3.2.2 Classification of Development and Role of Port

There are various ways to classify national and regional development. In this report, development is classified into 5 types according to the purpose of development (See Table 3.2.2.1). And the necessary conditions for development and characteristics of each type are also shown in the table. Generally, development is composed of some combination of these types.

Table 3.2.2.1 Classification of National and Regional Development

Type of Development		Necessary Conditions for Development and Characteristics
Type A	Promoting Industrialization (mainly manufacturing industries, heavy industries, etc.) and Attracting Investors to Industrial Estate	① High labor potential based on accumulation of population ② Development of industrial estate which has well-developed infrastructure (access road, water supply, electric power, etc.) ③ Accumulation of various related industries (industrial complexes, etc.) ④ Close connection with consumption areas and market
Type B	Developing Natural Resource / Raw Material (energy, mining)	① High potential for natural resource/raw material ② Promoting development of related factories (cement plant, building material plant, etc.) in use of the resources ③ Access road and shipping port
Type C	Developing Strategic Distributive Position in Domestic and International Trade	① Advantageous location in domestic and international trade (economical advantage in cargo transportation) ② Sufficient and efficient port facilities for reshipment (feeder service)
Type D	Developing / Improving Regional Infrastructure (for example, expansion of airport, large scale irrigation by constructing dam, etc.)	① Reliable demand of use of the facility to be developed / improved ② Supply of materials and machines for construction of the facility
Type E	Supporting Local Industry and Community/Business Center (for example, primary industries (agri-business, marine products industry), tourism, cultural asset, etc.)	① Improvement of the productivity of agriculture, forestry and fisheries through development of unique products based on regional individuality ② Promoting the processing industry for agricultural, marine products, etc. ③ Attractive area for tourism and supporting facilities (hotel, marina, tourism port (terminal for sightseeing boat and cruiser), airport, etc.)

The role of port for each type of development is shown in Table 3.2.2.2.

Table 3.2.2.2 Role of Port for each Type of National and Regional Development

Type of Development	Role of Port
Type A	① Serving as the point of entry for the supply of raw materials and exit for shipment of manufactured products ② Providing large scale sites for industrial estate in port area (Especially in the case of heavy industries, transportation cost of heavy raw materials and heavy products will be reduced due to shortening the distance for transport.)
Type B	① Shipping of natural resource / raw material ② Providing sites for related factories (cement plant, building material plant, etc.)
Type C	① Core infrastructure for development (supply of facilities for reshipment (feeder service))
Type D	① Shipping of construction materials and machines ② Providing sites for construction material plant (cement factory, asphalt plant, etc.)
Type E	① Base of joint shipment for primary products ② Distributive base of feed and fertilizer products for primary industries ③ Providing mooring facilities and maintenance plant for large fishing boat ④ Providing sites for processing industries (canning, grinding, etc.) ⑤ Development of tourism port (terminal for sightseeing boat and cruiser) and providing sites for commercial zone (restaurant, souvenir shop, pocket park, etc.)

3.2.3 Development Scenario of Sectors

(1) Industries

1) Manufacturing

According to the governmental policy, the target of the growth rate of manufacturing sector (non-oil/gas) in PJP II is 9.0-10.3% per year, and it is set at the highest rate in all sectors. The national government places special emphasis on promoting export-oriented industry. Therefore, it can be considered that industrialization will advantageously progress centering around Jawa, where export-oriented industry together with the supporting industries are accumulated.

In this report, we tried to estimate GRDP of manufacturing industries in 2018 based on

existing trends, and analyze the relation between GRDP/km2 and population/km2. (See Figure 3.2.3.1, Figure 3.2.3.2, Table A3.2.3.1 and Table A3.2.3.2 in Appendix Chapter III.)

According to Figure 3.2.3.1, GRDP is concentrated in Jawa, especially Jakarta, and secondly in Sumatra. And it is estimated that this trend will continue up to 2018 as shown in Figure 3.2.3.2.

Among other regions, South Kalimantan in Kalimantan, South and North Sulawesi in Sulawesi have relatively high GRDP levels. It can be considered that these provinces will also become candidates for development, by effectively utilizing the potential of closeness to Jawa, relatively high-concentrated population, and so on.

2) Agriculture

In the agriculture sector, the target of the growth rate in PJP II is 3.4-3.5% per year, and it is set at low rate compared with other sectors. But agriculture is still the main industry in Indonesia. The national government is attempting to increase productivity and efficiency, promote mechanization of cultivation and heighten quality and added-value of products as part of promoting agri-business.

Jawa has a large production capacity not only for manufacturing but also for agriculture, especially farm food crops such as rice. But there has been a rapid decline in the rice field area because of the industrialization and urbanization in recent years. It can be considered that this trend will continue in future. Therefore, the national government is promoting a massive plan to develop a million ha of arable land in Central Kalimantan for the purpose of making up food shortages in Indonesia. Thus, some of the regions in the eastern part of Indonesia have a high potential for agriculture though this potential remains undeveloped. It can be considered that production capacity will increase gradually.

For reference, we estimated GRDP of farm food crops in 2018 according to recent trends, and analyzed the relation between GRDP/km2 and population/km2. (See Figure 3.2.3.3, Figure 3.2.3.4, Table A3.2.3.3 and Table A3.2.3.4 in Appendix Chapter III.) Bali, North Sumatra, Lampung, South Sulawesi, West Nusa Tenggara have relatively high GRDP levels among other regions excluding Jawa.

3) Mining

In the mining sector, existing areas with large oil/gas production are mainly concentrated in Sumatra and Kalimantan. (See Figure A3.2.3.1 and Figure A3.2.3.2 in Appendix Chapter III.) In these areas, products are mainly exported in their raw material form. However these areas have high potential not only for production of raw materials, but also for industrialization. Namely, advanced industries which utilize these raw materials are expected to be gradually developed in these areas.

Meanwhile, field surveys in other areas provide insufficient or still remain to be done, so

Figure 3.2.3.1 GRDP of Manufacturing Industries/km2----Population/km2 (1996)

(1993 constant price)

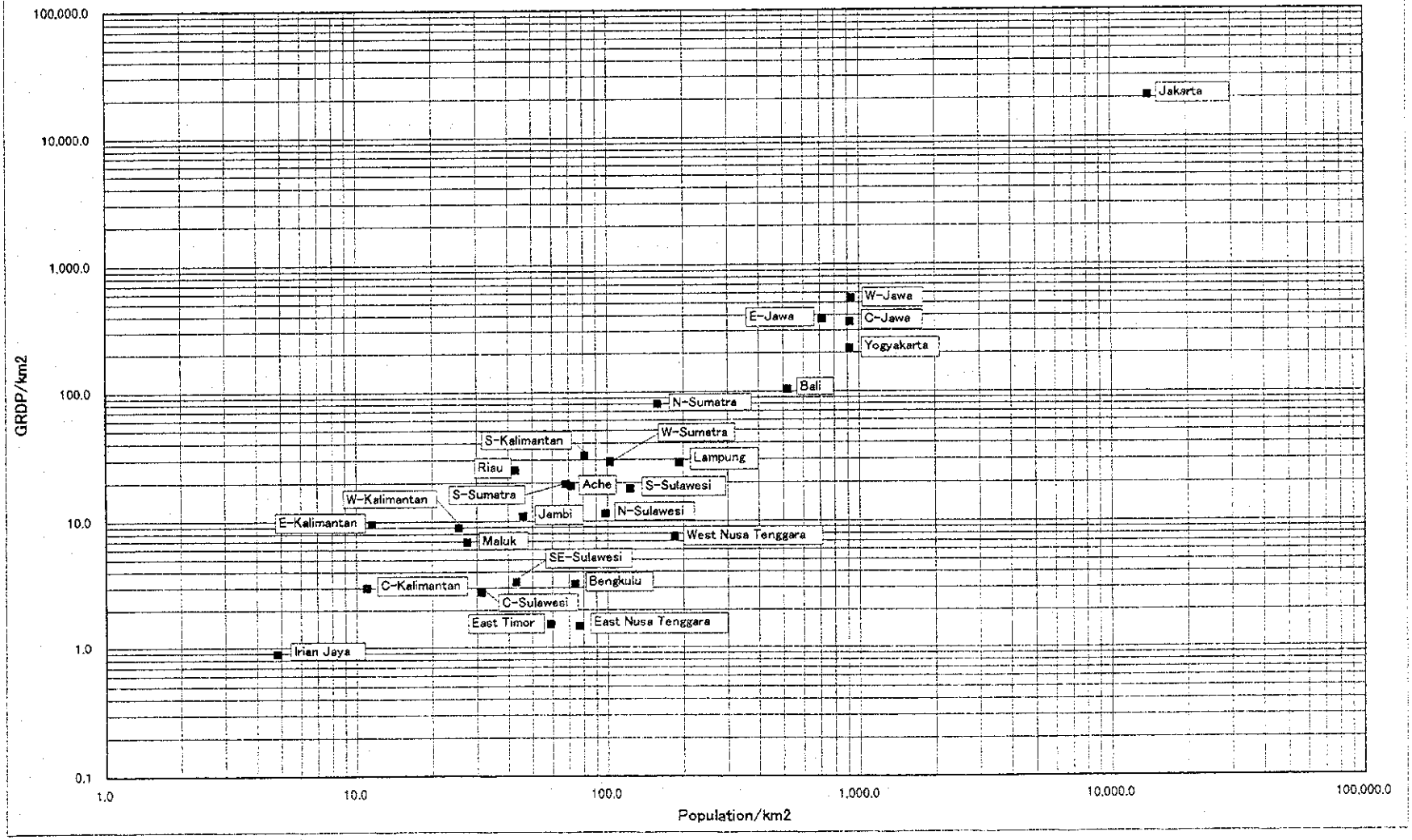
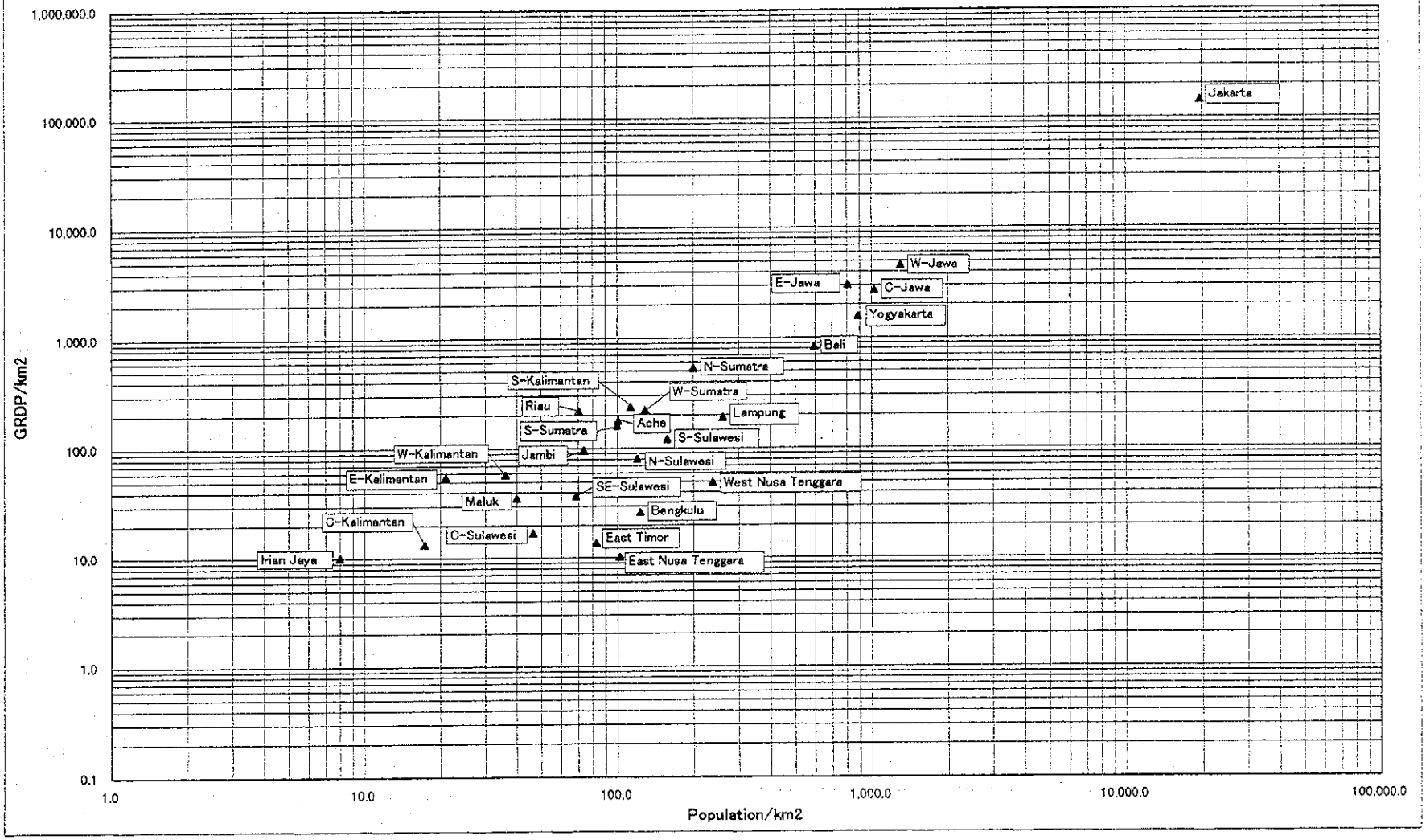


Figure 3.2.3.2 GRDP of Manufacturing Industries/km2----Population/km2 (2018 Estimation) (1993 constant price)



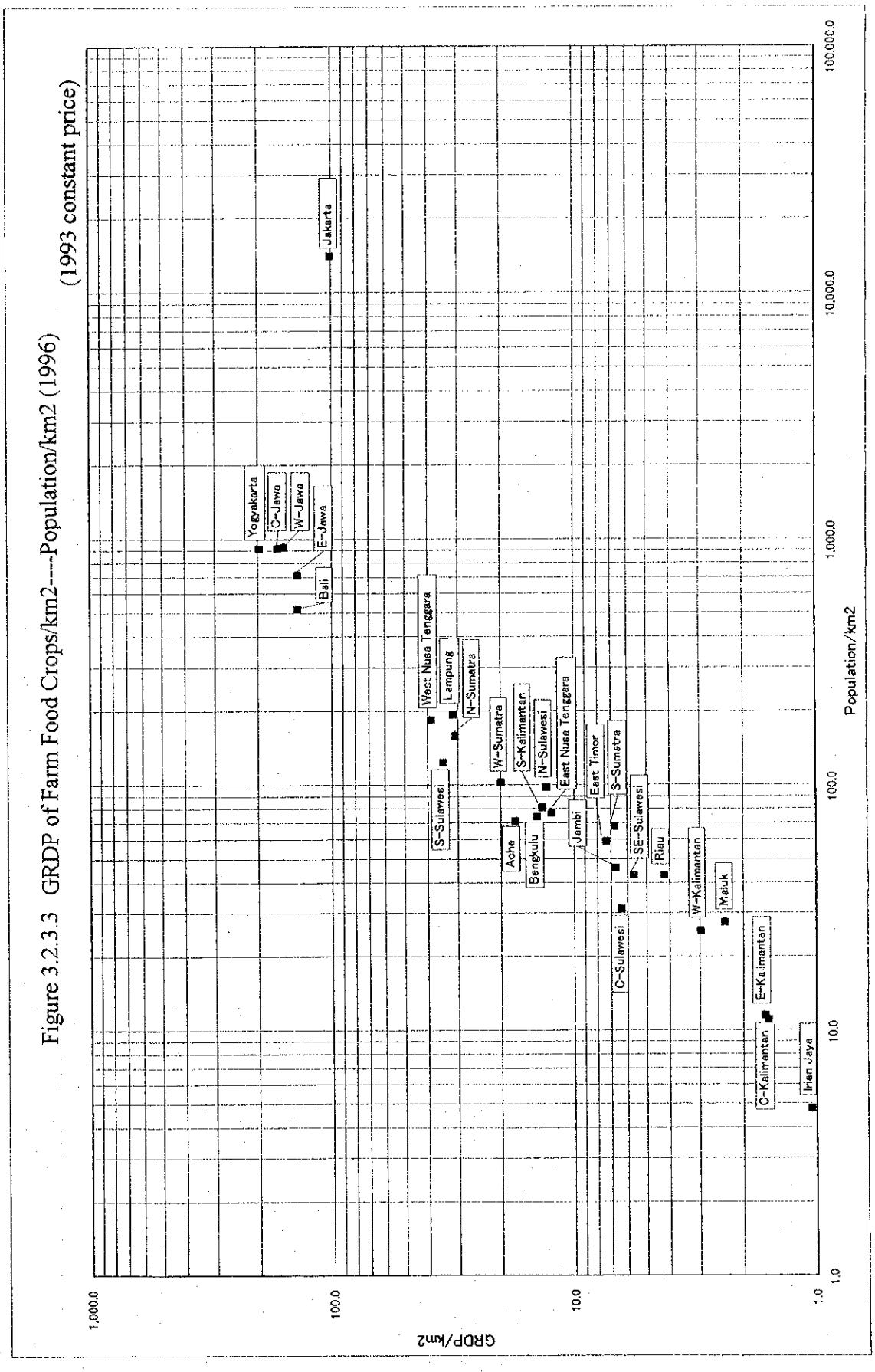
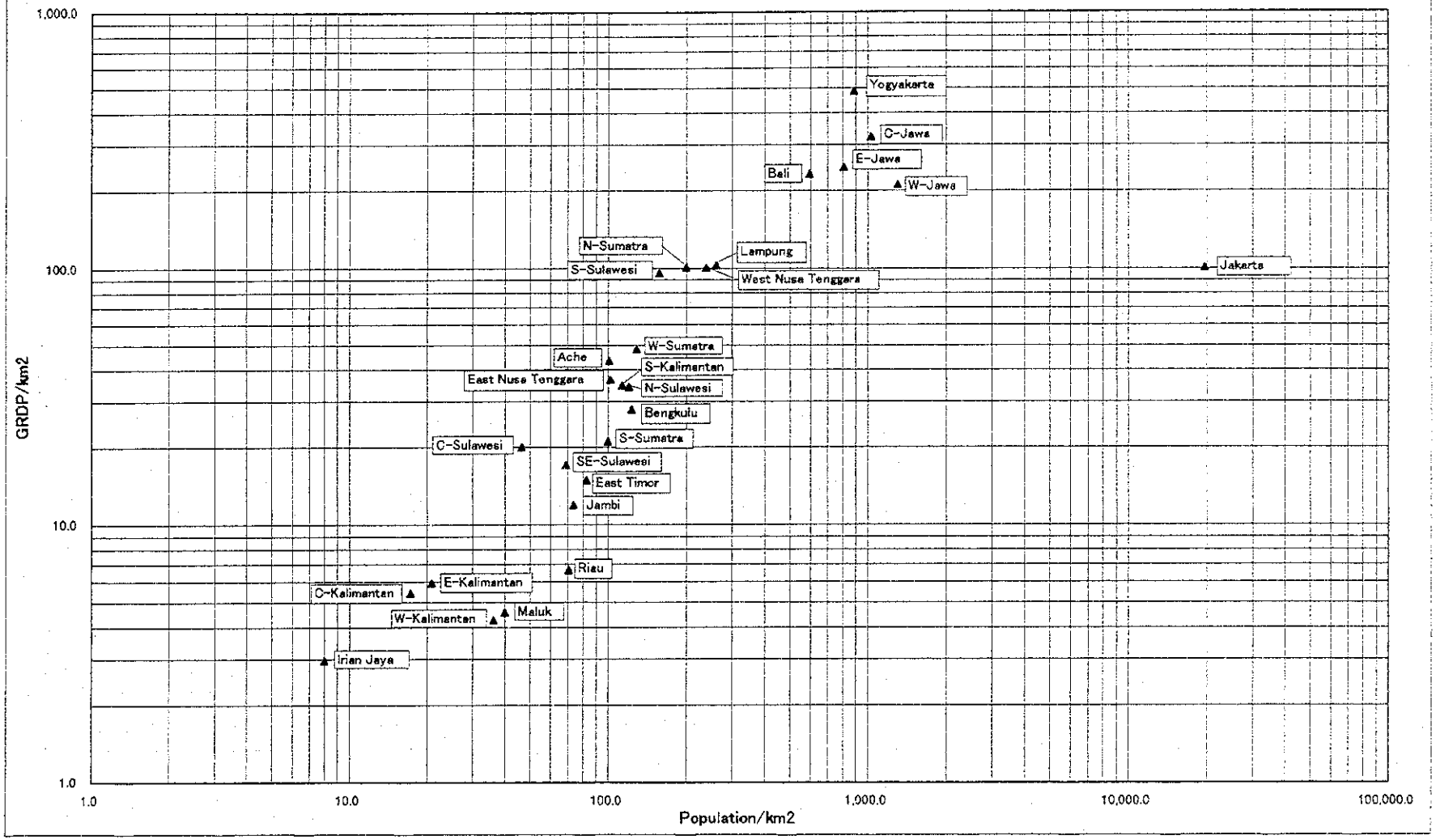


Figure 3.2.3.3 GRDP of Farm Food Crops/km2---Population/km2 (1996)
(1993 constant price)
GRDP/km2
Population/km2
1,000.0
100.0
10.0
1.0
1.0
10.0
100.0
1,000.0
10,000.0
100,000.0
Jakarta
Yogyakarta
C-Jawa
W-Jawa
E-Jawa
Bali
West Nusa Tenggara
Lampung
N-Sumatra
S-Sulawesi
W-Sumatra
S-Kalimantan
N-Sulawesi
East Nusa Tenggara
East Timor
S-Sumatra
Jambi
Aceh
Bengkulu
SE-Sulawesi
Riau
C-Sulawesi
W-Kalimantan
Maluku
E-Kalimantan
C-Kalimantan
Irian Jaya

Figure 3.2.3.4 GRDP of Farm Food Crops/km2----Population/km2 (2018 Estimation) (1993 constant price)



the potential level in other areas is more or less unclear (for example, Irian Jaya, etc.).

