Appendix 5.3.2 Rough Cost Estimation of Container Shipping in Indonesia

1. General

In order to select the proper location of international hub port in tern of total sea transportation cost of container cargo, the study team prepared rough cost estimate procedure to simulate the effect of international hub port location and O/D Container volume (Origin/Destination of container cargo is located in hinterland).

The following three patterns of allocation of international hub port were compared.

a) Singapore is only one international hub port for all Indonesia port
b) Singapore and Tg.Priok are international hub port with equivalent service level. Tg.Perak and/or Bitung are supplemental port of them.
c) Batam and Bitung is two gate ports for international container transportation

Here, Bitung is selected as an example port, which have a potential for International Hub port in eastern part of Indonesia.

2. Selecting Potential International Hub Port

For International Hub Port, The Study team Proposed to be further categorized as two types ; "Mother Port Type International Hub Port" and "Transshipment Port type International Hub Port". For detail see Chapter 5. Section 5.3.1.3.

Potential International Hub Ports in Indonesia were selected following procedure.

2.1 Scenario to be "Mother Port Type" and "Transshipment Port Type" Hub Port

1) "Mother Port Type" International Hub Port

Scenario to be "Mother Port Type" is assumed as follows.

STEP 1 Container Shipping Start
Receiving container round feeder service from hub port

STEP 2 Container Shipping establish
Receiving container liner feeder service from hub port

STEP 3 Called by Intra-Asia Service
Domestic feeder service to near area is started to collect international transshipment container cargo, but the service is not competitive to hub port (Share of feeder service for neighboring ports is 0%)

STEP 4 Called by Transpacific Service

Domestic feeder service is still not so competitive to fruitful international hub port. (Share of feeder service for neighboring ports is less than 50%)

STEP 5 Called by Europe-Asia Service

Domestic feeder service is competitive in international hub port activity (Share of feeder service for neighboring ports is 100%)

2) "Transshipment Port Type" International Hub Port

Scenario to be "Transshipment Port Type" Hub Port is assumed as follows.

STEP 1 Container Shipping Start

Receiving container round feeder service from hub port

STEP 2 Container Shipping establish

Receiving container liner feeder service from hub port

STEP 3 Called by Intra-Asia Service

Domestic feeder service to near area is started and promoted intensively to collect international transshipment container cargo in neighboring ports where feeder service from existing Hub Port is not sufficient.

STEP 4 Called by Transpacific Service

In order to be called by Transpacific service, incentive tariff may be introduced and domestic feeder service for neighboring ports is competitive to fruitful international hub port

STEP 5 Called by Europe-Asia Service

Container volume in port is competitive in international hub port activity

2.2 Basic Condition and Assumption

Basic condition and assumption to evaluate the potential International Hub Port are as follows. (See Section 5.3.1 and Appendix 5.3.1)

a) The share of O/D cargo to total cargo in Transshipment Port Type International Hub Port is about 40%.

b) Required O/D Container volume for direct call by International Service

Service Route	Mother Ship Size(TEU) In Each Route	Load O/D Container Volume(TEU) in a port
Intra-Asia Service	1,500-3,000	450,000
Transpacific Service	4,500-6,500	1,500,000
Europe-Asia Service	6,000-8,500	3,000,000

c) Required Container volume for International Hub Port with Transshipment

Classification	Location	Kinds 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

d) Ratio of empty container in a port should be less than 25%

e) Container volume in target year was forecasted by The Study Team

f) All container cargo in a province is handled at one port in the province

g) All container cargo in a port (feeder port) is transported to/from the nearest International Hub Port (mother port) with feeder service

h) It is preferable that the distance between mother port and feeder port is less than 600Miles, which is 2days service distance (20Knots×30hours=600miles).

2.3 Candidate for Mother Port Type International Hub Port in Indonesia

The result of examination with forecasted O/D container cargo volume is shown Table A.5.3.2.1 and Table A.5.3.2.2. The candidates for International Hub Port and called by Intra-Asia at target year are as follows.

a) In west Jawa area has a potential to receive Europe/East -Asia Service and to be a "Mother Port Type"

b) In East Jawa area has a potential to receive Transpacific Service to be a "Transshipment Port Type"

c) North Sumatra, Riau, South Sumatra and East Kalimantan have a potential to be called by Long Distance Intra-Asia Service

3. Rough Cost Estimation of Container Shipping in Indonesia

3.1 General

In order to evaluate the location of International Hub Port in Indonesia from viewpoint of container transportation total cost, the shipping cost of international

viewpoint of container transportation total cost, the shipping cost of international container was estimated roughly for several patterns of international hub port location.

Tg.Priok/Bojonegara and Tg.Perak/Gresik were selected by Forecasted O/D container volume, and Bitung port was selected as supplemental port in eastern part of Indonesia to improve container transportation system in this area. Batam Port was alternative to Singapore as "Transshipment Port Type" port.

3.2 Basic Assumption

Cost evaluation to select proper location of international hub port in Indonesia is prepared considering the combination of money-cost, time-cost and level-of-service. Cost evaluation are usually described in monetary units, while time-cost and level-of - service are converted into monetary units and added to the direct money-cost.

a) Money-Cost Total freight cost from origin port to nearest transshipment port for all container cargo in Indonesia and to destination port (Seatle) on transpacific service are calculated, including loading/unloading cost, feeder service cost, transshipment cost and international trunk service cost.

b) Time-Cost If frequency of feeder service and direct call service is similar level, the difference of total delivery time between transshipment service and direct service is not significant and therefore the value of time for cargo is not considered in this examination. On the other hand, the size of feeder vessel is selected considering frequency of the service.

c) Level-of-Service This factor depends on both quantitative and qualitative feature, and it is difficult to convert into monetary units. In this evaluation all subjective ports are assumed to be operating in certain service level to be called by international service.

Shipping cost, port due and terminal cost utilizing in the evaluation are shown Table A.5.3.2.4.

3.2 Result of Cost Estimation

Result of cost estimation is shown in Table A.5.3.2.3.

Table A.5.3.2.1 Possibility of Mother Port Type Hub Port from O/D Container Volume In 2018

No	Province Name	Load Container Volume(TEU)	Total Container Volume(TEU)	Ratio of Empty Container	Possivility For Direct Call
1	Aceh	345,392	491,075	30%	
2	North Sumatra	713,662	1,014,679	30%	Intra-Asia
3	West Sumatra	228,921	325,478	30%	
4	Reau	596,115	847,552	30%	Intra-Asia
5	Jambi	94,576	134,467	30%	
6	South Sumatra	408,302	580,520	30%	Intra-Asia
7	Bengkulu	51,952	73,865	30%	
8	Lampung	208,016	295,756	30%	
9	DKI.Jakarta	1,648,692	1,862,801	11%	Europe/East-Asia
10	West Jawa	1,681,578	1,899,959	11%	3,330,000TEU
11	Central Jawa	1,039,988	1,175,048	11%	
12	D.I.Yogyakarta	127,299	143,830	11%	Transpacific
13	East Jawa	1,538,927	1,738,782	11%	1,539,000TEU
14	Bali	177,851	200,947	11%	
15	West Kalimantan	244,992	475,847	49%	
16	Central Kalimantan	147,314	286,127	49%	
17	South Kalimantan	215,416	418,401	49%	
18	East Kalimantan	757,803	1,471,875	49%	Intra-Asia
19	North Sulawesi	76,576	127,999	40%	
20	Central Sulawesi	47,399	79,228	40%	
21	South Sulawesi	202,762	338,923	40%	
22	Southeast Sulawesi	33,439	55,895	40%	
23	West Nusa Tenggara	240,391	462,845	48%	
24	East Nusa Tenggara	201,556	388,073	48%	
25	East Timor	51,702	99,546	48%	
26	Maluku	223,437	430,203	48%	
27	Irian Jaya	525,637	1,012,054	48%	

Table A.5.3.2.2 Conaier Volume In International Hub Port Included Transshipment In 2018

No	Province Name	Load Container Volume(TEU)	Total Container Volume(TEU)	Ratio of Empty Container
1	Aceh	345,392	491,075	30%
2	North Sumatra	713,662	1,014,679	30%
4	Reau	596,115	847,552	30%
5	Jambi	94,576	134,467	30%
6	South Sumatra	408,302	580,520	30%
15	West Kalimantan	244,992	475,847	49%
	Mother Port Singapore	2,403,040	3,544,140	32%
3	West Sumatra	228,921	325,478	30%
7	Bengkulu	51,952	73,865	30%
8	Lampung	208,016	295,756	30%
9	DKI.Jakarta	1,648,692	1,862,801	11%
10	West Jawa	1,681,578	1,899,959	11%
	Mother Port Tg.Priok	3,819,159	4,457,859	14%
11	Central Jawa	1,039,988	1,175,048	11%
12	D.I.Yogyakarta	127,299	143,830	11%
13	East Jawa	1,538,927	1,738,782	11%
14	Bali	177,851	200,947	11%
16	Central Kalimantan	147,314	286,127	49%
17	South Kalimantan	215,416	418,401	49%
18	East Kalimantan	757,803	1,471,875	49%
21	South Sulawesi	202,762	338,923	40%
23	West Nusa Tenggara	240,391	462,845	48%
24	East Nusa Tenggara	201,556	388,073	48%
	Mother Port Tg.Perak	4,649,305	6,624,852	30%
25	East Timor	51,702	99,546	48%
26	Maluku	223,437	430,203	48%
27	Irian Jaya	525,637	1,012,054	48%
19	North Sulawesi	76,576	127,999	40%
20	Central Sulawesi	47,399	79,228	40%
22	Southeast Sulawesi	33,439	55,895	40%
	Mother Port Bitung	958,190	1,804,925	47%

Source : Prepared By The Study Team

Table A.5.3.2.3 Sea Transportation Cost Index 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 A.5.3.2.4 Data for Shipping Cost Calculation

Size of Vessel (TEU)	Type of Vessel	DRT	Speed (Knots)	Charter Rate (US$)	Fuel Consumption (US$/Day)
500	Geared	8,000	15	8,500	2,000
1,000	Gearless	9,500	17	11,000	3,500
2,000	Gearless	32,000	20	20,000	5,000
3,000	Gearless	45,000	23	27,000	8,000
4,500	Gearless	55,000	23	31,000	15,000
6,000	Gearless	75,000	23	37,000	20,000

Size of Vessel (TEU)	Port Due and Others (US$)			Container Terminal Cost (US$)	
	Singapore	Indonesia Port	LA.	Singapore	Indonesia Port
500	4,000	1,100	-	Loading/Unloading	
1,000	6,000	1,400	-	-	62
2,000	8,000	4,300	-		
3,000	10,000	5,400	20,000	Transshipment	
4,500	11,000	7,000	26,000	60	40
6,000	12,000	8,000	30,000		

Table A.5.3.2.5 Total Feeder Cost from/to Hub Port (Case1)

Province	Container Handling Volume	Port	Distance(Miles) Singapore	Feeder Vessel Size (TEU)	Shipping Cost (US$/TEU)	Total Shipping Cost (US$)
Aceh	491,075	Lhok Seumawe	486	1,000	179	88,094,304
North Sumatra	1,014,679	Belawan	373	2,000	167	169,595,425
West Sumatra	325,478	Teluk Bayur	1,025	1,000	202	65,748,227
Reau	847,552	Dumai	162	2,000	160	135,840,051
Jambi	134,467	Jambi	241	500	194	26,029,183
South Sumatra	580,520	Palembang	295	2,000	165	95,555,315
Bengkulu	73,865	Bengkuku	820	500	236	17,416,763
Lampung	295,756	Panjang	630	1,000	185	54,842,662
DKI.Jakarta	1,862,801	Tg.Priok	532	2,000	172	320,993,646
West Jawa	1,899,959	Tg.Priok	532	2,000	172	327,396,502
Central Jawa	1,175,048	Tg.Emas	675	2,000	177	207,951,353
D.I.Yogyakarta	143,830	Tg.Emas	675	2,000	177	25,454,043
East Jawa	1,738,782	Tg.Perak	763	2,000	180	312,697,672
Bali	200,947	Benoa	1,083	500	255	51,235,292
West Kalimantan	475,847	Pontianak	355	500	202	96,066,474
Central Kalimantan	286,127	Sampit	734	500	230	65,672,148
South Kalimantan	418,401	Banjarmasin	895	500	241	100,943,600
East Kalimantan	1,471,875	Balikpapan	1,025	2,000	188	277,251,065
North Sulawesi	127,999	Bitung	1,846	500	311	39,757,021
Central Sulawesi	79,228	Pantoloan	1,200	500	264	20,876,645
South Sulawesi	338,923	Makassar	1,065	2,000	190	64,282,747
Southeast Sulawesi	55,895	Kendari	1,561	500	290	16,199,580
West Nusa Tenggara	462,845	Lember	1,230	1,000	211	97,477,957
East Nusa Tenggara	388,073	Kupang	1,442	1,000	220	85,182,298
East Timor	99,546	Dilli	1,824	500	309	30,759,852
Maluku	430,203	Ambon	1,615	1,000	227	97,552,299
Irian Jaya	1,012,054	Sorong	1,915	2,000	217	219,957,044
	16,431,776			Total Shipping Cost (US$)		3,110,829,169

Table A.5.3.2.6 Total Feeder Cost from/to Hub Port (Case2-1)

Province	Container Volume	Port	Distance(Miles)		Feeder Vessel	Shipping Cost	Total Shipping Cost (US$)
			Singapore	Tg.Priok			
Aceh	491,075	Lhok Seumawe	486		1,000	179	88,094,304
North Sumatra	1,014,679	Belawan	373		2,000	167	169,595,425
West Sumatra	325,478	Teluk Bayur		573	1,000	157	51,113,379
Reau	847,552	Dumai	162		2,000	160	135,840,051
Jambi	134,467	Jambi	241		500	194	26,029,183
South Sumatra	580,520	Palembang	295		2,000	165	95,555,315
Bengkulu	73,865	Bengkuku		374	500	177	13,094,119
Lampung	295,756	Panjang		120	1,000	138	40,824,560
DKI.Jakarta	1,862,801	Tg.Priok		0	2,000	22	40,981,628
West Jawa	1,899,959	Tg.Priok		0	2,000	22	41,799,088
Central Jawa	1,175,048	Tg.Emas		235	2,000	140	164,095,137
D.I.Yogyakarta	143,830	Tg.Emas		235	2,000	140	20,085,874
East Jawa	1,738,782	Tg.Perak		389	2,000	145	251,536,937
Bali	200,947	Benoa		611	500	195	39,094,723
West Kalimantan	475,847	Pontianak	355		500	202	96,066,474
Central Kalimantan	286,127	Sampit		480	500	185	52,933,528
South Kalimantan	418,401	Banjarmasin		515	500	188	78,471,980
East Kalimantan	1,471,875	Balikpapan		777	2,000	157	231,515,611
North Sulawesi	127,999	Bitung		1,575	500	265	33,899,734
Central Sulawesi	79,228	Pantoloan		921	500	217	17,204,911
South Sulawesi	338,923	Makassar		795	2,000	158	53,508,718
Southeast Sulawesi	55,895	Kendari		1,128	500	232	12,981,556
West Nusa Tenggara	462,845	Lember		760	1,000	191	88,350,958
East Nusa Tenggara	388,073	Kupang		1,084	1,000	178	69,263,435
East Timor	99,546	Dilli		1,145	500	233	23,243,059
Maluku	430,203	Ambon		1,339	1,000	189	81,385,345
Irian Jaya	1,012,054	Sorong		1,619	2,000	185	186,928,237
				Total Shipping Cost (US$)			2,203,493,269

Table A.5.3.2.7 Total Feeder Cost from/to Hub Port (Case2-2-1)

