Japan International Cooperation Agency

Study on the Development of Domestic Sea Transportation and Maritime Industry in the Republic of Indonesia (STRAMINDO)

FINAL REPORT

Technical Report 1

Maritime Traffic Database Development and Demand Forecast

March 2004

ALMEC Corporation

Japan Marine Science Inc.

STRAMINDO

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

STRAMINDO

STUDY ON THE DEVELOPMENT OF DOMESTIC SEA TRANSPORTATION
AND MARITIME INDUSTRY IN THE REPUBLIC OF INDONESIA

TECHNICAL REPORT 1

Maritime Traffic Database Development and Demand Forecast

March 2004

ALMEC CORPORATION
JAPAN MARINE SCIENCE INC.

COMPOSITION OF STRAMINDO REPORTS

Summary (English, Japanese and Indonesian)

Main Text

Volume 1: Sector Achievements and Issues

Volume 2: Integrated Master Plan and Action Plan

Technical Report No. 1: Maritime Traffic Database Development and Demand Forecast

Technical Report No. 2: Social Environmental Survey on Traditional Shipping Modernization

Technical Report No. 3: Participatory Approach in the Development of STRAMINDO Plan

The exchange rate used in the report is:

J. Yen 115 = US$ 1 = Indonesian Rupiah 8,600

(average in 2003)

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1. OVERVIEW

1.1. Highlights of Contents

Technical Report 1 details the technical details of maritime traffic database development and demand forecast conducted for this Study. Moreover, as this Study emphasizes technology transfer, this technical report also describes the learning session program and the lectures provided. The following Table highlights the contents of this technical report.

Table 1.1 Highlights of Contents

ITEM	DESCRIPTION
Field Surveys OD Survey Port Activity Survey Shipping Company Interview Sea Passenger Interview	Field surveys were conducted to obtain basic information needed for demand forecast. OD survey and port activity survey provided key information to develop the OD database. Shipping company interviews provide key information in order to determine transport cost parameters. Sea passenger interview provide basic information on the profile of passengers and trip habits needed to understand better travel characteristics.
Maritime Traffic Database Freight OD Database Passenger OD database Shipping operations database Passenger profile database	Based on the field surveys several maritime traffic databases were developed. Each is described in detail.
Demand Forecast Methodology Freight demand forecast Passenger demand forecast	The demand forecast methodology and key assumptions are illustrated for freight and passenger demand forecast. It covers sea traffic forecast and fleet estimation.
Technology Transfer	As part of the program in improving administration capabilities, an intensive learning session was held to teach demand forecast to several key DGSC staffs.

Attached to this report is a CD containing the main output of field surveys and demand forecast. See Annex for details of the contents of the CD.

2. FIELD SURVEYS

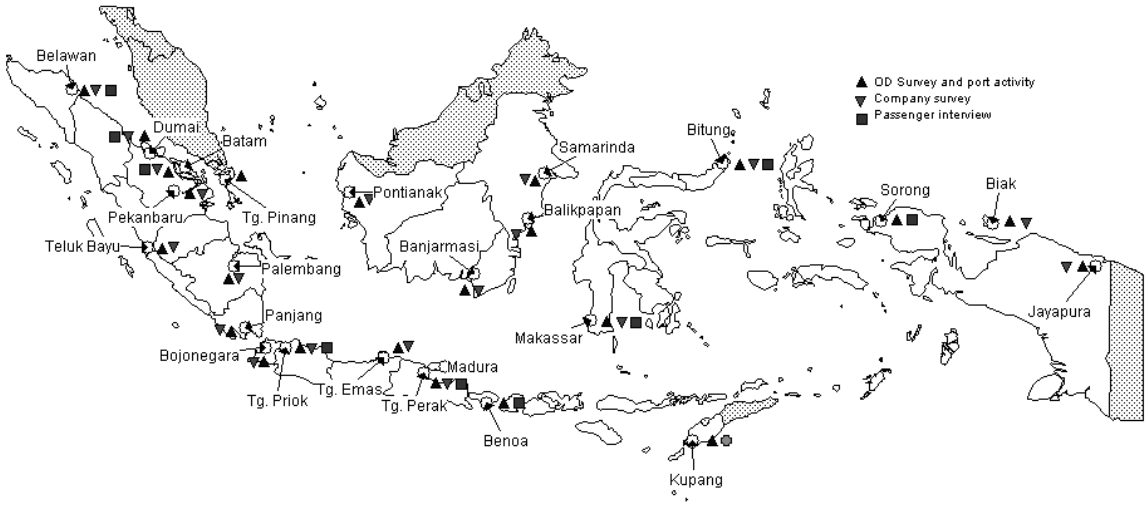
2.1. Outline of Surveys

Table 2.1.1 summarizes the field surveys conducted for STRAMINDO.

Table 2.1 Outline of Surveys

SURVEY	SCOPE	TARGET COVERAGE	ACTUAL COVERAGE
OD Survey	Origin and Destination of domestic maritime demand	23 strategic ports	23 strategic ports
Port Activity Survey	Domestic sea traffic at selected ports	23 strategic ports	23 strategic ports
Shipping Company Survey	Business and financial profile of shipping companies and freight forwarders	120 shipping companies at selected 13 port cities; and, 50 freight forwarders at 13 selected cities	80 shipping companies at selected 13 port cities; and, 37 freight forwarders at 13 selected cities
Sea Passenger Interview	Profile of sea passengers	1,000 passengers in 10 ports	1,118 passengers in 9 ports

Figure 2.1 Coverage Area of Surveys



2.2. OD Survey

2.2.1. Description

The design of shipping networks and fleet characteristics will be dependent upon the profile of demand. In DGSC, is a database of freight and passenger demand for the year 2001 is available which was derived from the compilation of the Voyage Report. The OD survey is conducted to enhance the accuracy and update this database for transport planning purposes.

2.2.2. Methodology

Every ADPEL office at each survey port, calling ships have to submit an activity report (LK3) describing both loading and unloading activities. Survey teams were then dispatched to collect these LK3 reports. These reports contain the basic information that was used to generate the OD database. For passenger traffic, ticket information detailing origin and destination was compiled from P.T. Pelni and is supplemented by information regarding non-Pelni passengers gathered at each relevant port.

2.2.3. Sampling

The OD survey collected 1 month data per port at 23 strategic ports.

2.3. Port Survey

2.3.1. Description

The development of the current OD Matrix using sampling data (i.e. Voyage Report Data and OD Survey Database) requires knowledge of the annual port activity to be able to expand the calculated OD shares into annual freight tonnage. Port loading and unloading (sometimes detailing freight into commodity type and/or package type) is available for the year 2000 and/or 2001 for all strategic ports though there are cases where no data is available or is incomplete. The port activity survey was conducted to update and to fill in missing information in this regard.

2.3.2. Methodology

Every ADPEL office at each survey port, calling ships have to submit an activity report (LK3) describing both loading and unloading activities. These per ship information is compiled and summarized and is the basic source of information. Surveyors were dispatched to each survey port to collect such information.

2.3.3. Sampling

The survey covered 23 strategic ports. For every surveyed port, freight and passenger activities for the year 2002 were collected.

2.4. Shipping Company Survey

2.4.1. Description

To be able to understand the current state of activity and health the domestic maritime industry, a survey was conducted to get information on shipping companies and freight forwarders.

2.4.2. Methodology

Direct contact to each company was conducted. If applicable, relevant organizations such as INFA and INSA were contacted and representatives from selected companies were invited for detailed explanation and briefing regarding the survey. During the briefing, survey forms were distributed for self-completion. In case, a group briefing is not possible or not practical, individual briefings were conducted.

2.4.3. Sampling

A list of 120 shipping companies and 50 freight forwarding companies were pre-selected through rigorous discussions with DGSC and other relevant agencies (INSA and INFA). The selected companies were selected so as they represent a broad spectrum of shipping and freight forwarding companies.

2.5. Sea Passenger Interview

2.5.1. Description

To better understand the profile of sea passengers, sea passenger interview was conducted. The survey collected data regarding their socio-economic and trip characteristics as well their personal opinion on the level-of-service of maritime passenger service.