Today the following development projects are in the preparing stage, and it can be considered that production from these areas would be enormous if they are actively developed.

-Natuna island (natural gas)

-Timor sea (oil)

4) Processing Industries for Primary Products

At present, various primary products in the field of agriculture, forestry and fishery are processed into secondary products in Jawa. Some of those primary products are transported from the production areas outside of Jawa, such as Kalimantan, Sulawesi, and so on, because processing industries are not well developed in those areas yet.

However in the future, processing industries are expected to be gradually developed in those undeveloped areas. Especially in the eastern part of Indonesia, building up the processing industries close to the production areas will play an important role in stimulating regional development. Namely it will improve the regional economic situation by heightening added-value of products, increasing opportunities for employment, and so on.

(2) Transportation

Transportation plays a crucial role for national and regional development. The National Transportation System (SISTRANAS), issued by government, stresses the importance of transportation, especially of comprehensive coordination among transportation modes. As sea transportation is closely related to road transportation, we examined the trend of these transportation modes as follows.

1) Road Transportation

The number of motor vehicles in Indonesia is increasing rapidly; the average growth rate from 1993-1996 was 11.3%. However most are concentrated in Jawa; its share is around 65% of the total in 1996. We analyzed the relation between the number of vehicles/km2 and population/km2. (See Figure 3.2.3.5, Table A3.2.3.5 and Table A3.2.3.6 in Appendix Chapter III.) There is a clear concentration of vehicles in Jawa, especially Jakarta. On the other hand, there are very few in Kalimantan and Irian Jaya .

And regarding road development, we also analyzed the relation between road length/1000km2 and population/km2. (See Figure 3.2.3.6, Table A3.2.3.7 and Table A3.2.3.8 in Appendix Chapter III.) According to this figure, we can see the advantage of Jawa and Bali, especially Jakarta. In Sumatra, there is a difference of degree of development by province. In the eastern part of Indonesia, East Timor, South Sulawesi and North

Figure 3.2.3.5 Number of Vehicles/km2---Population/km2 (1996)

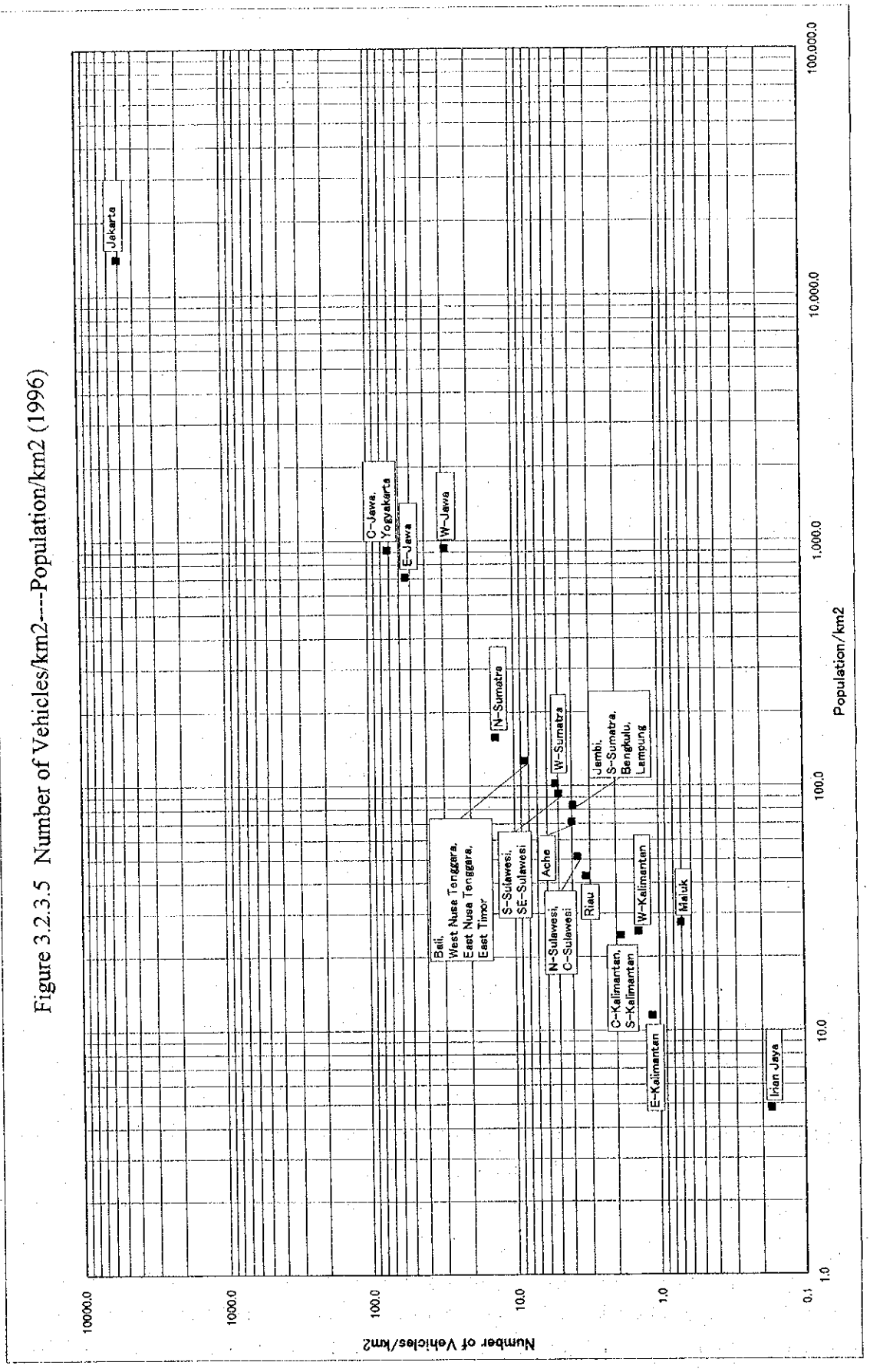
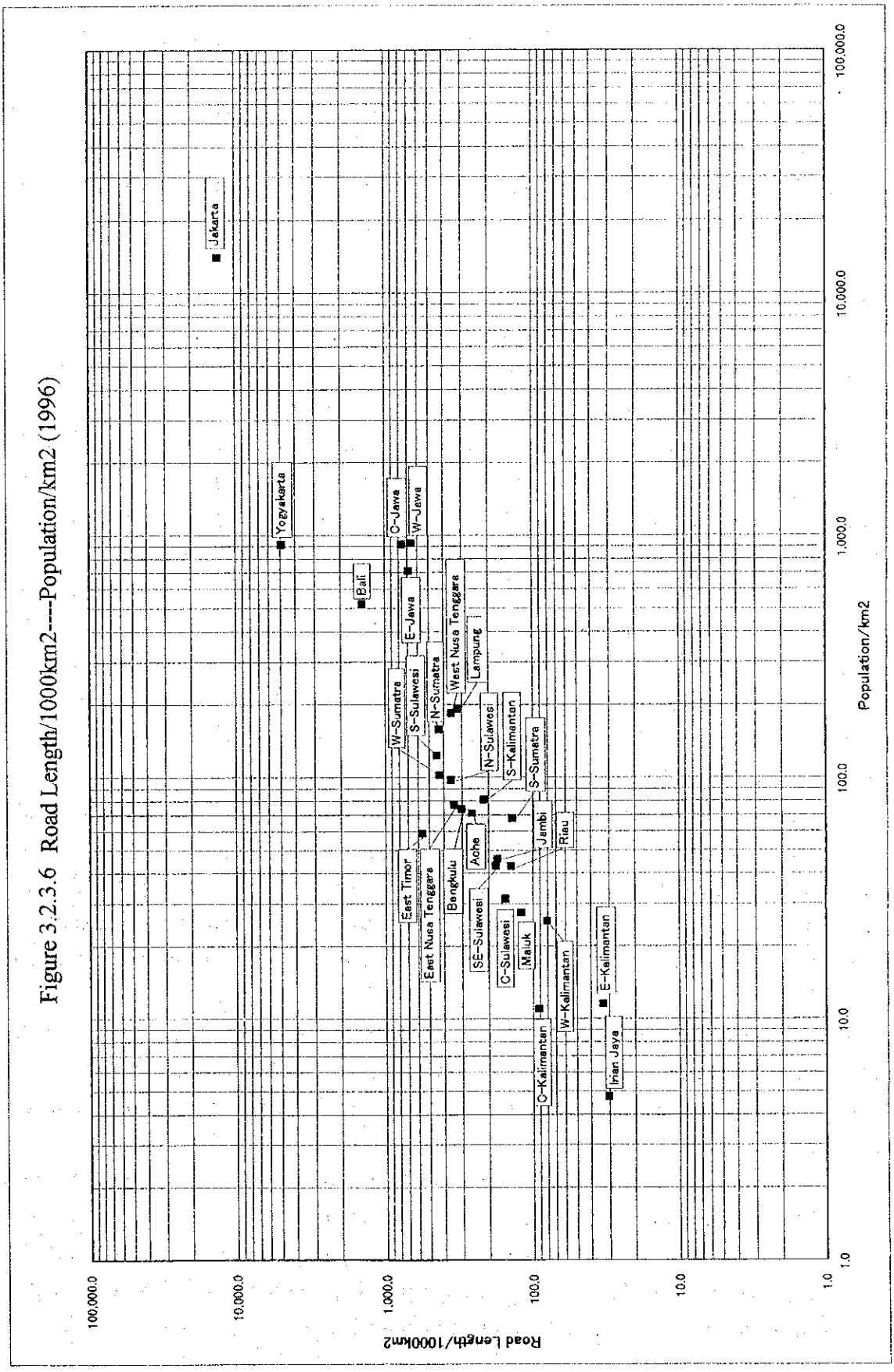


Figure 3.2.3.6 Road Length/1000km2---Population/km2 (1996)



Sulawesi have relatively high levels of road development while Kalimantan and Irian Jaya have low levels (although South Kalimantan in Kalimantan has a middle level of road development).

The government aims to increase road length to more than double the current length by 2018. Extensive road development in Jawa will continue to cope with the rapid increase of vehicles there, and in other regions major routes connecting important cities will be mainly developed based on priority.

2) Dependence Rate of Sea Transportation for Total Transportation

In 1996, MOC conducted the Cargo Traffic OD survey. In this survey, volume of respective transportation mode (transportation mode of sea, road, river, ferry, railway and air) was estimated. By analyzing the results, we calculated the dependence rate of sea transportation for total transportation by ton base. (See Table 3.2.3.1) In case by ton-km base, the rate of sea transportation is much higher. (See Table 3.2.3.2)

In total, the dependence rate of sea transportation is almost 27%. However, the rate varies widely among islands. In Kalimantan, Sulawesi and Others, the dependence rates are 97%, 90% and 79% respectively. In addition, the dependence rates within the same island except Jawa and Sumatra are almost 40%. (See Table 3.2.3.3)

The very high rates in Kalimantan, Sulawesi and Others, come as a result of the geographical and economic conditions in those islands. Namely, vast swampy areas, rivers and large valleys hamper land transportation. At the same time, people in those areas depend on other islands for their livelihood.

On the other hand, the dependence rate of sea transportation in Jawa and Sumatra remains at a low level. The low rates are due to mainly economic conditions in those islands. The comparatively large flat areas made it possible to construct road and railway transportation infrastructure at a low cost, while the rapidity, door-to-door convenience and flexibility of land transportation were necessitated in Jawa and some parts of Sumatra due to the rapid economic growth.

Generally speaking, it can be considered that there are two types of cargo transportation according to the degree of progress in road transportation. (See Figure 3.2.3.7)

Based on the above analysis, we assume the character of transportation mode in Indonesia as follows.

(a) In Kalimantan, Sulawesi and Others, sea transportation plays the dominant role in cargo transportation among other transportation modes.

(b) In Jawa and some parts of Sumatra, land transportation plays the major role. Sea transportation will play a role in transporting large volumes of cargo over a great distance as one of the means for promoting modal shift.

Table 3.2.3.1 Share of Cargo Traffic of Sea Transportation for Total Transportation
(Based on 1996 OD data, by Ton base)

PROVINCE	Volume of Outgoing Cargo Traffic			Volume of incoming Cargo Traffic			Volume of Total Cargo Traffic		
	Sea Transportation (Ton)	Total Transportation (Ton)	Share	Sea Transportation (Ton)	Total Transportation (Ton)	Share	Sea Transportation (Ton)	Total Transportation (Ton)	Share
Aceh	2,891,563	10,593,031	27.3%	5,279,762	11,011,706	47.9%	8,171,325	21,604,737	37.8%
Sumatra Utara	7,167,823	25,098,379	28.6%	9,861,157	21,445,216	46.0%	17,028,980	46,543,595	36.6%
Sumatra Barat	8,749,210	32,952,758	26.6%	114,056	5,813,108	2.0%	8,863,266	38,765,866	22.9%
Riau	12,921,970	16,186,109	79.8%	12,409,250	41,639,270	29.8%	25,331,220	57,825,379	43.8%
Jambi	3,242,622	5,721,376	56.7%	4,610,172	9,180,624	50.2%	7,852,794	14,902,000	52.7%
Sumatera selatan	6,244,500	10,012,093	62.4%	5,744,161	10,172,344	56.5%	11,988,661	20,184,437	59.4%
Bengkulu	1,518	1,966,645	0.1%	4,758,077	7,378,914	64.5%	4,759,595	9,345,559	50.9%
Lampung	610,671	3,852,749	15.9%	3,824,013	8,153,289	46.9%	4,434,684	12,006,038	36.9%
Sumatra Total	41,829,877	106,383,140	39.3%	46,600,648	114,794,471	40.6%	88,430,525	221,177,611	40.0%
D.K.I Jakarta	28,480,769	144,030,975	19.8%	22,153,644	148,511,962	14.9%	50,634,413	292,542,937	17.3%
Jawa Barat	3,561,034	156,852,704	2.3%	3,317,313	110,854,652	3.0%	6,878,347	267,707,356	2.6%
Jawa Tengah	16,282,337	92,043,606	17.7%	36,134,375	131,329,625	27.5%	52,416,712	223,373,231	23.5%
D.I Yogyakarta	0	35,417,129	0.0%	0	17,003,690	0.0%	0	52,420,819	0.0%
Jawa Timur	44,071,681	110,513,456	39.9%	23,798,682	118,139,129	20.1%	67,870,363	228,652,585	29.7%
Bali	23,330	9,673,974	0.2%	1,134,656	11,154,822	10.2%	1,157,986	20,828,796	5.6%
Jawa Total	92,419,151	548,531,844	16.8%	86,538,670	536,993,880	16.1%	178,957,821	1,085,525,724	16.5%
Kalimantan Barat	30,367,894	30,369,157	100.0%	12,819,916	12,820,452	100.0%	43,187,810	43,189,609	100.0%
Kalimantan Tengah	831,844	932,122	89.2%	2,792,082	3,075,048	90.8%	3,623,926	4,007,170	90.4%
Kalimantan Selatan	2,129,562	2,735,082	77.9%	2,913,092	3,465,692	84.1%	5,042,654	6,200,774	81.3%
Kalimantan Timur	7,031,525	7,501,832	93.7%	10,264,632	10,639,683	96.5%	17,296,157	18,141,515	95.3%
Kalimantan Total	40,360,825	41,538,193	97.2%	28,789,722	30,000,875	96.0%	69,150,547	71,539,068	96.7%
Sulawesi Utara	4,620,588	4,707,767	98.1%	4,176,084	4,339,980	96.2%	8,796,672	9,047,747	97.2%
Sulawesi Tengah	633,008	1,062,129	59.6%	6,460,902	6,591,294	98.0%	7,093,910	7,653,423	92.7%
Sulawesi Selatan	7,983,251	8,683,824	91.9%	2,880,554	3,660,212	78.7%	10,863,805	12,344,036	88.0%
Sulawesi Tenggara	412,371	771,306	53.5%	1,445	467,876	0.3%	413,816	1,239,182	33.4%
Sulawesi Total	13,649,218	15,225,026	89.6%	13,518,985	15,059,362	89.8%	27,168,203	30,284,388	89.7%
Nusa Tenggara Barat	537,849	1,833,215	29.3%	5,887,053	9,099,329	64.7%	6,424,902	10,932,544	58.8%
Nusa Tenggara Timur	847,043	1,005,634	84.2%	4,075,935	4,154,535	98.1%	4,922,978	5,160,169	95.4%
Timor Timor	0	9,444	0.0%	276,845	438,284	63.2%	276,845	447,728	61.8%
Maluku	298,410	299,349	99.7%	5,108,860	5,140,288	99.4%	5,407,270	5,439,637	99.4%
Irian Jaya	1,045,630	1,048,398	99.7%	191,285	193,219	99.0%	1,236,915	1,241,617	99.6%
Others Total	2,728,932	4,196,040	65.0%	15,539,978	19,025,655	81.7%	18,268,910	23,221,695	78.7%
Total	190,988,003	715,874,243	26.7%	190,988,003	715,874,243	26.7%	381,976,006	1,431,748,486	26.7%

Source : Prepared by OCDI based on the OD survey made by MOC Reserch Center

Table 3.2.3.2 Share of Cargo Traffic of Sea Transportation for Total Transportation (Based on 1996 OD data, by Ton-Km base)

Unit: 1,000Ton-Km

PROVINCE	Volume-Distance of Outgoing Cargo Traffic			Volume-Distance of Incoming Cargo Traffic			Volume-Distance of Total Cargo Traffic		
	Sea Transportation (Ton-Km)	Total Transportation (Ton-Km)	Share	Sea Transportation (Ton-Km)	Total Transportation (Ton-Km)	Share	Sea Transportation (Ton-Km)	Total Transportation (Ton-Km)	Share
Aceh	3,807,689	8,357,199	45.6%	6,552,395	10,287,324	63.7%	10,360,084	18,644,523	55.6%
Sumatera Utara	12,252,217	27,666,261	44.3%	16,973,761	26,319,792	64.5%	29,225,978	53,986,053	54.1%
Sumatera Barat	8,189,537	15,836,566	51.7%	188,404	4,236,618	4.4%	8,377,941	20,073,184	41.7%
Riau	13,702,037	15,503,136	88.4%	10,098,346	22,413,755	45.1%	23,800,383	37,916,891	62.8%
Jambi	2,261,162	3,457,572	65.4%	4,964,020	7,477,307	66.4%	7,225,183	10,934,879	66.1%
Sumatera Selatan	3,446,264	5,310,791	64.9%	11,593,700	14,607,733	79.4%	15,039,964	19,918,524	75.5%
Bengkulu	638	1,007,171	0.1%	1,998,392	3,277,614	61.0%	1,999,030	4,284,785	46.7%
Lampung	140,966	1,999,920	7.0%	1,068,143	3,657,826	29.2%	1,209,109	5,657,746	21.4%
Sumatera Total	43,800,510	79,138,616	55.3%	53,437,163	92,277,969	57.9%	97,237,673	171,416,585	56.7%
D.K.I Jakarta	28,024,747	76,605,382	36.6%	22,363,174	62,509,208	35.8%	50,387,922	139,114,590	36.2%
Jawa Barat	1,671,257	44,304,665	3.8%	3,748,475	37,494,723	10.0%	5,419,732	81,799,388	6.6%
Jawa Tengah	12,251,191	38,894,264	31.5%	34,121,390	64,101,127	53.2%	46,372,581	102,995,391	45.0%
D.I Yogyakarta	0	7,312,102	0.0%	0	2,884,295	0.0%	0	10,196,397	0.0%
Jawa Timur	47,155,412	87,689,484	53.8%	19,900,979	72,047,303	27.6%	67,056,391	159,736,787	42.0%
Bali	10,265	4,966,665	0.2%	618,796	8,417,066	7.4%	629,061	13,383,731	4.7%
Jawa Total	89,112,872	259,772,562	34.3%	80,752,814	247,453,722	32.6%	169,865,686	507,226,284	33.5%
Kalimantan Barat	24,073,061	24,073,838	100.0%	9,626,282	9,626,622	100.0%	33,699,342	33,700,460	100.0%
Kalimantan Tengah	595,219	616,366	96.6%	2,364,067	2,420,076	97.7%	2,959,286	3,036,442	97.5%
Kalimantan Selatan	1,715,469	1,975,567	86.8%	2,039,457	2,347,645	86.9%	3,754,926	4,323,212	86.9%
Kalimantan Timur	13,518,708	13,807,123	97.9%	11,411,382	11,616,255	98.2%	24,930,090	25,423,378	98.1%
Kalimantan Total	39,902,457	40,472,894	98.6%	25,441,187	26,010,598	97.8%	65,343,644	66,483,492	98.3%
Sulawesi Utara	12,428,516	12,526,431	99.2%	10,030,286	10,218,567	98.2%	22,458,802	22,744,998	98.7%
Sulawesi Tengah	908,266	1,338,035	67.9%	8,631,298	8,760,210	98.5%	9,539,563	10,098,245	94.5%
Sulawesi Selatan	8,830,201	9,752,692	90.5%	4,784,514	5,716,651	83.7%	13,614,716	15,469,343	88.0%
Sulawesi Tenggara	923,953	1,458,860	63.3%	2,428	732,140	0.3%	926,381	2,191,000	42.3%
Sulawesi Total	23,090,936	25,076,018	92.1%	23,448,526	25,427,568	92.2%	46,539,462	50,503,586	92.2%
Nusa Tenggara Barat	435,630	1,554,228	28.0%	4,342,571	5,698,758	76.2%	4,778,202	7,252,986	65.9%
Nusa Tenggara Timur	930,865	1,039,699	89.5%	4,246,708	4,354,995	97.5%	5,177,573	5,394,694	96.0%
Timor Timur	0	5,071	0.0%	266,583	402,666	66.2%	266,583	407,737	65.4%
Maluku	701,013	701,894	99.9%	7,497,679	7,599,785	98.7%	8,198,692	8,301,679	98.8%
Irian Jaya	2,143,106	2,153,087	99.5%	684,159	688,008	99.4%	2,827,265	2,841,095	99.5%
Others Total	4,210,614	5,453,979	77.2%	17,037,700	18,744,212	90.9%	21,248,314	24,198,191	87.8%
Total	200,117,389	409,914,069	48.8%	200,117,389	409,914,069	48.8%	400,234,779	819,828,138	48.8%

