846					
1	Aceh	Lhok Seumawe	486	1,098	1,252	2,120	0	1,557	3,453	3,945	6,213
2	North Sumatra	Belawan	373	863	1,017	2,020	1,771	3,218	7,136	11,306	23,273
3	West Sumatra	Teluk Bayur	1,025	573	940	2,044	13	1,032	2,289	4,390	7,606
4	Reau	Dumai	162	667	821	1,888	4	2,688	5,961	4,057	7,853
5	Jambi	Jambi	241	501	754	1,713	54	426	945	2,458	3,046
6	South Sumatra	Palembang	295	345	480	1,700	104	1,841	4,083	7,413	11,611
7	Bengkulu	Bengkuku	820	374	750	1,839	0	234	519	1,464	1,726
8	Lampung	Panjang	630	120	496	1,340	426	938	2,080	6,806	6,912
9	DKI.Jakarta	Tg.Priok	532	0	389	1,575	13,808	11,537	33,300	49,458	130,918
10	West Jawa										
11	Central Jawa	Tg.Emas	675	235	183	1,188	946	4,043	11,673	32,795	44,969
12	D.I.Yogyakarta										
13	East Jawa	Tg.Perak	763	389	0	1,193	5,677	5,331	15,389	34,124	61,752
14	Bali	Benoa	1,083	611	275	966	0	616	1,778	2,924	7,141
15	West Kalimantan	Pontianak	355	428	560	1,390	266	890	2,449	3,732	6,712
16	Central Kalimantan	Sampit	734	480	293	1,005	40	535	1,473	1,685	4,036
17	South Kalimantan	Banjarmasin	895	515	268	900	670	782	2,154	2,960	5,897
18	East Kalimantan	Balikpapan	1,025	777	442	603	37	2,753	7,578	3,289	10,916
19	North Sulawesi	Bitung	1,846	1,575	1,193	0	163	243	766	2,686	3,574
20	Central Sulawesi	Pantoloan	1,200	921	613	475	0	150	474	1,997	2,212
21	South Sulawesi	Makassar	1,065	795	458	731	948	644	2,028	7,693	9,465
22	Southeast Sulawesi	Kendari	1,561	1,128	772	365	0	106	334	1,643	1,561
23	West Nusa Tenggara	Lember	1,230	760	420	850	0	893	2,404	3,707	3,196
24	East Nusa Tenggara	Kupang	1,442	1,084	697	720	0	749	2,016	3,640	2,679
25	East Timor	Dilli	1,824	1,145	787	609	0	192	517	859	687
26	Maluku	Ambon	1,615	1,339	986	366	18	830	2,234	2,141	2,955
27	Irian Jaya	Sorong	1,915	1,619	1,306	485	0.7	1,954	5,256	2,020	6,748

Note : * GRDP without oil and gas

Table 5.3.1.12 Rough Transportation Cost Estimation by Location of International Hub Port in 2018

	Name of Hub Port	Volume of Loaded O/D Cargo at the Port (1,000TEU/year)	Volume of Loaded Container Including Transshipment (1,000TEU/year)	Index of Total Cost for Feeder Service from/to Nearest Hub Port	Index of Total Cost for Transpacific Service	Profit with Transshipment in Each Hub Port (Million US$)
Case 1	Singapore		11,830	100.0	100.0	1,972
Case 2-1	Singapore Bojonegara/Tg.Priok	3,330	2,403 9,427	70.8 (-29.2)	90.9 (-9.1)	425 730
Case 2-2-1	Singapore Bojonegara/Tg.Priok Tg.Perak/Gresik	3,330 1,539	2,403 3,819 5,607	61.1 (-38.9)	86.4 (-13.6)	425 56 535
Case 2-2-2	Singapore Bojonegara/Tg.Priok Bitung	3,330 77	2,403 8,267 1,160	66.9 (-33.1)	89.1 (-10.9)	425 410 310
Case 2-3	Singapore Bojonegara/Tg.Priok Tg.Perak/Gresik Bitung	3,330 1,539 77	2,403 3,819 4,649 958	58.9 (-41.1)	85.7 (-14.3)	425 56 391 134
Case 4	Batam Bitung	No Forecast Figure 77	10,430 1,400	84.7 (-15.6)	94.5 (-5.5)	908 397

Note : Index 100 The Figure Indicate Case1 (All Singapore feeder)

Table 5.3.1.13 Container Cargo Handling Network in Middle Term

Conceptual Scenario 1	
Classification	Proposed Location
International Hub Port	(Transshipment Type) Singapore/Batam
Major Container Port	North Sumatra (Belawan) West Jawa (Tg.Priok/Bojonegara) Central Jawa (Tg.Emas) East Jawa (Tg.Perak/Gresik) East Kalimantan (Balikpapan) South Sulawesi (Makassar)
Feeder Container Port	One port located in central Sumatra Area One port located in southern Sumatra Area Lampung (Panjang) One port located in West Kalimantan North Sulawesi (Bitung) NT/TIMTOR (Kupang) One port located in Maluku/Irian Jaya

Table 5.3.1.14 Conceptual Container Cargo Handling Network in Long Term

Conceptual Scenario 1	
Classification	Proposed Location
International Hub Port	(Mother Port Type) Tg.Priok/Bojonegara (Transshipment Type) Tg.Perak/Gresik (Singapore/Batam)
Major Container Port	North Sumatra (Belawan) One port located in central Sumatra Area One port located in southern Sumatra Area Central Jawa (Tg.Emas) East Kalimantan (Balikpapan) South Sulawesi (Makassar)
Feeder Container Port	One port located in Ache (Sabang) Lampung (Panjang) One port located in West Kalimantan North Sulawesi (Bitung) NT/TIMTOR(Kupang) One port located in Maluku/Irian Jaya
Conceptual Scenario 2	
Classification	Proposed Location
International Hub Port	(Mother Port Type) Tg.Priok/Bojonegara (Transshipment Type) One Port in eastern part of Indonesia (Singapore/Batam)
Major Container Port	North Sumatra (Belawan) One port located in central Sumatra Area One port located in southern Sumatra Area Central Jawa (Tg.Emas) East Jawa (Tg.Perak/Gresik*) East Kalimantan (Balikpapan*) South Sulawesi (Makassar*)
Feeder Container Port	One port located in Ache Lampung (Panjang) One port located in West Kalimantan North Sulawesi (Bitung*) NT/TIMTOR(Kupang) One port located in Maluku/Irian Jaya

Note : * the port could be International Hub Port in eastern part of Indonesia

Figure 5.3.1.4 Container Port Network in Indonesia (at Present)

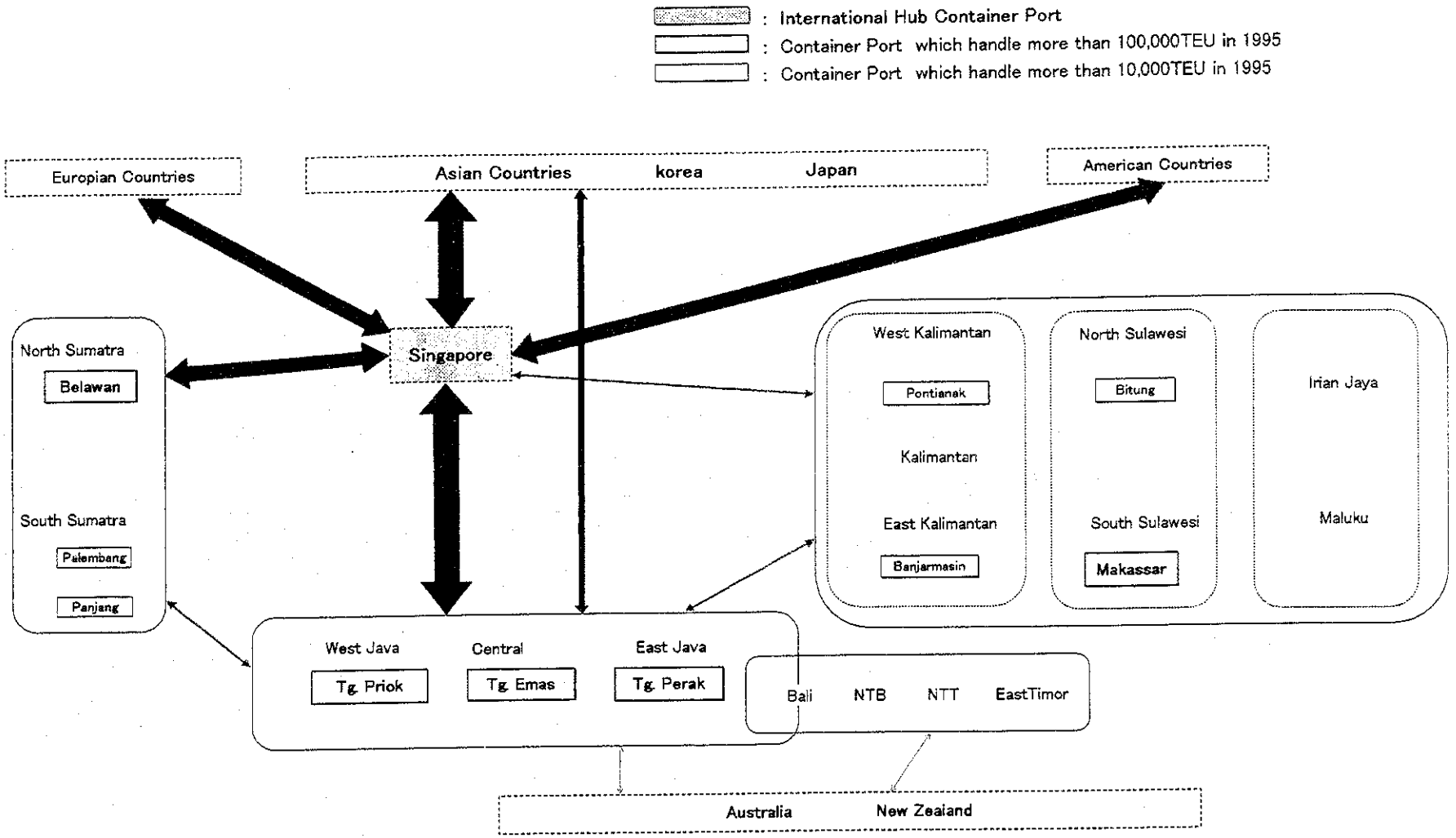


Figure 5.3.1.5 Container Port Network in Indonesia (Middle Term)

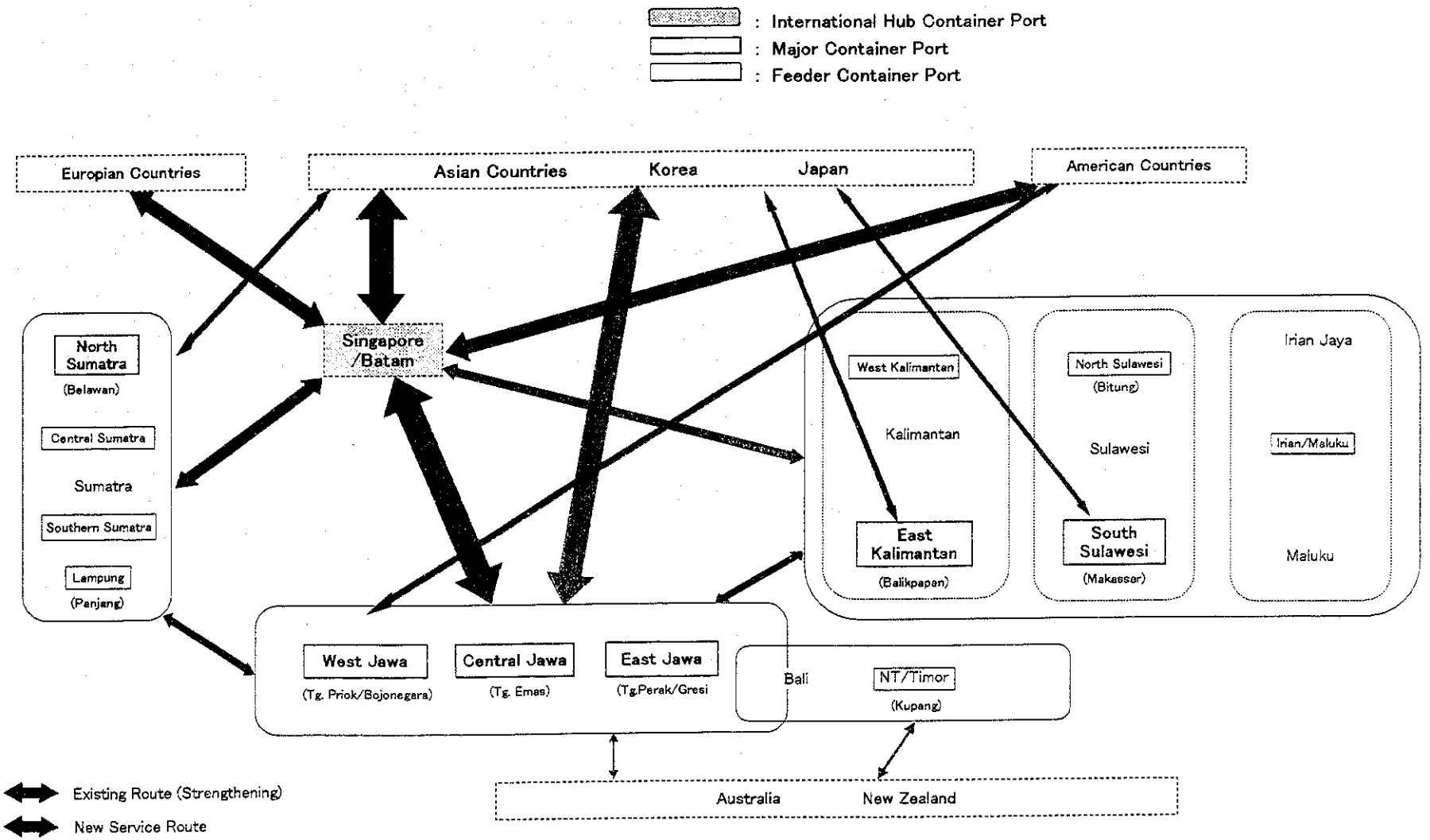


Figure 5.3.1.6 Container Port Network in Indonesia (Long Term, Scenario 1)