2.5.2. Methodology

Surveyors were dispatched to selected ports to conduct direct interview of passengers waiting at ports.

2.5.3. Sampling

A total of 1,000 samples are designated (enough to achieve good statistical accuracy). To get random samples, the survey was conducted at 10 pre-selected ports.

3. DATABASE INVETORY AND DESCRIPTION

3.1. Database Inventory

Based on the surveys conducted and sometimes combined with DGSC statistics, the following major and original databases were developed. These databases are used in STRAMINDO.

Table 3.1 Database Inventory

Database	Contents
Freight OD	
Ship Activity	Domestic ship activity at 23 strategic (surveyed) ports
Port-to-Port Traffic	Domestic port-to-port traffic demand classified by package type and commodity type
Passenger OD	Passenger OD comprising of sea, ferry (from DGLT) and airline (from BPS)
Shipping company database	Profile of shipping companies (80 records)
Freight forwarder database	Profile of freight forwarders (37 records)
Passenger profile	Profile of domestic sea passengers (1,118 records)

3.2. Database Description

3.2.1. Freight OD Database

There are two freight OD databases developed: (1) ship activity database at strategic ports; and, (2) corrected and expanded freight OD database. Each is described in this section.

The ship activity database covers only domestic activities at surveyed ports. The following is the description of the database. Each record is a particular domestic ship activity (i.e. a loading activity or an unloading activity).

Table 3.2 Description of Ship Activity Database

Field No.	Field Code	Field Description	Field Code
1	S_port	Code of survey port (survey port is the port where the data was collected)	Port Code
2	No	Record number	
3	S_port_name	Survey port name	
4	Month	Month of ship activity	
5	Year	Year of ship activity	
6	Day	Day of ship activity	
7	Activity	Loading or unloading	1. loading 2. unloading
8	Shiptyp	Type of ship	1. Container 2. Bulker 3. Conventional

			4. Tanker 5. Passenger vessel 6. Ro-Ro 7. Others 9. Unknown
9	Flag	Flag of ship	1. Indonesian 2. Non-Indonesian 3. Unknown
10	Grt_GT	Size of ship in GT	
11	Grt_DWT	Size of ship in DWT	
12	Oport	Origin on freight	Port Code
13	Dport	Destination of freight	Port Code
14	Comptyp	Commodity type of freight	Commodity Code
15	Volume_MT	Volume of freight in MT	
16	Volume_CuM	Volume of freight in CuM	
17	Volume_TEU	Volume of fright in TEU	
18	Volume_other	Volume of freight in other units	
19	Index	Type of unit used in (18)	1. Box 2. Unit 3. Liter 4. Container 40’ 5. Heads (ekor) 6. Container 10’ 7. Drum 8. Unknwon
20	Paktyp	Packaging type	1. Bag 2. Box 3. Bale 4. Barrel 5. Pallet 6. Container 7. Reefer 8. Other packaging 9. Dry bulk 10. Liquid bulk

The ship activity database, as previously indicated, covers only the activity at the 23 strategic ports – thus, it does not cover ship activity between ports not covered by the survey. A compilation of Voyage Report from DGSC, was used to fill in missing portions of the voyage report. The voyage Report is a report submitted to DGSC by shipping operators detailing activities of their vessels including loading and unloading activities. The Voyage Report is therefore very useful for OD development, however, the quality and the frequent non-submission of operators taints the reliability of the Voyage Report. Data compiled using the LK3 report is more reliable and more complete. However, LK3 reports have to be collected and compiled at each port making it expensive and time consuming for OD

development. The use of the combination of the OD survey and the Voyage Report database was a compromise between cost and accuracy. The combination of the OD Survey and the Voyage Report is illustrated in Figure 3.2.1.

Table 3.3 Combination of OD Survey and Voyage Report

Destination / Origin	23 Strategic Ports	Other Ports
23 Strategic Ports	OD Survey	OD Survey
Other Ports	OD Survey	Voyage Report

The freight OD database is developed through the combination of the Ship Activity Database and the Voyage Report. The following is the description of the database. Each record is a particular Port Origin-Destination pair.

To minimize the number of ports for easy analysis, the nearly 1,000 domestic ports are grouped and aggregated into 130 ports referred to as Port Code 2:

- Commercial port systems as defined by the scope of responsibility of the respective local ADPEL office – 99 ports
- Batam – 1 port
- Non-commercial ports, aggregated into provinces (thus is all non-commercial ports in the province are combined and are represented as one port only) – 30 ports

For the purpose of further simplification of the OD matrix for demand generation and attraction forecast, the ports are aggregated by province. This is referred to as Port Code 3.

In the Ship Activity Database, commodities are classified into 52 types, for the freight OD database, the commodity type classification is simplified into 13 types only. Similarly, the packaging type is re-classified into four types only.

Table 3.4 Description of Freight OD Database

Field No.	Field Code	Field Description	Field Code
1	Dport2	Destination port	Port Code 2
2	Oport2	Origin port	Port Code 2
3	Dport3	Destination port	Port Code 3
4	Oport3	Origin port	Port Code 3
5	1-1	Petroleum via container (MT)	
6	1-2	Petroleum via break bulk (MT)	
7	1-3	Petroleum via dry bulk (MT)	
8	1-4	Petroleum via liquid bulk (MT)	
9	2-1	CPO via container (MT)	
10	2-2	CPO via break bulk (MT)	

11	2-3	CPO via dry bulk (MT)	
12	2-4	CPO via liquid bulk (MT)	
13	3-1	Other liquid via container (MT)	
14	3-2	Other liquid via break bulk (MT)	
15	3-3	Other liquid via dry bulk (MT)	
16	3-4	Other liquid via liquid bulk (MT)	
17	4-1	Coal via container (MT)	
18	4-2	Coal via break bulk (MT)	
19	4-3	Coal via dry bulk (MT)	
20	4-4	Coal via liquid bulk (MT)	
21	5-1	Mine/quarry via container (MT)	
22	5-2	Mine/quarry via break bulk (MT)	
23	5-3	Mine/quarry via dry bulk (MT)	
24	5-4	Mine/quarry via liquid bulk (MT)	
25	6-1	Rice via container (MT)	
26	6-2	Rice via break bulk (MT)	
27	6-3	Rice via dry bulk (MT)	
28	6-4	Rice via liquid bulk (MT)	
29	7-1	Agri grains via container (MT)	
30	7-2	Agri grains via break bulk (MT)	
31	7-3	Agri grains via dry bulk (MT)	
32	7-4	Agri grains via liquid bulk (MT)	
33	8-1	Fertilizer via container (MT)	
34	8-2	Fertilizer via break bulk (MT)	
35	8-3	Fertilizer via dry bulk (MT)	
36	8-4	Fertilizer via liquid bulk (MT)	
37	9-1	Cement via container (MT)	
38	9-2	Cement via break bulk (MT)	
39	9-3	Cement via dry bulk (MT)	
40	9-4	Cement via liquid bulk (MT)	
41	10-1	Other grains via container (MT)	
42	10-2	Other grains via break bulk (MT)	
43	10-3	Other grains via dry bulk (MT)	
44	10-4	Other grains via liquid bulk (MT)	
45	11-1	Fresh prod. via container (MT)	
46	11-2	Fresh prod. via break bulk (MT)	
47	11-3	Fresh prod. via dry bulk (MT)	
48	11-4	Fresh prod. via liquid bulk (MT)	
49	12-1	Wood via container (MT)	
50	12-2	Wood via break bulk (MT)	
51	12-3	Wood via dry bulk (MT)	
52	12-4	Wood via liquid bulk (MT)	

53	13-1	Others (GC) via container (MT)	
54	13-2	Others (GC) via break bulk (MT)	
55	13-3	Others (GC) via dry bulk (MT)	
56	13-4	Others (GC) via liquid bulk (MT)	
57	C1	Petroleum (MT)	
58	C2	CPO (MT)	
59	C3	Other liquid – e.g. chemicals (MT)	
60	C4	Coal (MT)	
61	C5	Mine/quarry – e.g. sand, ore (MT)	
62	C6	Rice (MT)	
63	C7	Agri grains – e.g. soybeans (MT)	
64	C8	Fertilizer (MT)	
65	C9	Cement (MT)	
66	C10	Other grains – e.g. sugar (MT)	
67	C11	Fresh prod. – e.g. fruits, fish (MT)	
68	C12	Wood	
69	C13	Others (GC)	
70	P1	Containerized freight	
71	P2	Break bulk freight	
72	P3	Dry bulk freight	
73	P4	Liquid bulk freight	
74	ALL	All freight	

3.2.2. Passenger OD Database

The passenger OD database is developed through the combination of the PT Pelni data, passenger activity data collected from several ports, and Voyage Report. Passenger OD of ferry vessels and airlines were sourced from DGLT and BPS respectively. The following is the description of the database. Each record is a particular port Origin-Destination pair.