Province	Container Volume	Port	Distance(Miles)			Feeder Vessel	Shipping Cost	Total Shipping Cost (US$)
			Singapore	Tg.Priok	Tg.Perak			
Aceh	491,075	Lhok Seumawe	486			1,000	179	88,094,304
North Sumatra	1,014,679	Belawan	373			2,000	167	169,595,425
West Sumatra	325,478	Teluk Bayur		573		1,000	157	51,113,379
Reau	847,552	Dumai	162			2,000	160	135,840,051
Jambi	134,467	Jambi	241			500	194	26,029,183
South Sumatra	580,520	Palembang	295			2,000	165	95,555,315
Bengkulu	73,865	Bengkuku		374		500	177	13,094,119
Lampung	295,756	Panjang		120		1,000	138	40,824,560
DKI.Jakarta	1,862,801	Tg.Priok		0		2,000	22	40,981,628
West Jawa	1,899,959	Tg.Priok		0		2,000	22	41,799,088
Central Jawa	1,175,048	Tg.Emas			183	2,000	138	162,106,124
D.I.Yogyakarta	143,830	Tg.Emas			183	2,000	138	19,842,411
East Jawa	1,738,782	Tg.Perak			0	2,000	22	38,253,194
Bali	200,947	Benoa			275	500	170	34,171,513
West Kalimantan	475,847	Pontianak	355			500	202	96,066,474
Central Kalimantan	286,127	Sampit			293	500	171	49,032,065
South Kalimantan	418,401	Banjarmasin			268	500	170	70,936,403
East Kalimantan	1,471,875	Balikpapan			442	2,000	146	215,464,889
North Sulawesi	127,999	Bitung			1,193	500	237	30,334,428
Central Sulawesi	79,228	Pantoloan			613	500	195	15,425,576
South Sulawesi	338,923	Makassar			458	2,000	147	49,790,720
Southeast Sulawesi	55,895	Kendari			772	500	206	11,530,621
West Nusa Tenggara	462,845	Lember			420	1,000	151	69,714,470
East Nusa Tenggara	388,073	Kupang			697	1,000	162	62,962,298
East Timor	99,546	Dilli			787	500	207	20,644,481
Maluku	430,203	Ambon			986	1,000	174	75,013,840
Irian Jaya	1,012,054	Sorong			1,306	2,000	175	176,616,618
					Total Shipping Cost (US$)			1,900,833,180

Table A.5.3.2.8 Total Feeder Cost from/to Hub Port (Case2-2-2)

Province	Container Volume	Mother Port			Feeder Vessel	Shipping Cost	Total Shipping Cost (US$)
		Singapore	Tg.Priok	Bitung			
Aceh	491,075	486			1,000	179	88,094,304
North Sumatra	1,014,679	373			2,000	167	169,595,425
West Sumatra	325,478		573		1,000	157	51,113,379
Reau	847,552	162			2,000	160	135,840,051
Jambi	134,467	241			500	194	26,029,183
South Sumatra	580,520	295			2,000	165	95,555,315
Bengkulu	73,865		374		500	177	13,094,119
Lampung	295,756		120		1,000	138	40,824,560
DKI.Jakarta	1,862,801		0			22	40,981,628
West Jawa	1,899,959		0			22	41,799,088
Central Jawa	1,175,048		235		2,000	140	164,095,137
D.I.Yogyakarta	143,830		235		2,000	140	20,085,874
East Jawa	1,738,782		389		2,000	145	251,536,937
Bali	200,947		611		500	195	39,094,723
West Kalimantan	475,847	355			500	202	96,066,474
Central Kalimantan	286,127		480		500	185	52,933,528
South Kalimantan	418,401		515		500	188	78,471,980
East Kalimantan	1,471,875			603	2,000	152	223,178,818
North Sulawesi	127,999			0		22	2,815,978
Central Sulawesi	79,228			475	500	185	14,628,342
South Sulawesi	338,923			731	2,000	156	52,802,629
Southeast Sulawesi	55,895			365	500	177	9,871,828
West Nusa Tenggara	462,845		760		1,000	165	76,316,980
East Nusa Tenggara	388,073			720	1,000	163	63,336,785
East Timor	99,546			609	500	194	19,352,452
Maluku	430,203			366	1,000	148	63,823,096
Irian Jaya	1,012,054			485	2,000	148	149,569,209
				Total Shipping Cost (US$)			2,080,907,821

Table A.5.3.2.9 Total Feeder Cost from/to Hub Port (Case2-3)

Province	Container Volume	Mother Port				Feeder Vessel	Shipping Cost	Total Shipping Cost (US$)
		Singapore	Tg.Priok	Tg.Perak	Bitung			
Aceh	491,075	486				1,000	179	88,094,304
North Sumatra	1,014,679	373				2,000	167	169,595,425
West Sumatra	325,478		573			1,000	157	51,113,379
Reau	847,552	162				2,000	160	135,840,051
Jambi	134,467	241				500	194	26,029,183
South Sumatra	580,520	295				2,000	165	95,555,315
Bengkulu	73,865		374			500	177	13,094,119
Lampung	295,756		120			1,000	138	40,824,560
DKI.Jakarta	1,862,801		0			2,000	22	40,981,628
West Jawa	1,899,959		0			2,000	22	41,799,088
Central Jawa	1,175,048			183		2,000	138	162,106,124
D.I.Yogyakarta	143,830			183		2,000	138	19,842,411
East Jawa	1,738,782			0		2,000	22	38,253,194
Bali	200,947			275		500	170	34,171,513
West Kalimantan	475,847	355				500	202	96,066,474
Central Kalimantan	286,127			293		500	171	49,032,065
South Kalimantan	418,401			268		500	170	70,936,403
East Kalimantan	1,471,875			442		2,000	146	215,464,889
North Sulawesi	127,999				0	500	22	2,815,978
Central Sulawesi	79,228				475	500	185	14,628,342
South Sulawesi	338,923			458		2,000	147	49,790,720
Southeast Sulawesi	55,895				365	500	177	9,871,828
West Nusa Tenggara	462,845			420		1,000	151	69,714,470
East Nusa Tenggara	388,073			697		1,000	162	62,962,298
East Timor	99,546				609	500	194	19,352,452
Maluku	430,203				366	1,000	148	63,823,096
Irian Jaya	1,012,054				485	2,000	148	149,569,209
						Total Shipping Cost (US$)		1,831,328,518

Table A.5.3.2.10 Total Feeder Cost from/to Hub Port (Case3)

Province	Container Volume	Port	Mother Port		Feeder Vessel	Shipping Cost	Total Shipping Cost (US$)
			Batam	Bitung			
Aceh	491,075	Lhok Seumawe	486		1,000	153	75,326,347
North Sumatra	1,014,679	Belawan	373		2,000	144	146,257,805
West Sumatra	325,478	Teluk Bayur	1,025		1,000	176	57,285,790
Reau	847,552	Dumai	162		2,000	137	116,346,358
Jambi	134,467	Jambi	241		500	168	22,533,039
South Sumatra	580,520	Palembang	295		2,000	142	82,203,347
Bengkulu	73,865	Bengkuku	820		500	210	15,496,272
Lampung	295,756	Panjang	630		1,000	159	47,153,013
DKI.Jakarta	1,862,801	Tg.Priok	532		2,000	149	278,149,216
West Jawa	1,899,959	Tg.Priok	532		2,000	149	283,697,455
Central Jawa	1,175,048	Tg.Emas	675		2,000	154	180,925,251
D.I.Yogyakarta	143,830	Tg.Emas	675		2,000	154	22,145,945
East Jawa	1,738,782	Tg.Perak	763		2,000	157	272,705,696
Bali	200,947	Benoa		966	500	220	44,296,329
West Kalimantan	475,847	Pontianak	355		500	176	83,694,465
Central Kalimantan	286,127	Sampit	734		500	204	58,232,842
South Kalimantan	418,401	Banjarmasin		900	500	216	90,217,716
East Kalimantan	1,471,875	Balikpapan		603	2,000	152	223,178,818
North Sulawesi	127,999	Bitung		0	500	22	2,815,978
Central Sulawesi	79,228	Pantoloan		921	500	217	17,204,911
South Sulawesi	338,923	Makassar		795	2,000	158	53,508,718
Southeast Sulawesi	55,895	Kendari		1,128	500	232	12,981,556
West Nusa Tenggara	462,845	Lember		760	1,000	191	88,350,958
East Nusa Tenggara	388,073	Kupang		1,084	1,000	178	69,263,435
East Timor	99,546	Dilli		1,145	500	233	23,243,059
Maluku	430,203	Ambon		1,339	1,000	189	81,385,345
Irian Jaya	1,012,054	Sorong		1,619	2,000	185	186,928,237
				Total Shipping Cost (US$)			2,635,527,900

Appendix 5.3.3 Present Potential for Indonesian Ports to be International Hub Ports

Tabe A.5.3.3.1 Present Potential of Indonesian Ports

Items of Criteria	O/D Container Base International Hub Port (Tg. Priok/Bojonegara and Tg. Perak/Gresik)	Transshipment Port Type International Hub Port (Batam and Bitung)
1. Geographical Condition	- Tg.Priok/Bojonegara port is located in West Jawa where the demand for container cargoes is the greatest in Indonesia and will increase in future. - Tg.Perak/Gresik port is located East Jawa as eastern gateway for Jawa Island and the distribution center of the eastern part of Indonesia at present. - In particular, Bojonegara port is located along the Sunda Strait, which is recognized as the alternative route of the Malacca Strait.	- Batam is located along the Malacca Strait which plays an important role as key waterway of International Trunk Container Route - Bitung port is situated facing one of the international sea lane, Indonesia has 3 international sea lanes; Sunda, Lombok and other one lane
2. Cargo Condition	- Sufficient volume of O/D container cargoes is expected to be handled in Tg.Priok/Bojonegara and Tg.Perak/Gresik ports because the economic activities in the hinterland is most vital in Indonesia.	- At present, almost all container cargo produced in Batam Island is transported to Singapore Port for international service. - However Batam has potential for handling transshipment containers, because it is proximate to the many export/import oriented industries in surrounding countries. - O/D Container cargo produced in Batam Island, which is acknowledged to O/D cargo of Batam port, is still small.
3 Port Development Condition	- In Tg.Priok/Bojonegara and Tg.Perak/ Gresik, at present port facilities are not sufficient for accommodating Panamax type vessels at International Trunk Line. - Construction plan of Bojinegara port had prepared as the BOT Scheme but because of the economic crises, it is postponed.	- In Batam, port facilities are limited only to accommodate the feeder container from/to Singapore at present. - The tentative location for international hub port in Batam Island is nominated for private sector investment
4. Port Service Condition	- For Tg.Priok/Bojonegara and Tg.Perak/ Gresik port, the service level is still not sufficient compared to that of the Mother Port Type International Hub Port in other countries.	- For Batam port to become a Trans-shipment Port Type International Hub Port, more comprehensive port service is required compared to that of Singapore port

Appendix 5.3.4 Batam port Development Scenario

The Study Team examined the following 2 Alternative Scenarios (See Table A.5.3.4.1). Alternative 1 is more practical and efficient than Alternative 2 (See Table A.5.3.4.2).

If all international containers in Indonesia shall pass through in Batam port, total transportation cost would be definitely more expensive than the case that several major ports would be called by international direct service as shown Appendix 5.3.2.

Table A.5.3.4.1 Scenarios of Batam port Development

	Scenario of Development	
Alternative 1	Basic Policy	Basically Batam port shall be developed based on the industrial activities in Batam Island in primary phase.
	First Step	- The container volume produced in Batam Island is not so big at present, hence Batam port shall play a role as the feeder port of Singapore port. The port facilities shall be developed based on O/D container volume as a feeder port of Singapore
	Second Step	- After a certain volume of container will be produced in Batam Island, these containers shall be transported to/from foreign countries directly through Batam port. Necessary port facilities of Batam Island shall be developed for calling of international service vessel.
	Final Step	- After the port service level becomes almost the same as that of Singapore, Batam port is expected to handle the substantial volume of transshipment container from/to Indonesia.
Alternative 2	Basic Policy	According to the policy of Batam development, Batam port shall be developed to collect almost all of the international containers all over Indonesia, intentionally, by private funds.
	First Step	- International container from/to all over Indonesia shall be transported through Batam port, Intentionally. So, very large port facilities should be developed to satisfy handling all international containers in Indonesia with sufficient service level.
	Final Step	- By taking strategic measures, such as setting of the incentive tariff system for transshipment container, Batam port shall start to handle the transshipment container under great competition with Singapore. So, sufficient big scale port facilities with more fruitful port service than Singapore should be developed for accommodating Over-Panamax container vessels and for handling international containers including transshipment containers of neighboring countries.

Table 5.3.4.2 Evaluation of the Batam port Development Scenario

	Alternative 1	Alternative 2
Relation with Singapore	- Singapore is important investor for Indonesian society, it is essential to maintain Good relation with Singapore for recovery of economic activity. ○ - Port service level can be developed, because support of Singapore can be easily obtained by friendly relation with it. ○ - Comprehensive development of Batam Island can be promoted, because the activities of Singapore investors in Batam Island shall be stimulated. ○	- Port industry is vital for for Singapore and invest a lot of money to organize present system X - Conflict against Singapore shall be caused, because container volume produced in Indonesia, which were handled in Singapore port, are forcefully reduced. X - Port service level cannot be developed, because support of Singapore cannot be obtained by hostile relation with it. X
Efficiency and Effectiveness of Container Transportation	- By utilizing present container transportation system, in which Singapore port play an important role as hub port of Indonesian ports, reliable and time-conscious container transportation can be secured. ○ - By utilizing present Singapore oriented system, containers can be transported to anywhere all over the world. ○	- By forcing the shipping company to use Batam port, reliable and time-conscious container transportation cannot be secured for the present and forthcoming time. X - The number of destination and origin countries of the international container is limited. X - Shipping operator selects calling port based on market requirement X
Recovery and promotion of socio-economic Development	- By utilizing present Singapore oriented system, recovery and promotion of socio-economic development can be facilitated. ○	- By forcing the shipping company to use Batam port, effective container transportation system cannot be realized for the present. So recovery and promotion of socio-economic development cannot be facilitated. X

Appendix 5.3.5 Bitung Port Development Scenario

The Study Team examined future role of Bitung Port comparing that of Tg.Perak/Gresik Port which is one of the most important distribution center for eastern part of Indonesia at present, based on the criteria given in Table 5.3.1.5.