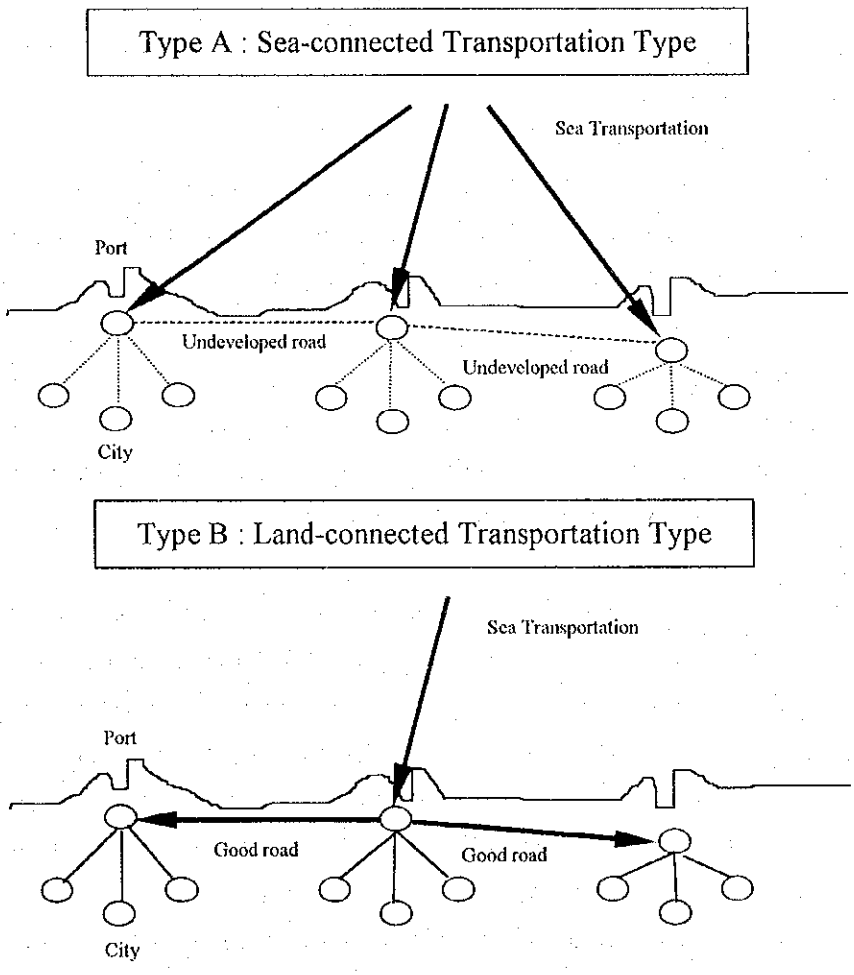
Source : Prepared by OCDI based on the OD survey made by MOC Reserch Center

Table 3.2.3.3 Cargo Traffic within the Same Island

Island : Cargo Traffic	Cargo Traffic within the Same Island		
	Volume of Total Transportation (A)	Volume of Sea Transportation (B)	Dependence Rate (B/A)
Sumatra	81,171,714	22,692,981	28.0%
Jawa, Bali	468,416,891	25,375,281	5.4%
Kalimantan	1,701,671	544,241	32.0%
Sulawesi	2,471,205	950,737	38.5%
Others	249,551	115,158	46.1%
Total	554,011,032	49,678,398	9.0%

Source : Prepared by OCDI based on the OD survey made by MOC Research Center

Figure 3.2.3.7 Classification of Cargo Transportation Type



3.2.4 Development Scenario of Regions

(1) Development Scenario of Regions and Nationwide Future Land Development Structure

As concerns the development scenario of regions, we examined firstly which type of development (TypeA-TypeE) is applicable to each province, and secondly we examined the development scenario by each region based on the potential for development of each region. The result is shown in Table 3.2.4.1. And for reference, a general view of regional development in Indonesia as proposed by an OECF (The Overseas Economic Cooperation Fund, Japan) report is given in Figure 3.2.4.1.

In addition, we examined the nationwide future land development structure in Indonesia. At first, we defined Total of national budget, national policy, private sector investment, and so on as "Input of development resources", and secondly we examined the change of "Input" by term in consideration of regional industrial potential, governmental policy such as KAPET and so on (See Figure 3.2.4.2 and Figure 3.2.4.3.).

a) Present Condition

To date, various kinds of economic activities have been well developed in Jawa and some parts of Sumatra. Namely it can be considered that "Input" has been intensively placed there.

b) Development Stage in the Short Term

In the short term, "Input" will still continue to grow mainly in Jawa and Sumatra, and according to governmental policy, will grow somewhat in the eastern part of Indonesia, such as South, East and West Kalimantan, North and South Sulawesi, Lombok, and so on.

c) Development Stage in the Middle Term

In the middle term, the growth of "Input" in Jawa and Sumatra will gradually slow down, on the other hand, the growth of "Input" in the eastern part of Indonesia will be accelerated and extended to underdeveloped areas.

d) Development Stage in the Long Term

In the long term, "Input" will be extended to whole Indonesia, as a result, regional disparity between the western and eastern part of Indonesia will be reduced.

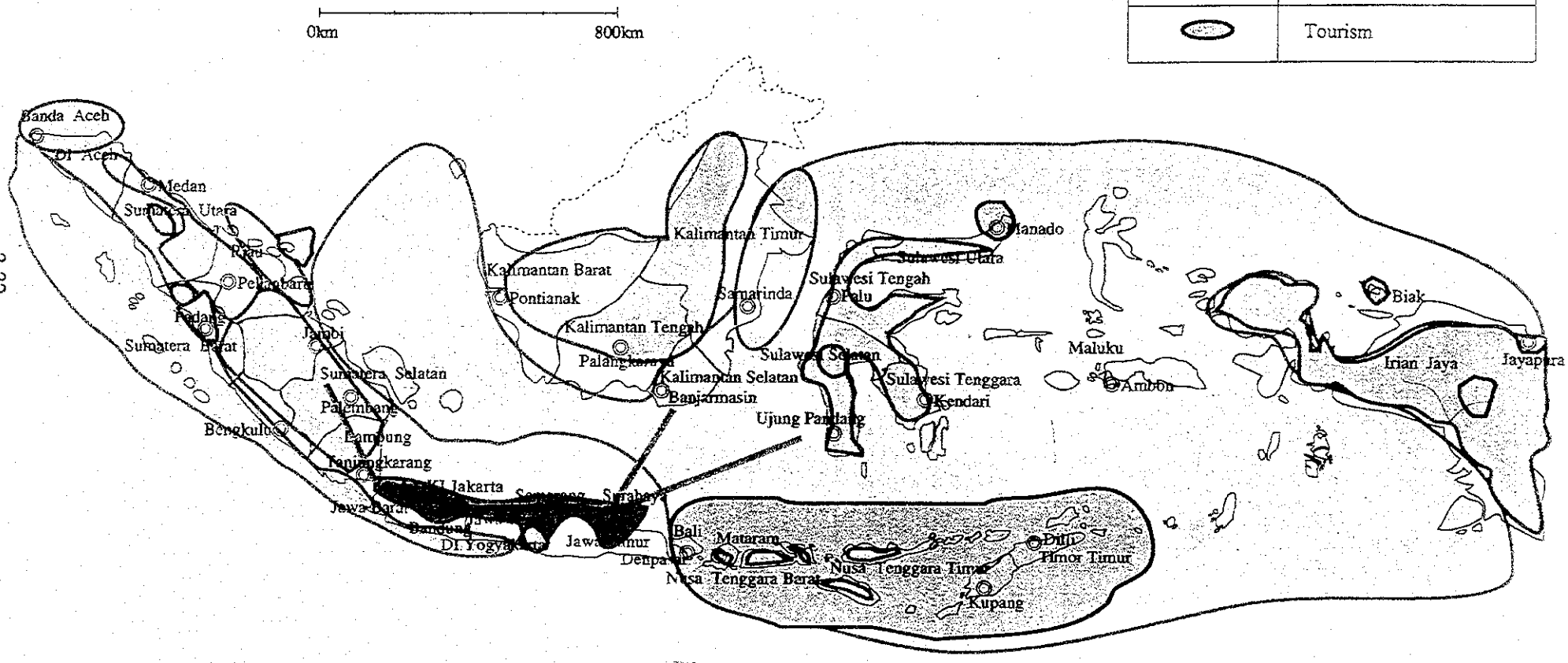
As concerns above nationwide future land development structure, we supposed that "Input" in the eastern part of Indonesia will gradually grow as shown in the Case 2 of Figure 3.2.4.3. Namely, in order to reduce regional disparity, national budget and policy will be gradually turned toward the eastern part of Indonesia according to the governmental policy, as a result, private sector investment will follow it. In this sense, KAPET projects are expected to heighten the potential of the eastern part of Indonesia, if they are actively executed.

Table 3.2.4.1 Development Scenario of Regions

Province	Type of Development					Development Scenario of Regions
	A	B	C	D	E	
Aceh	○	○		○	○	SUMATRA
North Sumatra	○	○		○	○	Economic network of 'Jawa-Sumatra' in the short term
West Sumatra	○	○		○	○	*Economic cooperation between Malaysia, Thailand and northern part of Sumatra [IMT-GT]
Riau	○	○	○	○	○	*Economic cooperation between Malaysia, Singapore and Riau (Batam, Bintan) [IMS-GT]
Jambi				○	○	*High potential of natural resources of oil, gas and coal, and its effective use
South Sumatra	○	○		○	○	(Ache, North Sumatra, West Sumatra, Riau, South Sumatra, Lampung)
Bengkulu				○	○	--- Promoting related industry (For example, petro-chemical industry)
Lampung	○	○		○	○	*High potential of development of natural gas (Natuna island)
						*High potential of production of estate crops (northern part of Sumatra)
						*Development of tourism in Riau (Batam & Bintan)
Jakarta	○		○	○	○	JAWA
West Jawa	○	○	○	○	○	Economic network of 'Jawa-Sumatra' in the short term
Central Jawa	○	○	○	○	○	*Expansion of industrial belt zone (①Western part and Eastern part→②Central part)
Yogyakarta					○	--- Concentration of various manufacturing industries
East Jawa	○	○	○	○	○	*High potential of production of farm food crops (but, gradually declining)
West Kalimantan	○	○		○	○	KALIMANTAN
						Economic network of 'Jawa-West Kalimantan' in the middle term
Central Kalimantan		○		○	○	Economic network of 'Jawa-South and East Kalimantan-North Sulawesi' in the middle term
						*Economic cooperation between Singapore, Malaysia and West Kalimantan [IMS-GT]
South Kalimantan	○	○		○	○	*Economic cooperation between Philippines, Malaysia and northern Kalimantan [BIMP-EAGA]
						*Formation of industrial belt zone in eastern part of Kalimantan
East Kalimantan	○	○		○	○	(Samalinda, Balikpapan, Batulicin and Banjarmasin)
						*High potential of natural resources of oil, gas and coal (West Kalimantan, South Kalimantan,
						East Kalimantan) and mineral (Central Kalimantan, South Kalimantan), and its effective use
						--- Promoting related industry (For example, petro-chemical industry)
						*High potential of production of estate crops (West Kalimantan, Central Kalimantan)
						*Large scale development of rice field (Central Kalimantan)
North Sulawesi	○		○	○	○	SULAWESI
Central Sulawesi				○	○	Economic network of 'Jawa-South Sulawesi' in the middle term
South Sulawesi	○		○	○	○	Economic network of 'Jawa-South and East Kalimantan-North Sulawesi' in the middle term
Southeast Sulawesi				○	○	*Economic cooperation between Philippines and North Sulawesi [BIMP-EAGA]
						*Promoting processing industry of primary products (North Sulawesi, South Sulawesi)
						*Development of tourism in North Sulawesi (Manado)
Bali			○	○	○	Others
West Nusa Tenggara		○		○	○	Economic network of 'Jawa-Bali-Lombok' in the middle term
						*Economic cooperation between Australia, East Nusa Tenggara and East Timor) [AIDA]
East Nusa Tenggara		○		○	○	*Enhancement of potential of local industries
						--- Promoting agri-business, marine industry, etc.
East Timor		○		○	○	*High potential of production of farm food crops in Bali
Maluku				○	○	*High potential of natural resources of mineral (West Nusa Tenggara)
Irian Jaya		○		○	○	*High potential of development of oil field (Timor Sea)
						*Development of tourism in Bali-Nusa Tenggara

Figure 3.2.4.1 General View of Regional Development in Indonesia

LEGEND	
	Advanced Manufacturing Industries
	Oil/gas related Industries
	Agriculture, Forestry (Including Preservation)
	Fishery
	Tourism



Source: Discussion paper of 'Integrated National Physical Development Plan - Japan's Experiences and Introduction of This Concept into Developing Countries' (1995, OECF)

Figure 3.2.4.2 Nationwide Future Land Development Structure (Input of Development Resources)

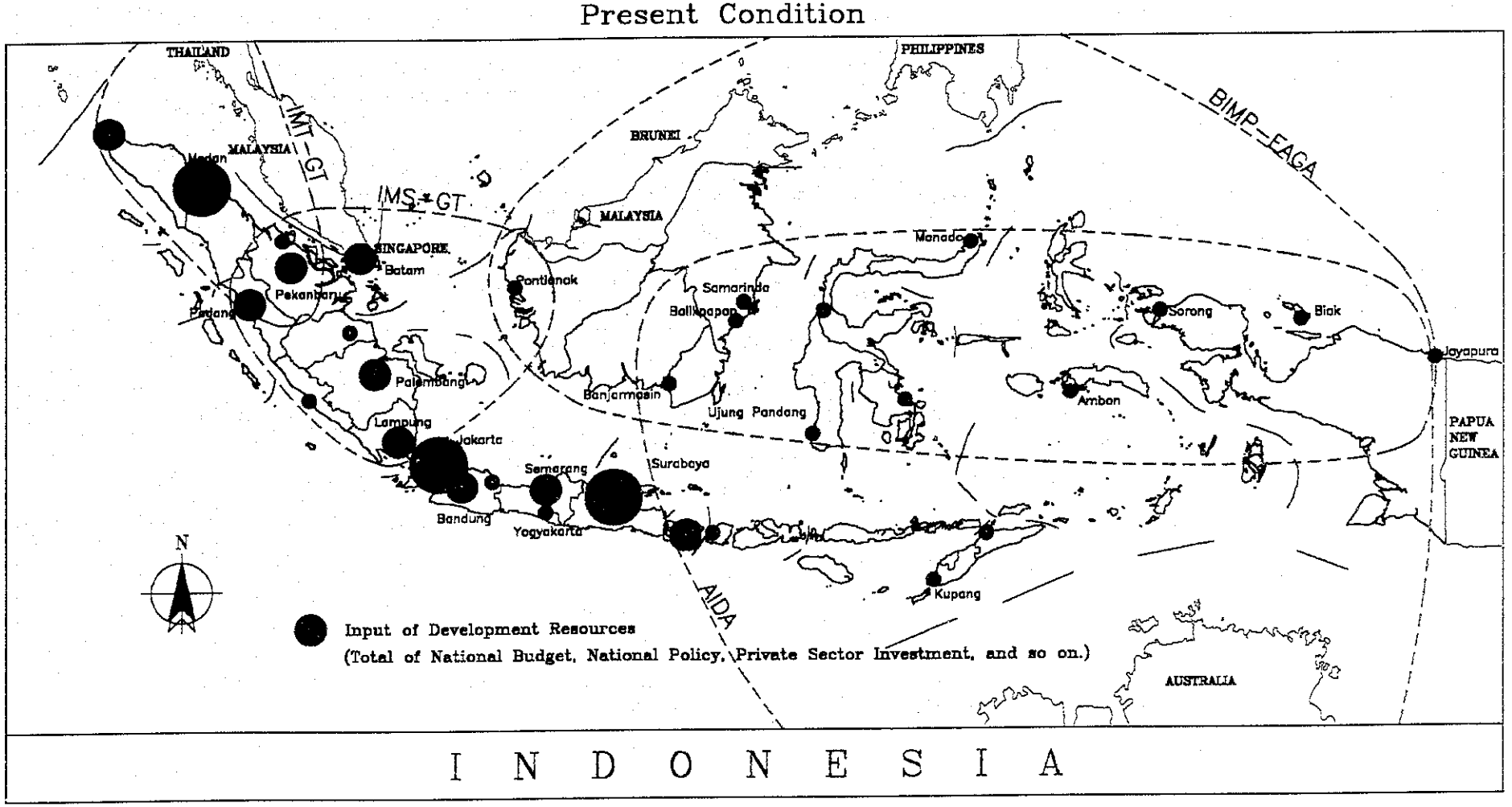
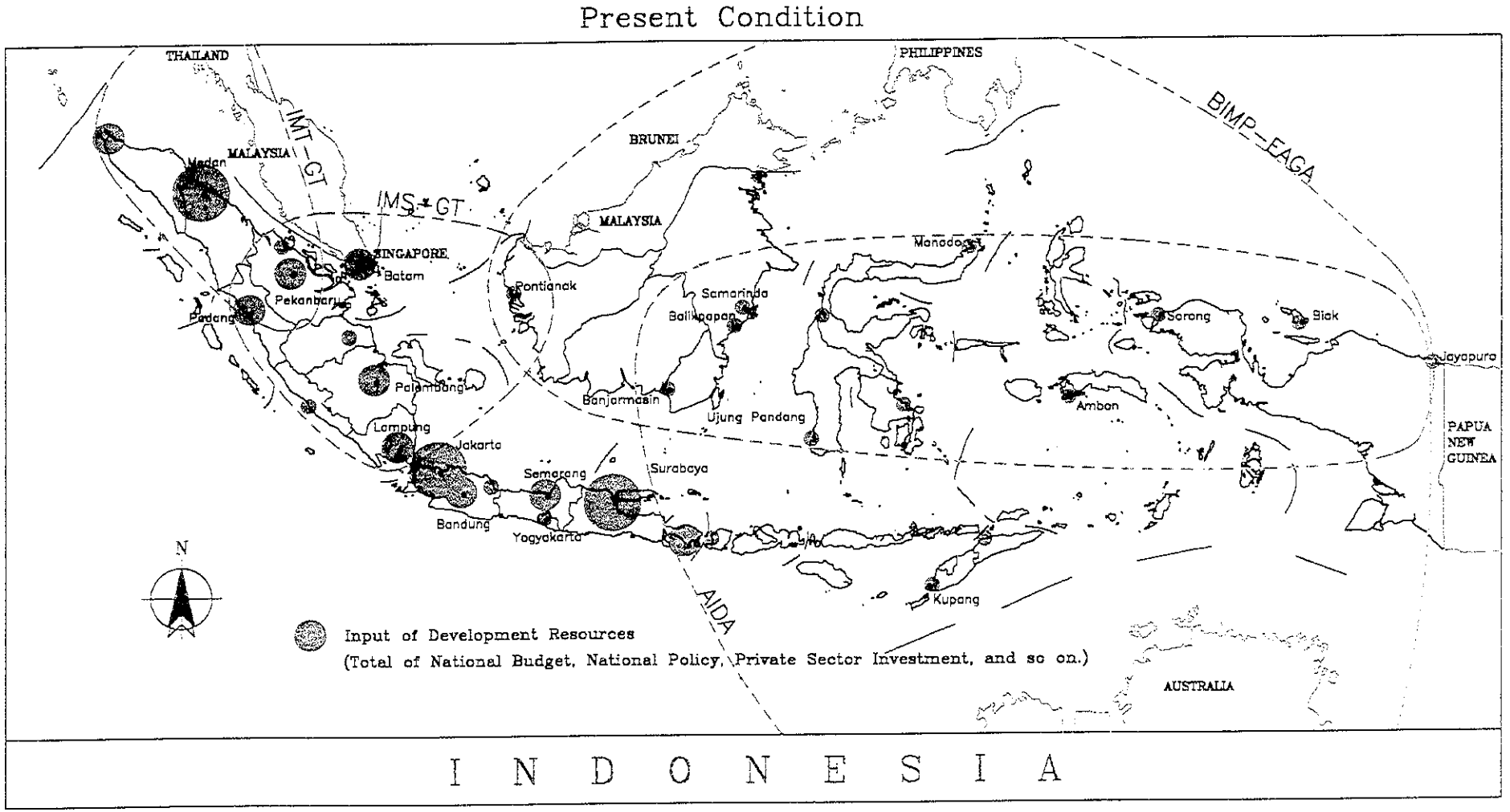
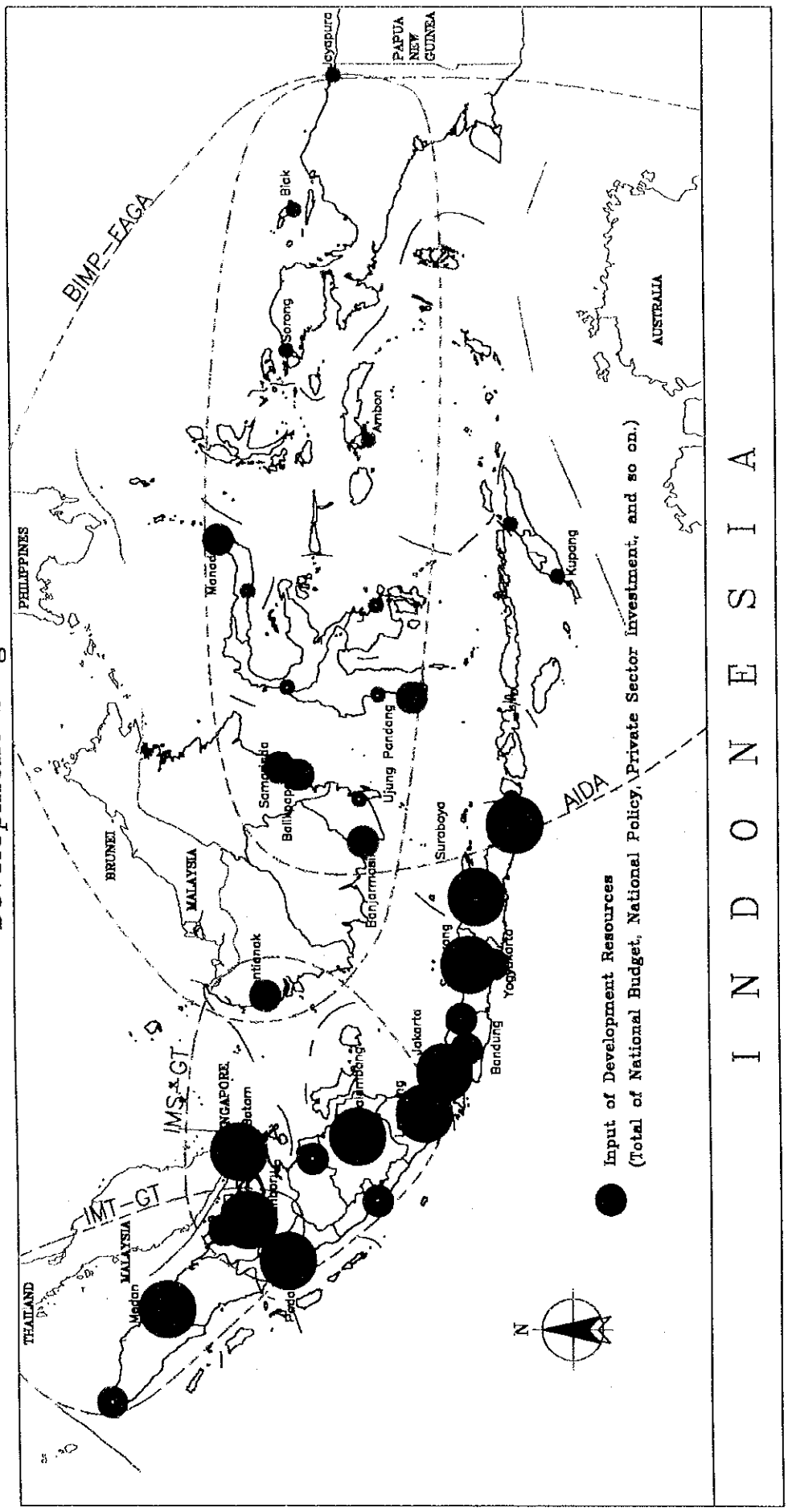