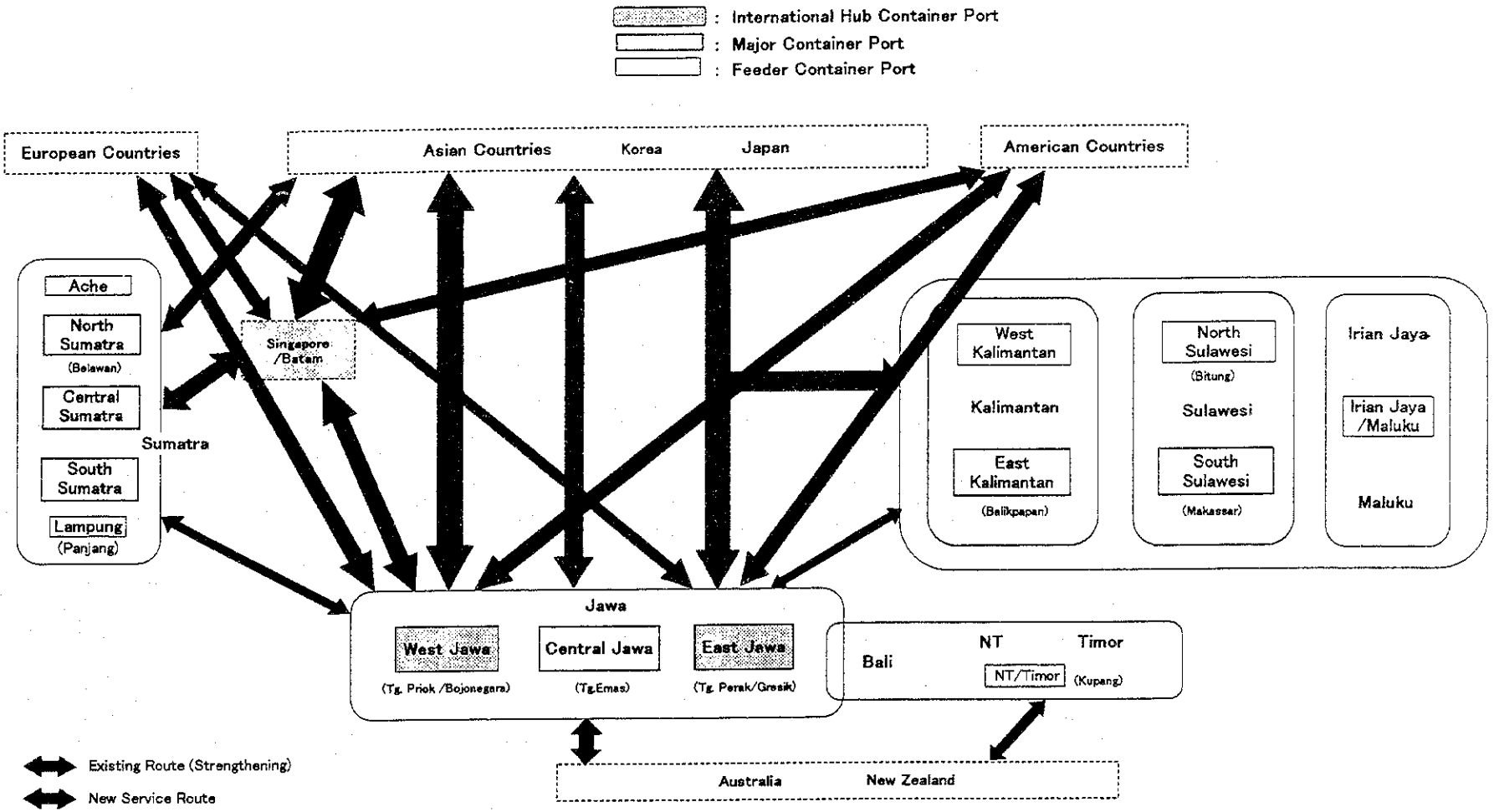
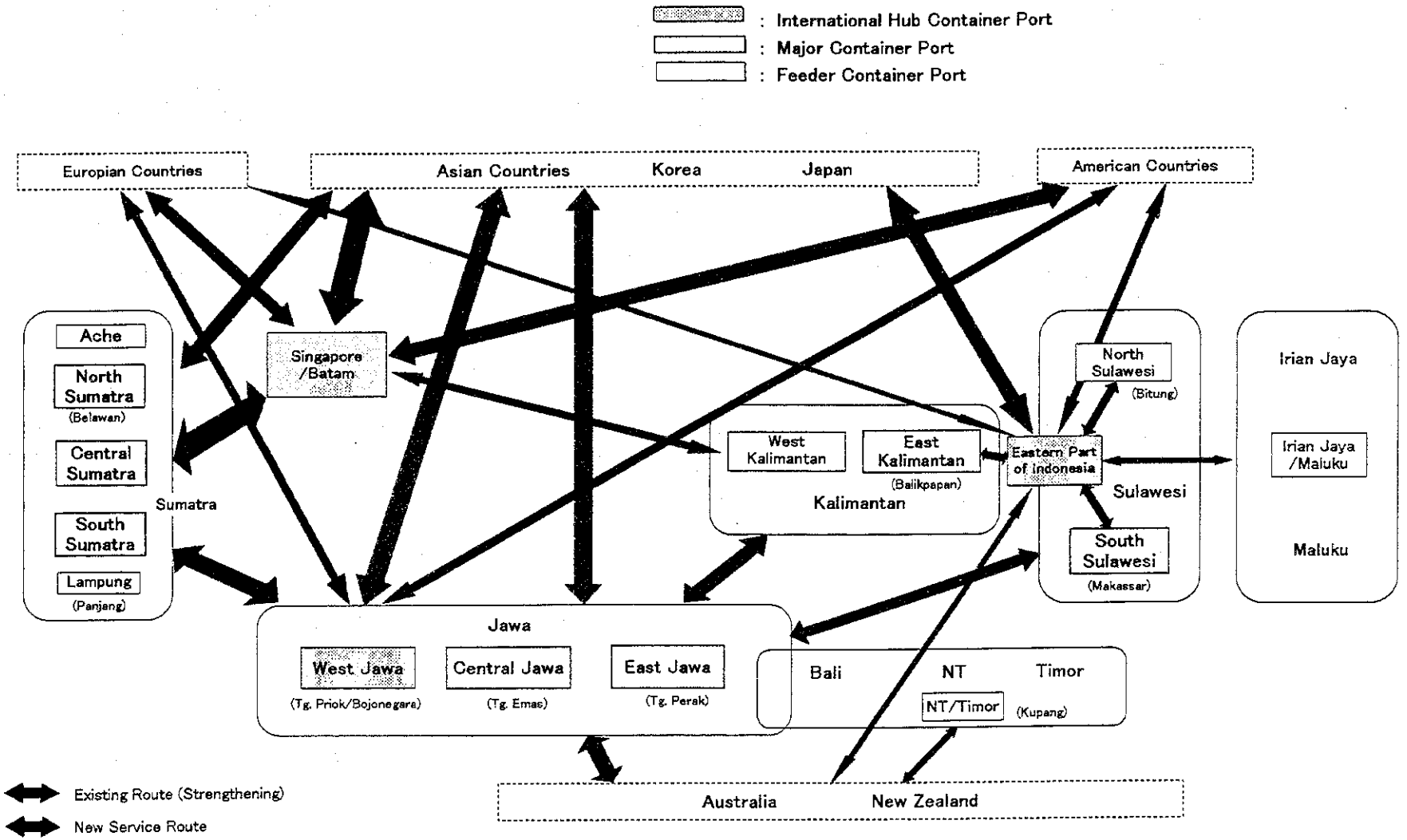


Figure 5.3.1.7 Container Port Network in Indonesia (Long Term, Scenario 2)

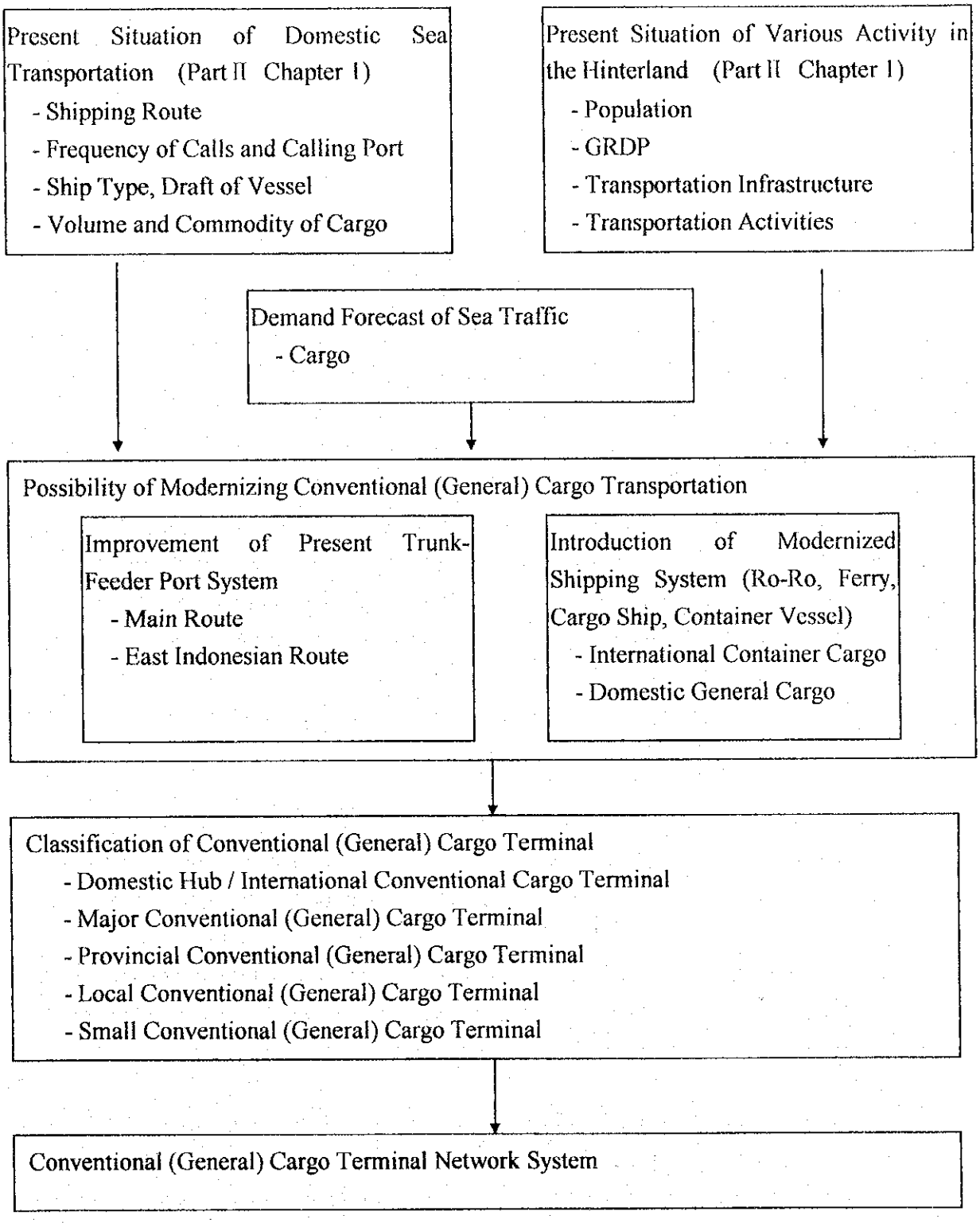


5.3.2 Policy for Conventional (General) Cargo Terminal

5.3.2.1 Outline

In this section, a main concept for formulating the conventional (general) cargo terminal network system is proposed. The procedure is comprised of "Possibility of Modernizing Conventional (General) Cargo Transportation", "Classification of Conventional (General) Cargo Terminal" and "Conventional (General) Cargo Terminal Network System". In particular, "Possibility of Modernizing Conventional Cargo Transportation" is vital in formulating this network system. (See Figure 5.3.2.1)

Figure 5.3.2.1 Procedure for Establishing Conventional (General) Cargo Terminal Network System



5.3.2.2 Possibility of Modernizing Conventional (General) Cargo Transportation

(1) Present conventional (general) cargo transportation

1) OD distribution of cargo traffic

(a) Regional distribution of cargo volume

Here, we pay attention to the OD data on cargo transportation excluding oil, gas and coal, since those cargoes can be transported by specialized vessels. It is thought that the above data shall represent the transportation of conventional (general) cargoes which is the main concern in this chapter.