Table A.5.3.5.1 Scenario of Bitung Port development

Terms	Bitung Port	Tg.Perak/Gresik Port
Short-Term	(Recovery of Socio-Economic Activity) - It is anticipated that primary recovery of economic activity in Indonesia will occur in Jawa Island where the large volume of fundamental capital is concentrated. - Major resource of economic activity in North Sulawesi at present is the most excellent natural condition in the world. Tourism is the one of important resource to recover present economic condition. (Environmental Consideration) - Environmental Conservation is key factor for large –scale development in this area.	(Recovery of Socio-Economic Activity) - Jawa Island will have essential role for primary recovery of economic activity with large fundamental capital. - The effectiveness of port investment in this area is relatively large and will promote the economic recovery. (Investment of Port of Port facilities) - Scale of investment is decided based on volume of O/D container that is produced in primary recovery area. New port facilities will be developed taking advantage of existing facilities.
Middle-Term	(Promote of Socio-Economic Activity) In order to promote economic activity in hinterland, the port should be developed to satisfy regional demand. (Improve Reliability of Transport System) In order to receive feeder service from major port and Intra-Asia service, the port with suitable level of service should be organized to improve the reliability.	(Promote of Socio-Economic Activity) In order to promote economic activity in Indonesia, the port should be developed to receive international direct service and operate with sufficient level of service. (Saving Transport Cost and Delivery Time) If sufficient volume of O/D cargo is handled with international direct service in the port, that cost and time will reduced.
Long-Term	(Rectifying Regional Disparity) After certain level of economic activity is realized in hinterland, transshipment type port facilities might be developed to rectify regional disparity. (Risk of Port Infrastructure Investment) - Certain level of economic activity is realized neighboring area, the investment could be supported by private sectors.	(Rectifying Regional Disparity) Considering development policy in Bitung port area to rectify regional disparity, the role of the port should be clarified. (Saving Transport Cost and Delivery Time) If sufficient volume of O/D cargo is handled with international direct service in the port, total nationwide sea-borne transportation cost could reduced

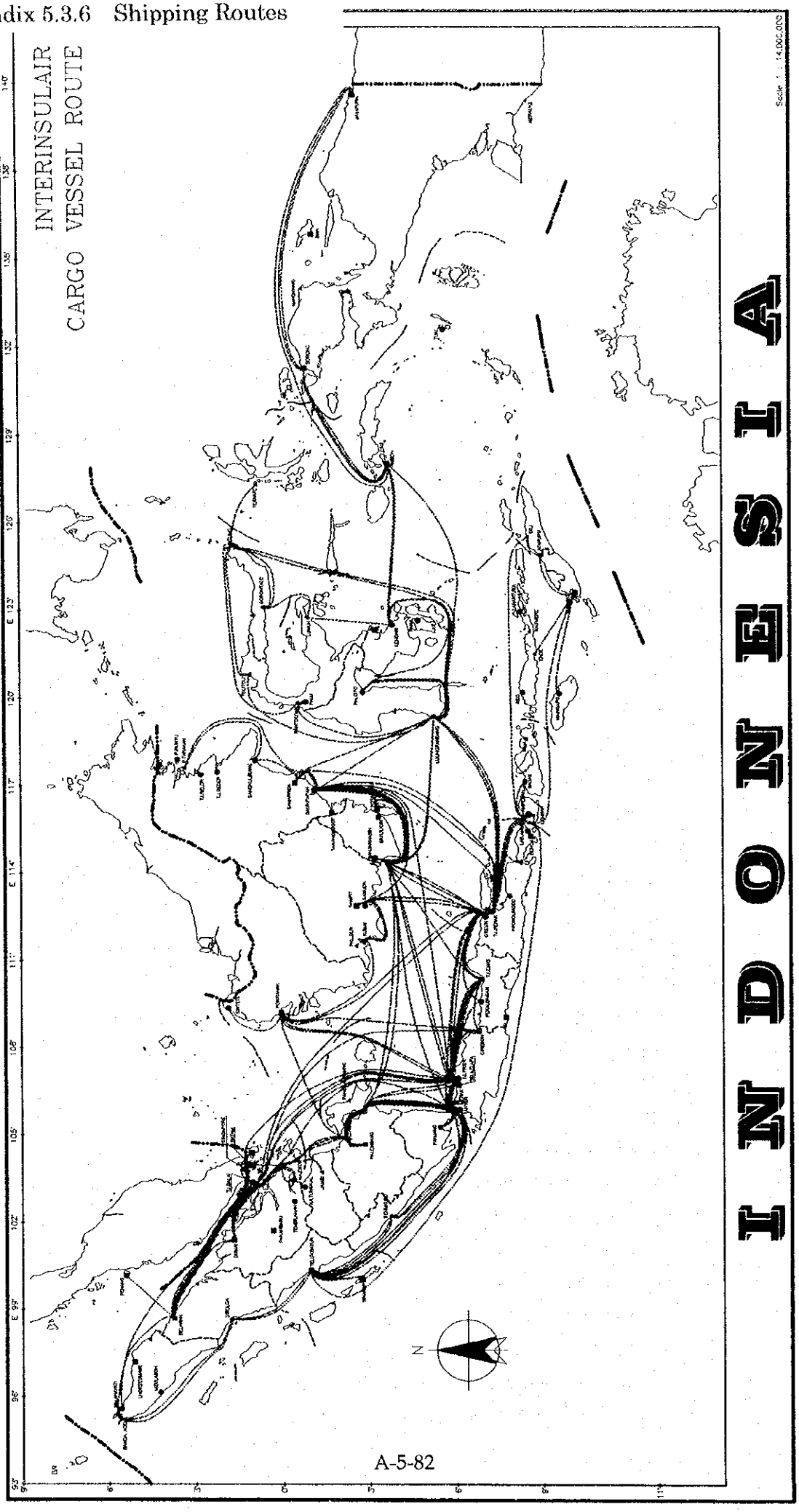


Figure A.5.3.6.1 Inter-Island Shipping Routes

Figure A.5.3.6.2 Inter-Island Shipping Route (Base Port : Belawan)

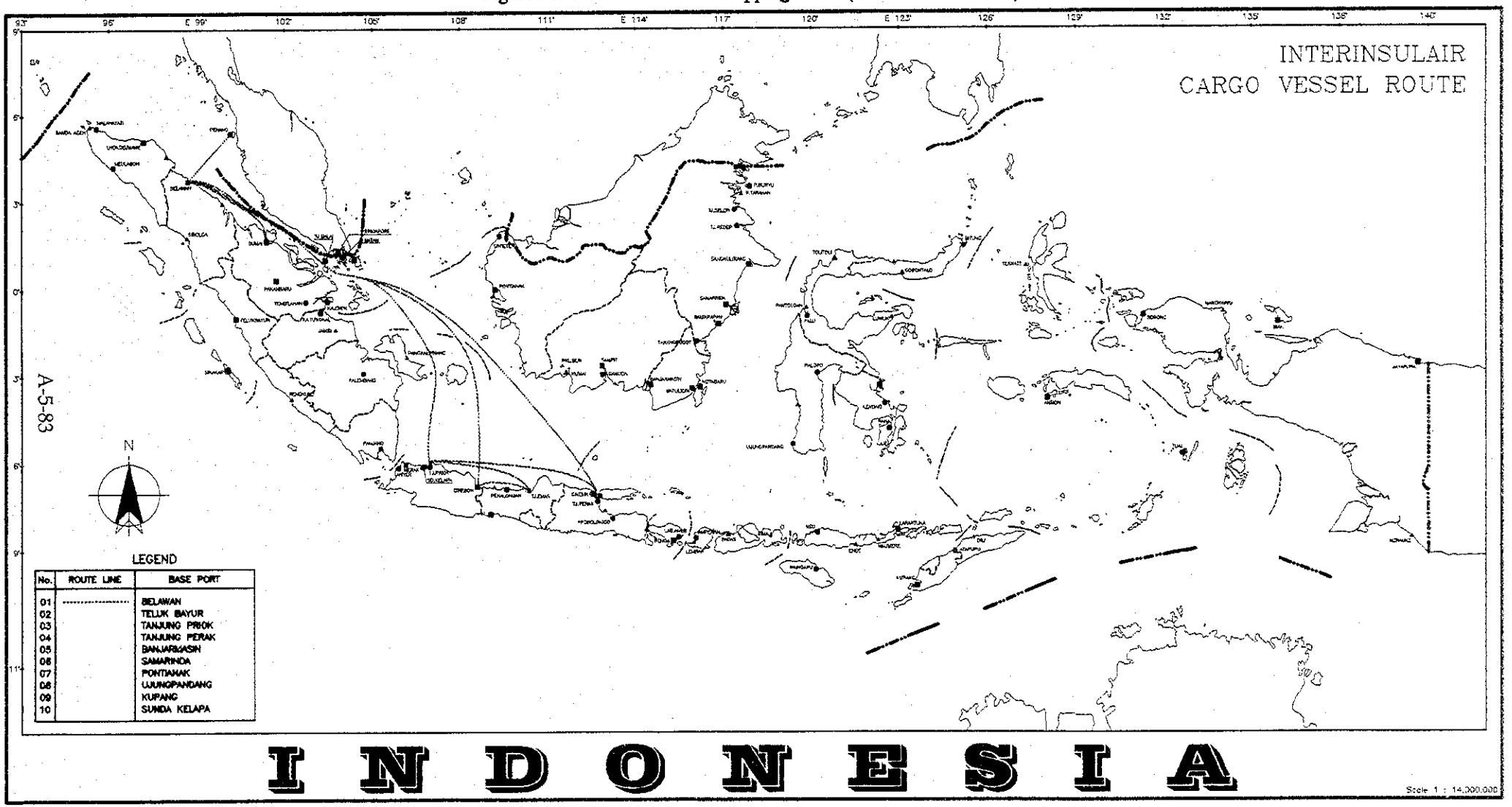


Figure A.5.3.6.3 Inter-Island Shipping Route (Base Port : Teluk Bayur)

Figure A.5.3.6.4 Inter-Island Shipping Route (Base Port : Tg. Priok)

Figure A.5.3.6.5 Inter-Island Shipping Route (Base Port : Tg. Perak)

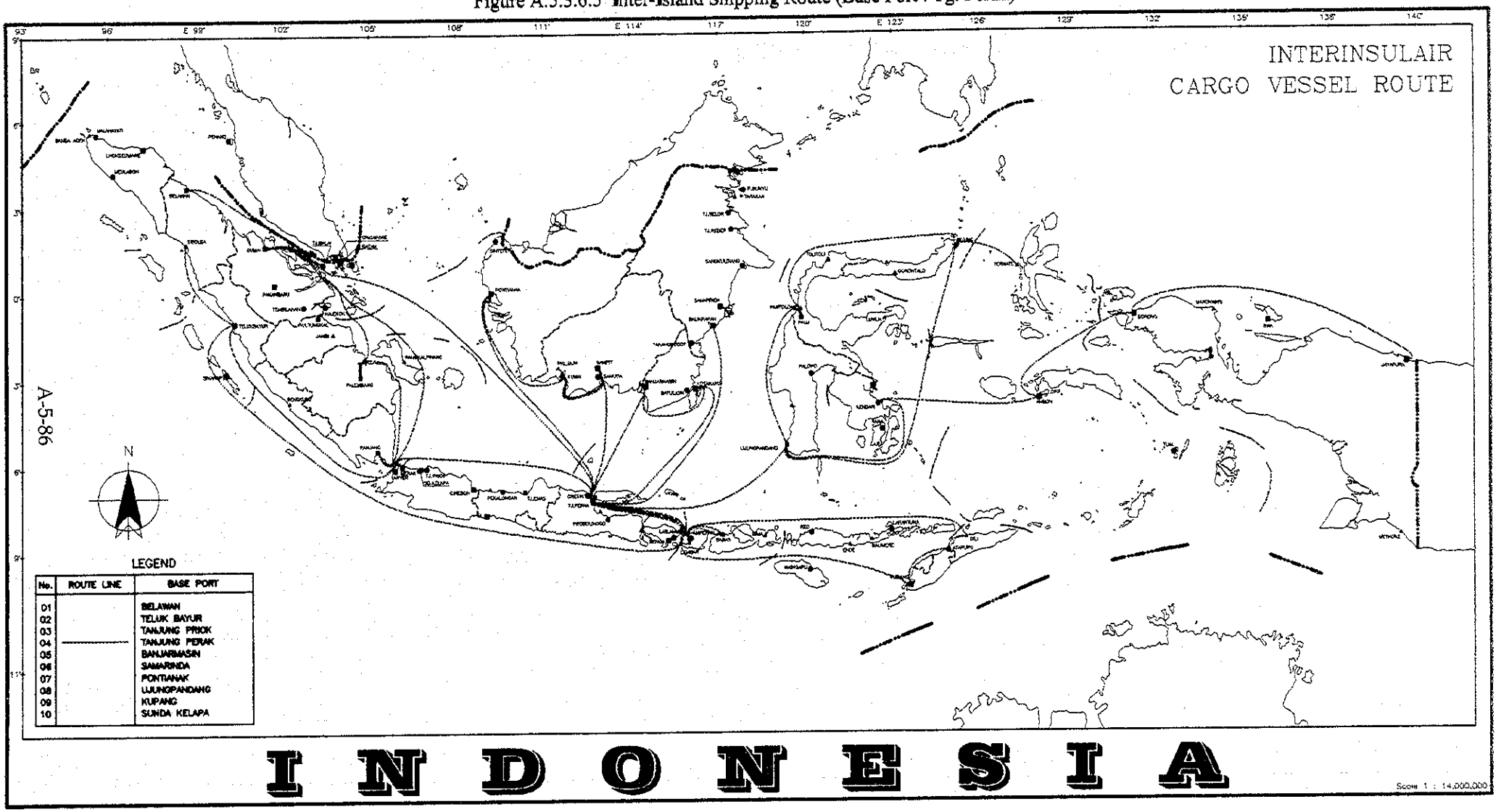


Figure A.5.3.6.6 Inter-Island Shipping Route (Base Port : Banjarmasin)

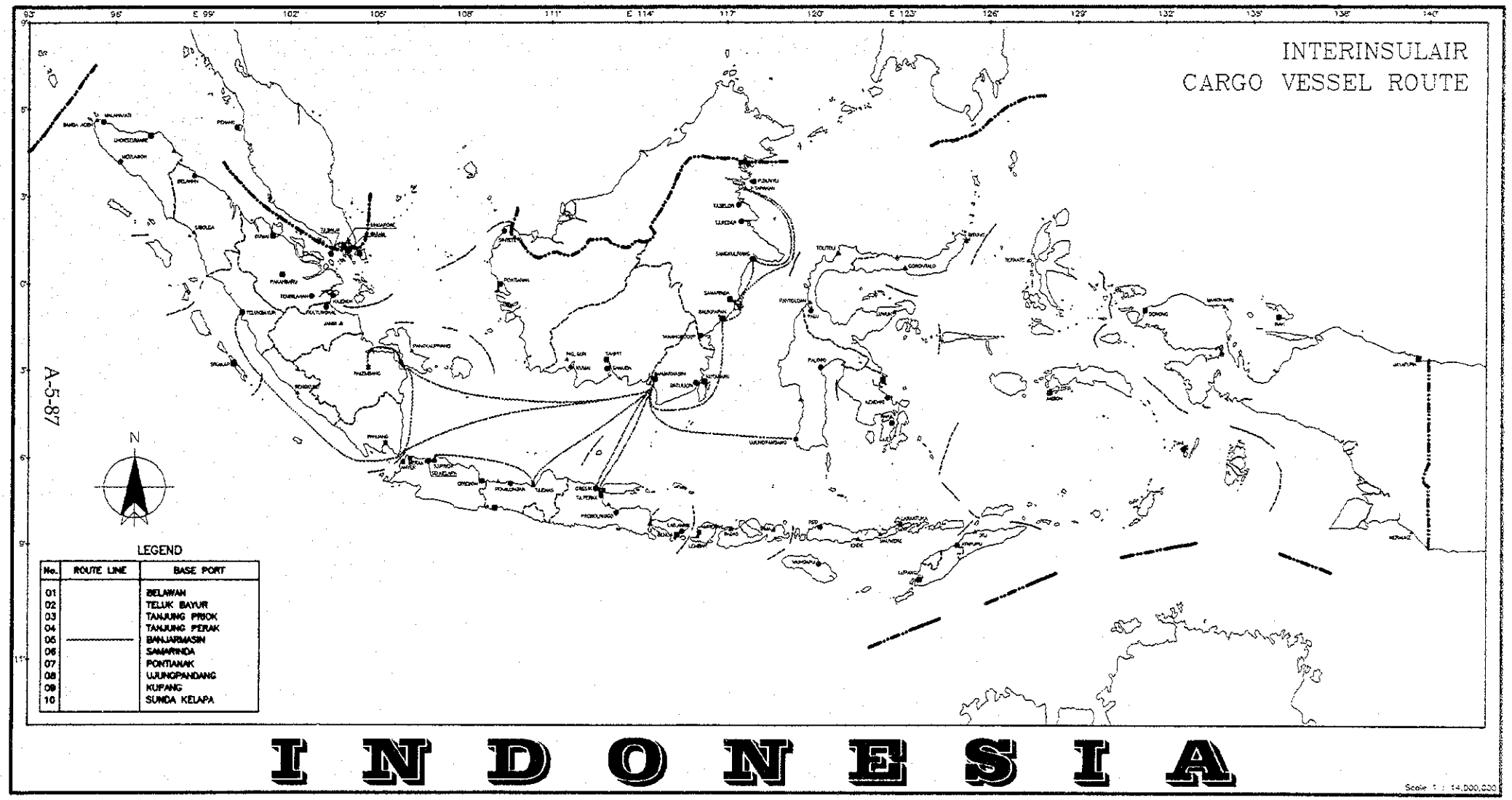


Figure A.5.3.6.7 **Inter-Island Shipping Route (Base Port : Samarinda)**

Figure A.5.3.6.8 Inter-Island Shipping Route (Base Port : Pontianak)