Figure 3.2.4.2 Nationwide Future Land Development Structure (Input of Development Resources)



(Figure 3.2.4.2 continued)



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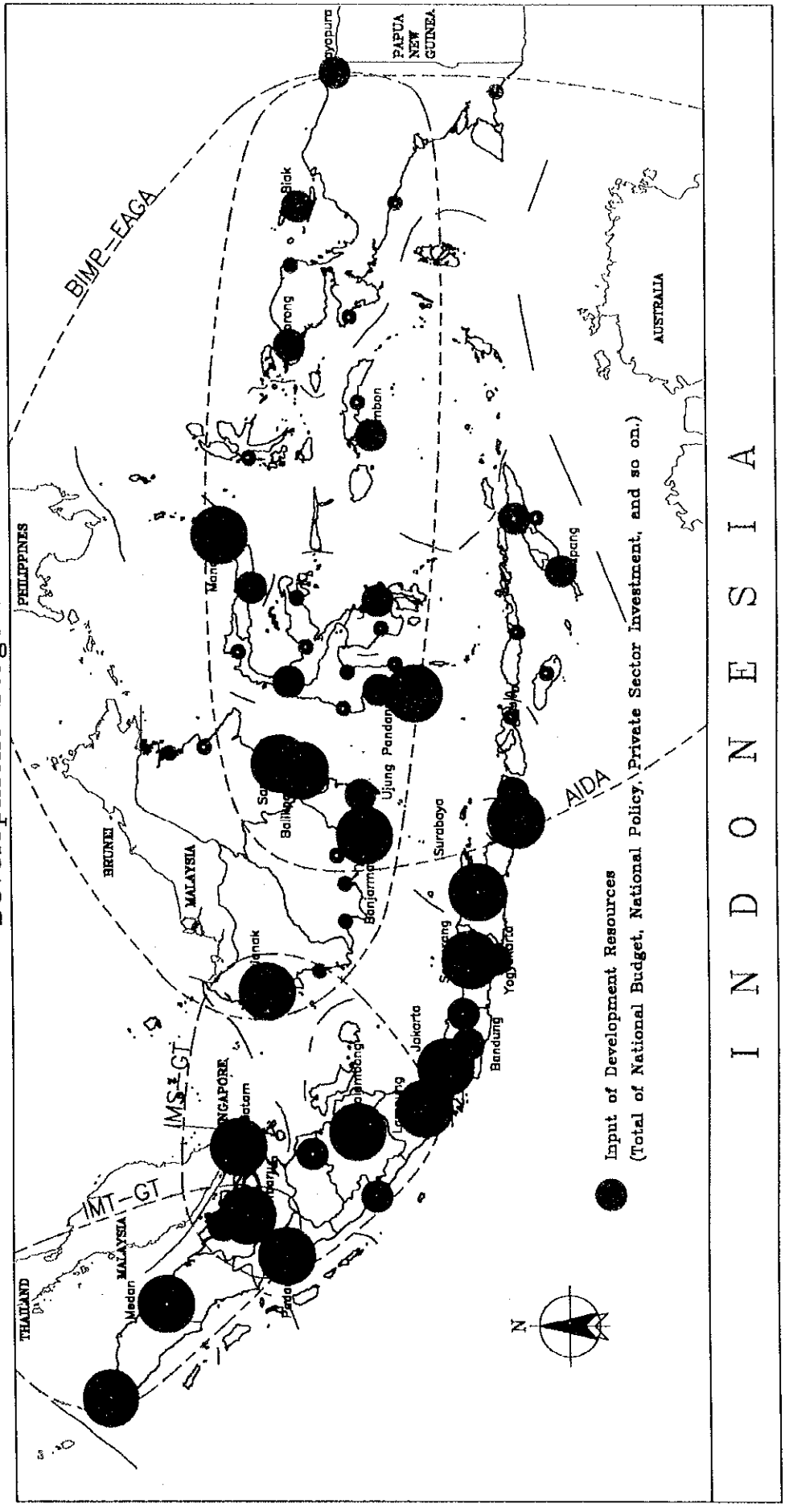

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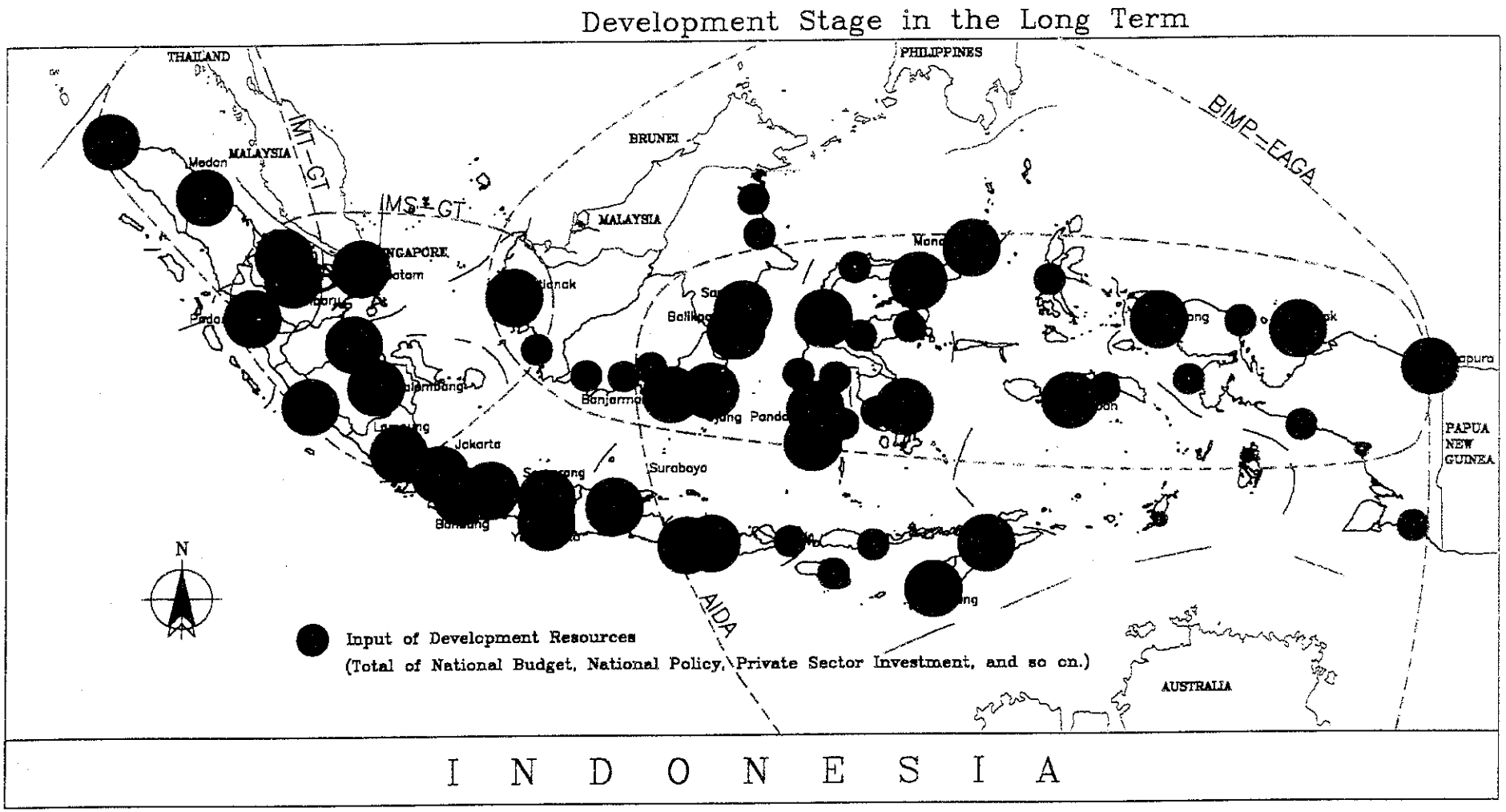
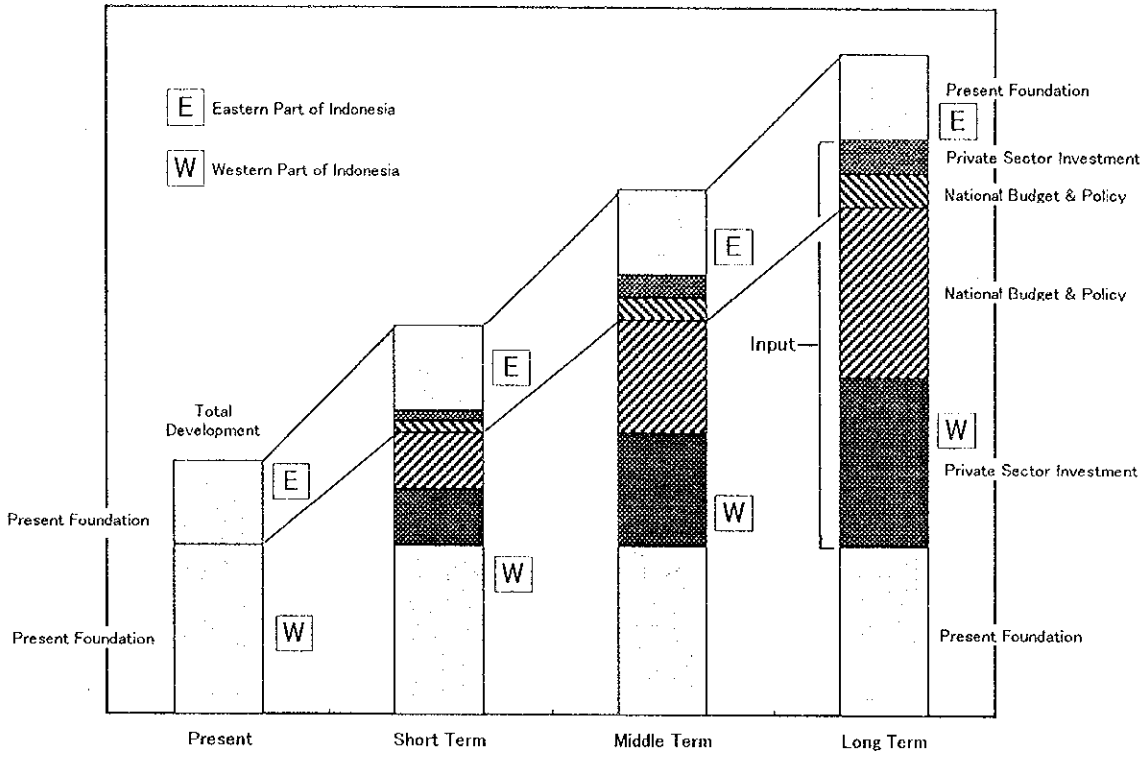
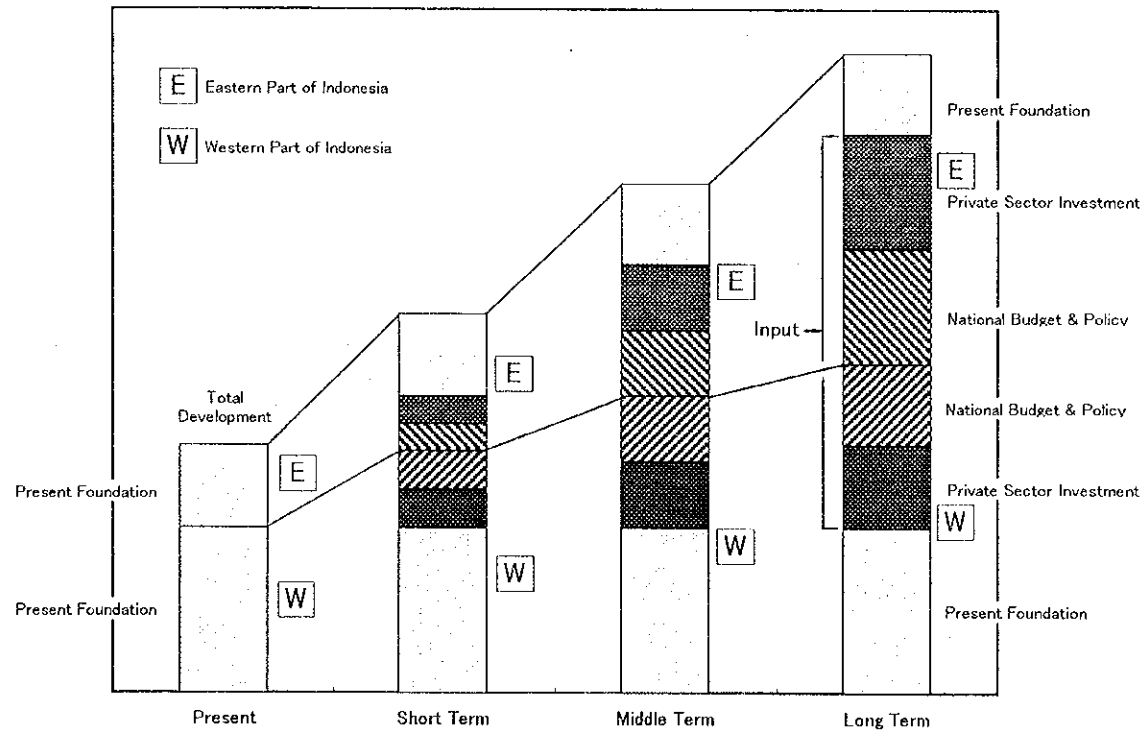


Figure 3.2.4.3 Assumption of Input of Development Resources

Projected Change of Input (Case1 : Non Consideration for Regional Disparity)



Projected Change of Input (Case2 : Consideration for Regional Disparity)



(2) Nationwide Economic Development Network in Future

According to above-mentioned future land development structure, we assumed that nationwide economic development network will be shaped as shown in Figure 3.2.4.4.

As the basic concept of the nationwide economic development network, we consider that the network will progress and enlarge as a chain-reaction in proportion to the progress of land development. Namely, in the short term, the network will be mainly well shaped in "Jawa-Sumatra", and in the middle term, the well shaped network will be extended toward "Jawa-West Kalimantan", "Jawa-South and East Kalimantan-North Sulawesi", "Jawa-South Sulawesi", and "Jawa-Bali-Lombok". Finally in the long term, it will be extended toward the remaining regions.

International regional economic cooperation with neighboring countries, such as IMT-GT, IMS-GT, BIMP-EAGA and AIDA, will also influence this network. In order to promote international economic cooperation, close contact shall be enhanced. In Sumatra and the eastern part of Indonesia, cooperation with neighboring countries will more and more increase. As a result, this cooperation will also contribute to regional development in those areas.

In this cooperation, sea linkages will play a vital role. Therefore port development should be examined in taking this cooperation into consideration. For example, considering the fact that more than 10% of the international cargo is transported from/to Australia, the progress of the economic cooperation with Australia will undoubtedly influence port development.

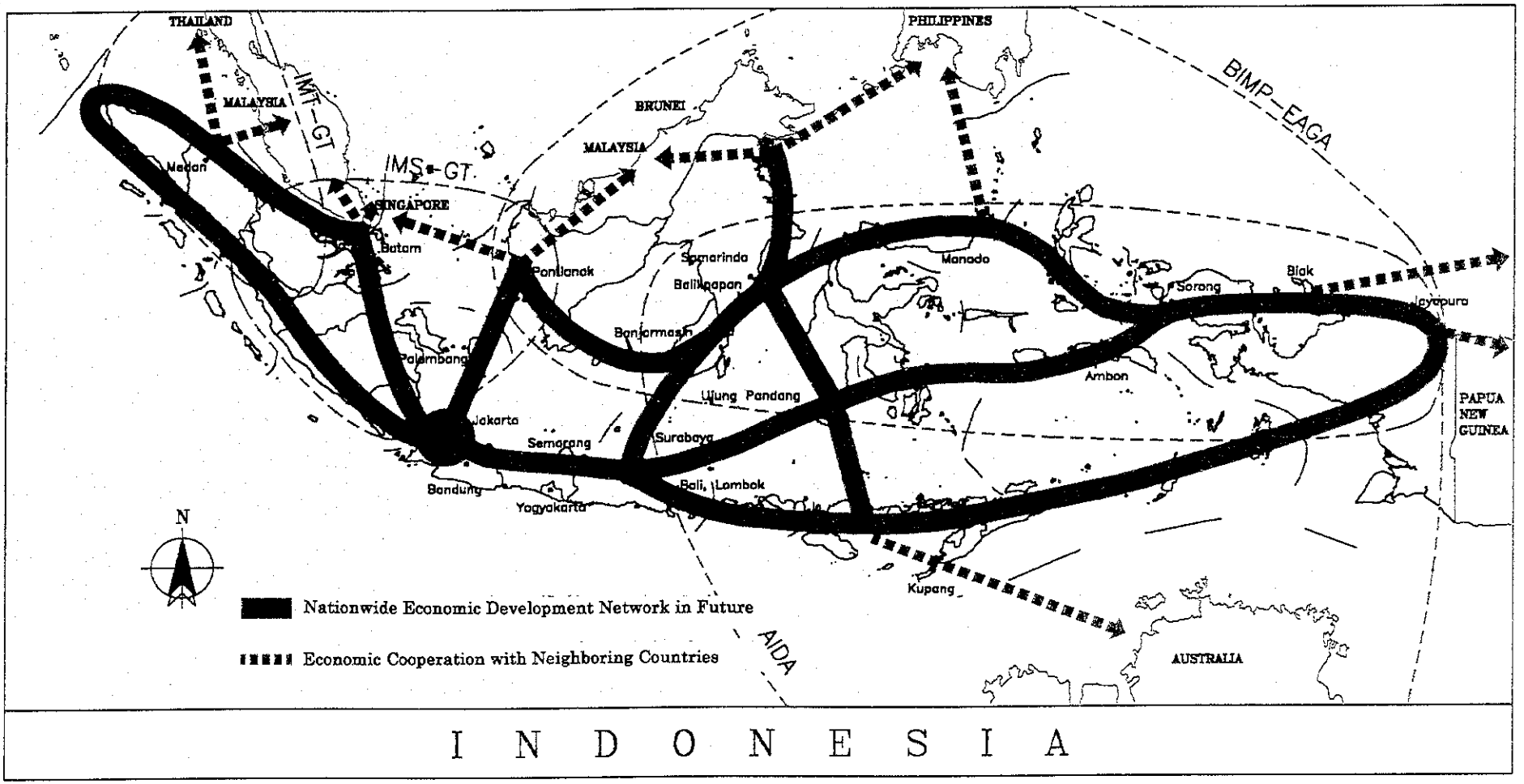
3.2.5 Japan's Experience of Regional Development related to Port Development

(1) Background

Japan is a mountainous island country, and almost all of the plains are along the coast. Therefore, the country's population and industry have been traditionally concentrated in coastal areas.