Based on the OD data (in 1994, excluding oil, gas and coal), major domestic cargo moves around Java Island. Approximately 30.5 % of the total outbound cargoes originates from Java and 27.0 % of the total inbound cargoes enters to Java. (See Table 5.3.2.1, 5.3.2.2 and Figure 5.3.2.2～5.3.2.6)

In particular, the major cargo traffic, which exceeds 500,000 tons/year, is transported from/to Java to/from Sumatra, the East and West Kalimantan. Even in OD distribution, where volume exceeds 200,000 tons/year, cargoes are dominantly transported within Java, Sumatra and Kalimantan. The main commodities from Kalimantan to Java are woods and foods. On the other hand, the main commodities from Java to Kalimantan are general cargoes and foods.

The traffic volume from Java to Eastern Indonesia is 190,000 tons/year while traffic in the opposite direction is 130,000 tons/year.

(b) Regional distribution of commodity

Here, we analyze the OD data on cargo transportation including energy materials in order to review comprehensive character of distribution of commodity. (See Table 5.3.2.3, 5.3.2.4)

In Indonesia, the major commodities of outgoing and incoming total cargoes are oil, gas and other energy materials (52%), general cargoes (12%), woods (10%), food/agricultural products (10%), machinery products (4%) and chemical products (4%).

Regional shares of the above major outgoing commodities are shown in Table 5.3.2.5.

For energy materials, Sumatra and East Kalimantan are the dominant regions for outgoing cargo. For woods and wood products, the West and East Kalimantan are the major region. For foods and agricultural products, the North Sumatra and the East and West Java are major regions. The level of industrial development in each region is a large factor to reflect the regional shares of the commodities.

Source : Prepared by OCDI based on the OD survey made by DGSC

Table 5.3.2.1 Regional Distribution of Outgoing Cargo Traffic Excluding Energy Materials by Region (Based on 1994 OD data)

Unit : 10,000 ton

Origin Destination	North Sumatra	South Sumatra	West Java	East Java	West Kalimantan	East Kalimantan	Sulawesi	Bali Nusa Tengarra	Maruku	Irianjaya	Total	
North Sumatra	1718.32	352.41	451.1	89.14	25.83	48.05	24.73	18.55	5.01	8.04	2,741.2	24.7%
	62.7%	12.9%	16.5%	3.3%	0.9%	1.8%	0.9%	0.7%	0.2%	0.3%	100.0%	
South Sumatra	349.27	322.41	426.76	267.45	25.93	10.55	1.66	30.2	8.26	4.95	1,447.4	13.0%
	24.1%	22.3%	29.5%	18.5%	1.8%	0.7%	0.1%	2.1%	0.6%	0.3%	100.0%	
West Java	367.15	402.04	147.2	107.98	502.73	92.51	24.17	24.06	1.33	10.18	1,679.4	15.1%
	21.9%	23.9%	8.8%	6.4%	29.9%	5.5%	1.4%	1.4%	0.1%	0.6%	100.0%	
East Java	112.05	119.4	104.43	90.84	360.24	704.02	95.19	68.11	13.83	38.87	1,707.0	15.4%
	6.6%	7.0%	6.1%	5.3%	21.1%	41.2%	5.6%	4.0%	0.8%	2.3%	100.0%	
West Kalimantan	43.47	119.66	539.42	247.61	192.02	108.21	7.21	7.34	4.89	3.06	1,272.9	11.5%
	3.4%	9.4%	42.4%	19.5%	15.1%	8.5%	0.6%	0.6%	0.4%	0.2%	100.0%	
East Kalimantan	32.75	64.15	61.18	306.43	77.38	373.16	67.56	23.65	10.17	13.68	1,030.1	9.3%
	3.2%	6.2%	5.9%	29.7%	7.5%	36.2%	6.6%	2.3%	1.0%	1.3%	100.0%	
Sulawesi	13.44	19.51	8.31	56.04	23.54	210.98	215.95	40.83	122.73	20.88	732.2	6.6%
	1.8%	2.7%	1.1%	7.7%	3.2%	28.8%	29.5%	5.6%	16.8%	2.9%	100.0%	
Bali Nusa Tengarra	4.84	5.11	2.01	72.68	0.25	9.29	32.2	19.49	2.05	3.77	151.7	1.4%
	3.2%	3.4%	1.3%	47.9%	0.2%	6.1%	21.2%	12.8%	1.4%	2.5%	100.0%	
Maruku	19.09	0.87	1.2	5.2	2.56	15.64	14.79	4.98	121.32	48.92	234.6	2.1%
	8.1%	0.4%	0.5%	2.2%	1.1%	6.7%	6.3%	2.1%	51.7%	20.9%	100.0%	
Irianjaya	7.5	0.5	3.4	9.77	4.39	4.77	8.46	7.69	13.5	46.62	106.6	1.0%
	7.0%	0.5%	3.2%	9.2%	4.1%	4.5%	7.9%	7.2%	12.7%	43.7%	100.0%	
Total	2,667.9	1,406.1	1,745.0	1,253.1	1,214.9	1,577.2	491.9	244.9	303.1	199.0	11,103.0	100.0%
	24.0%	12.7%	15.7%	11.3%	10.9%	14.2%	4.4%	2.2%	2.7%	1.8%	100.0%	

Table 5.3.2.2 Regional Distribution of Incoming Cargo Traffic Excluding Energy Materials by Region (Based on 1994 OD data)

Unit : 10,000 ton

	North Sumatra		South Sumatra		West Java		East Java		West Kalimantan		East Kalimantan		Sulawesi		Bali Nusa Tengarra		Maruku		Irianjaya		Total	
North Sumatra	1,718.32	64.4%	352.41	25.1%	451.10	25.9%	89.14	7.1%	25.83	2.1%	48.05	3.0%	24.73	5.0%	18.55	7.6%	5.01	1.7%	8.04	4.0%	2,741.18	24.7%
South Sumatra	349.27	13.1%	322.41	22.9%	426.76	24.5%	267.45	21.3%	25.93	2.1%	10.55	0.7%	1.66	0.3%	30.20	12.3%	8.26	2.7%	4.95	2.5%	1,447.44	13.0%
West Java	367.15	13.8%	402.04	28.6%	147.20	8.4%	107.98	8.6%	502.73	41.4%	92.51	5.9%	24.17	4.9%	24.06	9.8%	1.33	0.4%	10.18	5.1%	1,679.35	15.1%
East Java	112.05	4.2%	119.40	8.5%	104.43	6.0%	90.84	7.2%	360.24	29.7%	704.02	44.6%	95.19	19.4%	68.11	27.8%	13.83	4.6%	38.87	19.5%	1,706.98	15.4%
West Kalimantan	43.47	1.6%	119.66	8.5%	539.42	30.9%	247.61	19.8%	192.02	15.8%	108.21	6.9%	7.21	1.5%	7.34	3.0%	4.89	1.6%	3.06	1.5%	1,272.89	11.5%
East Kalimantan	32.75	1.2%	64.15	4.6%	61.18	3.5%	306.43	24.5%	77.38	6.4%	373.16	23.7%	67.56	13.7%	23.65	9.7%	10.17	3.4%	13.68	6.9%	1,030.11	9.3%
Sulawesi	13.44	0.5%	19.51	1.4%	8.31	0.5%	56.04	4.5%	23.54	1.9%	210.98	13.4%	215.95	43.9%	40.83	16.7%	122.73	40.5%	20.88	10.5%	732.21	6.6%
Bali Nusa	4.84	0.2%	5.11	0.4%	2.01	0.1%	72.68	5.8%	0.25	0.0%	9.29	0.6%	32.20	6.5%	19.49	8.0%	2.05	0.7%	3.77	1.9%	151.69	1.4%
Maruku	19.09	0.7%	0.87	0.1%	1.20	0.1%	5.20	0.4%	2.56	0.2%	15.64	1.0%	14.79	3.0%	4.98	2.0%	121.32	40.0%	48.92	24.6%	234.57	2.1%
Irianjaya	7.50	0.3%	0.50	0.0%	3.40	0.2%	9.77	0.8%	4.39	0.4%	4.77	0.3%	8.46	1.7%	7.69	3.1%	13.50	4.5%	46.62	23.4%	106.60	1.0%
Total	2,667.88	100.0%	1,406.06	100.0%	1,745.01	100.0%	1,253.14	100.0%	1,214.87	100.0%	1,577.18	100.0%	491.92	100.0%	244.90	100.0%	303.09	100.0%	198.97	100.0%	11,103.02	100.0%
	24.0%		12.7%		15.7%		11.3%		10.9%		14.2%		4.4%		2.2%		2.7%		1.8%		100.0%	

Table 5.3.2.3 Incoming Volume of All Domestic Shipping Cargo in 1994

Unit : 100 ton

Region	Live animals food beverages tabacco	Animal & vegitable Oil & Fats	Chemicals & Chemical Products	Rubber & Rubber Products	Wood Softwood & its Products	Pulp Paper & Paper board	Leather Tanned Hide & Leather Products	Textiles Clothing & Convection goods	Salt cement non metalic porcelain	Precious Metal Metal Precious Stone &	Metal & Metal Products	Machineries Electrical Tool & Transportati	Articles not elsewhere Classified	Energy Materials	General Cargo	Total
North Sumatra	58,270	16,342	17,151	14,183	38,782	1,460	18	1,360	10,809	1,376	7,970	44,791	5,900	226,856	48,373	493,641
	12%	3%	3%	3%	8%	0%	0%	0%	2%	0%	2%	9%	1%	46%	10%	100%
South Sumatra	32,962	3,754	15,930	1,105	32,182	269	0	238	13,177	267	2,550	2,688	8,895	124,182	26,590	264,789
	12%	1%	6%	0%	12%	0%	0%	0%	5%	0%	1%	1%	3%	47%	10%	100%
West Java	21,196	10,346	22,327	1,330	37,652	2,877	273	98	13,986	0	5,900	18,221	3,842	152,509	36,451	327,008
	6%	3%	7%	0%	12%	1%	0%	0%	4%	0%	2%	6%	1%	47%	11%	100%
East Java	18,066	13,455	11,585	314	36,710	130	60	62	4,914	2	1,307	1,545	3,031	262,743	34,130	388,054
	5%	3%	3%	0%	9%	0%	0%	0%	1%	0%	0%	0%	1%	68%	9%	100%
West Kalimantan	26,515	3,216	6,750	944	30,742	1,300	79	1,883	3,726	116	2,290	5,758	3,117	33,989	35,051	155,476
	17%	2%	4%	1%	20%	1%	0%	1%	2%	0%	1%	4%	2%	22%	23%	100%
East Kalimantan	26,827	3,030	10,865	145	32,176	26	35	197	9,248	2,348	3,929	6,183	3,572	115,752	59,132	273,465
	10%	1%	4%	0%	12%	0%	0%	0%	3%	1%	1%	2%	1%	42%	22%	100%
Sulawesi	11,171	3,692	3,525	27	5,654	304	160	141	6,766	890	938	982	1,419	92,128	13,534	141,331
	8%	3%	2%	0%	4%	0%	0%	0%	5%	1%	1%	1%	1%	65%	10%	100%
Tengarra	9,289	421	1,487	16	2,847	23	32	16	2,586	4	303	880	197	69,365	6,386	93,852
	10%	0%	2%	0%	3%	0%	0%	0%	3%	0%	0%	1%	0%	74%	7%	100%
Maruku	9,295	3,283	651	73	3,689	0	0	428	2,446	62	296	941	839	24,363	8,307	54,673
	17%	6%	1%	0%	7%	0%	0%	1%	4%	0%	1%	2%	2%	45%	15%	100%
Irianjaya	5,756	176	109	7	4,033	21	0	16	1,654	30	1,096	1,094	729	79,800	5,179	99,700
	6%	0%	0%	0%	4%	0%	0%	0%	2%	0%	1%	1%	1%	80%	5%	100%
Total	219,347	57,715	90,380	18,144	224,467	6,410	657	4,439	69,312	5,095	26,579	83,083	31,541	1,181,687	273,133	2,291,989
	10%	3%	4%	1%	10%	0%	0%	0%	3%	0%	1%	4%	1%	52%	12%	100%