Figure A.5.3.6.9 Inter-Island Shipping Route (Base Port : Ujung Pandang)

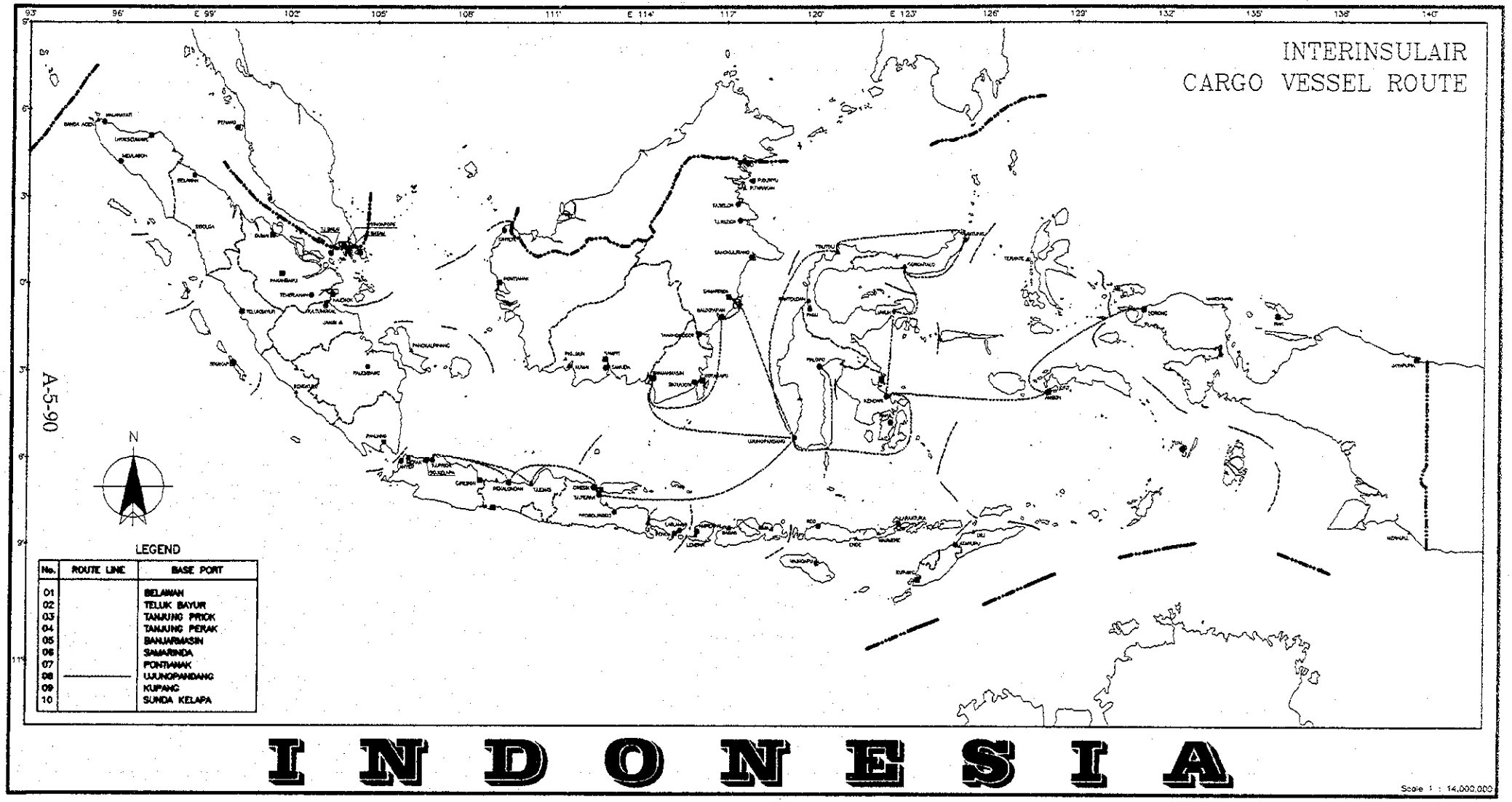
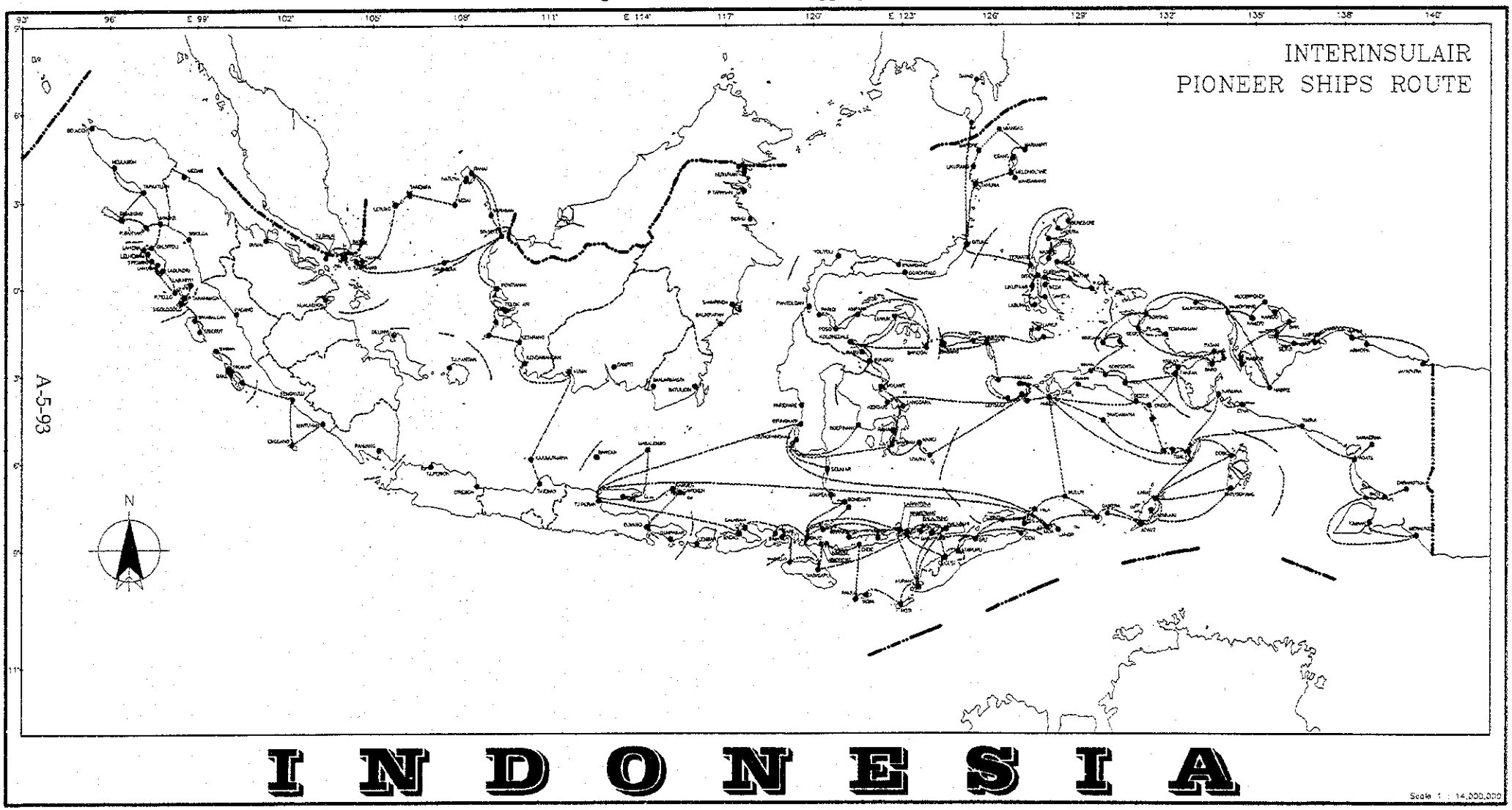


Figure A.5.3.6.10 Inter-Island Shipping Route (Base Port : Kupang)

Figure A.5.3.6.11 Inter-Island Shipping Route (Base Port : Sunda Kelapa)

Figure A5.3.6.12 Pioneer Shipping Routes



Appendix 5.3.7 Comparison between Sea and Land Transportation Cost

As one of a trial for reviewing 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.

The result of this examination can be utilized as one of the reference for justifying the development of feeder ports.

(1) Procedure

The tariff in transporting the cargo by sea and land was collected and compared by distance in each island in the following procedure.

1) Sea transportation cost (See Table A.5.3.7.1)

- The tariff in transporting the cargo by sea, which is reflected by the present commercial situation, was collected by interviewing domestic shipping companies by distance in each island.
- The sea transportation cost includes the cost for loading and unloading cargoes at ports and for transporting cargoes from origin to a port for 30 km distance and from a port to destination by 30 km distance.
- Considering the fact that this tariff is applicable to the shipping service route by inter-island shipping vessel, this sea transportation cost is effective in case the volume of cargoes is large enough to be transported by regular cargo shipping vessels such as inter-island shipping vessels.

2) Land Transportation (See Table A.5.3.7.2)

- The tariff in transporting the cargo by land, which is reflected by the present commercial situation, was collected by interviewing moving companies by distance in each island.
- This land transportation cost is applicable subject to the condition that trunk roads which connect trunk port and other areas in the same province is completed.

3) Comparison between see and land transportation

(Figure A.5.3.7.1 – A.5.3.7.8)

- Sea and land transportation cost was compared by distance in each island.
- The distance in which sea and land transportation cost is same is

estimated by drawing the graph.

(3) Result

Based on the result of this cost comparison, the result is as follows. (Figure A.5.3.7.1 – A.5.3.7.8)

1) When the distance is less than approximately 200 km land transportation cost is cheaper than sea transportation cost.
2) When the origin/destination of cargo is apart from the nearest trunk port by more than approximately 250km, sea transportation cost for transporting same volume of cargoes is cheaper than land transportation cost.

Table A.5.3.7.1 Sea/River Transportation Tariff

DISTANCE (Km) \ COST	REGION							
	SUMATERA (Rp./ Ton)	JAVA (Rp./ Ton)	BALI (Rp./ Ton)	KALIMANTAN (Rp./ Ton)	SULAWESI (Rp./ Ton)	NTT/NTB (Rp./ Ton)	MALUKU (Rp./ Ton)	IRIAN JAYA (Rp./ Ton)
< 50	60,000	44,000	57,000	74,500	74,500	94,450	94,450	94,450
50 ~ 99	69,000	53,500	64,000	81,000	81,000	105,000	105,000	105,000
100 ~ 149	78,000	60,500	73,000	87,500	87,500	116,500	116,500	116,500
150 ~ 199	85,000	67,000	79,000	93,000	93,000	127,000	127,000	127,000
200 ~ 249	90,000	70,000	84,000	99,000	99,000	137,000	137,000	137,000
250 ~ 499	101,000	80,000	93,000	118,000	118,000	155,000	155,000	155,000
> 500	122,000	102,000	107,000	140,000	140,000	175,000	175,000	175,000

Note: Including loading and unloading cost

Source: Tentative Maximum Price based on Discussion on Marketing Price (from PT. Andhika Lines)
(Negotiation between transport company and customer)

Table A.5.3.7.2 Land Transportation Tariff

DISTANCE (Km) \ COST	REGION							
	SUMATERA (Rp./ Ton)	JAVA (Rp./ Ton)	BALI (Rp./ Ton)	KALIMANTAN (Rp./ Ton)	SULAWESI (Rp./ Ton)	NTT/NTB (Rp./ Ton)	MALUKU (Rp./ Ton)	IRIAN JAYA (Rp./ Ton)
< 50	40,000	35,000	38,000	56,000	56,000	62,000	62,000	62,000
50 ~ 99	47,000	40,000	44,000	64,000	64,000	71,000	71,000	71,000
100 ~ 149	60,000	50,000	55,000	90,000	90,000	99,000	99,000	99,000
150 ~ 199	85,000	60,000	73,000	110,000	110,000	121,000	121,000	121,000
200 ~ 249	100,000	71,000	86,000	125,000	125,000	137,500	137,500	137,500
250 ~ 499	120,000	85,000	103,000	150,000	150,000	165,000	165,000	165,000
> 500	150,000	107,000	129,000	188,000	188,000	207,000	207,000	207,000

Source: Tentative Maximum Price based on Discussion on Marketing Price (from PT. Andhika Lines, PT. Toho Diroha)
(Negotiation between transport company and customer)

Figure A.5.3.7.1 Comparison between Sea/River Transportation Cost and Land Transportation Cost by Distance (in Sumatra)

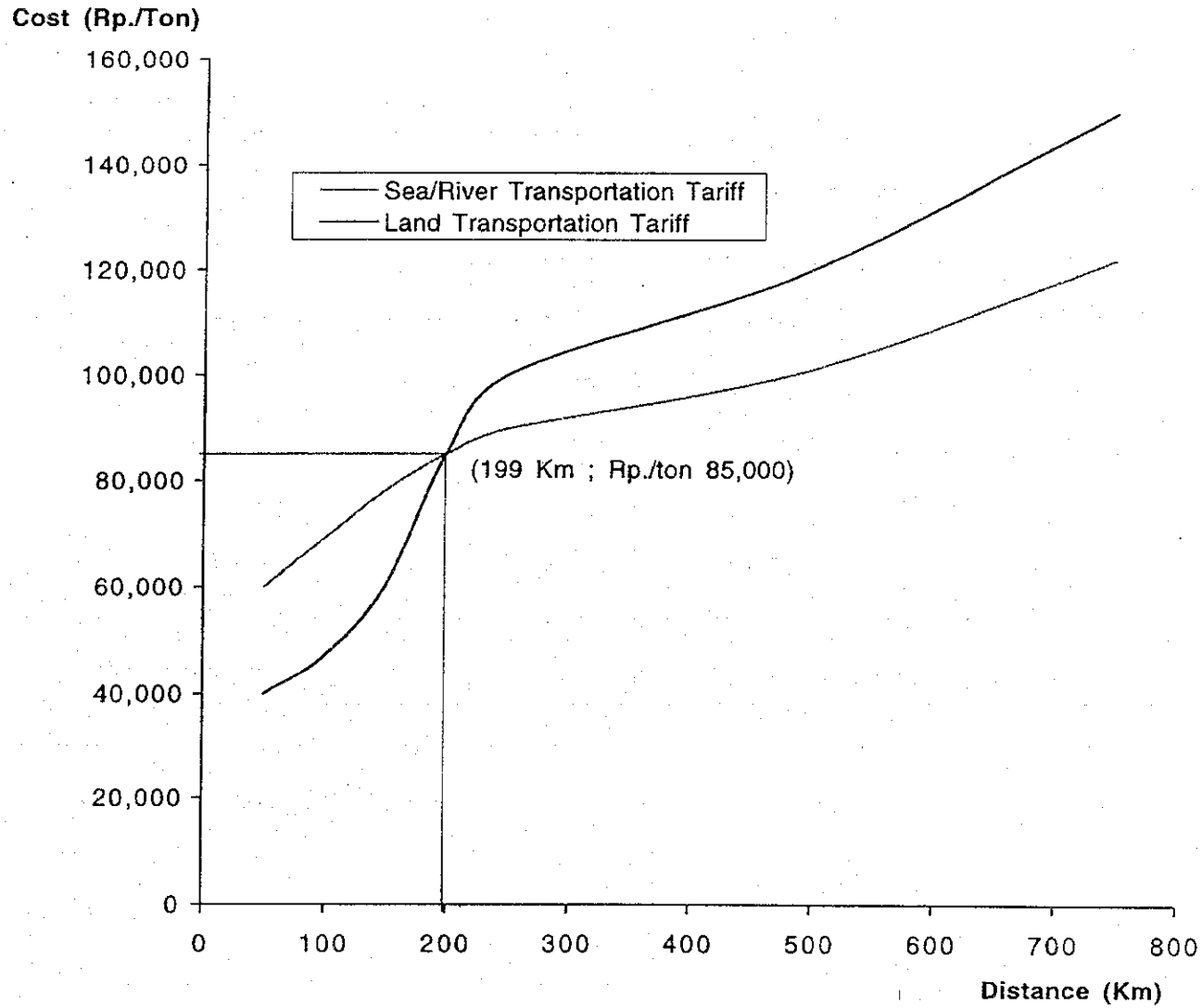


Figure A.5.3.7.2 Comparison between Sea/River Transportation Cost and Land Transportation Cost by Distance (in Java)