Table 3.5 Description of Passenger OD Database

Field No.	Field Code	Field Description	Field Code
1	Oport2	Origin port	Port Code 2
2	Dport2	Destination port	Port Code 2
3	Oport3	Origin port	Port Code 3
4	Dport3	Destination port	Port Code 3
5	Sea	Sea passengers (non-ferry)	
7	Ferry	Ferry passengers (under DGLT)	
8	Airline	Airline passengers	
9	ALL	ALL passengers	

3.2.3. Shipping Company Database

The shipping company database is based on the results of the shipping company interview. Each record is a shipping company. The following describes the contents of the database.

SHIPPING COMPANY INTERVIEW - Form A

S/N

Port : {0_1} (Port Code 1) Dat {0_2_1} (D) {0_2_2} (M) {0_2_3} (Y)

Company Name : {0_3} (Shipping company code) Interviewer :

Address : {0_4} (Regency/municipality code)

1 Year of establishment {1}

2 Ownership type {2_1}

(1) Private (Indonesian)
(2) State-owned
(3) Joint Venture, please indicate nationality of mother companies {2_2}

3 Service offered (check if available) and revenue and cost contribution to company

		Share in total company revenue								
		0~10%	10~20%	20~30%	30~40%	40~50%	60~70%	70~80%	80~90%	90~100 %
{3-1}	Freight shipping	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
{3-2}	Passenger shipping	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
{3-3}	Agency	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
{3-4}	Bunkering	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
{3-5}	Warehousing	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
{3-6}	Trucking	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
{3-7}	Others, pls specify {3_8}	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

4 Category/ies of shipping line {4_1}

(1) International
(2) Inter-island
(3) Pioner Shipping
(4) Special Shipping
(5) Traditional Shipping

5 Organization and Manpower {5}

Draw the company organization chart identifying headquarters and local offices

(Drawn as object in MS Word™ Using Shipping Company Record number as key)

6 Indicate the manpower of your company

	No. of personnel	working days/week	working hours per day
Seafarer	{6_1_1}	{6_1_2}	{6_1_3}
Head Office	{6_2_1}	{6_2_2}	{6_1_3}
Others (Branch Office, etc)	{6_3_1}	{6_3_2}	{6_1_3}

7 Top 5 major clients for freight shipping services (for the last two years 2001 and 2002)

	Client Name	Office location	Main cargo	Ports of shipment		Cargo volume (MT)	
				From	To	2001	2002
1	{7_1_1}	{7_2_2}	{7_1_3}	{7_1_4}	{7_1_5}	{7_1_6}	{7_1_7}
2	{7_2_1}	{7_2_2}	{7_2_3}	{7_2_4}	{7_2_5}	{7_2_6}	{7_2_7}
3	{7_3_1}	{7_3_2}	{7_3_3}	{7_3_4}	{7_3_5}	{7_3_6}	{7_3_7}
4	{7_4_1}	{7_4_2}	{7_4_3}	{7_4_4}	{7_4_5}	{7_4_6}	{7_4_7}
5	{7_5_1}	{7_5_2}	{7_5_3}	{7_5_4}	{7_5_5}	{7_5_6}	{7_5_7}

8

	1998	1999	2000	2001	2002
Cargo volume handled in MT	{8_1_1}	{8_1_2}	{8_1_3}	{8_1_4}	{8_1_5}
Container volume in TEU	{8_1_1}	{8_1_2}	{8_1_3}	{8_1_4}	{8_1_5}

9 Kindly provide us with your freight rates in relation to origin and destination, for the top 5 commodities handled in 2002.

	Comodity	Origin	Destination	Fare		
i.	{9_1_1}	{9_1_2}	{9_1_3}	Rp. {9_1_4} (1) /MT	{9_1_5} (2) /TEU	(3) /CuM
ii.	{9_2_1}	{9_2_2}	{9_2_3}	Rp. {9_2_4} (1) /MT	{9_2_5} (2) /TEU	(3) /CuM
iii.	{9_3_1}	{9_3_2}	{9_3_3}	Rp. {9_3_4} (1) /MT	{9_3_5} (2) /TEU	3 /CuM
iv.	{9_4_1}	{9_4_2}	{9_4_3}	Rp. {9_4_4} (1) /MT	{9_4_5} (2) /TEU	(3) /CuM

10 Major cost item of operation for year 2002, please indicate approximate amount to reach the total company expenses.

Consumption of fuel and lubrication oil

Fuel amount {10_1_1} in Rp (Rp or Liter) Purchased from : {10_1_4} {10_1_5}
{10_1_2} in liter ((1) Domestic (2) Foreign)
Lubrication Oil amount {10_2_1} in Rp Purchased from : {10_2_4} {10_2_5}
{10_2_2} in liter ((1) Domestic (2) Foreign)

Maintenance and repair
{10_3} Annual average cost
{10_4} Location of dock ((1) Domestic (2) Foreign (3) Both, sepcify {10_4_2}
Insurance
{10_5} Type of insurance {10_6_1} {10_6_1}
Annual insurance payments _____ Rp - or - _____ % of annual income
{10_7_1} Company ((1) Domestic (2) Foreign (3) Both, specify {10_7_2}
Loan repayments
{10_8} Interest payment
{10_9_1} Principal Repayment
((1) Domestic Bank (2) Foreign Bank (3) Both, specify {10_9_2}

11 Do you intend to expand your fleet in the near future
{11_1} (1) Yes how many _____ → go to Question 12 {11_2}
(2) No → go to Question 13

12 Please describe the ship or ships you would like to add to your fleet

	SHIP 1	SHIP 2
Procurement method {12_1_1} {12_1_2}	(1) foreign shipyard (2) local shipyard (3) Second-hand ship order (4) Charter (5) Lease-purchase	(1) foreign shipyard (2) local shipyard (3) Second-hand ship order (4) Charter (5) Lease-purchase
Type of Ship {12_1_2_1} {12_1_2_2}	(1) Tanker (4) Passenger (2) Bulker (5) Conventional (3) Container (6) Others	(1) Tanker (4) Passenger (2) Bulker (5) Conventional (3) Container (6) Others
Size (GT) {12_1_3} {12_2_3}	(1) = 175 (5) 2,001 ~ 5,000 (2) 176 ~ 500 (6) 5,001 ~ 10,000 (3) 501 ~ 1,000 (7) 10,001 ~ 15,000 (4) 1,001 ~ 2,000 (8) > 15,000	(1) = 175 (5) 2,001 ~ 5,000 (2) 176 ~ 500 (6) 5,001 ~ 10,000 (3) 501 ~ 1,000 (7) 10,001 ~ 15,000 (4) 1,001 ~ 2,000 (8) > 15,000
Estimated cost, if known (incl. Purchase, refurbishing, transportation) in Rp		
	{12_1_4}	{12_2_4}
Financial scheme	Share (%)	Share (%)
	Long-term loan (>1 yrs) {12_1_5_1}	Long-term loan (>1 yrs) {12_2_5_1}
	Short-term loan (=1yrs) {12_1_5_2}	Short-term loan (=1yrs) {12_2_5_2}
	Equity {12_1_5_3}	Equity {12_2_5_3}
	Others {12_1_5_4}	Others {12_2_5_4}

13 Under what financial terms do you feel it would be (marginally) inducive to invest in a ship (new or second-hand) to expand your fleet