Table 5.3.2.4 Outgoing Volume of All Domestic Shipping Cargo in 1994

Unit : 100 ton

Region	Live animals food beverages tabacco	Animal & vegitable Oil & Fats	Chemicals & Chemical Products	Rubber & Rubber Products	Wood Softwood & its Products	Pulp Paper & Paper board	Leather Tanned Hide & Leather Products	Textiles Clothing & Convection goods	Salt cement non metalic porcelain	Metal Metal Precious Stone & Products	Metal & Metal Products	Electrical Tool & Transportati on	Articles not elsewhere Classified	Energy Materials	General Cargo	Total
North Sumatra	63,433	22,179	12,994	14,050	36,314	2,921	18	746	11,426	1,410	11,744	42,780	7,180	285,190	46,921	559,306
	17%	6%	4%	4%	10%	1%	0%	0%	3%	0%	3%	12%	2%	77%	13%	152%
South Sumatra	14,788	6,647	20,389	1,775	30,243	260	0	18	11,889	18	838	7,242	5,082	224,138	45,550	368,877
	4%	2%	6%	0%	8%	0%	0%	0%	3%	0%	0%	2%	1%	61%	12%	100%
West Java	36,722	7,114	20,740	1,336	5,691	2,275	79	2,870	16,476	370	5,780	20,094	6,013	30,586	42,375	198,521
	18%	4%	10%	1%	3%	1%	0%	1%	8%	0%	3%	10%	3%	15%	21%	100%
East Java	38,263	8,503	13,271	99	18,357	109	0	177	11,103	260	2,189	2,361	5,076	185,670	70,933	356,371
	11%	2%	4%	0%	5%	0%	0%	0%	3%	0%	1%	1%	1%	52%	20%	100%
West Kalimantan	19,605	1,900	7,069	514	72,260	464	224	119	1,787	4	2,791	1,408	3,829	38,069	15,313	165,356
	12%	1%	4%	0%	44%	0%	0%	0%	1%	0%	2%	1%	2%	23%	9%	100%
East Kalimantan	10,136	379	11,600	237	45,244	86	49	0	2,783	339	1,799	6,005	2,262	268,429	22,088	371,436
	3%	0%	3%	0%	12%	0%	0%	0%	1%	0%	0%	2%	1%	72%	6%	100%
Sulawesi	22,763	6,032	2,806	84	8,067	279	249	491	12,710	2,561	756	1,811	1,234	54,433	13,381	127,657
	18%	5%	2%	0%	6%	0%	0%	0%	10%	2%	1%	1%	1%	43%	10%	100%
Tengarra	5,876	2,381	238	0	890	0	2	0	528	2	125	65	370	48,676	4,694	63,847
	9%	4%	0%	0%	1%	0%	0%	0%	1%	0%	0%	0%	1%	76%	7%	100%
Maruku	6,491	2,192	545	45	3,785	16	4	2	459	16	85	555	209	5,360	9,055	28,819
	23%	8%	2%	0%	13%	0%	0%	0%	2%	0%	0%	2%	1%	19%	31%	100%
Irianjaya	1,270	388	728	4	3,616	0	32	16	151	115	472	762	286	41,136	2,823	51,799
	2%	1%	1%	0%	7%	0%	0%	0%	0%	0%	1%	1%	1%	79%	5%	100%
Total	219,347	57,715	90,380	18,144	224,467	6,410	657	4,439	69,312	5,095	26,579	83,083	31,541	1,181,687	273,133	2,291,989
	10%	3%	4%	1%	10%	0%	0%	0%	3%	0%	1%	4%	1%	52%	12%	100%

Source : Prepared by OCDI based on the OD survey made by DGSC

Figure 5.3.2.2 Cargo Movement (All Commodities)

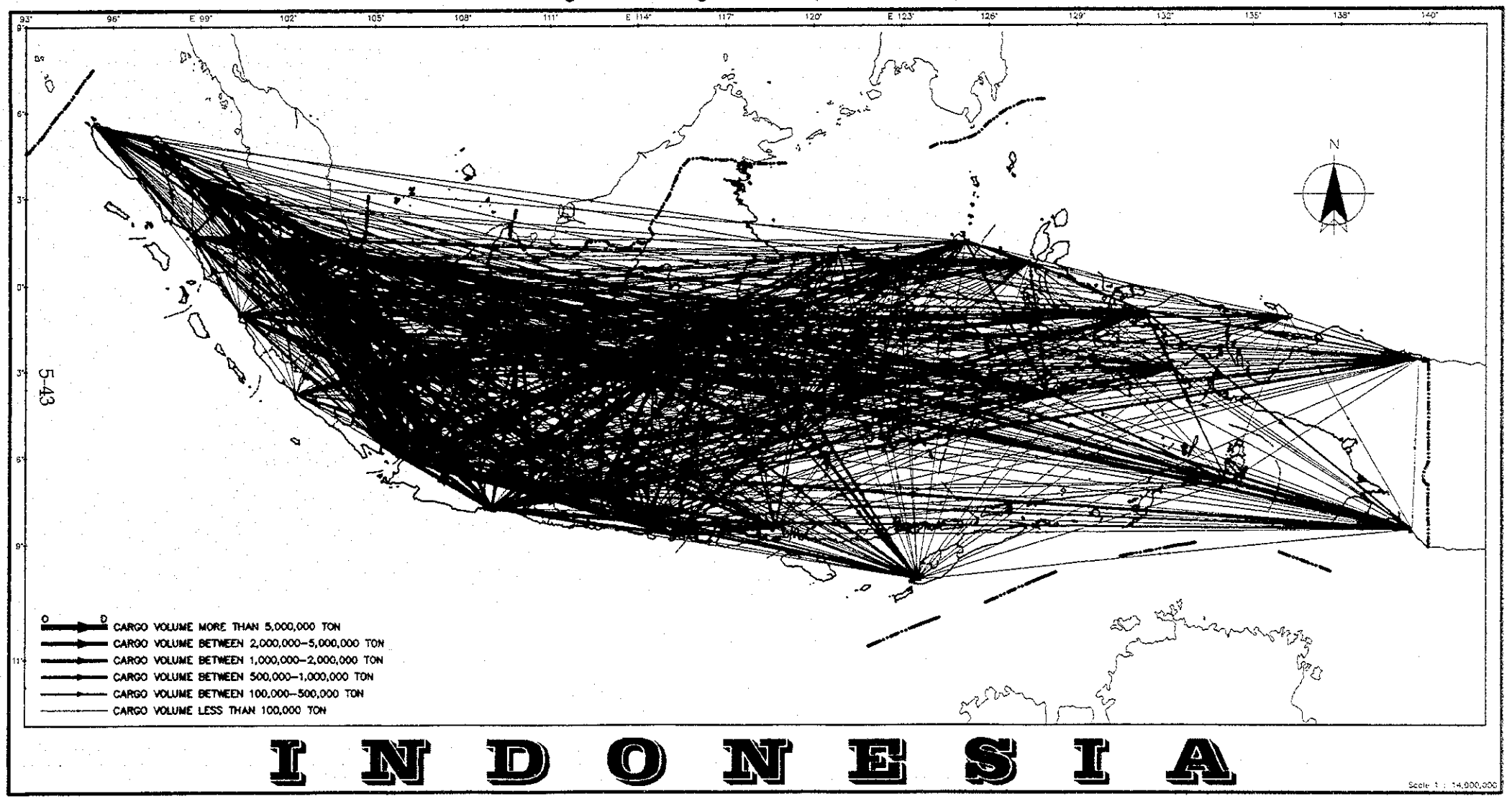


Figure 5.3.2.3 Cargo Movement (Commodities without Oils)

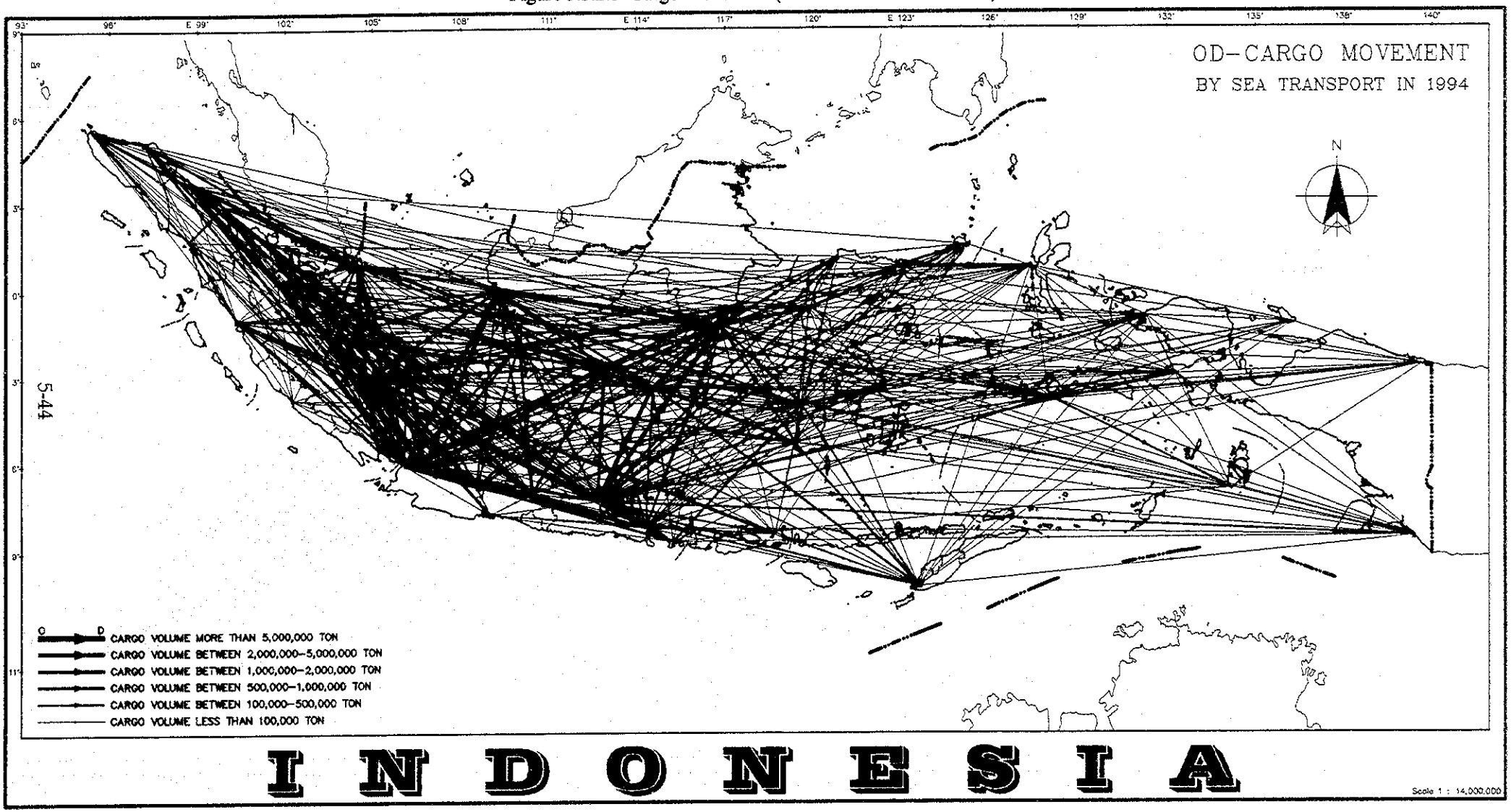


Figure 5.3.2.4 Cargo Movement more thsn 200,000 ton/year (Commodities without Oils)