During the period of the formation of the modern Japanese state from the Meiji Restoration of 1868 to the Second World War, industrial development in Japan began with the development of domestic mining resources such as coal, and on the basis of heavy industries as represented by the government-run Yahata ironworks (the mother company of the present Nippon Steel Corporation). It was mainly developed in four industrial belts; Keihin (Tokyo and Yokohama), Chukyo (Nagoya), Hanshin (Osaka and Kobe) and Kita-Kyushu industrial belts.

Figure 3.2.4.4 Nationwide Economic Development Network in Future



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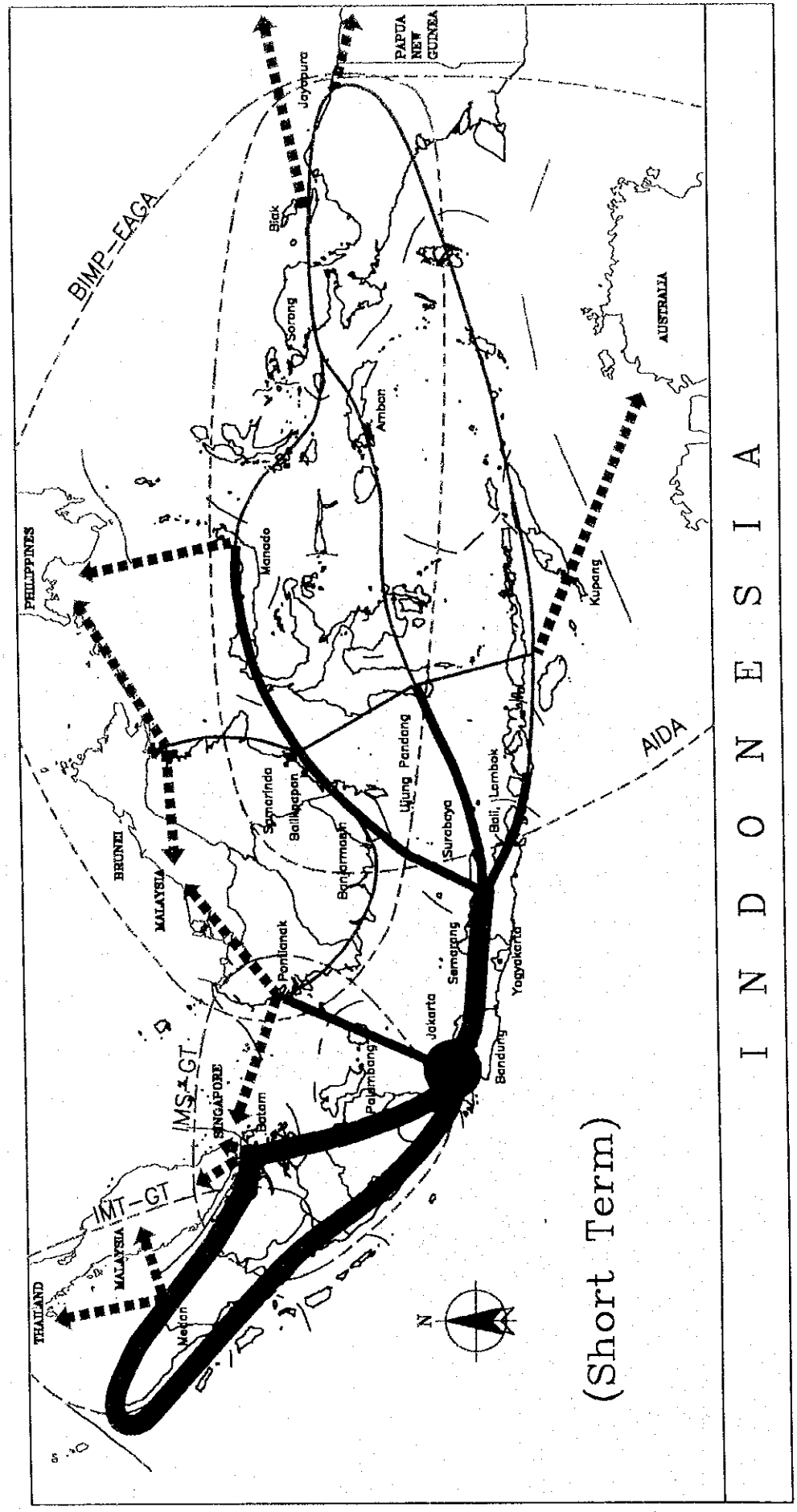

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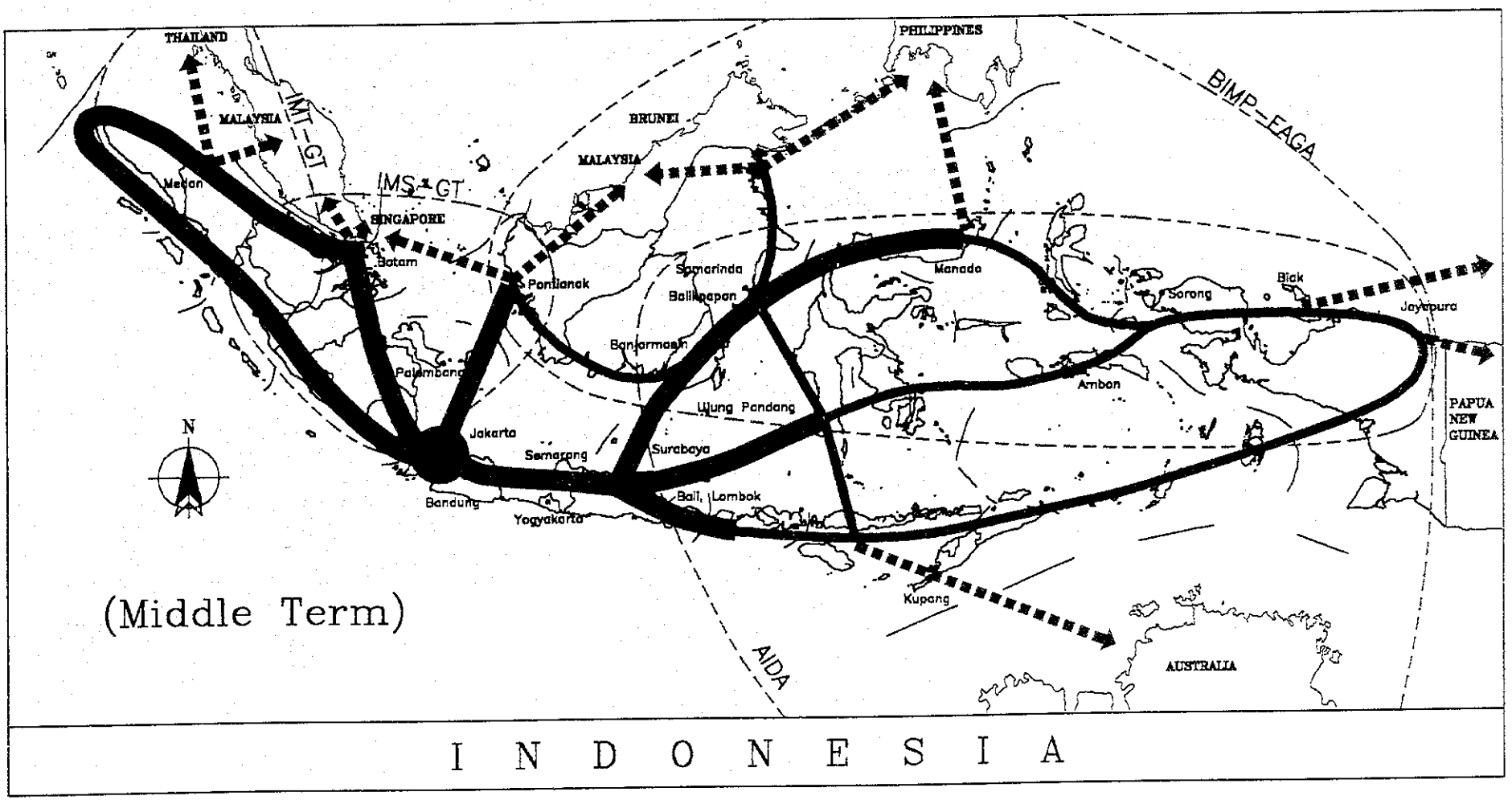

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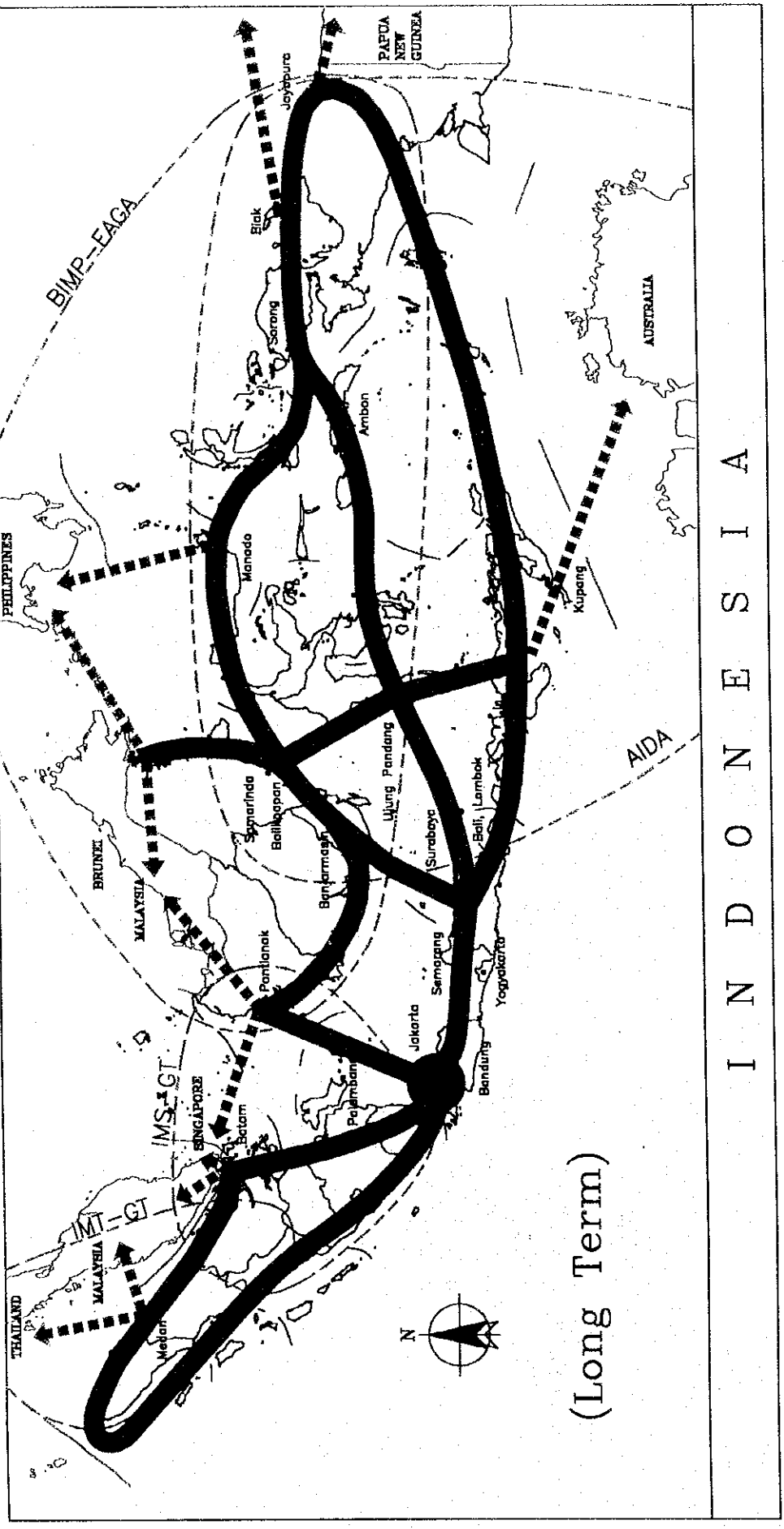


In the decade following the Second World War, Japan had its hands full recovering from war damage. Factory and plant facilities were rebuilt in the coastal industrial zones of the four main prewar industrial belts.

Such economic recovery was completed by around 1955, and Japan entered a period of tremendous economic growth. With the rapid economic growth, these industrial zones outgrew the capacities and began to spread to the surrounding areas. The growth of heavy industries; steel manufacturing, oil refining, petrochemical industries, and other basic resource-related industries; was particularly remarkable. As a result, further accumulation of industry and population occurred in the three metropolitan areas that include these industrial zones.

After that, the Ten-year Plan to Double National Income was formulated in 1960, which envisioned industrial development mainly in the 'Pacific Belt' joining these four major industrial zones, in order to make the most of the advantages of such concentration of industry and population. However, there was a fear that the income gap between the Pacific Belt and other areas of the country would be further widened.

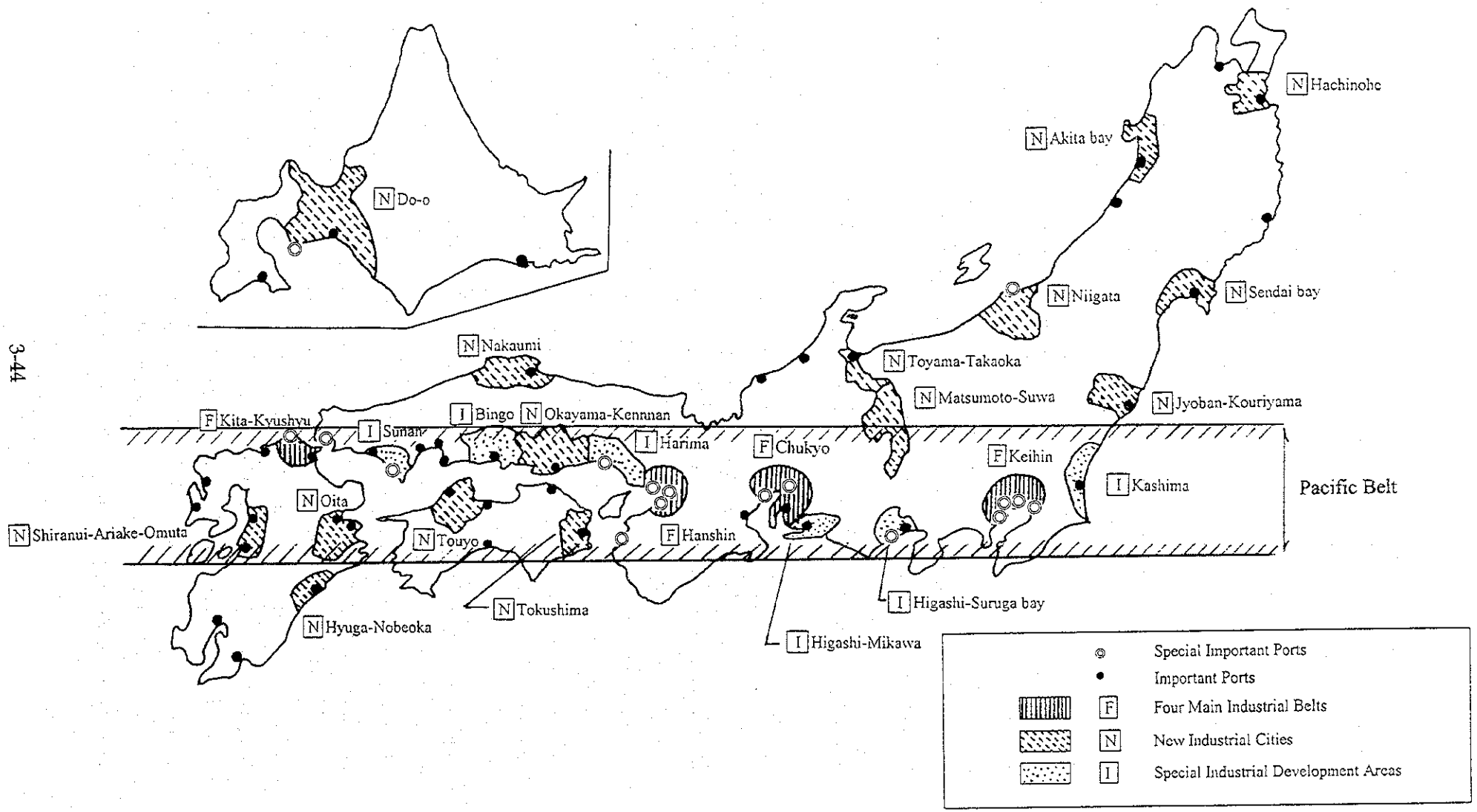
(2) Establishment of Comprehensive National Development Plans

On the basis of the Comprehensive National Land Development Law which was enacted in 1950 as the basic law for the comprehensive use, development and preservation of the national land area, the national government formulated the 1st Comprehensive National Development Plan in 1962. In this plan, it was attempted to correct such interregional disparity as income gap between the three metropolitan areas and other areas, and to promote balanced development by designating strategic area for development.

For the realization of designating such strategic area for development, the Law for Promotion of Construction of New Industrial Cities was enacted in 1962, and 15 areas were designated as new industrial cities. Two years later the Law for Promotion of Special Regional Industrial Development was enacted, and 6 areas were designated as special industrial development areas. (See Figure 3.2.5.1)

New industrial cities were designated for the purpose of narrowing regional disparity by developing basic facilities for industrialization and urbanization in several undeveloped regional blocks, and special industrial development areas were designated for the purpose of developing the areas which had relatively high potential for industrial development within the Pacific Belt, but which were not within existing industrial zones. Except for the Matsumoto-Suwa area, these designated areas are located along the coast. So, ports and other basic infrastructures were actively developed for the purpose of regional development in these areas. As a result, industry was attracted, industrial production steadily increased, and overall industrial development was promoted in order as planned.

Figure 3.2.5.1 New Industrial Cities, Special Industrial Development Areas and Pacific Belt



Although these new industrial cities and special industrial development areas played an important role in narrowing the gap in income between different regions to a certain extent, industrial development in the remote areas located far from the 'Pacific Belt' did not sufficiently progress, which meant that interregional disparities were not fully overcome. The problem was tackled in and after the 2nd Comprehensive National Development Plan.

(3) Industrial Development and the Role of Ports Development

As mentioned above, Japanese economic growth has been based on the development of heavy and chemical industries, particularly the steel and oil-related industries. These industries require large-scale industrial sites and large-scale ports to facilitate the use of large vessels in order to import large quantities of raw materials at lower transportation costs. As a result, many coastal industrial zones, particularly in the Pacific Belt, have been developed as production centers for Japan's key industries. Ports development has played an important role in this process. For example, regarding the development of above-mentioned new industrial cities and special industrial development areas, some ports were developed as the core infrastructure in the area. Namely, ports in coastal industrial zones have the following roles which are indispensable for resource-related industries such as heavy and chemical industries;

1) Reduction of transportation cost for getting necessary raw materials and shipping of products, due to locating in the port area
2) Function of strategic distribution points for both foreign and domestic trade
3) Providing large sites for industry in the port area

In the new industrial cities and special industrial development areas, other key infrastructures for industry besides port facilities; i.e. road, railway and water supply, etc. were also developed on the basis of the enacted two laws. The overall approach in planning led to successful development.

(4) Impact of Port Development to the Region (in the Case of Port of Kashima)

As an example of port development having a large regional impact, we introduce the case of the port of Kashima. This port played an important role in regional industrial development in the period of Japan's rapid economic growth.