{13_1} i. interest rate should be at least _____ % p.a
{13_2} ii. the repayment period should be at least _____ years
{13_3} iii. the available amount should cover _____% % of the total purchase cost of the ship
{13_4} iv. any other additional conditions ? : _____

14 What is your opinion of the lease-purchase agreement to finance a ship (new or 2nd-hand) procurement?

{14_1} *Lease-purchase agreement means that the Vessel becomes (or purchased as) Lessee's property after the termination of the lease period*

i. (1) It is more attractive than conventional schemes (i.e. bank loan)
(2) It is equally attractive as conventional financial schemes
(3) It is less attractive than traditional than conventional financial schemes

ii. Kindly elaborate on the major reason or reasons for your answer

{14_2}

iii. Under what conditions would make the lease-purchase agreement inducive for a ship investment

{14_3}

15 Kindly describe other practical scheme that will induce ship-owners to invest in (new or 2nd hand)

{15}

16 What is your opinion on available finance for a ship procurement (new or 2nd hand)?

{16}

17 Please indicate your company's policy by ranking the following key aspects of management based on your company's priority (1 is the highest priority)

priority			specific description
{17_1}	Revenue maximization	{17_1_1}	
{17_2}	Cost cutting in operation	{17_2_1}	
{17_3}	Personnel development	{17_3_1}	
{17_4}	Organizational strength	{17_4_1}	
{17_5}	Safety in operation	{17_5_1}	
{17_6}	Marketing of the company	{17_6_1}	
{17_7}	Environmental consideration	{17_7_1}	
{17_8}	Fleet expansion	{17_8_1}	
{17_9}	Implementation of new technology	{17_9_1}	
{17_10}	Financial resources (e.g. credibility and linkages with banks)	{17_10_1}	
{17_11}	(others) {17_10_0}	{17_11_1}	
{17_12}	(others) {17_11_0}	{17_12_1}	

18 What do you recognize as impediments for the improvement and modernization of management of your company (indicate ranking, 1 is the most significant impediment)

priority			specific description
{18_1}	Old age of ships	{18_1_1}	
{18_2}	Lack of skills of seafarers	{18_2_1}	
{18_3}	Lack of man-power	{18_3_1}	
{18_4}	Shortage of vessel	{18_4_1}	
{18_5}	Lack of fund	{18_5_1}	
{18_6}	Poor port operation/facilities	{18_6_1}	
{18_7}	Regulation and its implementation	{18_7_1}	
{18_8}	High rate of invisible cost	{18_8_1}	
{18_9}	Lack of information technology	{18_9_1}	
{18_10}	(others) {18_10_0}	{18_10_1}	
{18_11}	(others) {18_11_0}	{18_11_1}	

19 What should the government do to improve and expand Indonesian domestic shipping industry

i. … With regards to Indonesian fleet expansion

{19_1}

ii. … With regards to port services/facilities (specify port name)

{19_2}

iii. … With regards to ship repair and maintenance (specify dock name)

{19_3}

iv. … With regards to maritime safety and navigation

{19_4}

v. … With regards to maritime shipping governance and regulation

{19_5}

SHIPPING COMPANY INTERVIEW - Form B

Company Name : _____
Address : _____

How many ships does your company use for freight shipping or passenger transport service (including chartered ships)? _____

Kindly describe your freight shipping fleet by filling in the following table

		Ship No.	Ship No.
1	Name of Ship	{1}	
2	Owned, leased, or chartered {2}	(1) Owned (2) Lease (Hire)-purchased (3) Bareboat charter (4) Time charter (5) Voyage charter (6) Others	(1) Owned (2) Lease (Hire)-purchased (3) Bareboat charter (4) Time charter (5) Voyage charter (6) Others
3	Type of Ship {3_1}	(1) Container (4) Conventional (2) Bulker (5) Tanker (3) Passenger (6) Oth {3_2}	(1) Container (4) Conventional (2) Bulker (5) Tanker (3) Passenger (6) Others
4	Type of shipping service {4}	(1) International (4) Pioneer (2) Inter-island (5) Special (3) Traditional	(1) International (4) Pioneer (2) Inter-island (5) Special (3) Traditional
5	Registered port (Flag)	{5}	
6	Class {6_1} (BKI, NK, GL, …)	(1) BKI (3) Lloyd (GL) (2) NK (4) Others {6_2}	(1) BKI (3) Lloyd (GL) (2) NK (4) Others
7	Size	Length (m) {7_1} Breadth (m) {7_2} Depth (m) {7_3} Max. Draft (m) {7_4} GT {7_5} DWT {7_6} HP {7_7}	Length (m) _____ Breadth (m) _____ Depth (m) _____ Max. Draft (m) _____ GT _____ DWT _____ HP
8	Carrying capacity	{8_1} {8_2} (1) Persons (2) TEUs (3) MT	(1) Persons (2) TEUs (3) MT
9	Main engine power	{9} HP	HP
10	Normal speed	{10} Knots	Knots
11	Does the ship have its own loading/unloading equipment {11_1}	(1) No (2) Yes, brief description {11_2}	1 No 2 Yes, brief description
12	Year built	{12}	
13	Ship Insured Value	value {13_1} {13_2} (1) Rp year: {13_3} (2) US$	value _____ (1) Rp year: _____ (2) US$
14	Lease charge and year started (if chartered or hire-purchased)	charge: {14_1} {14_3} (1) Rp year: {14_2} (2) US$ (1) per year {14_4} (2) per voyage (3) others ({14_5}	charge: _____ (1) Rp year: _____ (2) US$ 1 per year 2 per voyage 3 others (specify)

15	Was this ship purchased or leased from an Indonesian or Foreign company	{15} (1) Indonesian (2) Non-Indonesian (foreign)	(1) Indonesian (2) Non-Indonesian (foreign)
16	Number of Crew	Indonesian: {16_1} Non-Indonesian: {16_2} Total: {16_3}	Indonesian: Non-Indonesian: Total:
17	Major Service route, Ports-of-Call and service patterns.	Representative route: (1) tramper {17_1}, {17_2} (2) liner {17_3}, {17_4} {17_5}	Representative route: (1) tramper (2) liner
18	Top 3 Major cargo movement	Commodity {18_1_1} Volume {18_1_2} {18_1_3} (1) MT (2) TEU (3) CuM (4) pax Loading port {18_1_4} Unloading port {18_1_5} Commodity {18_2_1} Volume {18_2_2} {18_2_3} (1) MT (2) TEU (3) CuM (4) pax Loading port {18_2_4} Unloading port {18_2_5} Commodity {18_3_1} Volume {18_3_2} {18_3_3} (1) MT (2) TEU (3) CuM (4) pax Loading port {18_3_4} Unloading port {18_3_5}	Commodity Volume (1) MT (2) TEU (3) CuM (4) pax Loading port Unloading port Commodity Volume (1) MT (2) TEU (3) CuM (4) pax Loading port Unloading port Commodity Volume (1) MT (2) TEU (3) CuM (4) pax Loading port Unloading port
19	Total volume carried	{19_1} MT/year {19_2} passengers/yr	MT/year passengers/yr
20	Number of voyages per year	{20}	
21	Ship idle days per year	due to breakdown {21_1} days due to lack of cargo {21_2} days due to maintenance {21_3} days others {21_4} days	due to breakdown days due to lack of cargo days due to maintenance days others days
22	Ship operation days	at sea {22_1} days at port {22_2} days	at sea days at port days
23	Number of times sent to dock maintenance	in the last 3 years {23_1} in the last 5 years {23_2}	in the last 3 years in the last 5 years
24	Name and location of dockyard	name {24_1} city {24_2}	name city
25	Average days for dockyard maintenance per visit	dock time {25_1} days Floating time {25_2} days	dock time days Floating time days
26	Frequency of major (i.e. have to be idle) maintenance	Hull/deck {26_1} times per year Mechanical {26_2} times per year Total {26_3} times per year	Hull/deck times per year Mechanical times per year Total times per year
27	Total crew related expenses/year	wages {27_1} {27_3} (1) Rp food {27_2} (2) US$	wages (1) Rp food (2) US$
28	Ship store expense/yr (spare parts, consumables, etc.)	{28_1} {28_2} (1) Rp (2) US$	(1) Rp (2) US$