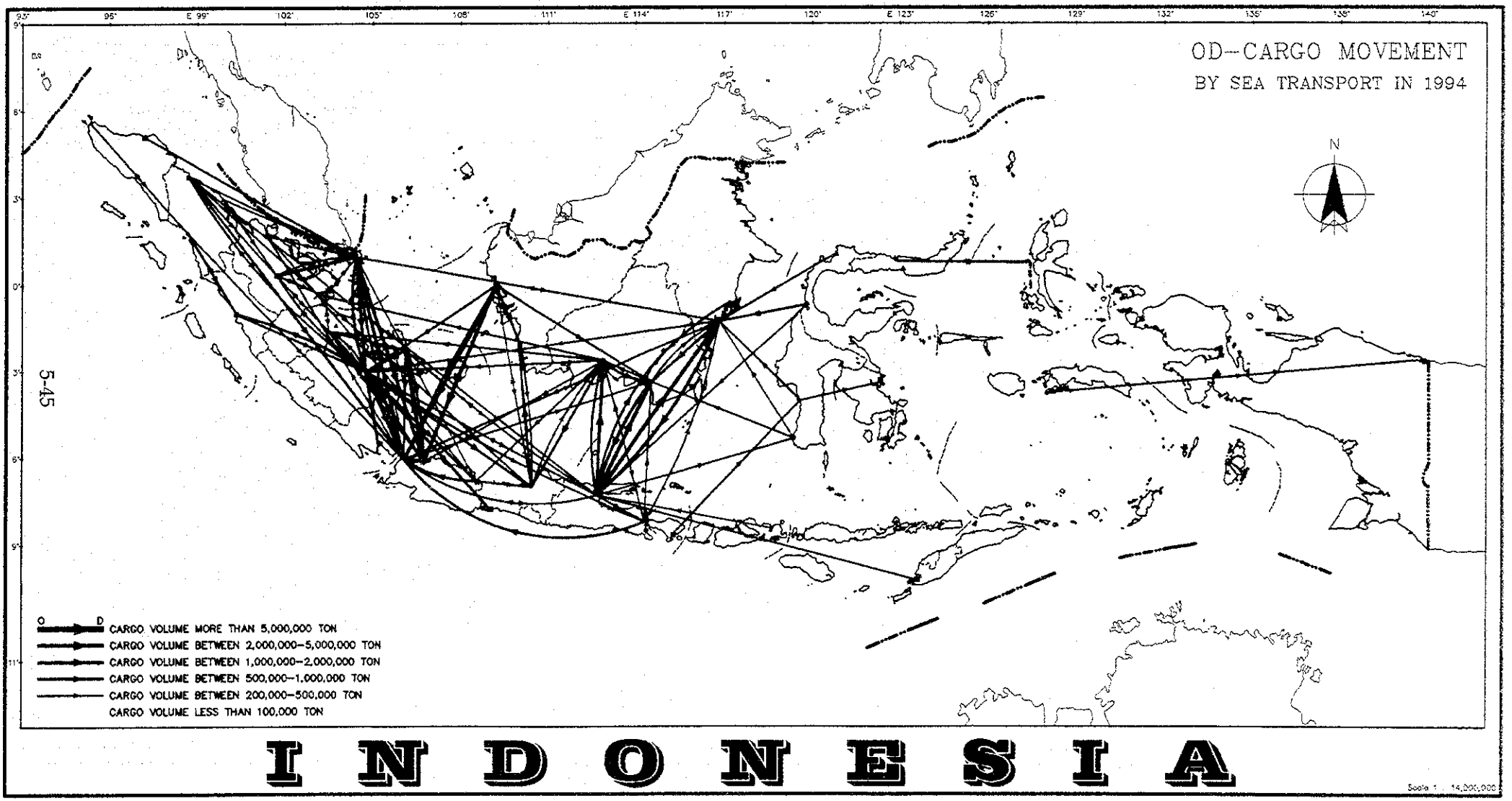


Figure 5.3.2.5 Cargo Movement more than 500,000 ton/year (Commodities without Oils)

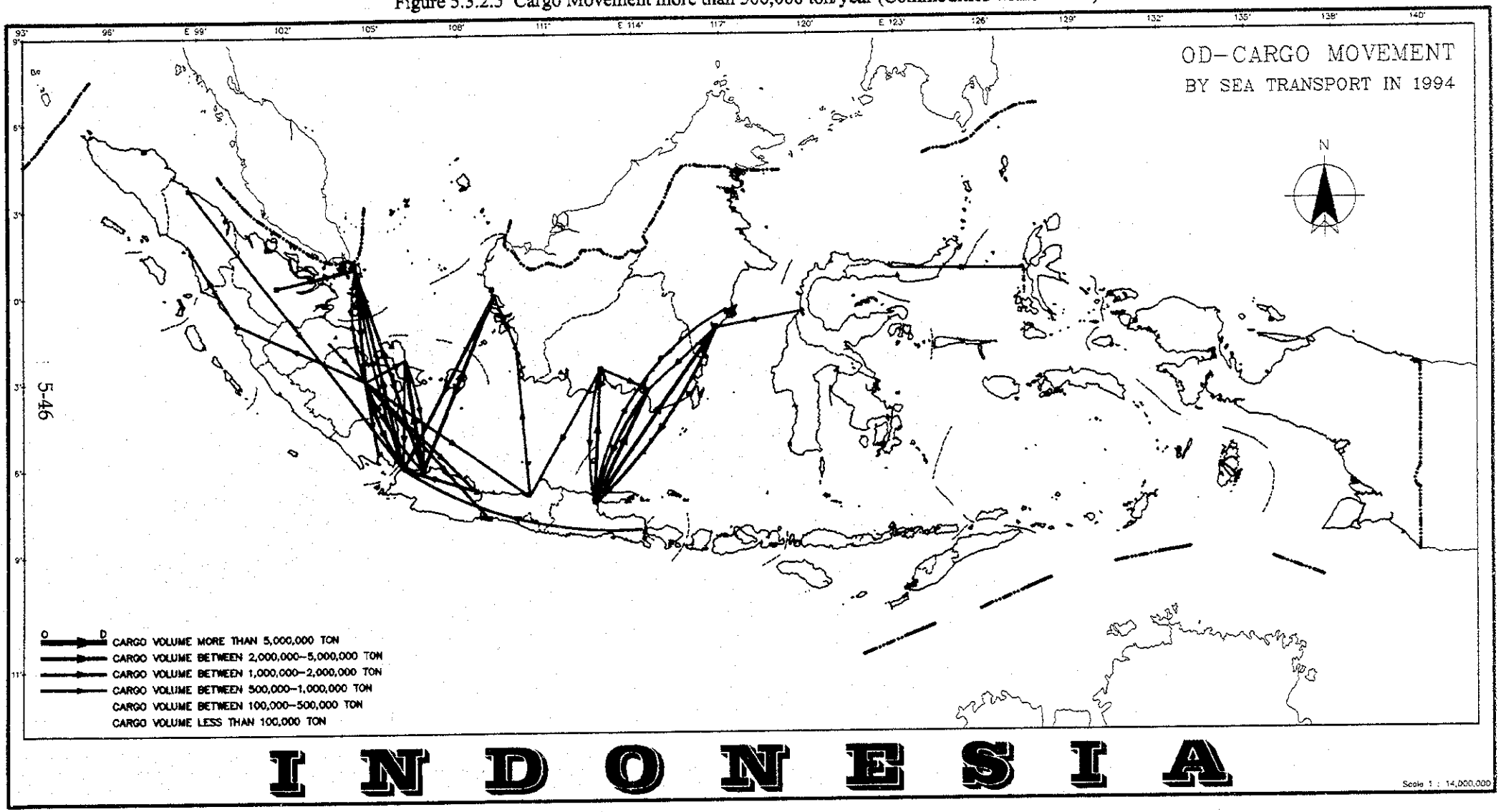


Figure 5.3.2.6 Cargo Movement by Regions (Commodities without Oils)

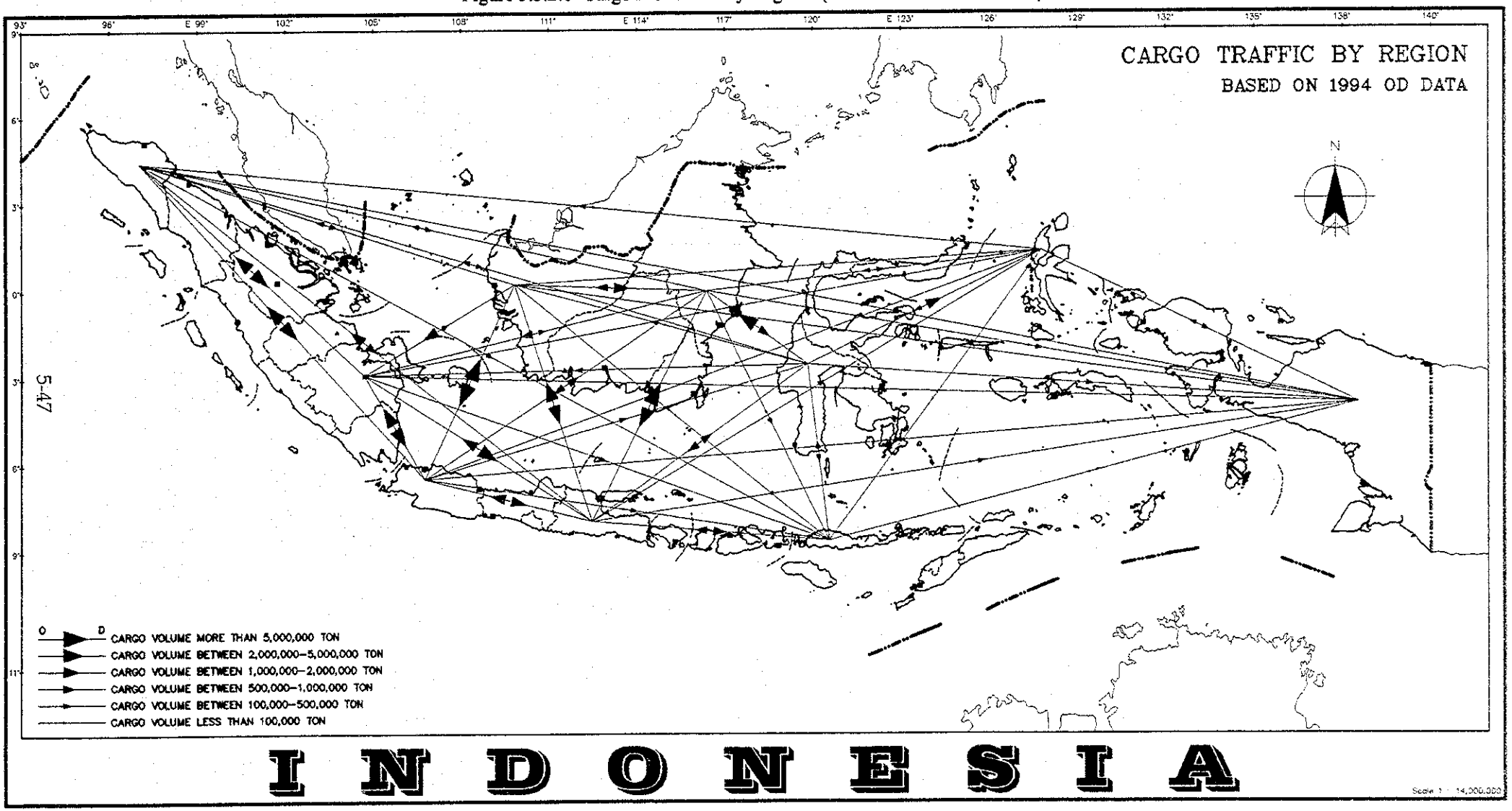


Table 5.3.2.5 Regional Character of Main Outgoing Commodity

Commodity	District	Volume Unit : 1000 ton
Energy Materials	North Sumatra	28,500 (24%)
	East Kalimantan	26,800 (23%)
	South Sumatra	22,400 (19%)
	East Java	18,600 (16%)
	Total	118,200 (100%)
General Cargo	East Java	7,093 (26%)
	North Sumatra	4,692 (17%)
	South Sumatra	4,555 (17%)
	West Java	4,237 (16%)
	Total	27,313 (100%)
Woods, Softwoods and wood products	West Kalimantan	7,226 (32%)
	East Kalimantan	4,524 (20%)
	North Sumatra	3,631 (16%)
	South Sumatra	3,024 (13%)
	Total	22,446 (100%)
Food, Agricultural/fishery products	North Sumatra	6,343 (29%)
	East Java	3,826 (17%)
	West Java	3,672 (17%)
	Sulawesi	2,276 (10%)
	Total	21,934 (100%)
Machinery and Industrial products	North Sumatra	4,278 (51%)
	West Java	2,009 (24%)
	South Sumatra	724 (9%)
	Sulawesi	600 (7%)
	Total	8,308 (100%)
Chemicals and Chemical Products	West Java	2,074 (23%)
	South Sumatra	2,038 (23%)
	East Java	1,327 (15%)
	North Sumatra	1,299 (14%)
	Total	9,038 (100%)

Source : DGSC

Note : The top 6 (six) largest commodities are selected in this table based on the OD data in 1994. And in each commodity, top 4 (four) largest districts are described in this table based on the same data.