1) General

Kashima area is located around 80km east of Tokyo, in the area centering on the towns of Kashima, Kamisu and Namizaki in Ibaraki prefecture (See Figure 3.2.5.2). These areas were extensive sand dunes, and underpopulated areas with no existing industrial concentration at all. They lagged behind industrialized areas and income levels were low.

In 1962, the national government formulated the 1st Comprehensive National Development Plan for the purpose of decentralization of industries and correction of income gap between different regions. In response to this government's policy, Ibaraki prefecture (local Government) drafted the Kashima Coastal Industrial Belt Development Master Plan. The development plan was composed of the construction of a port, railway and road, the provision of an industrial zone with an area extending over 3,000 ha, the construction of approximately 25,000 housing units on an area of approximately 600 ha, and so on.

After that, Kashima area was designated as a special industrial development area by the Japanese government in July 1963. In addition, the master plan of port of Kashima was approved by Planning Committee of Council for Ports and Harbors in 1963. (See Figure 3.2.5.3) Thus the port of Kashima became a new base of development.

Opened in 1969 after rapid construction, the port of Kashima had the capacity to accommodate 150,000 ton class vessels to the inner port and 200,000 ton class vessels to the outer port. Since then, the port of Kashima has served as the core for the development of mainly heavy industries; serving as the point of entry for the supply of raw materials and exit for shipment of products.

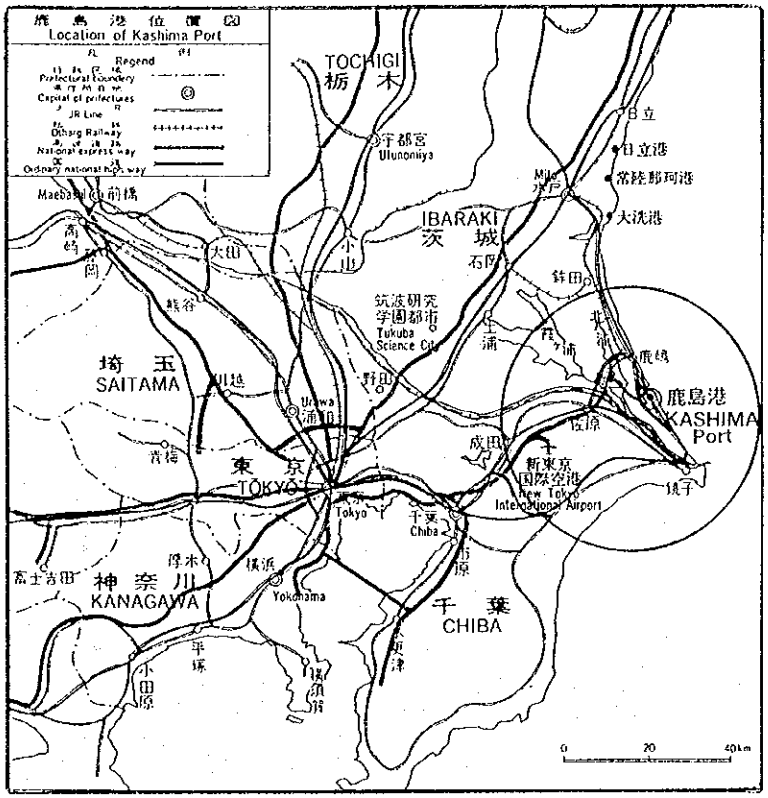
2) Regional Effect of the Port of Kashima

It is difficult to determine the impact of the port development alone to the region as an independent factor, but we can gain a general idea of the impact from the overall changes, because the changes of the regional characteristics are mainly due to the growth of the Kashima industrial zone on the basis of the port of Kashima.

Regional effect of the port of Kashima can be considered by comparing the Kashima area with the whole Ibaraki prefecture in terms of changes in population, household, industrial structure and value of manufacturing shipments. (See Figure 3.2.5.4 - Figure 3.2.5.7)

According to these figures, we can see that the changes in Kashima area after the port opened are greater than the changes in the whole Ibaraki prefecture in any case.

Figure 3.2.5.2 The Location of Kashima area



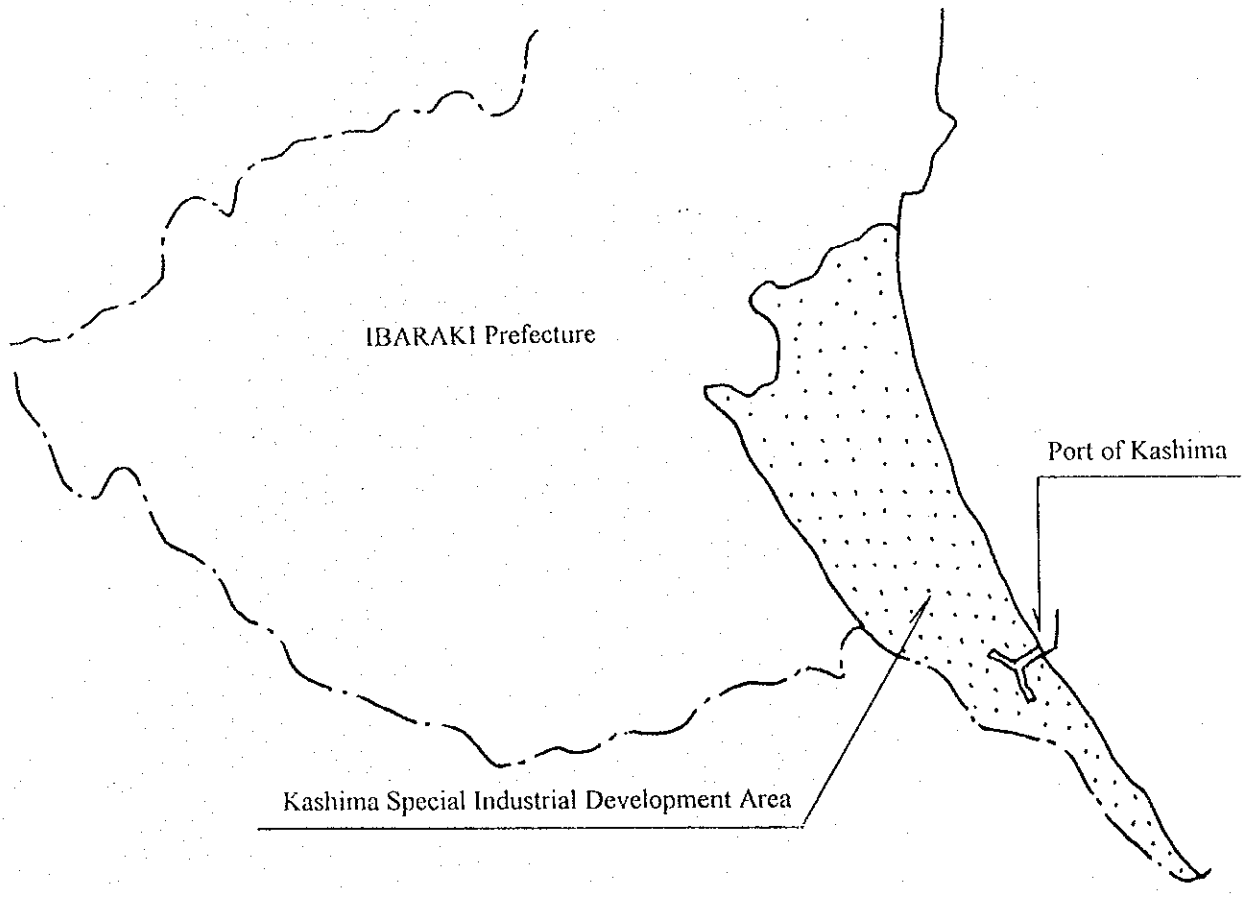


Figure 3.2.5.3 Port of Kashima

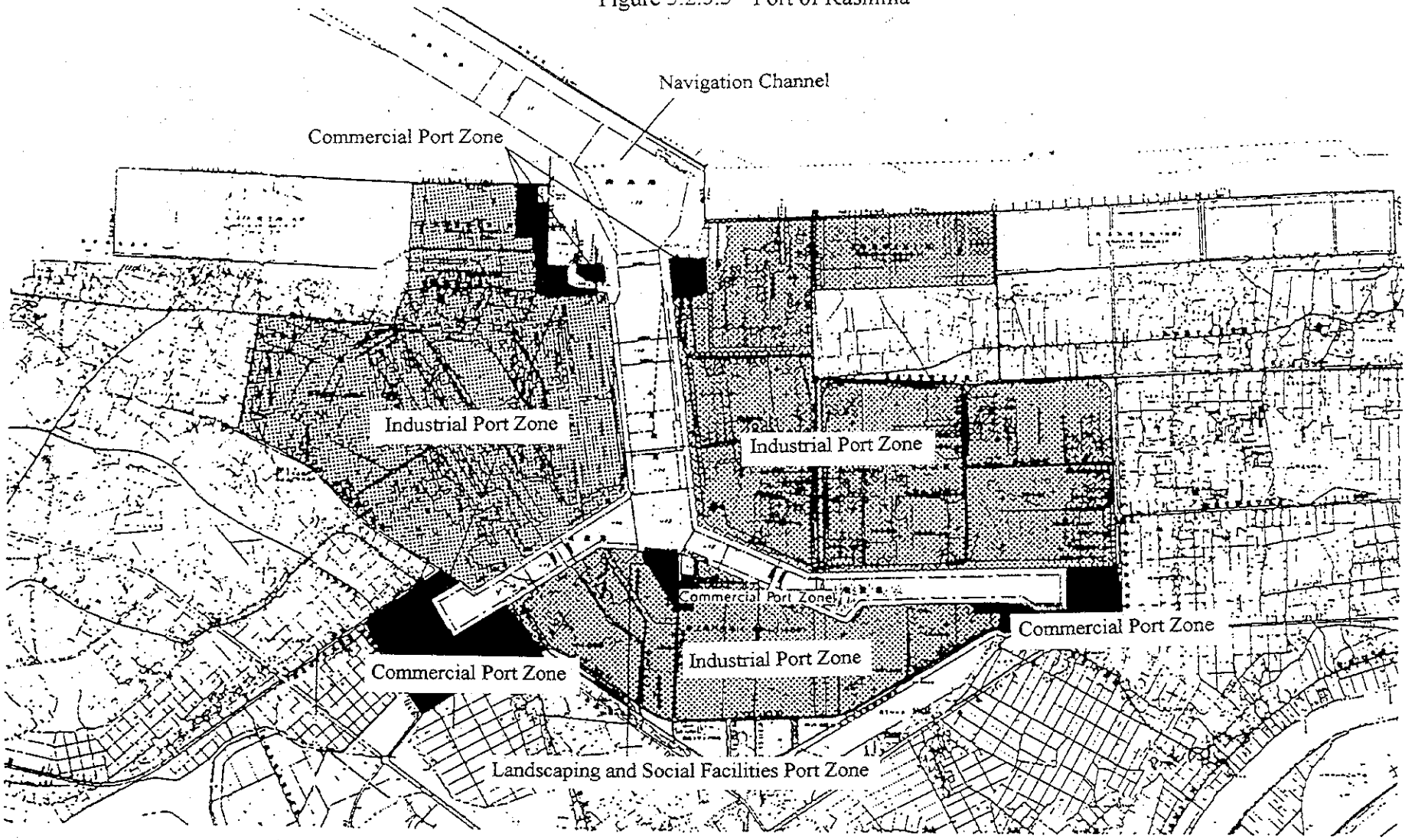


Figure 3.2.5.4 Regional Effect of the Port of Kashima (Population)

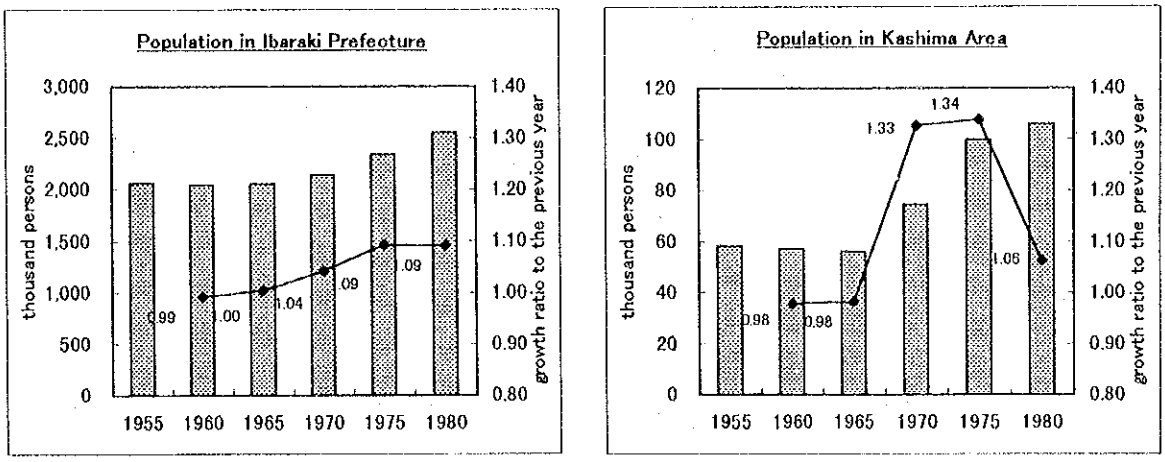


Figure 3.2.5.5 Regional Effect of the Port of Kashima (Household)

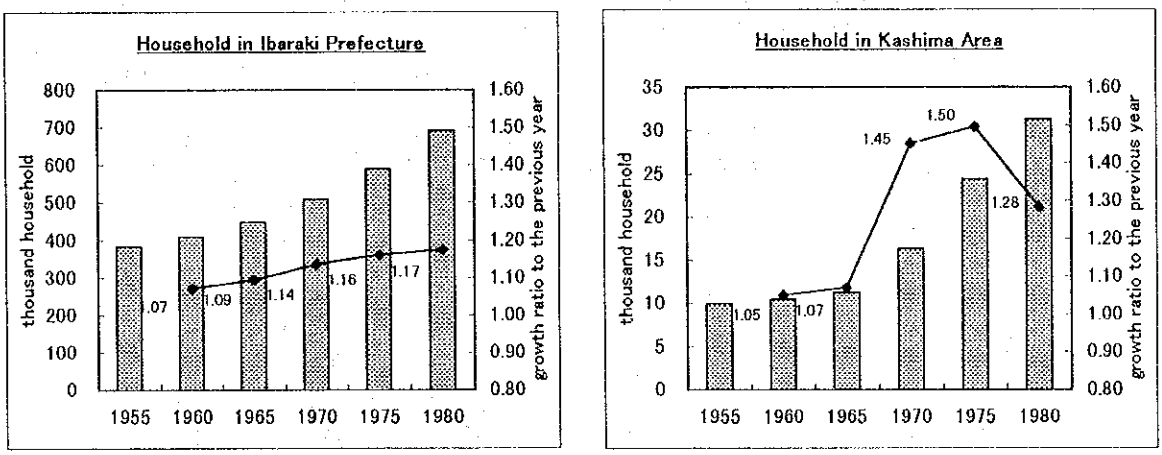


Figure 3.2.5.6 Regional Effect of the Port of Kashima (Industrial Structure)

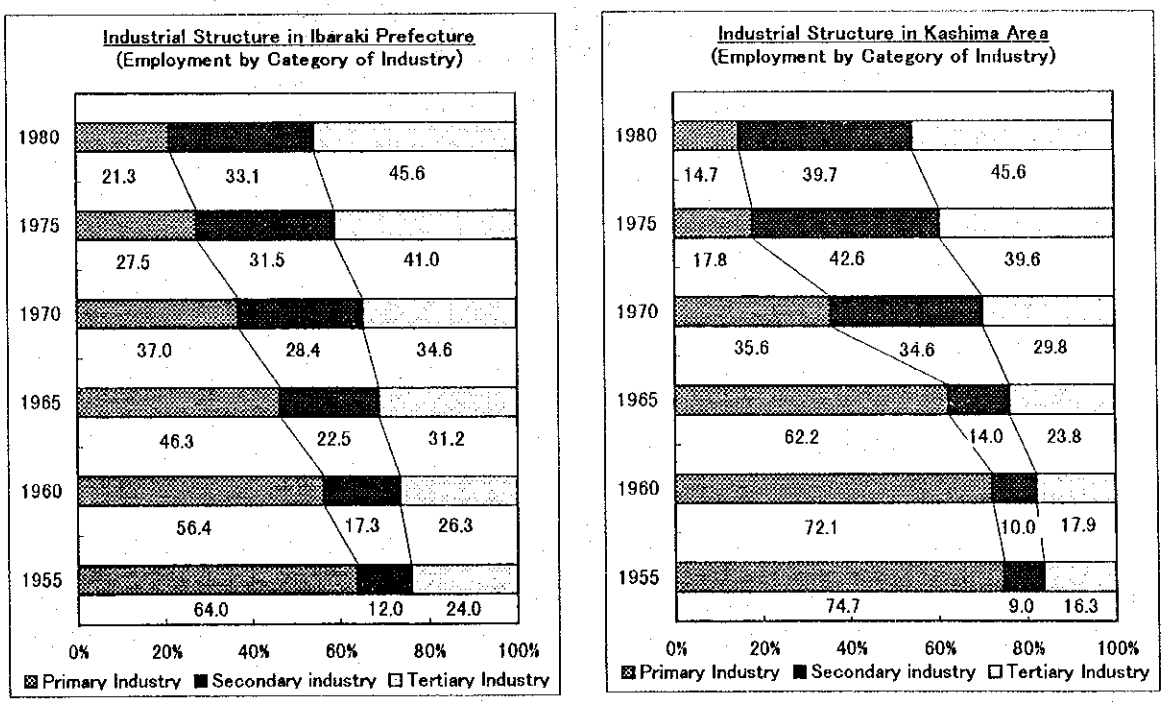
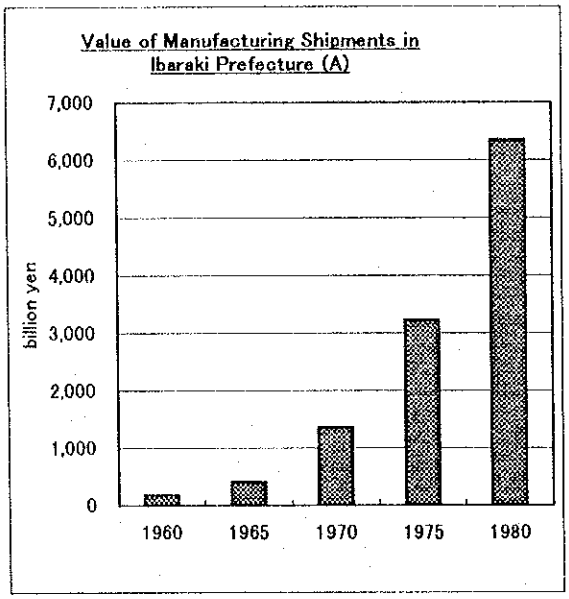
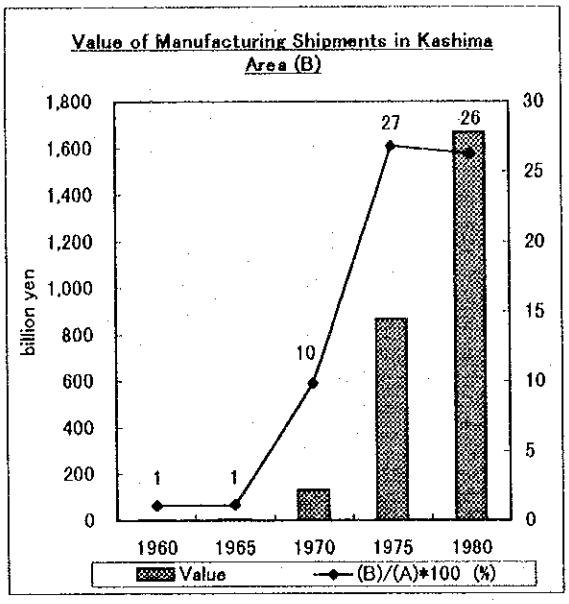
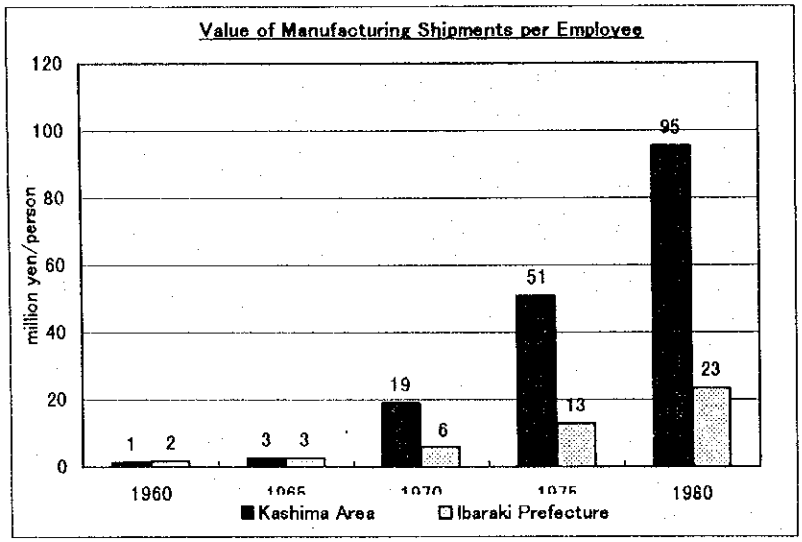


Figure 3.2.5.7 Regional Effect of the Port of Kashima
(Value of Manufacturing Shipments)







3.3 Trading Condition between Indonesia and Major Trading Partners

In this section, past Indonesian trading volume/value with major trading partners in Asia, Middle East, Europe, North America, Central & South America, Africa and Oceania are examined to identify key areas and countries for Indonesia.