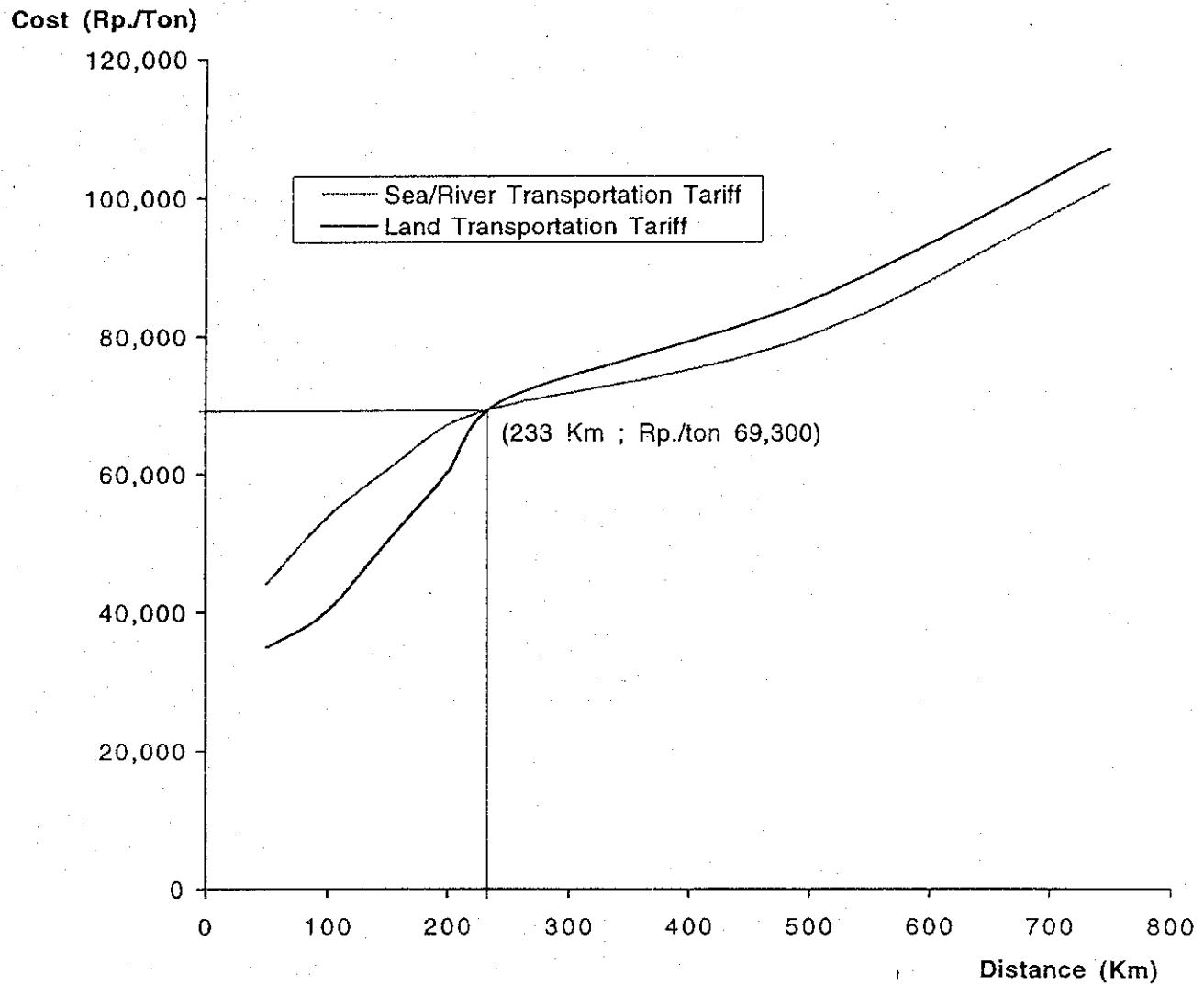


Figure A.5.3.7.3 Comparison between Sea/River Transportation Cost and Land Transportation Cost by Distance (in Bali)

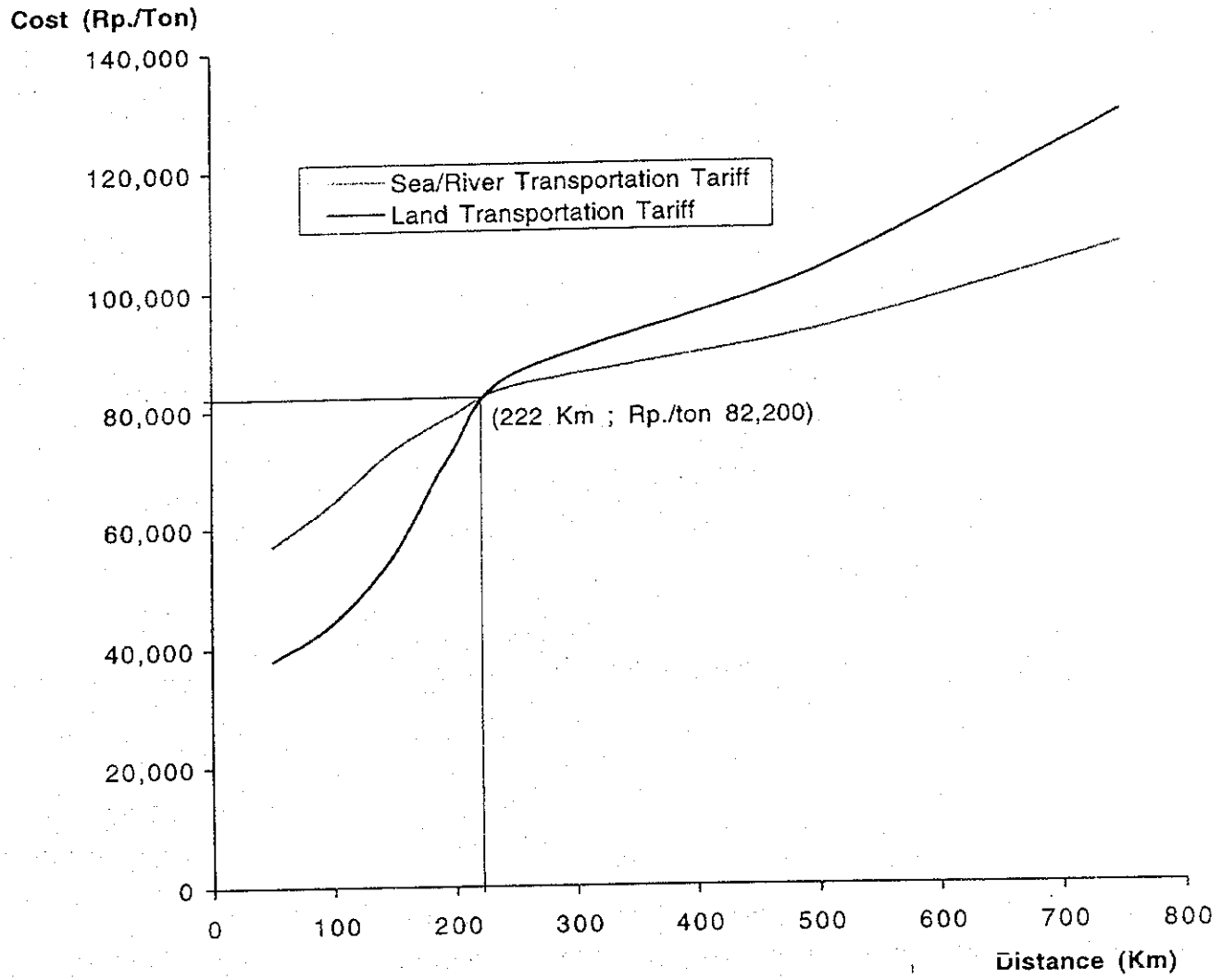


Figure A.5.3.7.4 Comparison between Sea/River Transportation Cost and Land Transportation Cost by Distance (in Kalimantan)

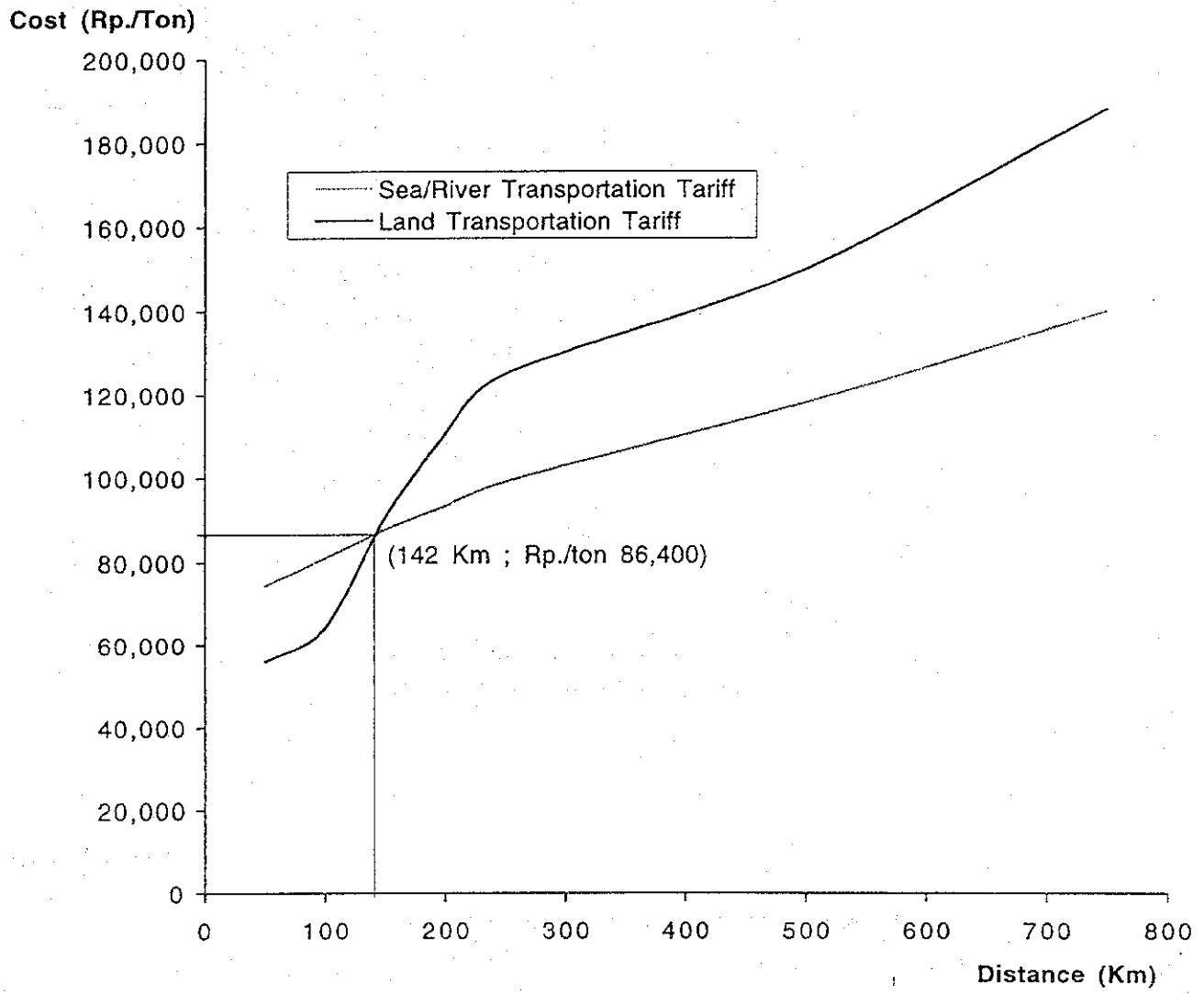


Figure A.5.3.7.5 Comparison between Sea/River Transportation Cost and Land Transportation Cost by Distance (in Sulawesi)

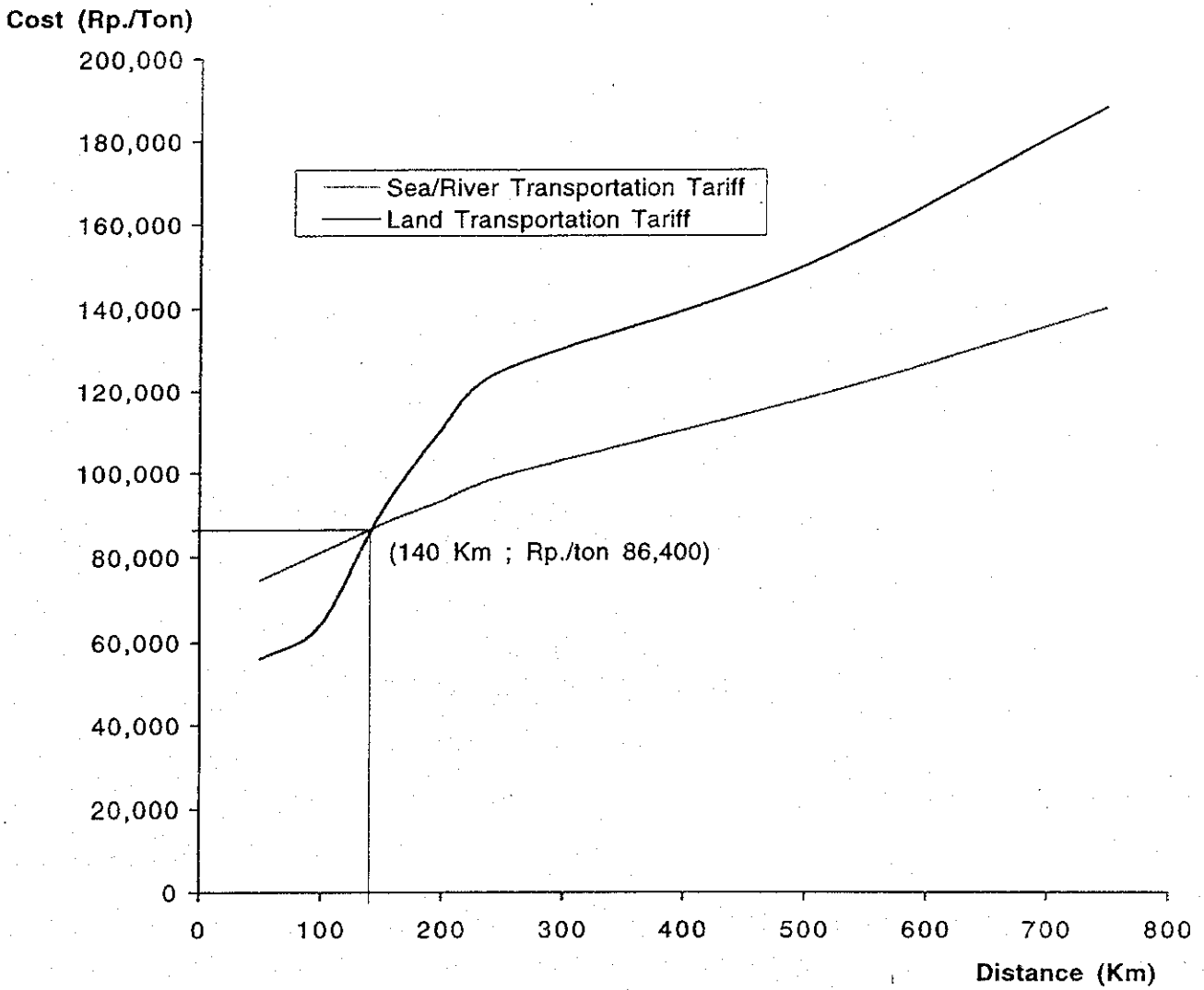


Figure A.5.3.7.6 Comparison between Sea/River Transportation Cost and Land Transportation Cost by Distance (in NTT/NTB)