2) Shipping route

Domestic shipping in Indonesia is comprised of Inter-island shipping, local shipping, pioneer shipping and Rakyat shipping. At present domestic cargoes are distributed to the regional areas by combining inter-island shipping, pioneer shipping and Rakyat shipping. Mainly an inter-island shipping plays a role of a trunk shipping route and a pioneer shipping plays a role of a feeder shipping.

Among those shipping types, the inter-island shipping plays a major role for domestic cargo distribution in Indonesia.

Therefore, in this study, the inter-island shipping will be a main focus. In the inter-island shipping, there are 8 base ports which play a role of origin/destination ports. According to the drawing which describes the shipping route by each base port, Tg. Perak port plays a key role of the national center of the total inter-island shipping routes. (See Figure A.5.3.6.1～A.5.3.6.11 and Table 5.3.2.6)

Table 5.3.2.6 Base Port of Inter-island Shipping and Pioneer Shipping

Area	Base Port		Note
	Inter island Shipping	Pioneer Shipping	
Sumatra	Belawan Teluk Bayur	Teluk Bayur Bengkulu, Tg.Pinang	
Java, Bali	Tg.Priok, Tg.Emas Tg.Perak	Tg.Perak	
Kalimantan	Banjarmasin Samarinda, Pontianak	Pontinak	
Sulawesi	Ujung Pandang	Bitung, Ujung Pandang Kendari	
Maluku, Irian Jaya Nusa Tenggara etc.	Kupang	Kupang, Dilli, Ambon, Ternate, Jayapura, Biak, Sorong, Merauke	

Source : DGSC

(2) Improvement of present Trunk- Feeder Port System

1) General

In 1981, ISTS study ("Integrated Sea Transportation Study" conducted by Netherlands Maritime Institute) recommended that DGSC establish a Trunk-Feeder Port System. In that system, Ambon, Ternate and Sorong ports were recommended in addition to Ujung Pandang port as Trunk Ports in Eastern Indonesia. But in that study Jayapura and Biak ports

were not recommended as Trunk Ports.

On the other hand, JICA study "The Study on Integrated Modernization Plan for Sea Transportation in Eastern Indonesia" proposed "2005 Sea Transportation Network Plan for Common Carrier" which comprises "Primary Routes", "Secondary Routes", "Tertiary Routes" and "Containerization Routes". (See Figure 5.3.2.7)

The present inter-shipping routes seem to follow the results of the above studies in general. In this study, we shall examine the following matters.

2) Basic principle for improving the present Trunk- Feeder Port System

Based on the current shipping situation, shipping routes from/to Java to/from Sumatra, the Eastern and Western Kalimantan shall play primary roles even in the future. Sumatra and East Kalimantan have much potential besides Java for further industrial development by making use of advantageous conditions such as large flat areas, rich national resources and closeness to Java.

Except Kalimantan, cargo and passenger traffic in the Eastern Indonesia has not been large. But, in order to provide the people with necessary transportation means and achieve well balanced national development, appropriate primary shipping routes should be established. By establishing an efficient shipping network, it is hoped that appropriate industries will be induced at such regions and that regional development will be further materialized.

As already mentioned in 5.3.2.2 (1), from one main island to another main island, cargoes are transported by inter-island shipping. After that cargoes are transported to the final destination located in the adjacent areas around the main island by pioneer shipping and other feeder means. The above actual sea transportation system seems to be effective and reflecting the Trunk-Feeder Port System. Base ports of inter-island shipping and major base ports of pioneer shipping play a key role as trunk ports, which has transshipment function as a cargo distribution/collection center.

However, in order to attain further effective and efficient sea transportation system, review of the Trunk-Feeder Port System is important. Basically this review shall be examined by comparing the cost of "With Case", in which the particular trunk or feeder port is developed, with the cost of "Without Case", in which its port is not developed and alternative port is used.

As one trial for reviewing the Trunk-Feeder Port System, the Study Team estimated the appropriate distance between trunk ports and feeder ports by comparing sea transportation cost with land transportation cost for transporting same volume of cargoes. (See Appendix

5.3.7) Based on the result of this cost comparison, when the origin/destination of cargo is apart from the nearest trunk port by more than 250 km, sea transportation cost for transporting the same volume of cargoes is cheaper than land transportation cost.

The result of this examination can be utilized to justify development of feeder ports.

Figure 5.3.2.7

2005 Sea Transportation Network Plan for Common Carrier

"The Study on Integrated Modernization Plan for Sea Transportation in Eastern Indonesia" in March 1994 by JICA

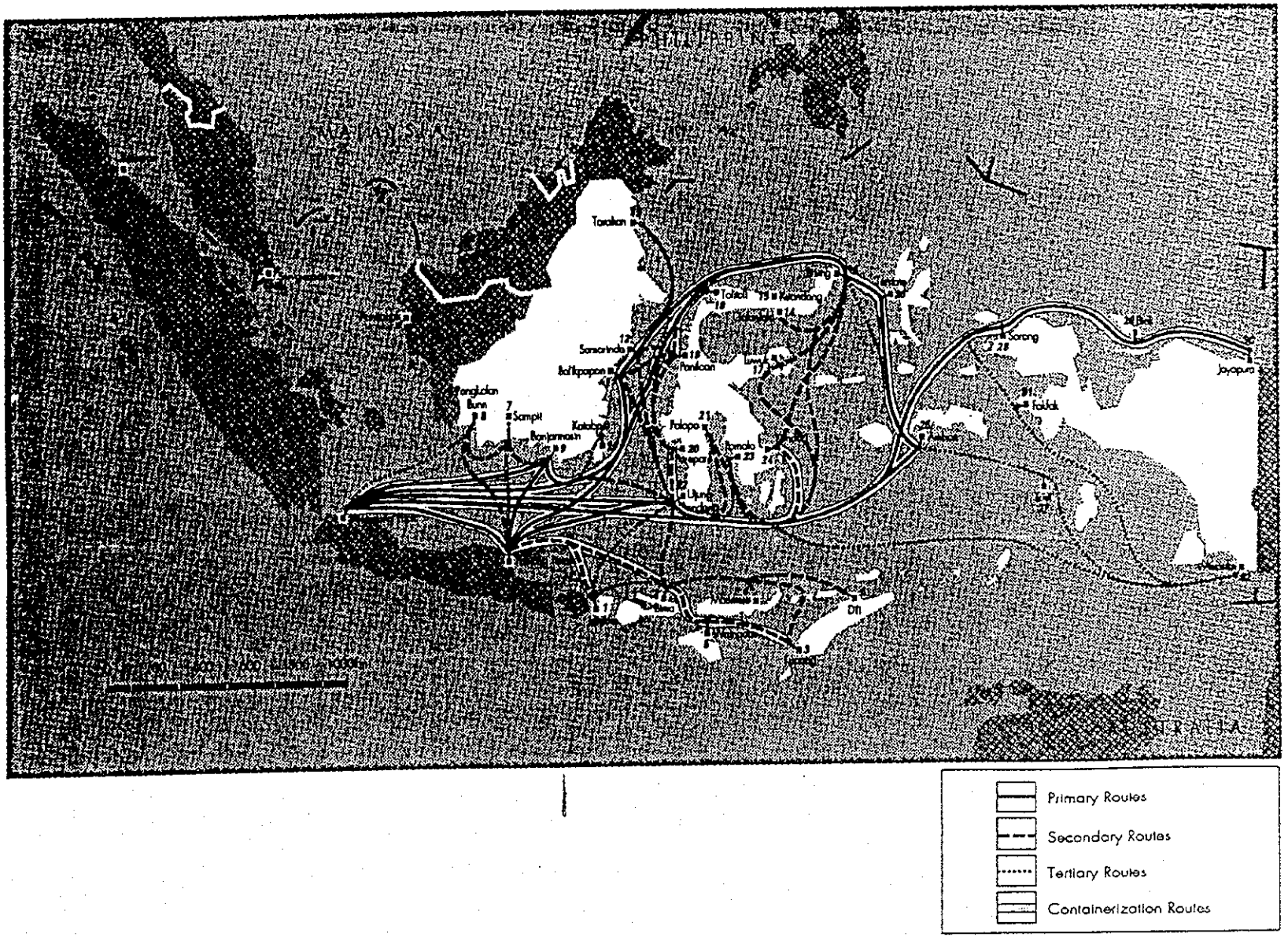
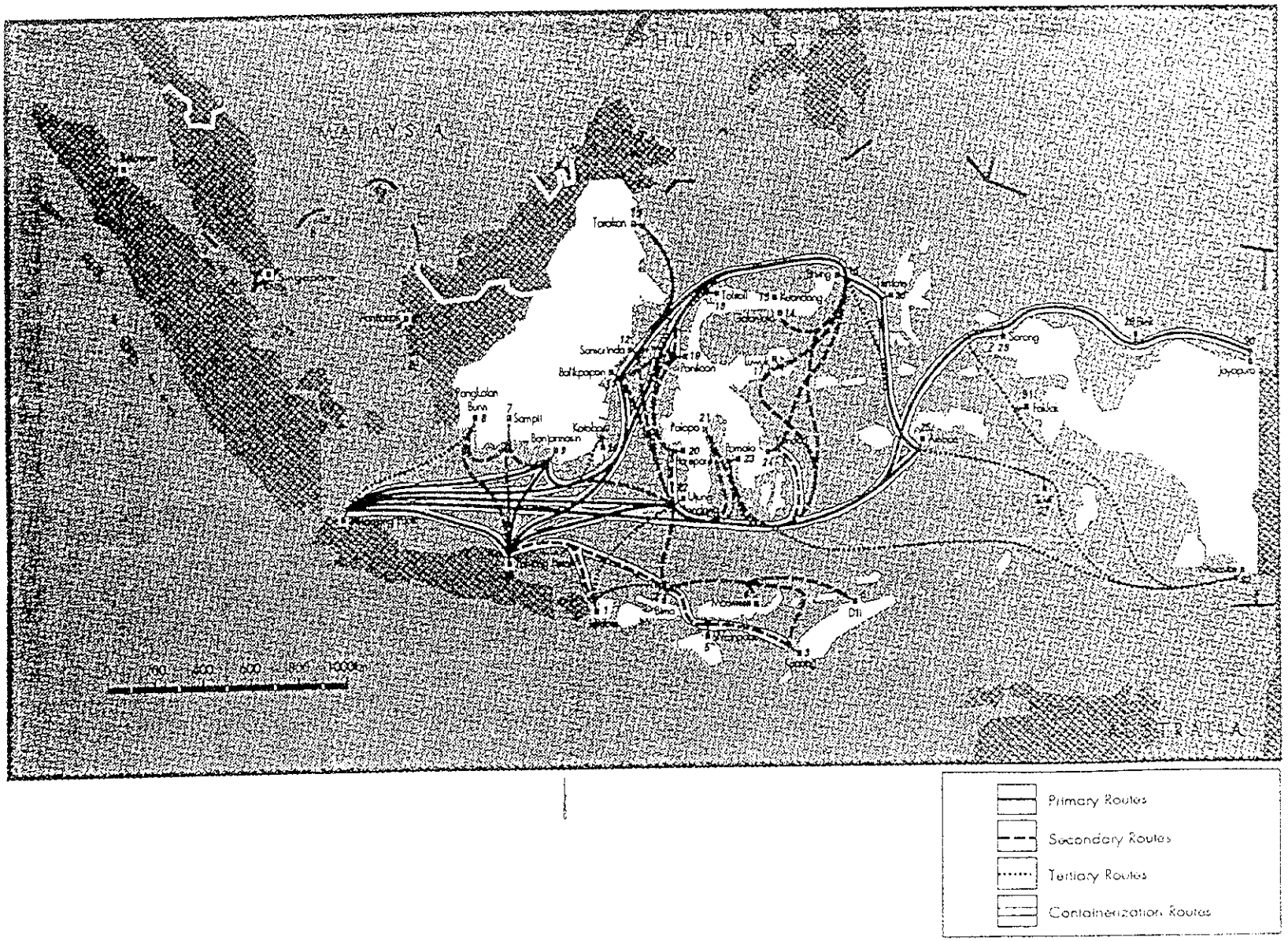


Figure 5.3.2.7

2005 Sea Transportation Network Plan for Common Carrier

"The Study on Integrated Modernization Plan for Sea Transportation in Eastern Indonesia" in March 1994 by JICA



(3) Introduction of modernized shipping system

1) Modernization of domestic transportation of international container cargo

At present, international container cargoes are transported to respective destinations except for major container handling ports inside Indonesia by using conventional inter-island cargo shipping vessels. Recently, container cargo handling ports are increasing. In 1968, the number of container cargo handling ports was 11, while in 1995 it had increased to 21. Some containers are transported by general cargo vessels. Others are devanned/vanned at major container ports.