29	**Total fixed cost** (Regular basic expense even without operation)	{29_1}	{29_2}	(1) Rp /day,month (2) US$ /day,month		(1) Rp /day,month (2) US$ /day,month
30	Annual insurance cost	{30_1}	{30_2}	(1) Rp (2) US$		(1) Rp (2) US$
31	Annual cost for repair/maintenance	{31_1}	{31_2}	(1) Rp (2) US$		(1) Rp (2) US$
32	Annual Lubricating oil cost	{32_1}	{32_2}	(1) Rp (2) US$		(1) Rp (2) US$
33	Administration cost for all ships (answer only once)	{33_1}	{33_2}	(1) Rp (2) US$		
34	Port charges / call (incl. Berthage, anchorage, pilotage)	{34_1}	{34_2}	(1) Rp (2) US$		1 Rp 2 US$
35	Annual stevedore cost per year	{35_1}	{35_2}	(1) Rp (2) US$		1 Rp 2 US$
36	Fuel consumption per year	volume {36_1} MT/year cost {36_2} {36_3}		(1) Rp (2) US$	volume ____ MT/year cost ____	(1) Rp (2) US$
37	Agency fee per call	cost: {37_1} {37_2}		(1) Rp (2) US$ Percentage from revenue : {37_3}	cost:	(1) Rp (2) US$
38	Other expenses	{38_1}	{38_2}	(1) Rp (2) US$		(1) Rp (2) US$

3.2.4. Freight Forwarder Database

SHIPPERS & FORWARDERS INTERVIEW

Port : {0_1} (Port Code) Dat {0_2_1} (D) {0_2_2} (M) {0_2_3} (Y)

Company Name : {0_3} (Shipper & Forwarder Code) Interviewer :

Address : {0_4} (Regency/Municipality Code)

1 Year of establishment {1}

2 Ownership type {2_1}

(1) Private (Indonesian) (3) Joint Venture, please indicate nationality of mother companies

(2) State-owned {2_2}

3 Service offered (check if available) and revenue and cost contribution to company

		Share in total company revenue								
		0~10%	10~20%	20~30%	30~40%	40~50%	60~70%	70~80%	80~90%	90~100 %
{3_1}	Warehousing	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
{3_2}	Trucking	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
{3_3}	Agency	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
{3_4}	Customs Clearance	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
{3_5}	Wholesale/Retail	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
{3_6}	Manufacturing	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
{3_7}	Agriculture/Mining	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
{3_8}	Petroleum	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
{3_9}	others (specify)									
	{3_9_1}	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

4 Organization and Manpower {4}

Draw the company organization chart identifying headquarters and local offices

(Drawn as object in MS Word™ using Shipper & Forwarder number as key)

5 Indicate the manpower of your company

	No. of personnel	working days/week	working hours per day
Workers for operation	{5_1_1}	{5_1_2}	{5_1_3}
Head Office	{5_2_1}	{5_2_2}	{5_2_3}
Others	{5_3_1}	{5_3_2}	{5_3_3}

6 Top 5 cargo shipped by your company

	Main cargo	Ports of shipment From	Ports of shipment To	Cargo volume (MT) 2000	Cargo volume (MT) 2001	Cargo volume (MT) 2002
1	{6_1_1}	{6_1_2}	{6_1_3}	{6_1_4}	{6_1_5}	{6_1_6}
2	{6_2_1}	{6_2_2}	{6_2_3}	{6_2_4}	{6_2_5}	{6_2_6}
3	{6_3_1}	{6_3_2}	{6_3_3}	{6_3_4}	{6_3_5}	{6_3_6}
4	{6_4_1}	{6_4_2}	{6_4_3}	{6_4_4}	{6_4_5}	{6_4_6}
5	{6_5_1}	{6_5_2}	{6_5_3}	{6_5_4}	{6_5_5}	{6_5_6}

7 Logistics Facilities

item	quantity/unit		
Trucks	{7_1} units		
Warehouses	{7_2_1} units	{7_2_2}	area in sq. m.
Land	{7_3}	area in sq. m.	
Others (please enumerate and describe):	{7_4_1}		
{7_4_2}	{7_4_3}		

8

Cargo handling volume	1998	1999	2000	2001	2002
Conventional/bulk cargo in MT	{8_1_1}	{8_1_2}	{8_1_3}	{8_1_4}	{8_1_5}
Container volume in TEU (Full)	{8_2_1}	{8_2_2}	{8_2_3}	{8_2_4}	{8_2_5}
Container volume in TEU (Empty)	{8_3_1}	{8_3_2}	{8_3_3}	{8_3_4}	{8_3_5}

9 Kindly provide us with your freight rates in relation to origin and distination, for the top 5 commodities handled in 2002.

	Comodity	Origin	Destination	Fare
i.	{9_1_1}	{9_1_2}	{9_1_3}	Rp. {9_1_4} {9_1_5} (1) /MT (2) /TEU (3) /CuM
ii.	{9_2_1}	{9_2_2}	{9_2_3}	Rp. {9_2_4} {9_2_5} (1) /MT (2) /TEU (3) /CuM
iii.	{9_3_1}	{9_3_2}	{9_3_3}	Rp. {9_3_4} {9_3_5} (1) /MT (2) /TEU (3) /CuM
iv.	{9_4_1}	{9_4_2}	{9_4_3}	Rp. {9_4_4} {9_4_5} (1) /MT (2) /TEU (3) /CuM

10 Major cost of operation for year 2002, please tick the top 5 item and indicate their approximate share in the total company cost

	(select top five only)	0~10%	10~20%	20~30%	30~40%	40~50%	60~70%	70~80%	80~90%	90~100%
{10_1}	salaries	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
{10_2}	shipping cost	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
{10_3}	administration cost	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
{10_4}	maintenance and repair	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
{10_5}	insurance	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
{10_6}	taxes	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
{10_7}	loans payments	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
{10_8}	truck operation	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
{10_9}	liability claims									
	{10_9_1}	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

11 How would you rate the following aspects of Indonesian freight shipping service ?
Please consider the importance of each item when you choose shipping company.

		Very bad	Bad	So-so	Good	Very good	No opinion	Rank
Price	{11_1_1}	(1)	(2)	(3)	(4)	(5)	(6)	{11_1_2}
Reliability of schedule	{11_2_1}	(1)	(2)	(3)	(4)	(5)	(6)	{11_2_2}
Reliability in preserving carg	{11_3_1}	(1)	(2)	(3)	(4)	(5)	(6)	{11_3_2}
Security against loss and pilf	{11_4_1}	(1)	(2)	(3)	(4)	(5)	(6)	{11_4_2}
Speed of delivery	{11_5_1}	(1)	(2)	(3)	(4)	(5)	(6)	{11_5_2}
Cargo information and monit	{11_6_1}	(1)	(2)	(3)	(4)	(5)	(6)	{11_6_2}
Carrying capacity	{11_7_1}	(1)	(2)	(3)	(4)	(5)	(6)	{11_7_2}
Convenience of scheduling	{11_8_1}	(1)	(2)	(3)	(4)	(5)	(6)	{11_8_2}
Other important aspects								
{11_9_0}	{11_9_1}	(1)	(2)	(3)	(4)	(5)	(6)	{11_9_2}

12 What are the major points of concern as an Indonesian shipper or forwarder? Please rank the following points according to importance - "1" is the most important.

	Rank	Specific description
Revenue maximization	{12_1_1}	{12_1_2}
Financial resources	{12_2_1}	{12_2_2}
Cost cutting in operation	{12_3_1}	{12_3_2}
Personnel development	{12_4_1}	{12_4_2}
Organizational strength	{12_5_1}	{12_5_2}
Safety in operation	{12_6_1}	{12_6_2}
Marketing of the company	{12_7_1}	{12_7_2}
Environmental consideration	{12_8_1}	{12_8_2}
Implementation of new technology	{12_9_1}	{12_9_2}
Others (please specify)		
{12_10_0}	{12_10_1}	{12_10_2}

13 What do you consider is the most significant obstacle for the improvement and modernization of your company's management? Please rank the following points according to importance - "1" is the most important.