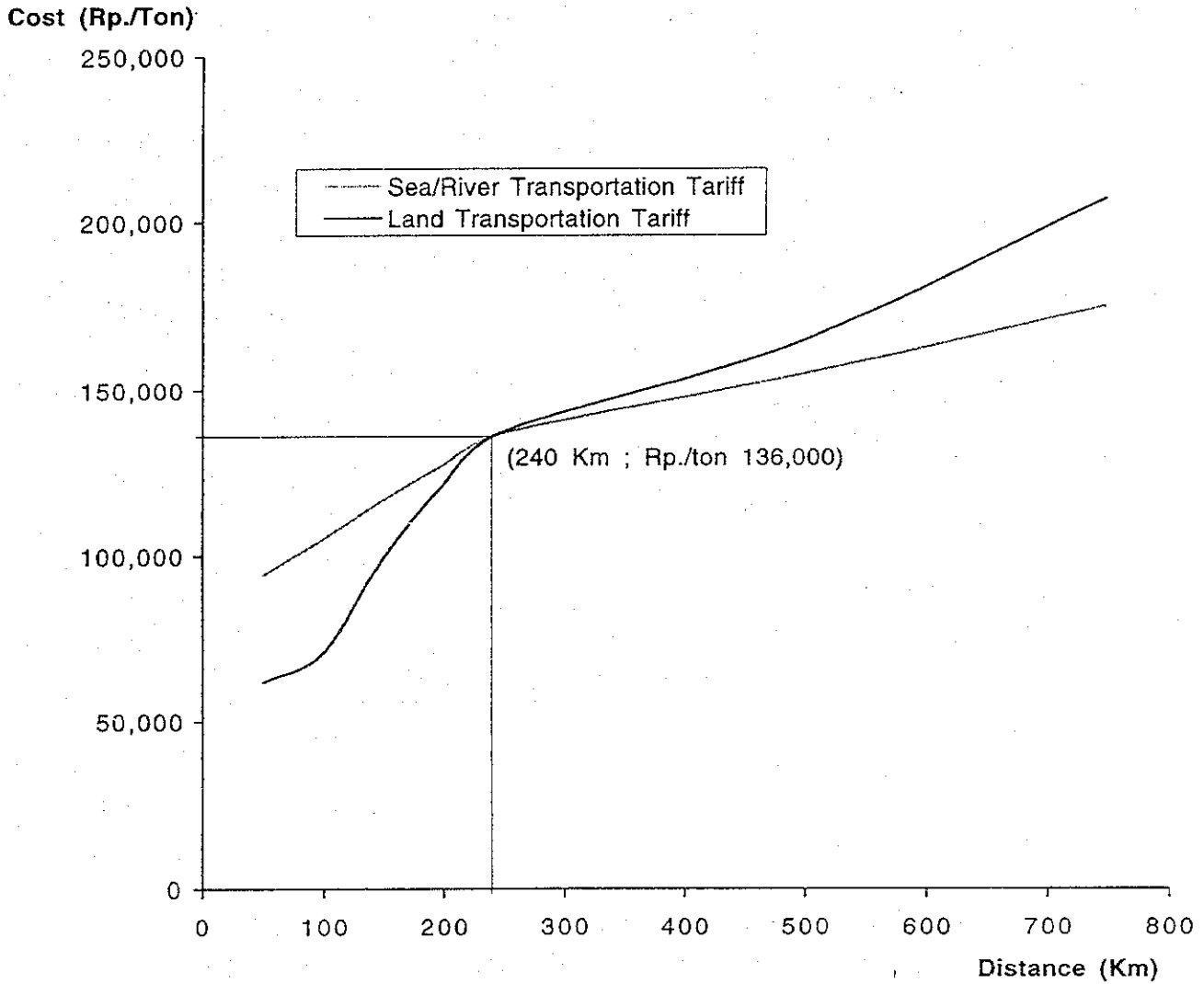


Figure A.5.3.7.7 Comparison between Sea/River Transportation Cost and Land Transportation Cost by Distance (in Maluku)

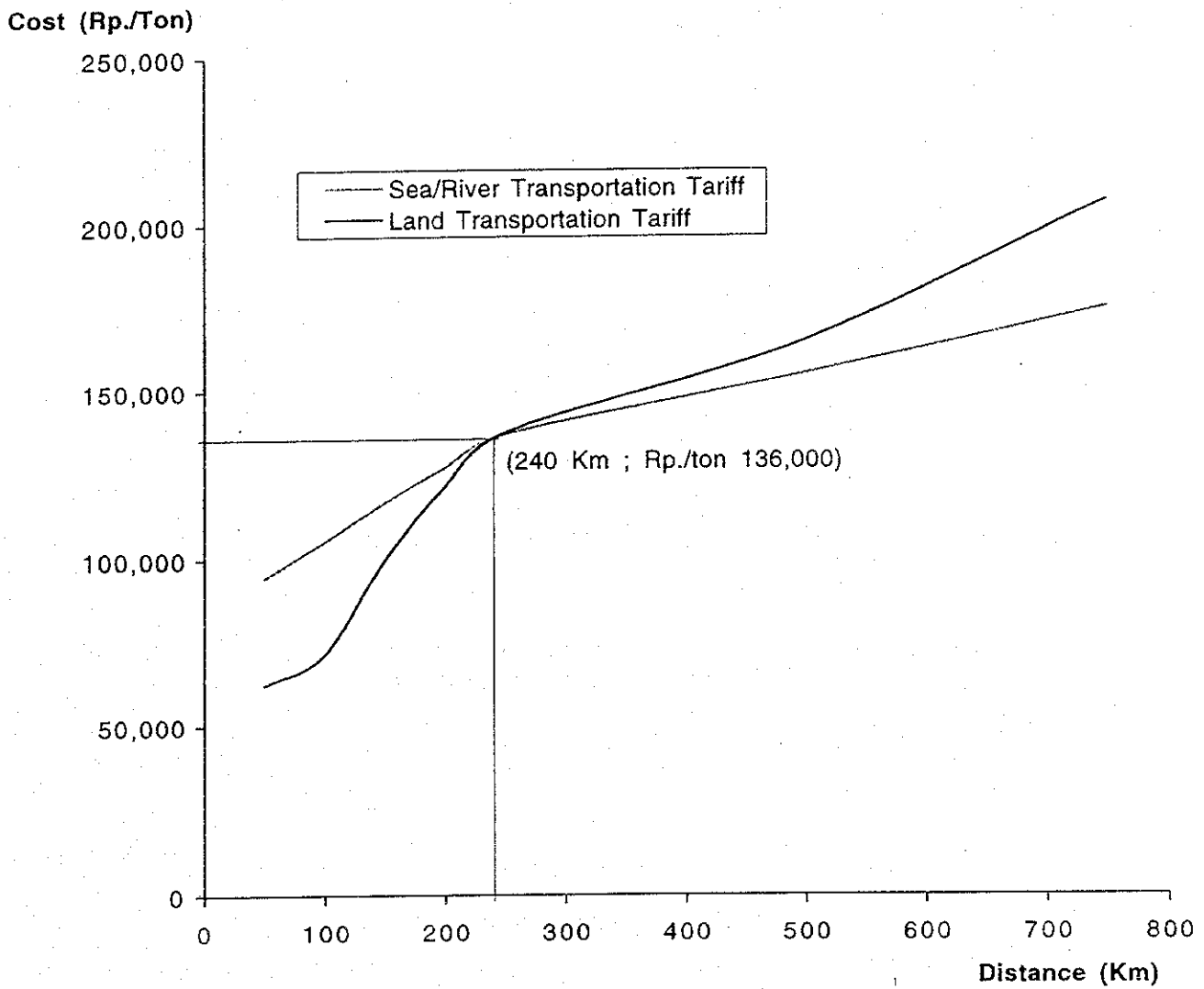
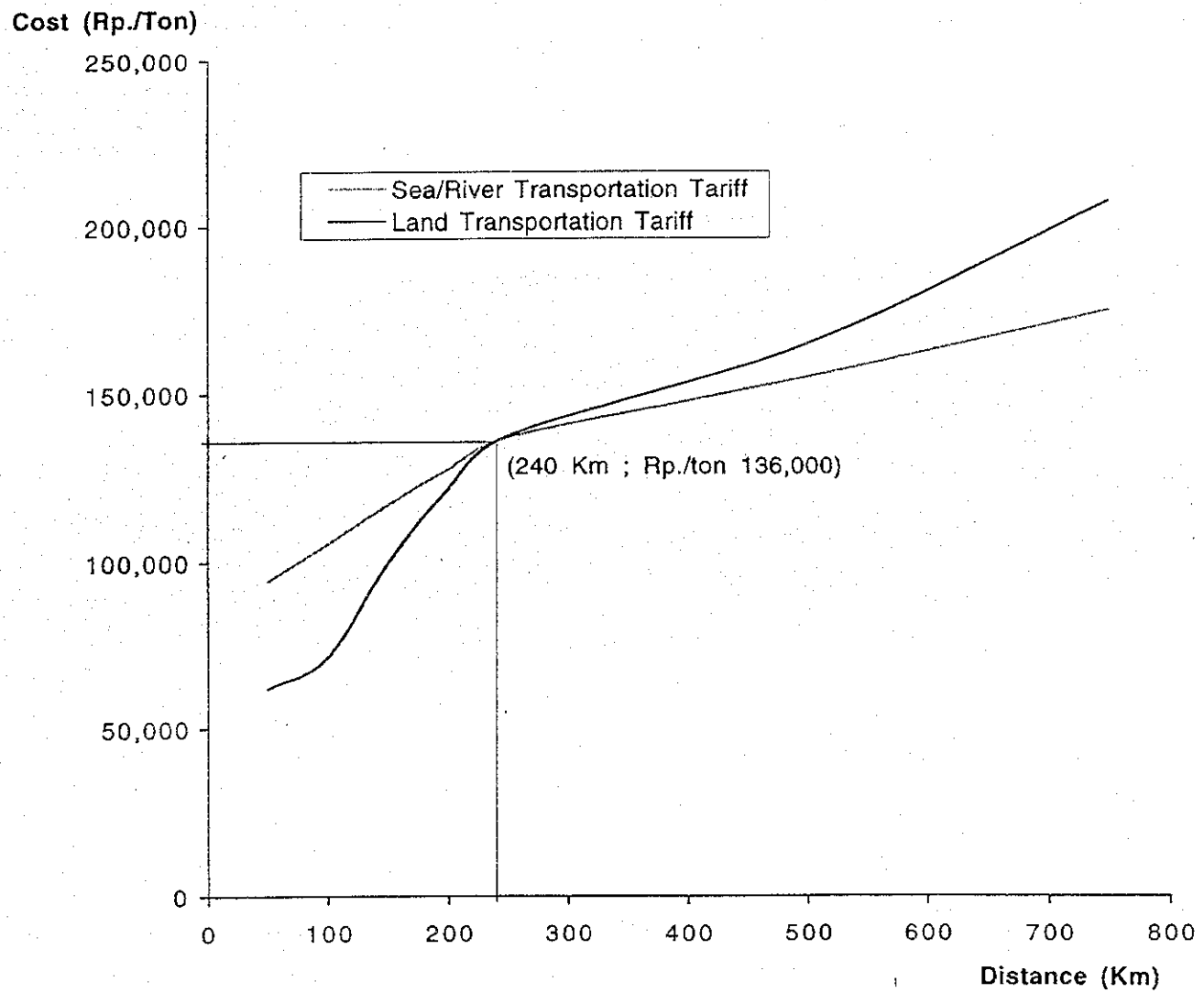


Figure A.5.3.7.8 Comparison between Sea/River Transportation Cost and Land Transportation Cost by Distance (in Irian Jaya)