In order to distribute/collect international container cargo to/from consignees all over Indonesia efficiently and rapidly, domestic container shipping routes, which is utilized to transport international container cargoes from/to major container ports systematically, shall be established.

Container shipping system shall change based on cargo volume, lot and frequency of container cargo service. Here, we shall examine the feasibility of four systems, which are Lo/Lo (Lift on/off) system by conventional vessel, Lo/Lo system by container vessel, Ro/Ro system by Ro/Ro vessel and ferry system.

Lo/Lo system by conventional vessel can be basically applied when the volume of container is not so large and also fluctuates throughout a year. This system cannot accommodate a large amount of container but it can deal with any fluctuation in the container volume by loading ordinary conventional cargo corresponding to the fluctuated container volume.

Lo/Lo system by container vessel can be basically applied when the volume of container is very large and does not fluctuate throughout a year. A large container volume is required because of the large scale investment needed to install high quality container crane and other port facilities.

Ro/Ro system can be basically applied when the volume of container is very large and does not fluctuate throughout a year. In addition, this system can be applied even when the terminal of ports is very crowded and consignees require shipping companies to transport container cargo more frequently and more rapidly while at the same time securing the safety of containers. Moreover, this system does not require specific container handling equipment. However, Ro/Ro vessel is more expensive than other vessel because of the dead space for accommodating vehicles.

Ferry system can be applied when the volume of container is not very large and also fluctuates throughout a year. This system cannot accommodate a large amount of container but can deal with any fluctuation in the container volume by loading ordinary conventional

cargo at vacant space designated for the containers. This system can also be viable even during periods when the container volume is small, since main income can be obtained by transporting passengers.

2) Unitization of domestic general cargo

Unitization of domestic general cargoes is one means for modernizing domestic shipping. It prevents damage to cargo and enables quick cargo handling. Unitization is composed of several styles, such as container transportation system, Ro/Ro system and ferry system. However, unitization remains at a low level at present. (See Appendix 5.3.9)

The main reason why the unitization of domestic cargo handling remains at a low level is attributed to the limitation of road and rail transportation capacity, particularly in rural areas of Indonesia. In order to let the consignors/consignees in Indonesia enjoy the merit of the above domestic unitized cargo transportation, unitization of the domestic general cargoes should be examined. This will result in motivating the land transportation side to implement the necessary road or rail development for transporting domestic cargoes.

However, at present, the commodities of the domestic cargoes in Indonesia are not so time conscious. Therefore demand for unitization of domestic cargoes has not been intensified much. In the future, after economic activities in regions other than Java grow, it will be possible to apply more modernized sea transportation system, such as Ro/Ro system for the routes which have large cargo traffic.

In addition, as for containerization, due to imbalanced cargo volume between inbound and outbound, a lot of empty containers should be transported. It will be a burden on the part of the container vessel operators. (See Table 5.3.2.7)

The utilization of those empty containers for domestic general cargo transportation shall be examined. In particular, the possibility for transporting loaded container with the domestic cargoes instead of transporting empty container itself shall be examined in the feeder container routes in which the difference between outgoing and incoming container is very large.

Table 5.3.2.7 Share of Empty Container for the Container Cargo Traffic in Indonesia (1995)

Unit : TEU

	Volume of Empty Container (A)	Total Container Volume (B)	Proportion (A/B)
Export	226,000	1,268,000	18%
Import	250,170	1,319,000	19%
Total	476,170	2,587,000	18%

Source : DGSC

3) Cost comparison among several shipping system vessels for handling conventional cargo

In order to examine the possibility of introducing a modernized shipping system in terms of economic aspect, transport cost comparison among conventional cargo vessel, semi-container vessel, full-container vessel and Ro/Ro vessel was conducted. (See Table 5.3.2.8)

Here, one voyage cost per metric ton among different shipping system vessels which have almost the same freight capacity were compared.

From this analysis, it can generally be said that the transport cost of conventional cargo vessel is cheaper than any other shipping system vessel. The reason why the cost of other modernized shipping system vessels is higher, is mainly attributed to the high ship operation cost.

However, containerization or other type unitization of the general cargo is inevitable as the need to protect cargoes and to provide swift and reliable door to door cargo transportation have become worldwide trends. So in the near future, semi-container vessel shall have an advantage, since its cost is not much higher than a conventional cargo vessel but it can accommodate containers within a certain volume.

The cost of a full-container vessel is much higher than the above two vessel types. So only after the volume of container becomes large and cannot be accommodated by other type of vessels, such vessels will be introduced in domestic shipping.

The cost of a Ro/Ro vessel is much higher than the cost of other shipping system vessels mainly due to absence of special tariff for Ro/Ro vessels, even though actual cargo handling charge such as receiving, delivering and stacking of the cargo is cheaper than other vessels. Therefore, in the future, after door to door cargo transportation becomes more popular and

Table 5.3.2.8 Cost Comparison by Inter-Island Shipping Type
(Cost Comparison by Weight Ton)

Vessel Assignment Plan (Average load1000-2400K/T)

	POSSIBLE VESSELS TO BE ASSIGNED			
Distance between Major O-D Ports	Convent'nal 3000DWT	Semi-cont 2500DWT	Full-cont 1000DWT	RO/RO 14000DWT
300 Miles	100	105	115	123
500 Miles	100	106	122	136
1000 Miles	100	109	138	168
1500 Miles	100	111	149	193

INDEX 100=The figure indicates the total voyage cost per K/T of 3000DWT conventional vessel in each distance

REMARK:

(A) Assumptive cargo quantity : General cargo loaded by each vessel
80 % of each vessel's full load

(B) Cargo movement : Between two ports in Indonesia

(C) Total voyage cost includes (a), (b), (c) and (d)

(a) Ship's operating cost or Charterage

Per day Conventional 3000DWT US$2500
Semi-Container 2500DWT US$2500
Full-Container 2500DWT US$6500
RO/RO 14000DWT US$11000

Ship's operating cost includes the following items

(1) Managing fee, ship's store fee, crew fee, lubricating oil fee, repair fee and P.I.Insurance fee etc.

(2) Capital fee including loan money and interest

(b) Port charge

Port dues, Berth dues, Wharfage on cargo, Pilot dues, Towage are applied to the tariff of Ministrial decree of Indonesia KM 65/1994
(Port tariff for services to domestic vessels)

(c) Cargo charges

Stevedoring, cargodoring (Assorting), receiving and delivering etc.
Container handling, Stacking fee etc.

(d) Fuel cost

(1) Marine fuel consumption per day (Unit: Kilo ton)
Conventional 12 K/T Full-Container 43K/T
Semi-container 13 K/T RO/RO vessel 43K/T

(2) Average speed 11 miles per hour, 264 miles per day at sea

(3) Marine diesel oil at port 1.5～2 K/T per day at port

(D) Stevedoring production

(1) Conventional per gang per shift about 200 K/T

(2) Semi-container vessel 18TEU～20TEU per hour

condition of land transportation is further developed, Ro/Ro vessel shall start operation in domestic shipping.

5.3.2.3 Conventional (General) Cargo Terminal Network System

(1) Classification of Conventional (General) Cargo Terminal

The Study Team proposes to classify the conventional cargo terminal into 5 categories; "Hub Conventional Cargo Terminal", "Major Conventional Cargo Terminal", "Provincial Conventional Cargo Terminal", "Local Conventional Cargo Terminal" and "Small Conventional Cargo Terminal". (See Table 5.3.2.9)

"Hub Conventional Cargo Terminal" plays an important port in handling not only domestic cargoes but also international cargoes including container cargoes. Handling of international cargo is also very important for playing a role as a national center for handling domestic cargo. Because, such port can play an important role as transit points connecting to foreign countries and any region in Indonesia.

"Major Conventional Cargo Terminal" is an important port as a regional level distribution center for handling conventional cargo.

"Provincial Conventional Cargo Terminal" is a port playing a role as a provincial level center for handling conventional cargoes.

"Local Conventional Cargo Terminal" is a port playing a role as a local level center for handling conventional cargoes.

Table 5.3.2.9 Classification of Conventional Cargo Terminal

Classification	Definition
Hub Conventional Cargo Terminal	Terminal which plays a primary role as a national level center for handling conventional (general) cargo
Major Conventional Cargo Terminal	Terminal which plays an important role as a regional level center for handling conventional (general) cargo
Provincial Conventional Cargo Terminal	Terminal which plays a role as a provincial level center for handling conventional (general) cargo
Local Conventional Cargo Terminal	Terminal which plays a role as a Local level center for handling conventional (general) cargo
Small Conventional Cargo Terminal	Terminal which handles conventional (general) cargo for supporting people's livelihood

(2) Concept of Conventional (general) Cargo Terminal Network

1) Procedure

"Hub Conventional Cargo Terminal" plays an important role as a national level center. For selecting terminals of this category, cargo volume, present situation of the base ports in inter-island shipping and pioneer shipping, regional balance and future regional development and so on shall be considered.

In this chapter, conceptual idea of "Hub Conventional Cargo Terminal" is presented based on the result of demand forecast which is reflected by the above various economic factors (See Chapter 3.3.6). In addition, considering regional balance, future regional development and distance from the "Hub Conventional Cargo Terminal" which was selected based on cargo volume, several ports were selected in the eastern part of Indonesia.

The preliminary criteria for selecting a port which has "Hub Conventional Cargo Terminal" is as follows.

a) The annual volume of general cargo handled in a province, where the port is located, is more than 50,000,000 ton. This criteria was set in order to select approximately 5 provinces where volume of general cargo is within the about 5th largest rank among all provinces.

b) A port, located in the province where the annual volume of general cargo is more than 10,000,000 ton, is located apart from the above ports in the distance of longer than 500 miles. This is because when the distance between major ports is longer than 500 miles, introduction of the big scale cargo vessels such as 3000 – 10000 DWT is profitable (See Table 3.4.2.2). The cargo volume criteria of 10,000,000 ton was set in order to add about 5 provinces to the selected provinces in procedure a).

Considering the role of "Major Conventional Cargo Terminal" as a regional level distribution center, at least one port in each province should be selected which has this categorized terminal or "Hub Conventional Terminal".

When there are several ports within one province which play an important role as regional level center because of the geographical reason, one or two additional ports which have "Major Conventional Cargo Terminal" are to be selected as an exceptional case subject to the condition that the ports are located 250 miles apart from the above ports.

2) Conceptual conventional cargo terminal network

Based on the above procedure we temporarily came up with the conceptual conventional cargo terminal network only by using the result of the demand forecast and the location of

ports (See Table 5.3.2.10 and Figure 5.3.2.8～5.3.2.9).

More detailed selecting procedure which also considered other factors is shown in Chapter 5.4.2.