	Rank	Specific description
Conventional system in industry	{13_1_1}	{13_1_2}
Lack of human resources	{13_2_1}	{13_2_2}
Poor port operation/facilities	{13_3_1}	{13_3_2}
Regulation and its implementation	{13_4_1}	{13_4_2}
High rate of invisible cost	{13_5_1}	{13_5_2}
Lack of information technology	{13_6_1}	{13_6_2}
Lack of land	{13_7_1}	{13_7_2}
Lack of good inter-modal facilities	{13_8_1}	{13_8_2}
Cumbersome documentations	{13_9_1}	{13_9_2}
Lack of finance	{13_10_1}	{13_10_2}
Others (please specify)		
{13_11_0}	{13_11_1}	{13_11_2}

14 What should the government do to improve Indonesian Domestic Freight Shipping Industry

i. … With regards to improving the plight of shippers or forwarders {14_1}

ii. … With regards to port services (specify port name) {14_2}

iii. … With regards to cargo insurance {14_3}

iv. … With regards to governance and regulation of the domestic freight industry {14_4}

v. … With regards to documentation procedures {14_5}

vi. … With regards to any other issue (please specify and give a brief description {14_6}

3.2.5. Sea Passenger Profile Database

The sea passenger database is described as follows.

S/N

Passenger Interview Survey

Port of Survey: {0_2} Surveyor:
Date of Survey: {0_1_1} (D) {0_1_2} (M) {0_1_3} (Y) Supervisor:

PERSONAL INFORMATION

1 **Name:** {1}
2 **Address:** {2} (City Code) (city)
(province)
3 **Gender:** {3}
(1) Male (2) Female
4 **Age (years)** {4}
(1) =10 (3) 21 ~ 30 (5) 41 ~ 50
(2) 11 ~ 20 (4) 31 ~ 40 (6) > 50
5 **Personal average income (Rp/month)** {5}
(1) < 500,000 (3) 1.1M ~ 2M (5) 4.1M ~ 7.5M
(2) 500,000 ~ 1M (4) 2.1M ~ 4M (6) > 7.5 M
6 **Occupation (please select best answer)** {6}
(1) Student (1) Laborer
(2) Professional (2) Retired/unemployed

TRIP INFORMATION

7 **Ship Name:** {7_1} **Ship Company** → P.T. PELNI
{7_2} → Others {7_3}
8 **Port of Origin** Port Name: {8_1}
City: {8_2} (City Code) Province:
9 **Port of Destination** Port Name: {9_1}
City: {9_2} (City Code) Province:
10 **Place of Trip Origin** City: {10} (City Code) Province:
11 **Place of Trip Destination** City: {11} (City Code) Province:
12 **Scheduled time and date of departure at origin port:**
Hour:Min: {12_1_1} (H) {12_1_2} (Min) Day: {12_2_1} (D) Month: {12_2_2} (M) Year: 2003
13 **Scheduled time and date of arrival at destination port:**
Hour:Min: {13_1_1} (H) {13_1_2} (Min) Day: {13_2_1} (D) Month: {13_2_2} (M) Year: 2003
14 **What time did you arrive at this port**
Hour:Min: {14_1_1} (H) {14_1_2} (Min) Day: {14_2_1} (D) Month: {14_2_2} (M) Year: 2003
15 **Purpose of Trip:**
{15} (1) Tourist (pleasure trip)
(2) Non-tourist - personal (visit family, transmigration, family errands, etc)
(3) Non-tourist - business (business related, company trip, etc.)
16 **Accommodation Class (please select answer that best describes your accommodation)**
Number of classess in ship? {16_1} {16_2} (1) First Class (best) (2) Second Class (3) Third Class (4) Fourth Class (5) Economy
17 **How many large baggage/boxes/sacks/etc. are you carrying with you on this voyage** {17} pcs.
18 **Are you traveling with a group?** {18_1}
(1) No (2) Yes, how many? {18_2}
19 **How much did you pay for your ticket?** {19_1} {19_2} Rp (1) One-way (2) Two-way
20 **How did you come to this port?** {20_1}
(1) Car (3) Bus (5) Boat (transferring at port of survey)
(2) Rail (4) Taxi (6) Others (specify ___ {21_2}
21 **How do you plan to go to your final destination after arriving at destination port** {21_1}
{21_1} (1) Car (3) Bus (5) Others (specify ___ {21_2}
(2) Rail (4) Taxi

OTHER INFORMATION

22 **How often do you travel by ship?**

{22} (1) = 5 times a week (3) 1~ 3 times a month (5) less than 6 times a year
(2) 1 ~ 4 times a week (4) 6~ 11 times a year

23 **Have you ever tried taking this particular voyage you are going to take?**

{23} (1) Yes
(2) No ? skip Question 24

24 **Assess the following aspects of <u>this</u> Voyage based on your experience?**

			Very Bad	Bad	So-so	Good	Very Good	No opinion
24-1	{24_1}	Travel fare	(1)	(2)	(3)	(4)	(5)	(6)
24-2	{24_2}	Livin	(1)	(2)	(3)	(4)	(5)	(6)
24-3	{24_3}	Conditions at origin port (waiting facilities, toilet, telephone, etc.)	(1)	(2)	(3)	(4)	(5)	(6)
24-4	{24_4}	Land access at origin port (cost, safety, convenience, etc.)	(1)	(2)	(3)	(4)	(5)	(6)
24-5	{24_5}	Conditions at destination port (waiting facilities, toilet, telephone, etc.)	(1)	(2)	(3)	(4)	(5)	(6)
24-6	{24_6}	Land access at destination port (cost, safety, convenience, etc.)	(1)	(2)	(3)	(4)	(5)	(6)
24-7	{24_7}	Speed of vessel	(1)	(2)	(3)	(4)	(5)	(6)
24-8	{24_8}	Convenience of Scheduling	(1)	(2)	(3)	(4)	(5)	(6)
24-9	{24_9}	Reliability of schedule	(1)	(2)	(3)	(4)	(5)	(6)
24-10	{24_10}	Conditions in purchasing tickets	(1)	(2)	(3)	(4)	(5)	(6)
24-11	{24_11}	Conditions regarding accompanied luggage or cargo	(1)	(2)	(3)	(4)	(5)	(6)
24-12	{24_12}	Safety of the ship	(1)	(2)	(3)	(4)	(5)	(6)
24-13	{24_13}	Security aboard the ship	(1)	(2)	(3)	(4)	(5)	(6)

25 **Assess the following aspects of Indonesian Domestic Passenger Shipping Service in general to best of your knowledge and experience?**

			Very Bad	Bad	So-so	Good	Very Good	No opinion
25-1	{25_1}	Travel fare	(1)	(2)	(3)	(4)	(5)	(6)
25-2	{25_2}	Living conditions on the ship	(1)	(2)	(3)	(4)	(5)	(6)
25-3	{25_3}	Conditions at port terminals	(1)	(2)	(3)	(4)	(5)	(6)
25-4	{25_4}	Conditions of access and egress to/from ports	(1)	(2)	(3)	(4)	(5)	(6)
25-5	{25_5}	Speed of vessel	(1)	(2)	(3)	(4)	(5)	(6)
25-6	{25_6}	Convenience of Scheduling	(1)	(2)	(3)	(4)	(5)	(6)
25-7	{25_7}	Reliability of schedule	(1)	(2)	(3)	(4)	(5)	(6)
25-8	{25_8}	Conditions in purchasing tickets	(1)	(2)	(3)	(4)	(5)	(6)
25-9	{25_9}	Conditions regarding accompanied luggage or cargo	(1)	(2)	(3)	(4)	(5)	(6)
25-10	{25_10}	Safety of the ship	(1)	(2)	(3)	(4)	(5)	(6)
25-11	{25_11}	Security aboard the ship	(1)	(2)	(3)	(4)	(5)	(6)

26 **Which aspects of traveling by domestic passenger ship do you feel is the most important for you, please rank each one -- 1 is the most important and 10 is the least important**

		RANK
26-1	Travel fare	{26_1}
26-2	Living conditions on the ship	{26_2}
26-3	Conditions at port terminals	{26_3}
26-4	Conditions of access and egress to/from ports	{26_4}
26-5	Speed of vessel	{26_5}
26-6	Convenience of Scheduling	{26_6}
26-7	Reliability of schedule	{26_7}
26-8	Conditions in purchasing tickets	{26_8}
26-9	Conditions regarding accompanied luggage or cargo	{26_9}
26-10	Safety of the ship	{26_10}
26-11	Security aboard the ship	{26_11}

4. TRAFFIC DEMAND FORECAST METHODOLOGY AND ASSUMPTIONS

4.1. Approach for Demand Forecast

4.1.1. General

Future demand for domestic maritime transportation in Indonesia was forecast to obtain basic information for developing maritime transport and also to prepare an analytical tool for project evaluation.