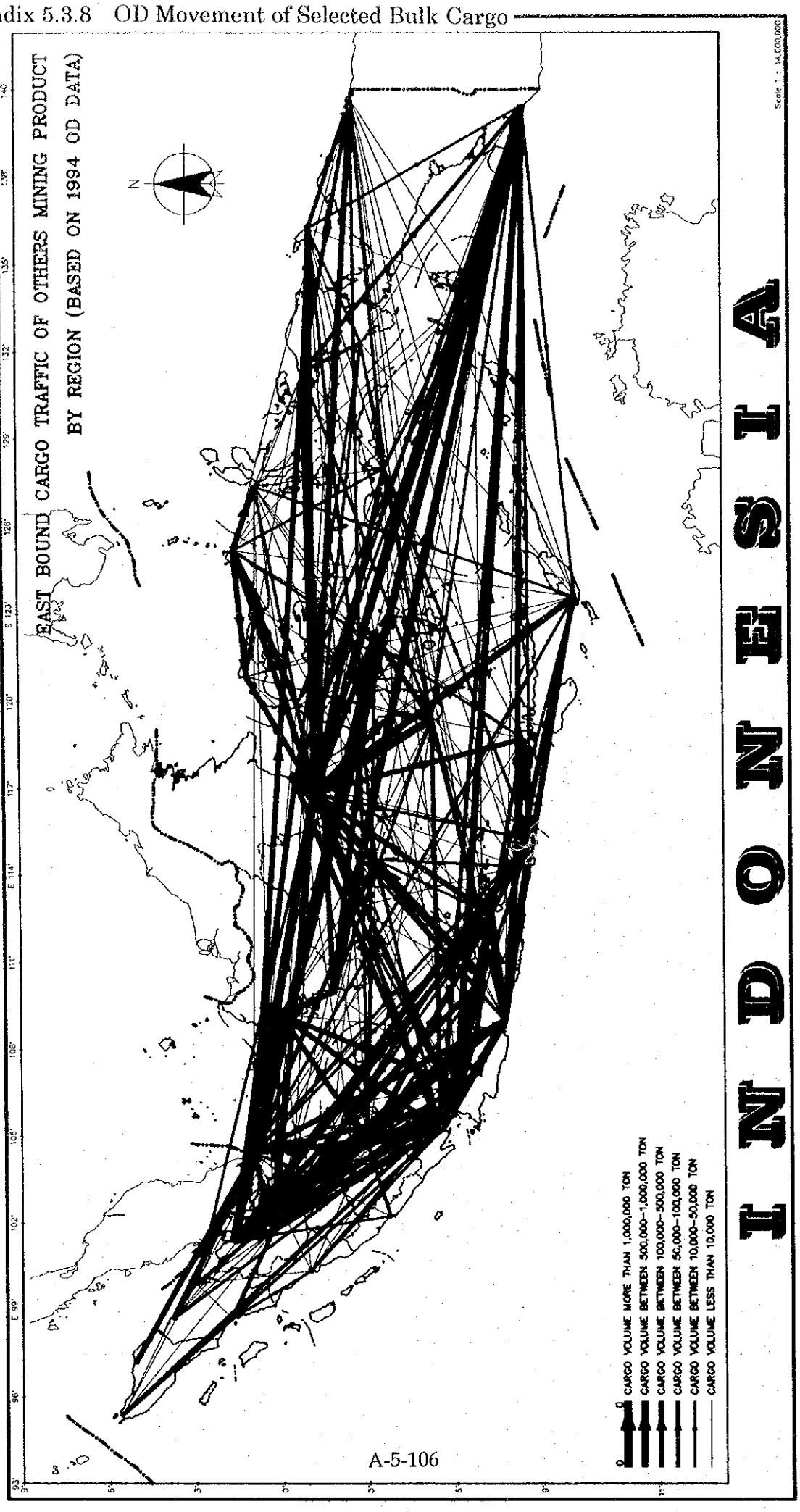
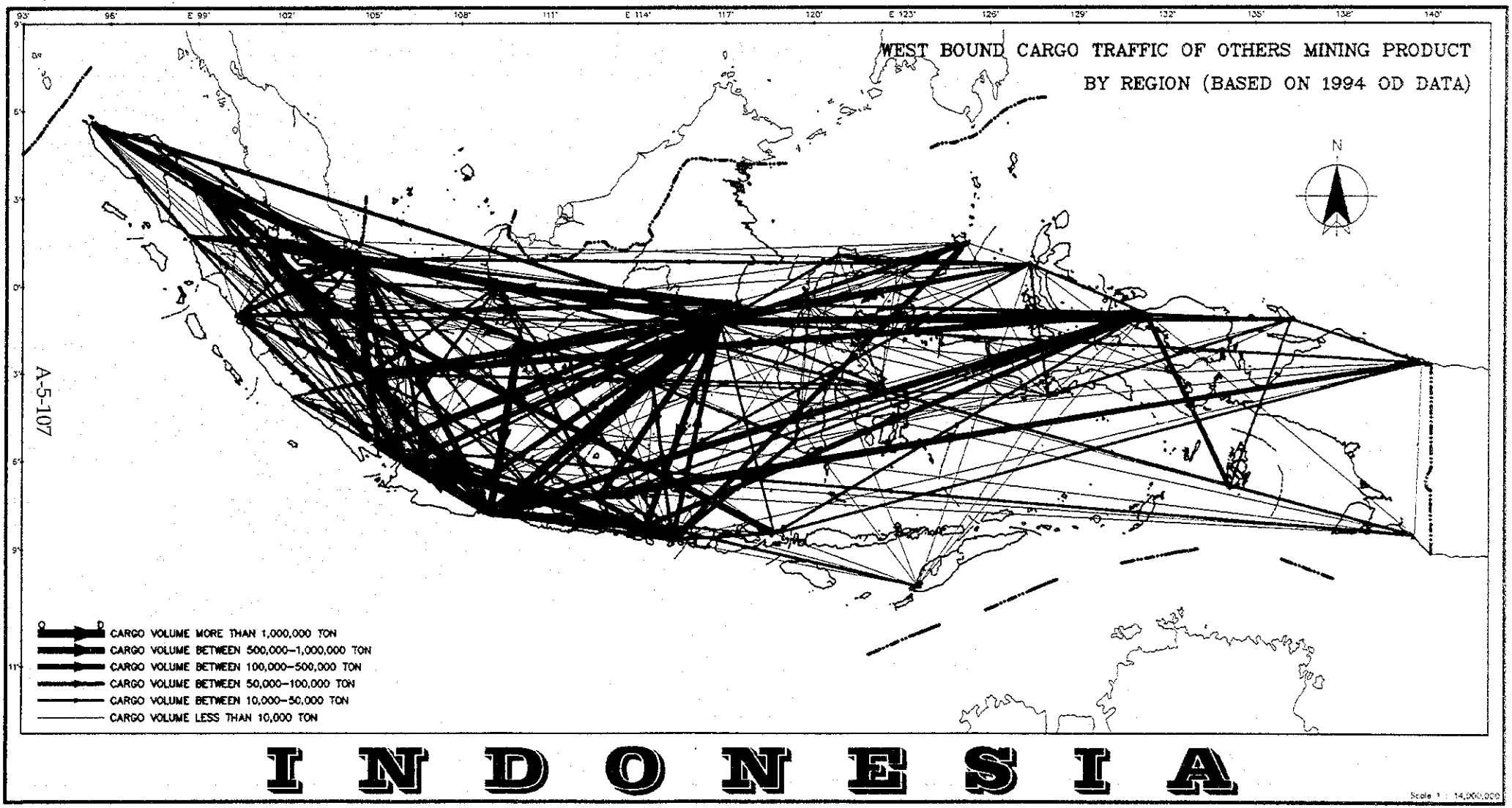


Figure A.5.3.8.1

Figure A.5.3.8.2



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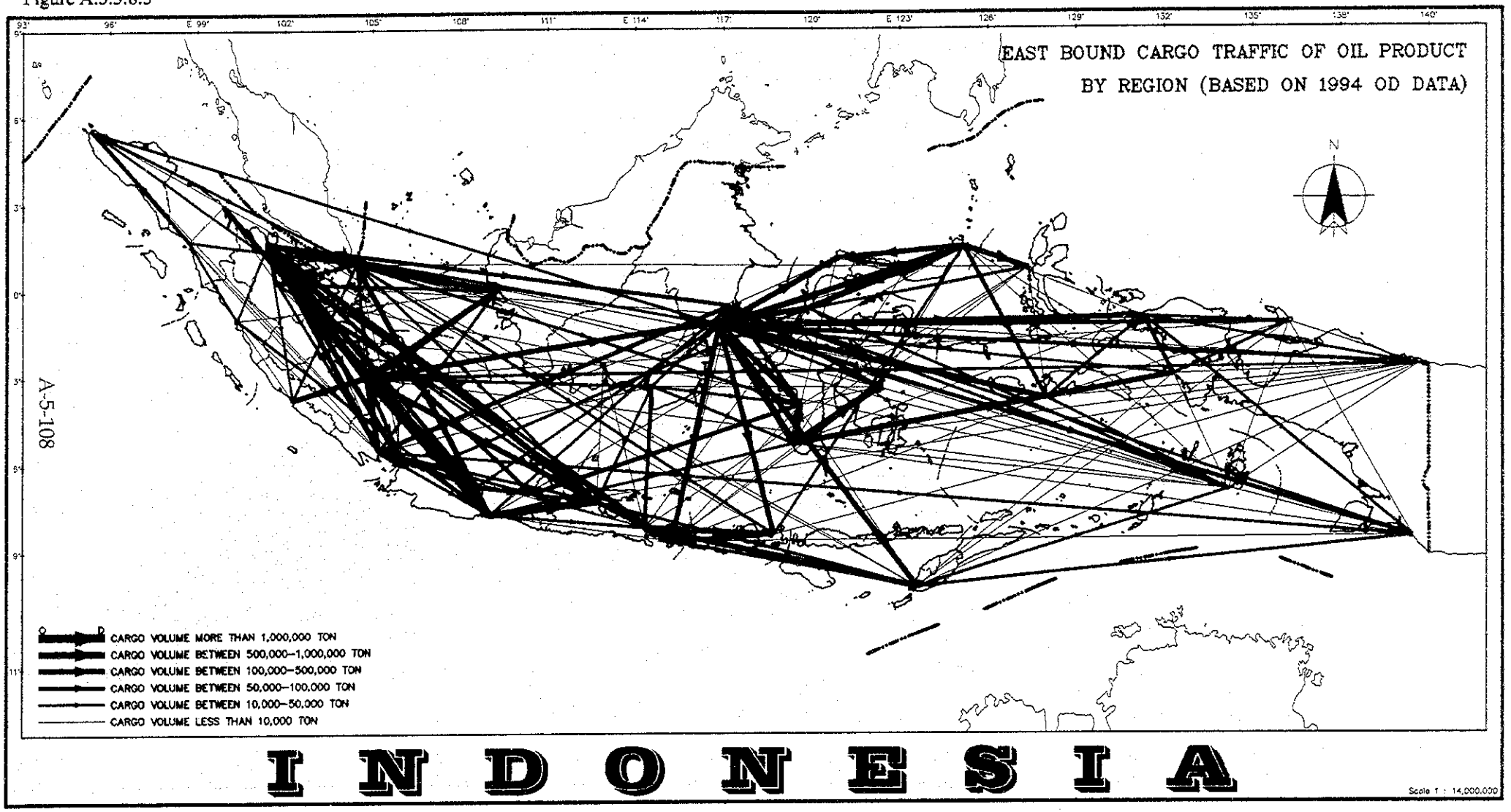