Table 5.3.2.10 Conceptual Scenario for Conventional (General) Terminal Network

Classification of the Conventional Cargo Terminal	Timing	Conceptual Development Scenario of Ports which have Conventional Cargo Terminal
Hub Conventional Cargo Terminal	By the year 2018	[Criteria a)] (Cargo volume in a province is more than 50,000,000t/year.) Tg.Priok, Tg.Perak, Tg.Emas, Belawan, Dumai, Balikpapan, [Criteria b)] (Cargo volume in a province is more than 10,000,000t/year and distance between major ports is longer than 500 miles.) Makassar, Bitung, Sorong
Major Conventional Cargo Terminal	By the year 2018	(One port in one province) Lhok Seumawe, Jambi, Teluk Bayur, Palembng(Tg Api-Api), Bengkulu, Panjang, Benoa, Bima, Dilli, Pontianak, Sampit, Banjarmasin, Pantoloan, Kendari, Ambon, Kupang, (Additional port which play a role as regional level center) Kumai, Tarakan, Ternate, Biak, Jayapura

Figure 5.3.2.8 Conventional Cargo Terminal Network in Indonesia
(at present)

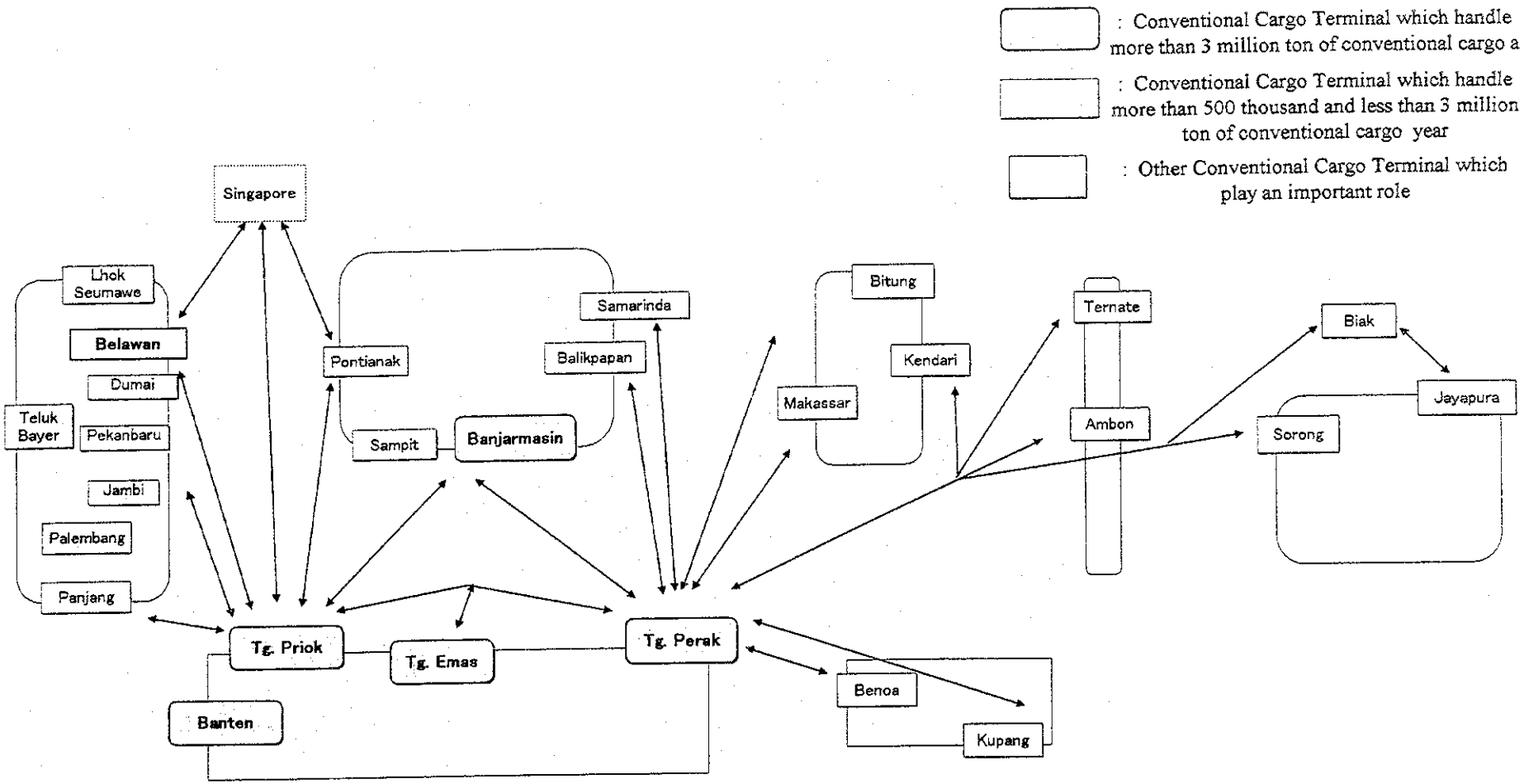
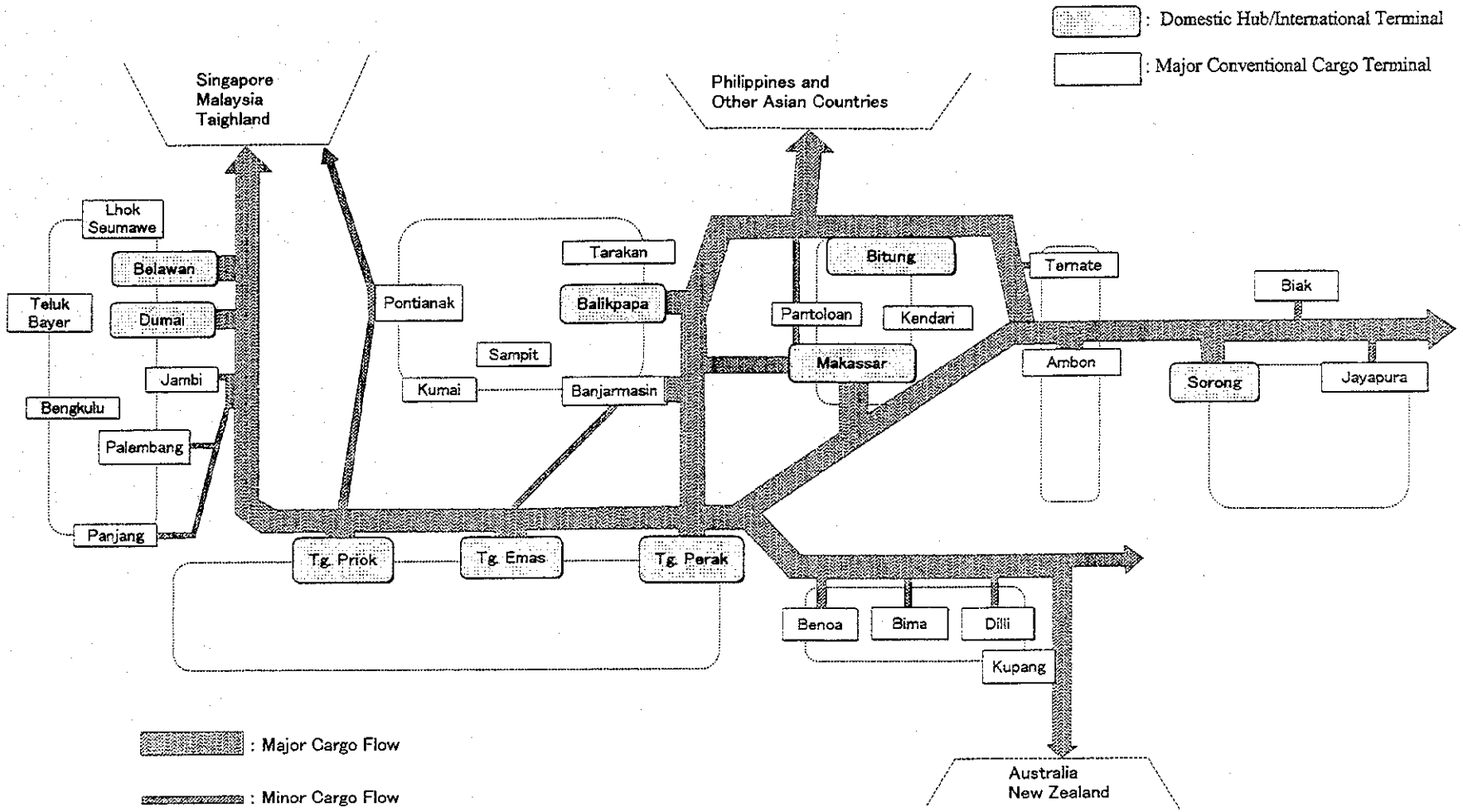


Figure 5.3.2.9 Conventional Cargo Terminal Network in Indonesia
(Future Image)



5.3.3 Policy for Terminal for Other Port Traffic Demand

5.3.3.1 Bulk Cargo Terminal System

(1) Present Situation

Based on the OD data by commodity in 1994, bulk cargo traffic of each commodity is quite different as follows. This bulk cargo traffic is determined based on the location of natural resources and industrial activities. (See Appendix 5.3.9)

(a) Mining Products

Cargo traffic of mining products is mainly originated from East Kalimantan and Sumatra.

(b) Oil Products

Cargo traffic of oil product is mainly originated from East Kalimantan and Sumatra. Destination of oil products is almost all over Indonesia.

(c) Iron and steel rod or sheet

Cargo traffic of iron and steel rod or sheet is mainly among Batam, Sumatra and Kalimantan.

(d) Fertilizer

Cargo traffic of fertilizer is mainly among Java and Sumatra.

Port facilities for bulk cargo have been developed mainly in special ports and wharves. On the other hand, for the public ports, only 14 major ports in Indonesia such as Belawan, Tg.Priok, Tg.Emas, Tg.Perak and Makassar have bulk terminals.

(2) Policy for Bulk Cargo Terminal System

1) Importance of a effective bulk cargo terminal system

Indonesia has depended mainly on the export of natural resources such as oil and gas, woods, agricultural products and so on. This tendency will still continue because those resources are still key products from which lots of people earn their income. But it is also expected that transportation of half processed products of those raw materials will also become necessary in accordance with gradual progresses of industrialization.

2) Role of national government

Hinterland of conventional and container cargo terminals is relatively large and sometimes it exceeds the boundary of the province. On the other hand, the hinterland of bulk cargo terminal is different by the type of commodities. In case of the bulk cargo

related to industrial activities, the hinterland of the bulk terminal is mainly just behind the port, because these bulk cargoes are closely related to the industrial activity. Therefore bulk cargo traffic for industry purpose mainly depends on the activity of the private sector. In the case of the bulk cargo which supports the daily livelihoods of the people such as fertilizer, the hinterland of the bulk terminal is very large, the same as a conventional and container terminal. In this case bulk cargo traffic mainly depends on the activity of the hinterland.

The role of the public sector in bulk cargo handling shall be clarified as follows according to the different natures of the bulk cargo.

(a) Bulk cargo for industry purpose

Regarding the bulk cargo terminal for industrial purpose, in the first period stage when the volume of bulk cargo, such as wood, iron rod, fertilizer and so on, is not so large, those bulk cargoes are transported to the destination ports in the form of bagged cargo, netted cargo and other type cargo. Therefore, those bulk cargoes except hazardous materials such as coal are accommodated by the conventional cargo terminal.

On the other hand, after the volume of bulk cargo becomes large, those cargoes will start to be accommodated by special ports or wharves constructed by concerned private companies. However, if effective transportation of bulk cargo cannot be secured and in particular the activities of small scale business companies cannot be promoted without the public sector's financial support, public sectors should participate in the development and management of the bulk cargo for industry purpose.

The role of the public sector for bulk cargo transportation for industrial purpose can be summarized as follows.

① Formulating the comprehensive port plan including special port/wharf and public port facilities
② Developing the conventional terminals which can accommodate anticipated volume of bulk cargo
③ Developing the bulk terminal for industrial purpose in cooperation with private sector
④ Supporting private sector to maintain and develop heavy natural resources oriented industry

(b) Bulk cargo for livelihood support purpose

Especially in case of ports located in great cities, bulk cargoes for livelihood support such as food and grain shall be imported from foreign countries or brought from other ports located inside Indonesia. Public sectors shall be responsible for developing and managing these bulk cargo terminals.

3) Preliminary ideas of the policy for bulk cargo terminal system by the public sector

For an efficient and effective bulk cargo port system, preliminary ideas of the policy for bulk cargo port system by the public sector are as follows.

(a) Formulating the comprehensive port plan including special port/wharf and public port facilities

In order to strengthen the international competitiveness of the private port users, reduction of the transportation cost and securing the effective activity in the port area are the crucial factors. The government should formulate and authorize the comprehensive port plan which supports the private port user to minimize the transportation cost and secures the appropriate space and conditions for their activities. In particular, access transportation plan between land and sea, development plan of the port facilities with required scale of depth, length and width, and land use plan which can secure the rational arrangement of the various kinds of port related facilities such as storage facility and industrial process facility are required.

(b) Development of the conventional cargo terminal which accommodates break-bulk cargo

Many break bulk cargoes are currently transported by conventional cargo vessels in a form of break-bulk. But in order to deal with the above mentioned increase of processed products, some part of bulk cargo shall be containerized and the other part shall be transported by specialized vessels.

The government should develop the conventional cargo terminal which can accommodate the anticipated volume of bulk cargo in the form of break-bulk. On the other hand, for the specialized bulk terminal, the government should let the private sector develop and manage/operate it without unreasonable restrictions

(c) Developing the bulk cargo terminal in cooperation with private sector

When the development of a bulk terminal is identified as an important facility based on the formulated master plan, public sector including IPCs may joint the joint venture development in cooperation with private sectors.

(d) Supporting the private sector in developing and operating the special port/wharf

In order to promote the activity of private sector related to the special port/wharf which will fuel economic recovery and improvement, the government should support the private sector in developing and operating the special port/wharf. For example, conventional cargo terminal, which is necessary for handling the daily commodities for the workers in the

related industrial companies and people in the adjacent areas, shall be developed by the government with high priority.