Target year for projection is 2024 and intermediate years of 2009, 2014 and 2019 are set as benchmark years.

Provinces were used as basic zones for demand forecast for reasons of data availability. As of the year 2003, Indonesia is divided into 30 zones. Finally OD matrices are expressed using 130 ports – ports 1 to 100 are ADPEL ports and ports 101 to 130 are aggregated non-ADPEL ports grouped in provinces (e.g. port 101 – ports in Aceh – is a representative port combining all the non-ADPEL ports in Aceh).

4.1.2. Methodology

Demand forecast was basically made by following the so-called four-step method – a stepwise forecast of (1) demand generation/attraction, (2) demand distribution or OD movement, (3) modal split and (4) traffic assignment. Modal split was made only for the projection of passenger trips because cargoes were forecast only for maritime transportation directly from the first step of forecasting demand generation and attraction.

In the steps from 1 to 3 of the four-step model, mathematical models were developed using historical data and by analyzing the relationship of volume of cargoes or passengers with socio-economic indicators and transportation attributes such as distance, transportation cost, etc.

For the forecast of cargo transportation demand, two approaches of macro- and micro-analyses are used. The former is to forecast the aggregated demand by cargo type directly, while the latter is to forecast the demand components by commodities. Here, cargo types mean four categories of general cargo, container cargo, dry bulk cargo and liquid bulk cargo.

Generally, the result of the macro-analysis is used as a control to adjust the results of the micro-analysis.

As for the passenger transport demand, step 1 and 2 of the four-step model were conducted by combining passengers both of sea and air transport and they were divided into sea and air at step 3 or modal split. This is because future modal change is one of the key issues in long-distance passenger trips.

Table 4.1.1 summarizes the main output of demand forecast.

Table 4.1 Main Output of Demand Forecast

Output	Location of output	Remarks
Sea Cargo Traffic Forecast	Main Report	Per commodity basis
Loading and Unloading Forecast	Database CD	Per commodity basis
Port-to-Port Cargo OD Matrix	Database CD	Per commodity basis
Passenger Generation/Attraction Forecast	Main Report	
Passenger OD Forecast	Database CD	
Fleet Estimate	Main Report	
Fleet productivity measures	Main Report	

4.2. Socio-economic Framework

The basis of any demand forecast is the future socio-economic framework. This section illustrates how the assumed future socio-economic framework is developed.

4.2.1. Demography

There is no official population forecast in Indonesia. In 2002, however, a comprehensive population study was published under the title of "The Population of Indonesia, Regional Demographic Scenarios Using a Multi-Regional Method and Multiple Data Sources" by Salahudin Muhidin. The author is a researcher at the Demographic Institute.

The study was financed under the scheme of the Center Grant, URGE (University Research for Graduate Education) project, the Demographic Institute, Faculty of Economics, University of Indonesia (LDUI), under the auspices of the World Bank through the government of Indonesia, the Ministry of Education, and also, partly financed by the Ph.D. Fellowship Program of the University of Groningen. A number of authorities in the field of demography advised or cooperated in the study. Consequently, the population forecast of the study can be regarded as a "semi"-official one.

The STRAMINDO study team made a demographic projection and the result was very close to the projection under Scenario C3 of the study (pp. 257 − 258), where using regional figures, the levels and/or patterns of fertility and mortality are assumed to change over the projection period while migration in terms of origin-destination migration rates are assumed not to change (Table 4.2.1).

Table 4.2 Comparison of Population Forecast

(million person)

Source	*2000*	*2005*	*2010*	*2015*	*2020*	*2025*
Population in Indonesia	210.1	224.8	238.3	250.5	261.1	270.7
Estimate by Study Team	205.8	220.4	234.6	248.5	261.9	271.2

STRAMINDO will adopt the forecast of the study as the future demographic framework, with a slight modification to fill the gap of 2000 population, because the study used preliminary census data for year 2000. According to the study, future regional population is as shown in Table 4.2.2.

Table 4.3 Population Projection by Region, 2005 - 2025

(1) Regional Population (1000 person)

	Region	1990	1995	2000	2005	2010	2015	2020	2025
1	Northern Sumatra	20,947	23,218	25,536	27,819	29,969	31,947	33,710	35,348
2	Southern Sumatra	15,525	17,141	18,633	20,029	21,306	22,471	23,494	24,410
3	Jakarta	8,228	9,790	11,411	13,040	14,654	16,247	17,799	19,377
4	West Jawa	35,382	37,230	39,000	40,616	41,934	42,940	43,613	44,020
5	Central Jawa	28,516	30,727	32,917	35,073	37,045	38,791	40,286	41,577
6	Yogyakarta	2,913	3,238	3,624	4,060	4,511	4,962	5,403	5,846
7	East Jawa	32,489	34,312	36,079	37,747	39,165	40,358	41,314	42,028
8	Bali	2,777	3,038	3,306	3,566	3,806	4,038	4,259	4,464
9	Nusa Tenggara	7,384	8,294	9,173	9,988	10,731	11,426	12,071	12,673
10	Kalimantan	9,096	10,079	11,018	11,905	12,722	13,476	14,142	14,748
11	Sulawesi	12,510	13,719	14,897	15,997	16,978	17,856	18,631	19,318
12	Maluku+Papua	3,483	4,000	4,503	4,997	5,485	5,966	6,424	6,874
	Indonesia Total	179,248	194,786	210,097	224,839	238,305	250,480	261,146	270,684

(2) Regional Population Composition (%)

	Region	1990	1995	2000	2005	2010	2015	2020	2025
1	Northern Sumatra	11.69	11.92	12.15	12.37	12.58	12.75	12.91	13.06
2	Southern Sumatra	8.66	8.80	8.87	8.91	8.94	8.97	9.00	9.02
3	Jakarta	4.59	5.03	5.43	5.80	6.15	6.49	6.82	7.16
4	West Jawa	19.74	19.11	18.56	18.06	17.60	17.14	16.70	16.26
5	Central Jawa	15.91	15.77	15.67	15.60	15.55	15.49	15.43	15.36
6	Yogyakarta	1.63	1.66	1.72	1.81	1.89	1.98	2.07	2.16
7	East Jawa	18.13	17.62	17.17	16.79	16.43	16.11	15.82	15.53
8	Bali	1.55	1.56	1.57	1.59	1.60	1.61	1.63	1.65
9	Nusa Tenggara	4.12	4.26	4.37	4.44	4.50	4.56	4.62	4.68
10	Kalimantan	5.07	5.17	5.24	5.29	5.34	5.38	5.42	5.45
11	Sulawesi	6.98	7.04	7.09	7.11	7.12	7.13	7.13	7.14
12	Maluku+Papua	1.94	2.05	2.14	2.22	2.30	2.38	2.46	2.54
	Indonesia Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

(3) Annual Average Growth Rate (%)

	Region	1990-95	1995-00	2000-05	2005-10	2010-15	2015-20	2020-25
1	Northern Sumatra	2.08	1.92	1.73	1.50	1.29	1.08	0.95
2	Southern Sumatra	2.00	1.68	1.46	1.24	1.07	0.89	0.77
3	Jakarta	3.54	3.11	2.70	2.36	2.09	1.84	1.71
4	West Jawa	1.02	0.93	0.82	0.64	0.48	0.31	0.19
5	Central Jawa	1.50	1.39	1.28	1.10	0.93	0.76	0.63
6	Yogyakarta	2.14	2.28	2.30	2.13	1.92	1.72	1.59
7	East Jawa	1.10	1.01	0.91	0.74	0.60	0.47	0.34
8	Bali	1.81	1.71	1.53	1.31	1.19	1.07	0.94
9	Nusa Tenggara	2.35	2.04	1.72	1.45	1.26	1.10	0.98
10	Kalimantan	2.07	1.80	1.56	1.34	1.16	0.97	0.84
11	Sulawesi	1.86	1.66	1.44	1.20	1.01	0.85	0.73
12	Maluku+Papua	2.81	2.40	2.10	1.88	1.70	1.49	1.36
	Indonesia Total	1.68	1.52	1.37	1.17	1.00	0.84	0.72