Figure A.5.3.8.4

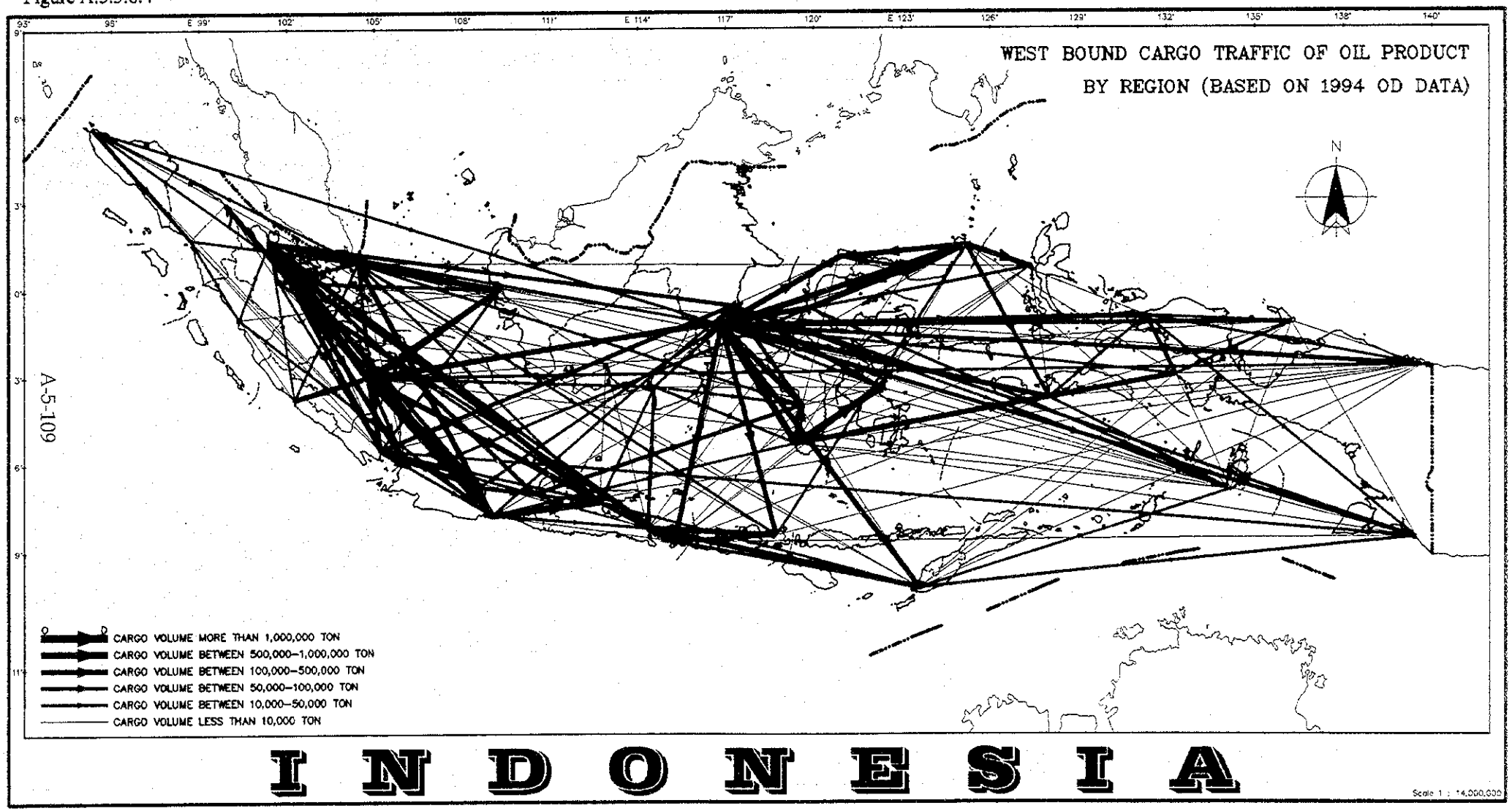


Figure A.5.3.8.5

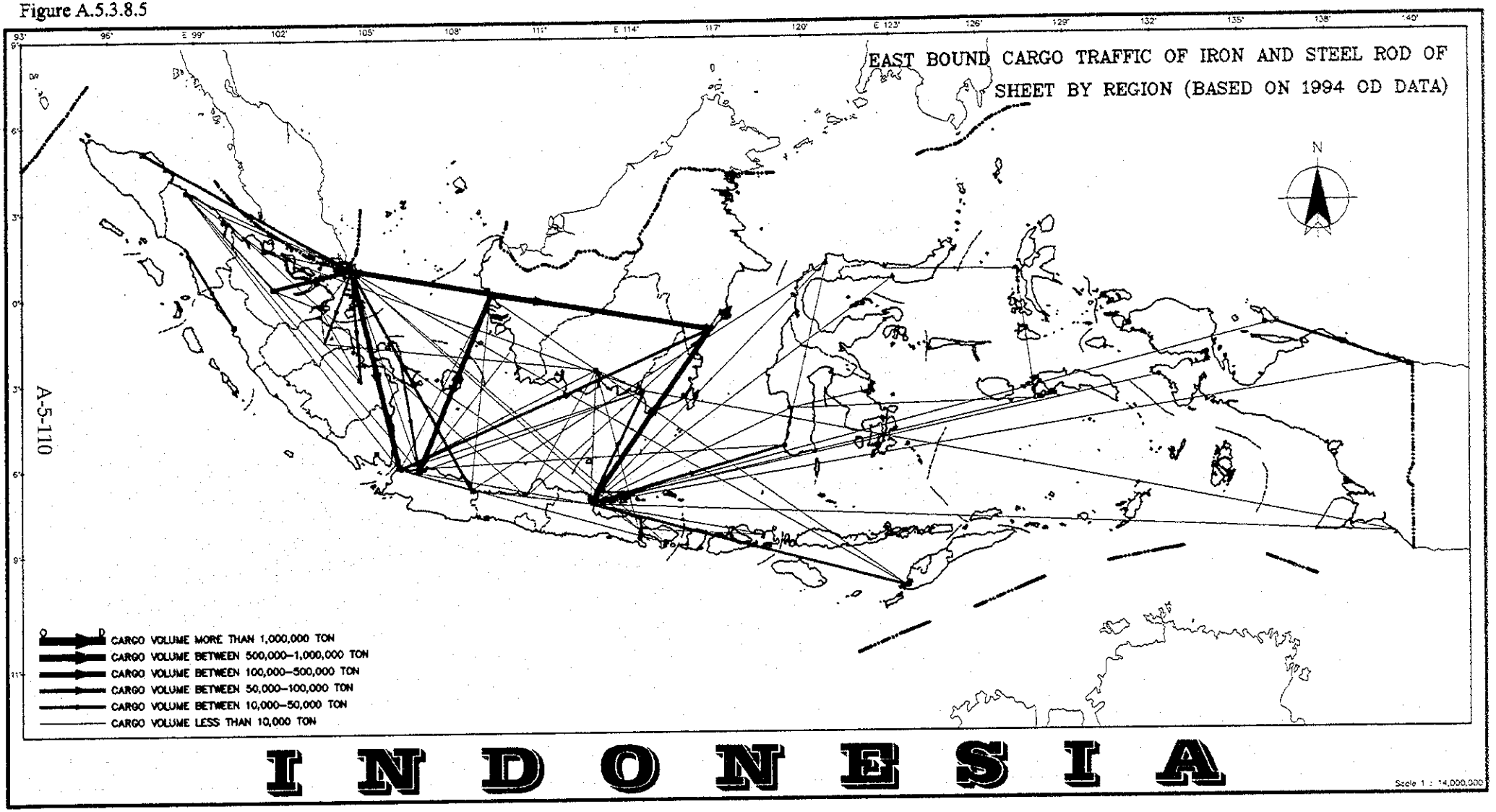


Figure A.5.3.8.6

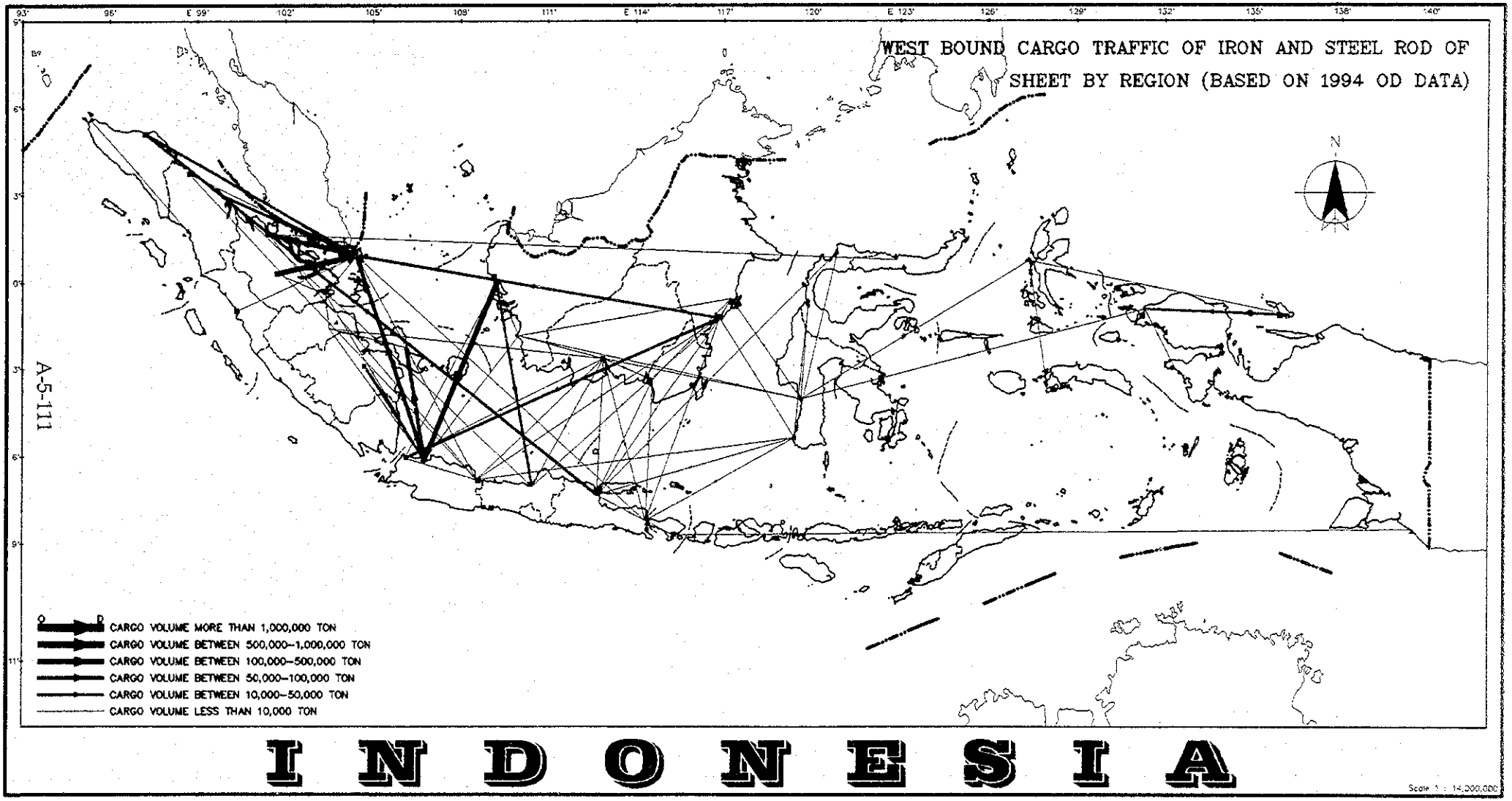
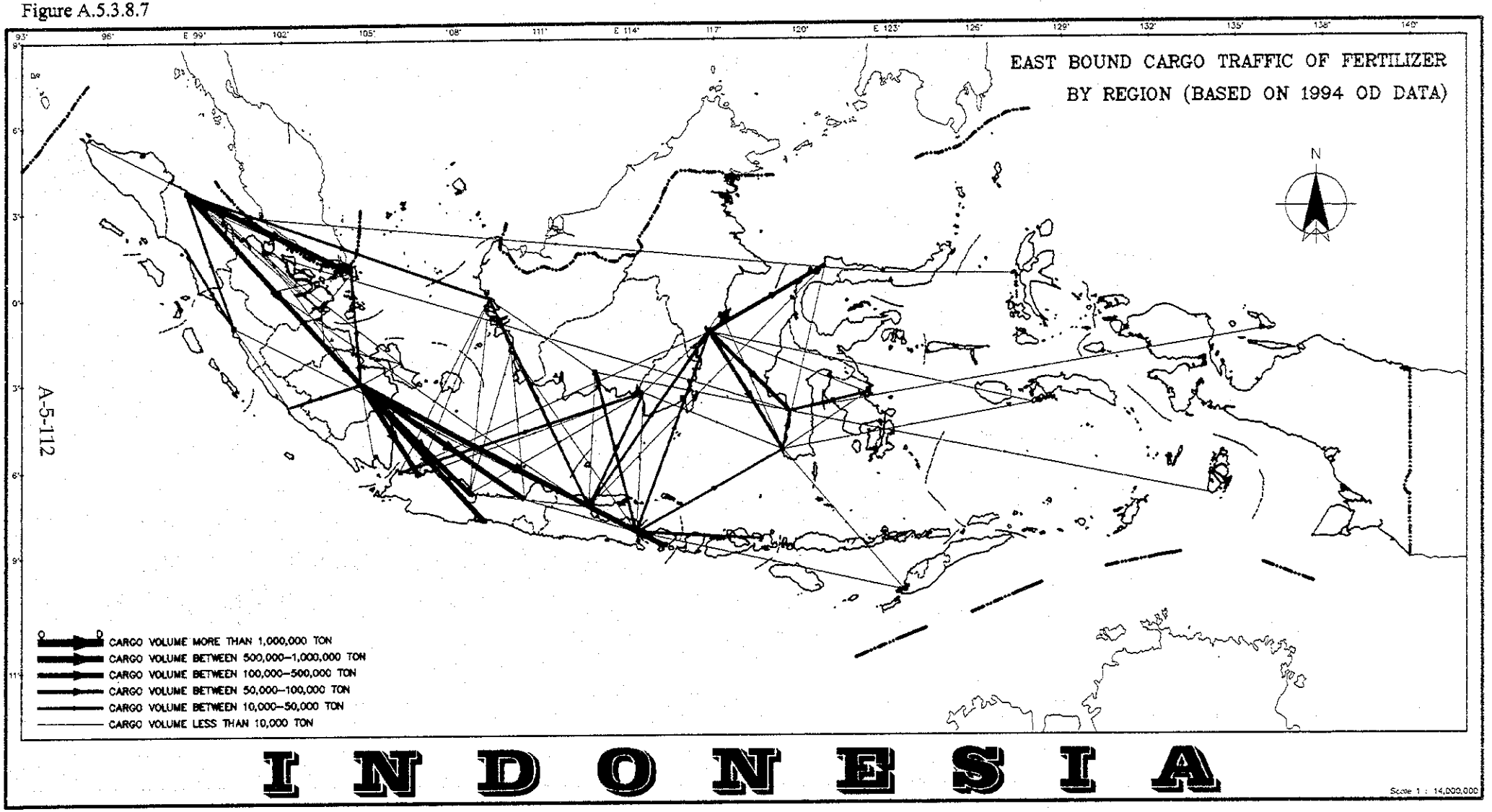


Figure A.5.3.8.7



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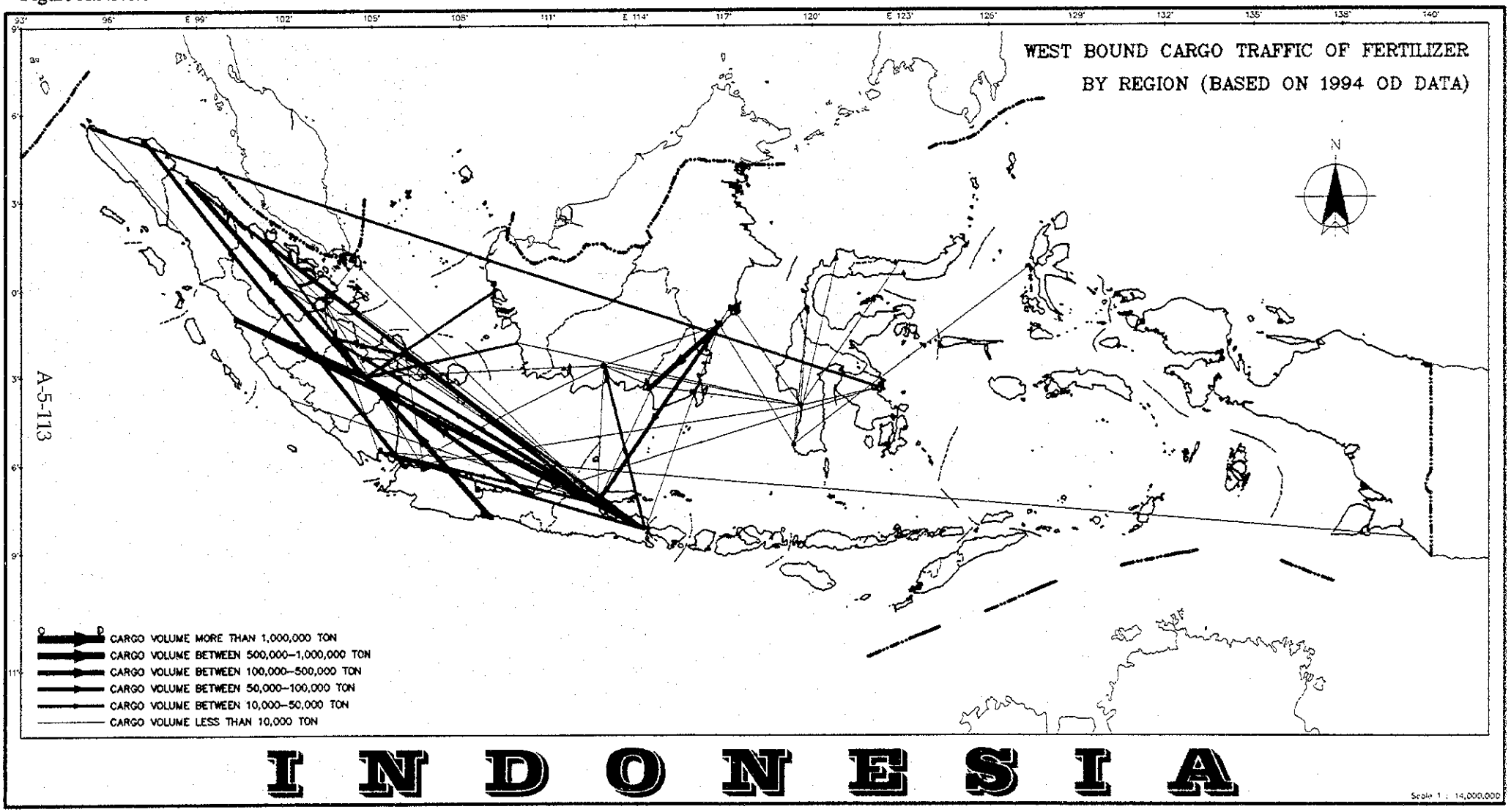


Appendix 5.3.9 Unit Load System

1) Main factors which consist of unit load system

In the course of cargo transportation, the unit should be done to the maximum. When the unit can not be done, the damage of breaking down the unit must be minimized.

The above definition of the unit load is the basic recognition when we consider the modernization of sea transportation. From this point of view, the success of unit load system depends on the following three points.

(a) Rationalization of unit scale
(b) Smoothness of making and breaking unit
(c) Establishment of joint transport operation system

Regarding (a), the cargo owners or the manufacturers will always consider how to make suitable unit without breaking the unit to the stock point in the first stage transportation, in the second stage from wholesale's warehouse to the stock point and in the third or final stage from the stock point to the consumers. It would be desirable for the first unit to be delivered intact to the final receiver. The unit of cargo will be done rather easy in bulky cargo. However, in case of general cargo it would be difficult to make appropriate unit. Therefore, in container transportation, the cargo unit in container is a very important factor, especially the consolidation at container freight station.

Regarding (b), the typical pattern of making and breaking the unit is as follows

a) Mass shipment and intact delivery
Container load shipment ------Delivery as container unit
b) Mass shipment and split delivery
Container load shipment------ Delivery at container freight station
c) Split shipment and mass delivery
Receiving at container freight station-----Delivery as container unit
d) Split shipment and split delivery
Receiving at container freight station-----Delivery at container freight station

Regarding (c), the final purpose of this transportation is to build up the door to door system. In order to transport these units, various modes of transportation will be done by fishy-back in the sea and inland waters, piggy-back by truck or by railway, birdy-back by airplane which are called coordinated transportation or integrated transportation or intermodal transportation system.

2) Palletization

Palletization originates from wooden bed for transporting or stocking goods in the factories by fork-lift and also supporting tool for trucker or forwarder at the railway terminal by loading /unloading the cargo.

In order to save the package cost, to reduce the cost and time of transportation, to prevent the damage during cargo operation and to raise the trucking turnaround, many transportation companies have set up the pallet systems.

In Europe, many countries signed an agreement to use a common pallet which is interchangeable in train transport. The dimensions are 800mm x 1200 mm.

Some major countries have a domestic pallet pool system.

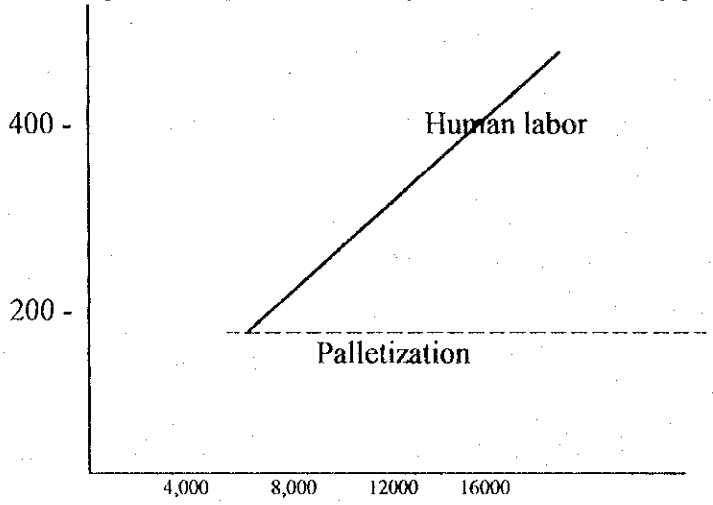
Main commodities of palletized merchandise in Japan are paper products, pulp, chemical and medical products, firebrick, sheet glass, machine parts and vinyl chloride.

For each stage of palletization, the operation cost in warehousing is said to be 68 % less than human labor. (Figure 5.3.7.1)

Meanwhile, in the through transportation, some items of palletization cost such as the cost of making pallet, lashing cargo and returning empty pallet should be considered together to ensure the low price of pallet and in some cases, extra cost of lashing cargo should be absorbed. According to the survey of Japan Pallet Association, if cargo bed of truck is not fitted to pallet, the efficiency of load would be extremely low. From the data of another survey, transportation by truck within 100 kilometers, the reduction by pallet is about 10 through 23 % and over 100 up to 1000 kilometers, it will be about 2 to 10 %.

Figure A.5.3.9.1

Break point of operation cost by human labor and by palletization



Remark: (1) Vertical axis shows operation cost by human labor in warehousing. (Unit: ¥1,000 /day)

(2) Horizontal axis shows production scale. (Unit: Cases/day)

Source: Japan Pallet Association

For inter-island transportation in Indonesia, we believe rationalization of break-bulk cargo should be considered at first. To raise the efficiency of sea transportation, palletization and unitization in conventional vessel should be thoroughly implemented. Since the traditional shipping is still playing an important role in this country, these transportation systems are essential to all vessel types. At the same time, unit load and containerization should be executed in semi-container and container vessels as soon as possible.