3.3.1 Indonesian Trade by Area

The most important area in terms of international trade volume/value for Indonesia in 1995 was Asia with share of 89.9%/60.7% for export and 39.3%/49.3% for import. Europe is also a key area, in terms of trade value of 15.9% for export and 22.8% for import. The import volume from the middle east is also substantial and its average is 16.1%. The shares for each of the top four areas from 1989 to 1995 are shown in Figures 3.3.1 to 3.3.4.

3.3.2 Major Trading Partners of Indonesia

Major trading partners of Indonesia in terms of export volume are Japan(23.4%), Republic of Korea(6.1%), Taiwan(4.9%), USA(3.2%) and China(3.2%), while for export value, Japan(27.1%), USA(13.9%), Republic of Korea(6.4%), Taiwan(3.9%) and China(3.8%) are the main partners. As for import volume, Australia(9.9%), Saudi Arabia(9.2%), USA(8.2%), China(5.9%) and Japan(5.4%) are the major countries, while Japan(22.7%), USA(11.7%), Germany(6.9%), Republic of Korea(6.0%) and Australia(5.0%) are the main countries in terms of value.

The volume and value for export and import in Singapore has a large share in Indonesian statistics, but it is assumed that the volume and value in Singapore include those of transshipment cargoes and thus Singapore is excluded here.

3.3.3 Trade volume of Major Trading Partners

The trading volume shares of the important trading area for Indonesian trade namely ASEAN, major important Asian countries such as Japan, China, Republic of Korea, Hong Kong and Taiwan, Europe and North America are estimated using the average growth rate of GDP at these area.

The share of the trading volume for export/import at the important trade areas for the Indonesian international trade are shown Figure 3.3.5 and 3.3.6.

Figure 3.3.1 Share of Cargo Volume for each of the Top Four Areas in the World for Indonesian Export Trade

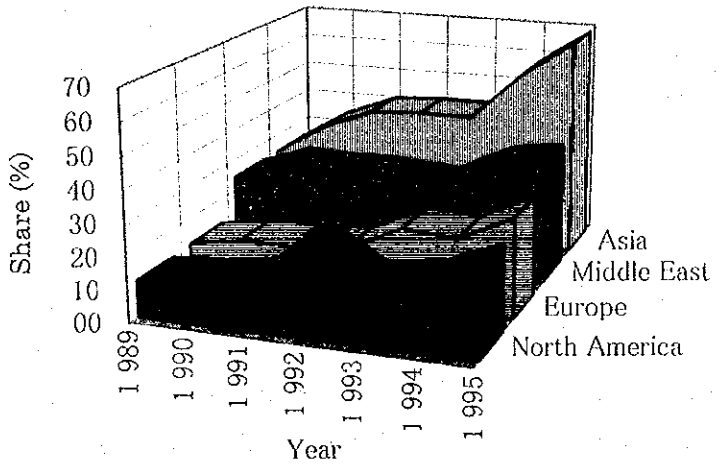


Figure 3.3.2 Share of Trade Value for each of the Top Four Areas for Indonesian Trade in the World

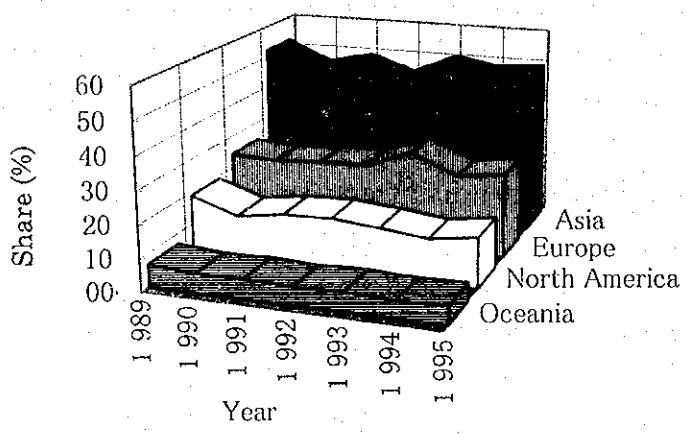


Figure 3.3.3 Share of Export Cargo Volume for each of the Top Four Areas in the World for Indonesian Trade

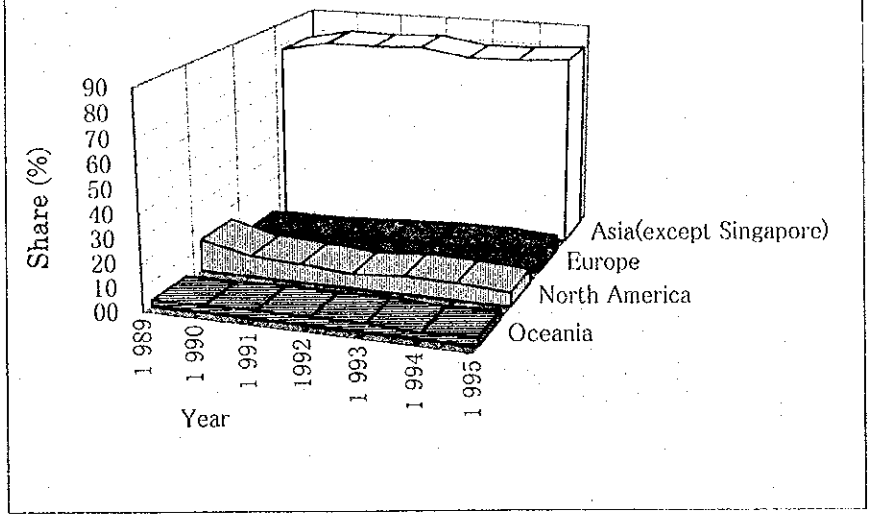


Figure 3.3.4 Share of Export Cargo Value for each of the Top Four Areas in the World for Indonesian Trade

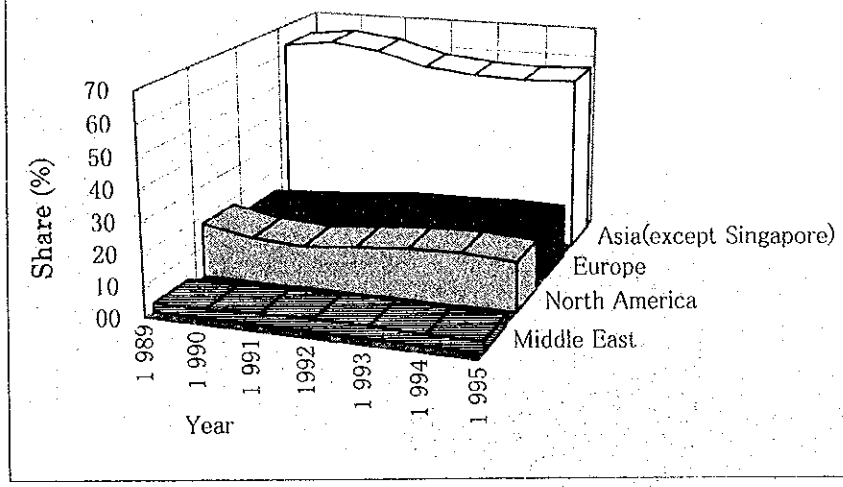


Figure 3.3.5 Imported Volume Share Estimated by GDP Growth

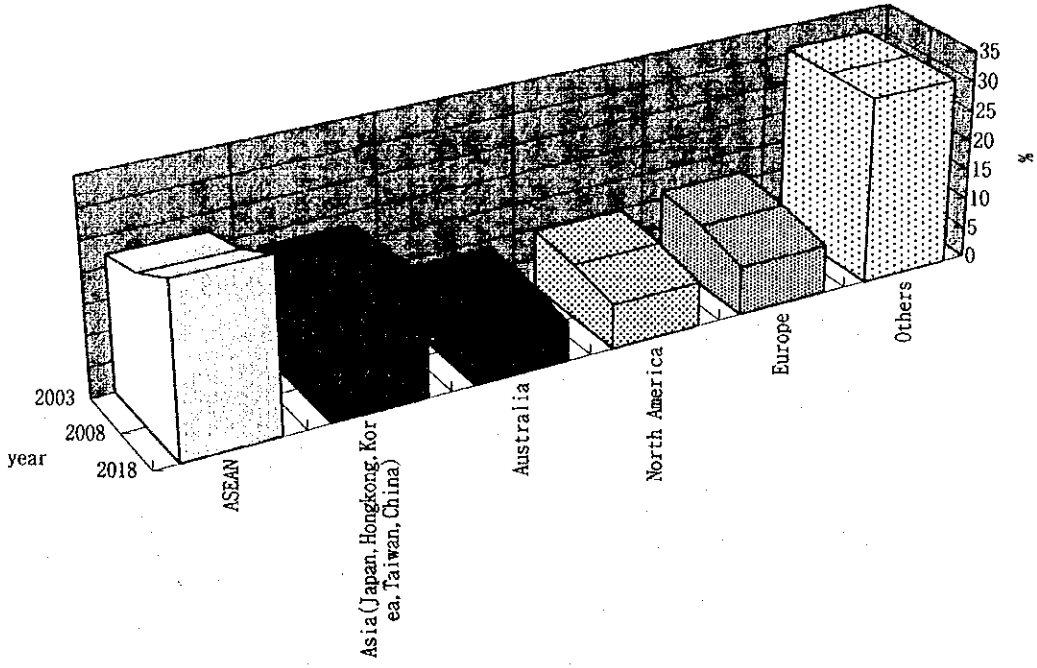
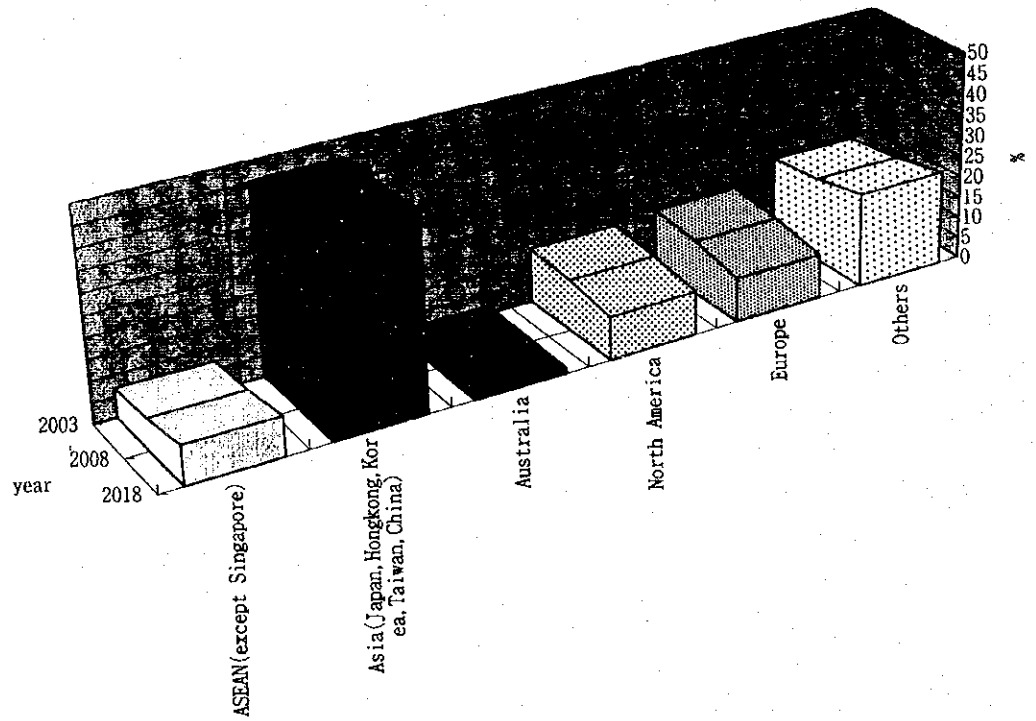


Figure 3.3.6 Exported Value Share Estimated by GDP Growth



3.4 Container and Major Domestic Shipping

3.4.1 Trend of International Container Vessel

(1) Trans-Pacific and Europe/Asia container route (International Trunk Container Route) vessels.

Before inauguration of full container ship, in the trade of Trans-Pacific the turnaround time by conventional vessel was about 60 days, but owing to the development of new marine diesel engine and the mechanized container operation system in ports, the new turnaround time of container vessels became only 30 days.

Afterwards, full container vessels developed remarkably and became much bigger and faster. By 1970, main container ships were already bigger than 2,000TEU load class.

The enlargement of container vessel size continued in the 1970's. In the 1980's, over Pana-Max vessels of 4,000TEU class came into service. In the 1990's, to serve long distance routes such as Far East/Europe and Far East/North America, the vessel size increased to 5,000TEU～6,000TEU load type. (See Table 3.4.1.1)

Table 3.4.1.1 History of Load Capacity of Container Ship Unit: TEU

YEAR	ASIA/NORTH AMERICA		ASIA/EUROPE		INTRA-ASIA	
	AVERAGE	MAXIMUM	AVERAGE	MAXIMUM	AVERAGE	MAXIMUM
1981	1,406	2,068	1,839	3,045	312	839
1986	1,965	2,900	2,023	3,042	477	1,266
1990	2,303	4,000	2,428	4,000	552	1,570
1991	2,343	4,300	2,502	4,000	603	1,570
1992	2,495	4,400	2,573	4,469	598	1,612
1993	2,521	4,050	2,679	4,450	622	1,612
1994	2,557	4,050	2,936	4,450	646	1,612
1995	2,740	5,350	3,133	4,950	676	1,612
1996	3,117	5,550	3,147	6,000	711	1,688

SOURCE: The Japan Shipping Exchange Inc.

When we look at the world situation from the economic point of view, we recognize that the world today is undergoing drastic and revolutionary changes. With the collapse of socialism in East European countries and the former Soviet Union, these countries have been shifting rapidly to free market economies. In Asia, ASEAN countries, China and other countries are showing rapid economic growth. Accompanied by the international division of labor, the world trade will grow significantly in around Asia. Therefore, the shipping

between Asia and other areas in the world will play a much more important role in the future.

In the world shipping circles, there are many theories about the future size of full container vessels especially post Pana-Max size. The pace of vessel enlargement has been faster than expected. Over 8,000TEU vessels will surely be in service at the end of this century.

According to the magazine "Fairplay Newbuildings" 2nd April 1998 edition, building of seven 8,700TEU container vessels were ordered to Odense Steel Shipyard by Maersk Line which will be delivered between the middle of 1998 and the end of 1999.

In another magazine "MER" August 1997 edition, it is said that a project group is studying a possibility of building over 8,700TEU vessels.

Some one even speculates the building of 10,000TEU or 13,000TEU capacity vessels. However the problems such as engine mechanics, the hull structure of the vessel, economic problems of fuel cost and methods to handle such large quantities of cargo at ports would have to be overcome.

The study team estimated average load capacity of full container vessels in major trade routes, taking into consideration of the history of container ships.

(See Table 3.4.1.2)

Table 3.4.1.2 Assumption of Average Load Capacity of Container Ship Unit: TEU

YEAR	ASIA/NORTH AMERICA (AVERAGE)	ASIA/EUROPE CONTINENT (AVERAGE)	INTRA-ASIA	
			AVERAGE	MAXIMUM
1995	2,740	5,350	3,133	4,950
2000	3,260	4,043	828	2,067
2003	3,618	4,711	935	2,334
2008	4,305	6,079	1,145	2,859
2013	4,864	7,273	1,320	3,297
2018	5,309	8,275	1,462	3,652

SOURCE: Data based on The Japan Shipping Exchange Inc. and estimated by the Study Team

REMARK: 1) Actual vessel size increased rate between 1990 and 1995 namely 3.5% for Asia/North America,5.2% for Asia/Europe Continent and 4.1% for Intra-Asia are applied for the estimation between 1997 and 2010.

2) Half of the actual vessel size increased rate between 1990 and 1995, namely 1.8% for Asia/N.America, 2.6% for Asia/Eirope Continent and 2.1% for Intra-Asia are applied for the estimation between 2011 and 2018.

Looking back at the history of full container vessels, we notice that while most major shipping companies managed to have large vessels, they effectively continued to replace their fleet with middle-sized and small sized vessels. In a big consortium, the combination scheme of ship size is also useful to any shipping group. Therefore, middle-sized container ships are still ordered to replace the same or small container ships.

According to world shipbuilding record in 1996, 340 vessels which amounted to 565,545TEU load capacity were ordered.

The number of vessels in 1996 increased by 19, but the load capacity fell by 6.6% of approximately 40,000TEU compared to the previous year. However loading capacity of 2,000TEU~2,999TEU type vessels in 1996 increased by 65,425TEU or 55.2% compared to the previous year.

(See Table 3.4.1.3)

In 1995, the number of 2,000~2,999TEU type vessel increased by 36 (3.8 times over 1994) which is equivalent to the load capacity of 84,716TEU (3.5 times over 1994). On the contrary, 3,000TEU~3,999TEU type of vessel and 4,000TEU type of vessel decreased by about 40% over the previous year.

(See Table 3.4.1.4,3.4.1.5 and Figure 3.4.1.1,.3.4.1.2)

Even if the trend of the current international container vessel is toward enlargement, middle-sized and small-sized container vessels are still playing important role in the fleet of a big group or international consortium of shipping companies. They help big vessels in connecting the containers to and from the local ports or international feeder network ports.

Some full container vessels ranging from 3,000TEU to 4,000TEU load which are currently serving in major trade routes such as Asia/North America or Asia/Europe will be transferred to Intra-Asia or other areas , some of them will be scrapped and newly built or larger vessels will be introduced.

When the gigantic vessels over 8,000TEU load type enter into services of Trans Pacific route around the year of 2010, the calling ports would be one or two on the Asian side whereas there would only one port on the West coast of the U.S.

After the era of gigantic vessels, the subsequent vessels like 5,000TEU~7,000TEU load type will call two or three ports on the Asian side and one or two ports on the U.S. West Coast side. When we look at the cargo movement of Indonesia, in terms of Intra-Asia or Trans Pacific trades, in the year of 2010 or afterwards, we presume there could be the possibilities for some of 3,000TEU~5,000TEU type of vessels might call Indonesian ports

Table 3.4.1.3 New Building Orders

Year	Vessel	TEU	TEU Growth
1985	68	114,946	- 9.1%
1986	46	107,186	- 6.8%
1987	74	124,489	16.1%
1988	62	95,209	-23.5%
1989	122	216,208	127.1%
1990	105	174,860	-19.1%
1991	60	110,092	-37.0%
1992	120	218,902	98.8%
1993	131	301,288	37.6%
1994	218	424,949	41.0%
1995	321	605,282	42.4%
1996	340	565,545	-6.6%

Remark: TEUs of 13 small size vessels among 340 in 1996 are not available
Source: Fairplay

Table 3.4.1.4 Change in number of newly-ordered ships by size

Year	Under 1,000 TEU	1,000 – 1,999	2,000 - 2,999	3,000 – 3,999	Over 4,000	Total Number
1987	35	6	19	11	3	74
1988	21	20	10	7	3	61
1989	29	56	30	11	6	132
1990	40	43	23	16	1	123
1991	24	14	1	16	5	60
1992	20	60	18	20	2	120
1993	28	50	10	12	1	131
1994	67	77	13	20	41	218
1995	84	120	49	30	38	321
1996	101	107	81	16	22	327

Remark: Excluding 13 small size unknown vessels in 1996
Source: Fairplay

Table 3.4.1.5 Change in total TEU of newly-ordered ships by size

Year	Under 1,000 TEU	1,000 – 1,999	2,000 - 2,999	3,000 – 3,999	Over 4,000	Total TEU
1987	15,995	11,080	46,930	38,484	12,000	124,489
1988	12,321	21,498	27,140	24,550	12,000	97,509
1989	14,528	73,319	78,300	37,100	26,425	229,672
1990	21,655	55,350	55,438	59,568	4,300	196,311
1991	12,226	17,498	2,668	57,700	20,000	110,092
1992	9,158	82,565	45,774	72,981	8,424	218,902
1993	15,045	76,132	24,868	43,390	141,853	301,288
1994	31,500	96,356	33,785	69,125	194,183	424,949
1995	45,060	164,322	118,501	102,925	174,474	605,282
1996	61,861	145,187	183,926	60,220	114,351	565,545

Remark: Excluding 13 small size unknown vessels in 1996
Source: Fairplay

Figure 3.4.1.1 History of Shipbuilding Order by Size

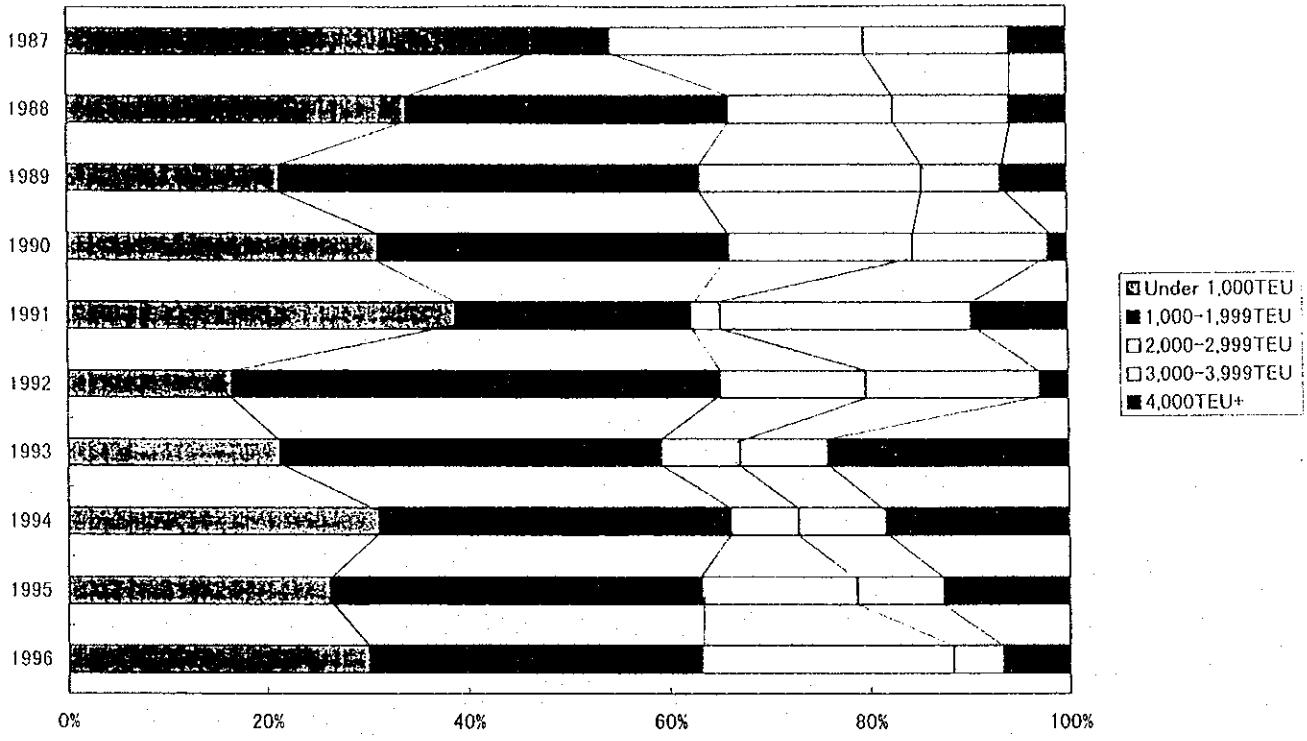
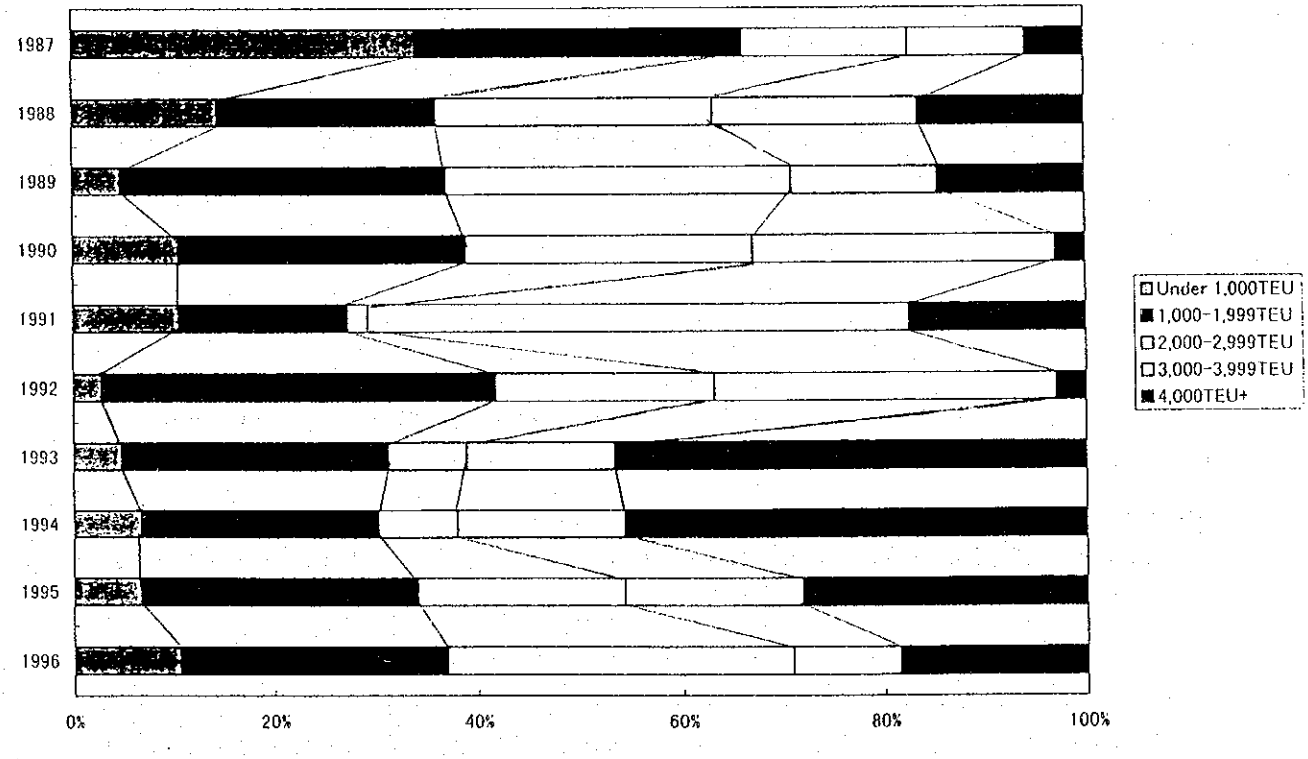


Figure 3.4.1.2 History of Load Capacity of Container Vessel by TEU



Source: Fairplay

in Trans-Pacific trade.

(2) Intra-Asia container route vessels

(a) Direct call to Indonesian ports

According to the Table 3.4.1.6, there are 14 shipping companies which operate 17 different Intra-Asia long distance container routes which directly call Indonesian ports. Almost all lines are calling Japanese ports initially and are also calling Taiwanese ports and Hong Kong. In some cases, they are also calling Philippines ports.

Major shipping lines which operate Trans-Pacific route have their own or joint service to Indonesia. For instance, American President Lines with Wan Hai, OOCL with P.I.L, Yang Ming with Chen Lie and Evergreen with Uniglory etc.

T.S.K. have direct call services from Japanese ports with N.Y.K. and Mitsui OSKLines. Recently "K" Line began direct call service from Japan via Philippines on the way to Fremantle, West Australia. (See Table 3.4.1.6)

Big lots from main countries are shipped by much larger vessels of more than 1,000TEU load which make direct calls at Jakarta or Surabaya.

[See Table 3.4.1.9 (A)]

(b) Feeder services to Indonesian ports

The current feeder services to Indonesian ports are mainly from Singapore. Some of the major shipping operators engaged in Asia/North America or Asia/Europe trades have their own or joint feeder network to Indonesian ports. (See Table 3.4.1.8)

There are 15 Intra-Asia long distance container routes which connect to Indonesian ports by feeder. In addition to feeder services from Singapore , there are other feeder services from other Asian countries. They are China Ocean Lines from Japan/Hong Kong/Bangkok, Heung-A from Japan/Hong Kong/Laem Chabang, Sea-Land from Japan/Hong Kong/Kaohsiung, etc. Korean flags also have their networks such as Hyundai/Wan Hai line, Hanjin/Dong Nama lines etc. (See Table 3.4.1.7)

When we look into the current feeder vessels from Singapore and other Asian ports to Indonesia, we understand the majority of vessel's space is almost up to 1,000TEU. This is because that the service vessels seem to be decided by the volume of cargo and quick turnaround. In case of Samudera Shipping Lines, container cargo to Belawan, Palembang is shipped by 300TEU class vessel or up to 500TEU vessels. This will be a reasonable choice

Table 3.4.1.6 Intra-Asia Container Route Direct Calling on Indonesia Port

LINE	Japan	Korea	Taiwan	HK	Manila	Bkok	Laem Chabang	S.P.	P.K.
Admiral	○	○	○	○			○		
APL/W.Hai	○		○	○	○				
C.Lie	○		○	○				○	
Djak/Kara/ Torikora	○								
ECL	○				○				
Gesuri									
Hanjin/D.N	○	○			○				
"		○	○	○				○	
"			○					○	○
K-Line	○				○			○	
OOCL	○		○	○	○			○	
TSK Group	○				○				○
TSK/Samu	○		○	○				○	
Uniglory	○		○	○					
Wan Hai	○		○	○	○				
Yang Ming	○		○	○	○				
C.Y'g/H-A		○		○				○	
Hy'dai/W.H		○		○				○	
Total	13	5	10	11	8	-	1	8	2

SOURCE: OCEAN COMMERCE LTD. (AS OF 1997)

Table 3.4.1.7 Feeder Vessel From Other Countries To Indonesian Ports (AS OF 1997)

LINE	Japan	Korea	Taiwan	HK	Manila	B'kok	Laem Chabang	S.P.	P.K.
Chien Lie	○		○	○		○	○		
China Ocean	○			○		○			
Hanjin/D.Nan	○			○				○	○
Heung-A	○			○		○	○		
Hyundai/W.H	○			○				○	○
Interasia/W.H	○			○				○	○
MONCON	○			○				○	○
Nantai	○		○						
S-Land	○		○	○					
TSK/Samude	○				○			○	○
Unigry/Ever			○	○		○	○		
" 2	○		○	○				○	○
" 3	○		○	○				○	○
" 4	○		○	○		○	○		
" 5	○	○	○						
Total	14	1	8	11	1	5	4	7	7

SOURCE: OCEAN COMMERCE LTD.

Table 3.4.1.8 Feeder Vessel From SingaporeTo Indonesian Ports (AS OF 1997)

LINE	F'quency	Jakarta	Surabaya	Semarang	Belawan	Panjang	Remark
APL	Weekly	○	○				Ind.
M'sk/S-L	"	◎	◎		○		"
MISC	"	○					"
NOL	"	○			◎	○	"
TSK/Samud	"	○	○	○			"
UASC	"	○	○	○	○		"
Uniglory	"	○	○	○	○		"
RCL	"	○	○	○	○	○	"

SOURCE: OCEAN COMMERCE LTD.

REMARK: (1) Ind. Means independently call

(2) ◎ shows twice call per week

Table 3.4.1.9 Current Full Container Vessel Served In Indonesia Trades

(A) Direct Call From Asian Countries

Vessel Capacity	Up to 500 TEU		501 to 1,000 TEU		Over 1,000 TEU		G.total
Load capacity	100 teu	4 vsl	900 teu	3	1,001 teu	6	
	200 teu	1	1,000	3	1,100	1	
					1,200	16	
					1,300	2	
					1,400	3	
					1,500	9	
					1,900	1	
					2,100	4	
Total vessels		5		6		42	53

(B) Feeder From Singapore

Vessel Capacity	Up to 500 TEU		501 to 1,000 TEU		Over 1,000 TEU		G.total
Load capacity	100 teu	1 vsl	500 teu	10	1,001teu	3	
	200	1	600	10	1,100	3	
	300	5	700	2	1,200	2	
	400	6	800	2	1,400	2	
			900	5	1,500	1	
					-	-	
Total vessels		13		29		11	53

SOURCE: Ocean Commerce Ltd.

to get quick turnaround to the nearest ports and receiving or delivering small lots of cargo.

[See Table 3.4.1.9 (B)]

(3) Estimation of future size of the international container vessel

The study team estimated future vessel sizes according to some fixed increase rates in major trades with Asia and Europe and North America. The largest vessel such as around 8000TEU load capacity or more will be in service at first between Asia and Europe Continent. Afterwards if these vessels become more competitive in this trade, they will probably be transferred to the Trans Pacific trade.

In Intra-Asia trades, we estimated that in the year of 2018, the average of full container vessels would be around 1,500TEU type. Maximum load of container will be about 3,500TEU type. These figures listed in the table (Table 3.4.1.2) are calculated in accordance with the increase rate of vessel size in the history.

Therefore, having investigated these data and various conditions how to cope with cargo movement among shipping companies in international consortium and how to combine the large vessels with other types, we estimated the future size of vessels in the major trades as forecast in the following table. (Table 3.4.1.10)

Table 3.4.1.10 Average ship sizes employed in various sea routes

Sea Routes	Ship size in TEU		
	1998	2008	2018
Asia / N. America	3,000 – 4,000	3,500 – 4,500	4,500 – 6,500
Asia / Europe	3,500 – 5,500	4,000 – 6,000	6,000 – 8,500
Intra-Asia	1,000 – 2,500	1,500 – 3,000	1,500 – 3,500
Intra-Asia Feeder	300 – 1,000	300 – 1,200	500 – 1,500
Indonesia Inter- Islands	Under 100	300 – 500	700 – 1,000

Source: The Japan Shipping Exchange Inc.
Remark: Estimated by JICA Study Team

It should be noted that the largest vessels are not always the main sharer of the trades. During the year 1993 to 1995, in the trade of Asia/North America, the container vessels calling the west coast of U.S.A were 2,500～3,000TEU type and the vessels calling on the east coast were about 2,000～2,500TEU type vessels. In the trade of Asia/Europe, the container vessel for Europe Continent were 2,500～3,500TEU type. On the other hand, vessels for Mediterranean ports were 2,000～2,500TEU which were relatively small.

In the container transportation of Intra-Asia, since there are many differences on developments among the countries and ports situations, container vessels would differ from

average sizes. For instance, in the trade of East Asian route between Japan, Korea and North-East China, container vessels are relatively smaller than those of ASEAN trades. In East Asia trade, an average container vessel size is 300TEU～800TEU.

3.4.2 Trend of Major Domestic Cargo Vessel

(1) Inter-Island Vessel

1) Current vessels served in Inter-Island

Cargo movement in domestic sea route is mostly carried out by conventional type of vessels. In proportion to the increase of general cargo, the transportation by Rakyat shipping is still increasing. This fact indicates that since the old type vessels are still carrying a certain share of cargo, it will take some time to modernize domestic sea transportation. (See Progress Report Table 3.3.1 Growth of Sea Transportation Cargo)

In the list of merchant ships, nearly half of them are general cargo ships. The average size is 1,313 dead weight tons and its load capacity shares almost 60% of merchant ships.

[See Table 3.4.2.1(A)]

Regarding the conventional cargo ships, they share 80% of general cargo ships. On the other hand, modern ships such as semi-container ships and RO/RO ships have already been in services. Those ships are expected to contribute to the modernization of domestic shipping itself. [See Table 3.4.2.1 (B)]

Some of 34 semi-container vessels are operated in domestic sea transportation. In merchant ships, the role of barge is not negligible since total dead weight of 757,918 tons represents nearly 20% of the total load capacity of merchant fleet and average size is around 1,100 dead weight tons.

[See Table 3.4.2.1 (B) & (C)]

2) Estimation of future conventional vessels

It is rather hard to define which type or size of the vessel is appropriate to the domestic sea route. Cargo movement varies from port to port and also differs by cargo type and time of shipment.

From the analysis of the current Indonesian fleet, it can be generally said that vessels of 1,000DWT～3,000DWT would be most appropriate transport means in case of distance around from 300～500 miles. For routes with distance around 1,000 miles to 1,500 miles, 3,000DWT or 5,000DWT vessel would be more advantageous.

(See Table 3.4.2.2)

Table 3.4.2.1 Current Indonesian Registered Merchant Fleet

(A) Fleet Of Merchant Ships (AS OF 1995)

Classification	Number	DWT	Average Dwt	Dwt share
General cargo	1,747	2,294,666	1,313	58
Dry bulk	47	396,974	8,446	10
Liquid bulk	174	392,649	2,257	10
Passenger	154	81,496	529	2
Barge	689	757,918	1,100	20
Tug boat	675	-	-	-
Work vessel	220	59	0	-
Grand total	3,706	3,923,762	1,059	100

SOURCE: DGSC

(B) Details Of Cargo Ships (AS OF 1995)

Type	NOS	DWT	Average DWT	Share of DWT	Remark
Conventional	1.551	1,819,671	1,173	80	
Semi container	34	284,315	8,362	13	Int'l/Domest
Full container	6	92,890	15,482	4	Inter'l
Multipurpose	1	10,138	10,138	-	
Landing craft	140	66,998	478	3	
RO-RO	3	3,528	1,176	-	Domestic
Car carrier	3	10,650	3,550	-	Domestic
Reefer cargo vessel	9	6,476	720	-	
Total	1.747	2,294,666	1,313	100	

SOURCE: DGSC

(C) Details Of Barges (AS OF 1995)

Type	Number	DWT	Average dwt	% Remark
Cargo barge	567	615,788	1,086	82
Flat-top barge	72	82,999	1,153	10
Crane barge	10	12,341	1,234	1
Oil barge	38	46,088	1,213	6
Hatch barge	2	702	351	—
Chemical barge	-	-	-	—
Total	689	757,918	1,100	100

SOURCE: DGSC

Table 3.4.2.2 Inter-Island Sea Transportation
(Cost Comparison by Freight Ton)

Vessel Assignment Plan

	POSSIBLE VESSELS TO BE ASSIGNED			
Distance between Major O-D Ports	Average 1,000DWT	Average 3,000DWT	Average 5,000DWT	Average 10,000DWT
300 Miles	100	113	132	189
500 Miles	100	102	118	168
1,000 Miles	100	88	95	126
1,500 Miles	100	81	84	109

INDEX 100=The figure indicates total voyage cost of 1,000DWT as 100

REMARK:
(A) Assumed cargo quantity : 100,000 F/T per year
(B) Cargo movement : Between two ports in Indonesia
(C) Total voyage cost includes (a), (b) and (c)
(a) Ship's operating cost
Per day 1,000DWT US$2,800, 3,000DWT US$3,200, 5,000DWT US$4,000
10,000DWT US$6,300
Ship's operating cost includes the following items
(1) Managing fee, ship's store fee, lubricating oil fee, repair & dock 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 applied to the tariff of Munistrial decree of Indonesia KM 65/1994
(Port tariff for services to domestic vessels)
(c) Fuel cost
(1) One deadweight ton per one P.S.
Consumption per day (Unit: K/T)
1,000DWT 6 K/T 5,000DWT 27 K/T
3,000DWT 16K/T 10,000DWT 53 K/T
(2) Average speed 14 miles per hour, 336 miles per day
(D) Running day: 350 days per year

(2) Possibility for modernization of domestic shipping

1) Full container vessel served in domestic sea route

The volume of container cargo which is transported as domestic cargo between inter-island ports is estimated to be very small at the moment.

Almost all containers handled in Indonesian ports are for international trade and over 80% is handled in major ports such as Tg. Priok , Tg. Emas, Tg. Perak and Belawan etc. In case of a small lot of container cargo to local ports, it is usually devanned to break bulk cargo at the above major ports for the convenience of shipping companies.

In order to economize shipping cost, shipping companies have to save the cost for returning or delivering empty containers.

Therefore, they usually accept to transport container to local ports on condition that consignee or shipper absorbs the cost of returning or picking up the empty container.

Since the number of full container vessel or semi-container vessels for both international and domestic trades is very small, most container cargo is transported by conventional vessels which are less efficient. For instance, when containers are handled in river ports, where port facilities are poor or draft is shallow, the container vessel is unable to load or unload container directly at the terminal. In this case, containers are discharged to a barge before landing and unloading. Therefore, in order to increase container handling productivity, even in the river ports, container cargoes are recommendable to be handled directly between the vessel and the terminal.

To improve the efficiency of container operation, mechanized port facilities and enough space for container vanning or devanning are required. At the same time container cargo should be handled exclusively in the area which is connected to terminals in the port area.

According to the fleet informations from some shipping companies which are engaged in the current trades, an average load capacity of container by conventional vessels or semi-container vessel are as follows. They are the same as estimated by JICA "The study on integrated modernization plan for sea transportation in Eastern Indonesia." in 1994.

1,000DWT	15TEU	(Container load capacity)
2,500DWT	44TEU	(〃)
5,000DWT	90TEU	(〃)

Therefore, before introduction of full container vessel, the above vessel type are considered reasonable in the domestic trade.

2) Introduction of Roll on/Roll off vessel

Before containerization of cargo, the unit load system was introduced by way of palletizing or unitizing cargoes. In case of container unit, cargo is usually stored in stacking or receiving/delivering places where forwarders or truckers gather to collect the cargo. RO/RO (Roll on/Roll off) vessel was invented to help trucker or forwarder making their unit cargo or container to be transported quickly. The most important point in the RO/RO operation is how to connect port area to cargo depots in the shortest time. That means the operation is deeply concerned with land transportation. RO/RO transportation services can greatly facilitate the cargo movement on land since no intermediate handling and storage is required there. And its system can shorten the cargo handling time because every unit can move by its own wheels.

The Study team recognized that a few high value commodities in domestic transportation could absorb the high ocean freight of RO/RO and a few roads in some area accomodate for RO/RO transportation system at present.

The construction cost and operation cost of RO/RO vessels is substantially higher than other container vessels because the hull structure should be sufficient enough for any type of truck or container on chassis which is sometimes over-high, over-wide or lengthy. The introduction of RO/RO is, therefore, recommendable, where there are the sufficient volume of time conscious commodities.

It will need comprehensive coordination and good connection between sea and land transportation to realize door-to-door service. It will take some more time for RO/RO vessels to be operated effectively in Indonesia.