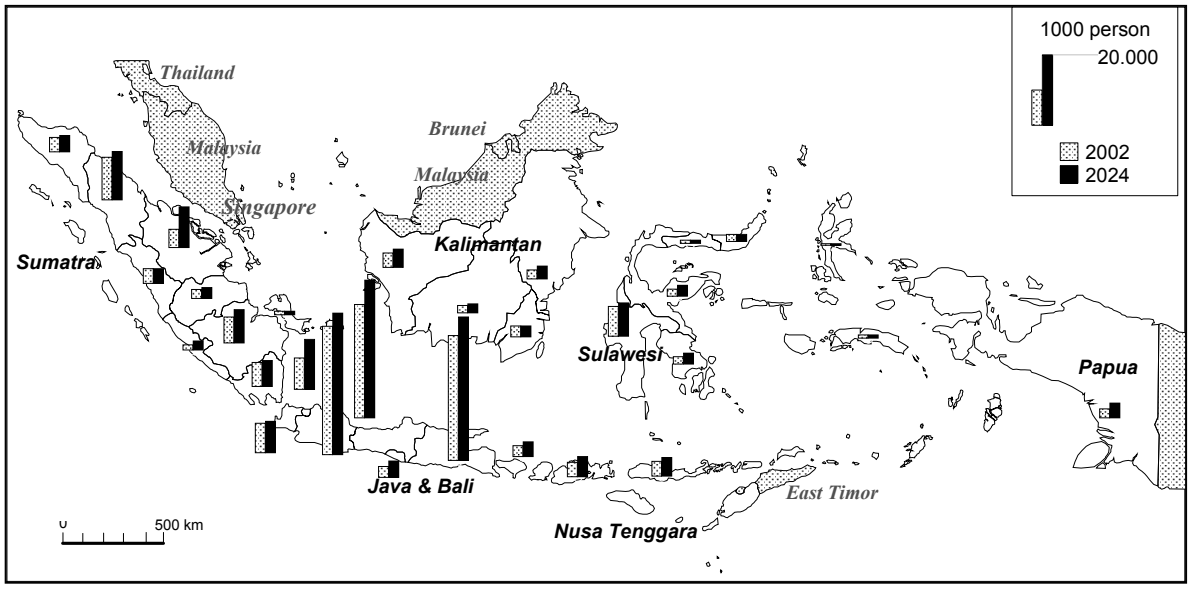
Source: Chapter 7, pp. 257-258, The Population of Indonesia, Salahudin Muhidin, 2002

Note: 1) Population in 2025 is extrapolated by Study Team

2) Annual average growth rates are changed by using compound growth rates instead of originally used simple growth rates.

The regional population was further broken down to provinces (i.e. into zones) by distributing the regional population in proportion to provincial population extrapolated into the future using past increase rates. The result is shown in Figure 4.2.1.

Figure 4.1 Future Population by 30 Zone Province



4.2.2. Economic Growth

It is almost impossible to foresee the long-term economic growth in Indonesia, especially after the economic deterioration caused by the financial crisis in 1997. In the current National Development Plan (PROPENAS) 1999 - 2004, the Government set the target of economic growth to recover from 4% in the first year to 7% in the last year.

For the year 2004, about 4% growth is expected by the Ministry of Finance according to "The Asian Development Outlook" of ADB. Beyond year 2005, STRAMINDO prepared two simple scenarios of high and low economic growth as the assumptions for demand forecast. Future economic growth was assumed at 4.0% p.a. for the low growth case and 7.0% p.a. for the high growth case as shown in Figure 4.2.2.

Figure 4.2 Past Trend and Target of GDP Growth Rate

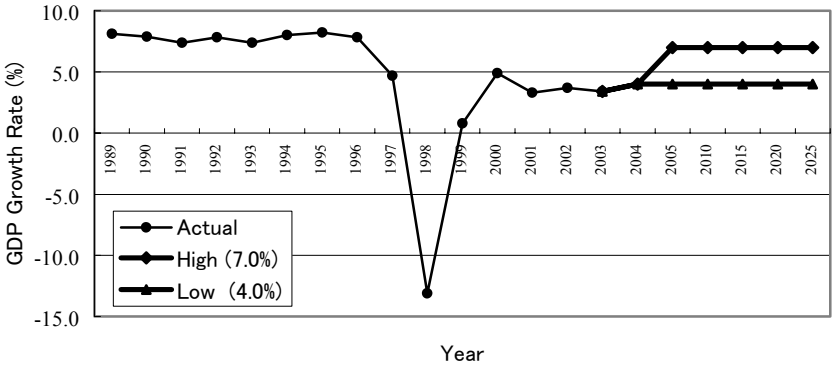
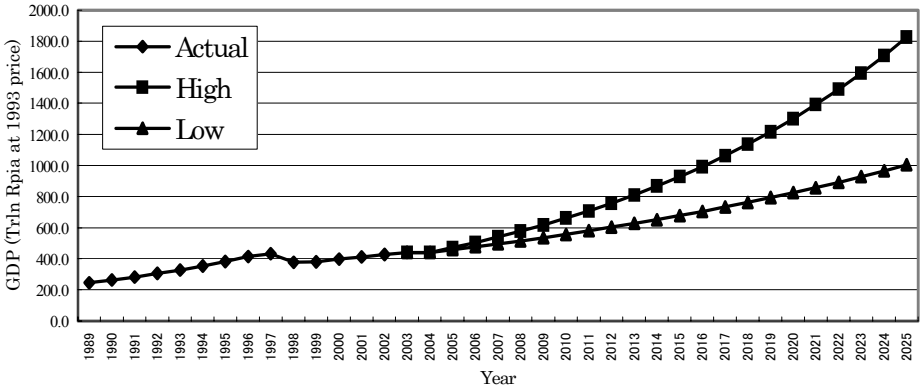


Figure 4.3 Future Economic Growth in Indonesia



The GDP was broken down into regions in the same manner as population; i.e., by distributing the national GDP in proportion to the projected regional GDPs (GRDPs), using past growth rate of each region. In this case, growth rates before 1997 were used in order to exclude the influence of the financial crisis. The results are shown in Table 4.2.3. According to the results, regional disparities between west and east Indonesia will be marginally improved.

Table 4.4 Future GRDP by Region (Trillion Rupiahs at 1993 price)

High Case (GR=7%)

Region	2000	2005	2010	2015	2020	2025
Sumatra	74.0	88.7	121.1	165.2	225.3	307.2
Jawa and Bali	233.7	286.4	400.1	558.7	779.7	1087.6
Kalimantan	39.6	50.4	73.1	105.9	153.4	222.0
Sulawesi	18.3	22.6	32.0	45.1	63.6	89.6
Others	18.0	23.6	35.4	53.0	79.4	118.9
Total	383.6	471.7	661.6	927.9	1301.4	1825.3

Low Case (GR=4%)

Region	2000	2005	2010	2015	2020	2025
Sumatra	74.0	86.2	102.1	120.8	143.0	169.1
Jawa and Bali	233.7	278.4	337.3	408.6	494.7	598.6
Kalimantan	39.6	49.0	61.6	77.5	97.3	122.2
Sulawesi	18.3	22.0	26.9	33.0	40.3	49.3
Others	18.0	23.0	29.8	38.8	50.4	65.4
Total	383.6	458.5	557.8	678.7	825.7	1004.6

Regional Composition (%)

Region	2000	2005	2010	2015	2020	2025
Sumatra	19.3	18.8	18.3	17.8	17.3	16.8
Jawa and Bali	60.9	60.7	60.5	60.2	59.9	59.6
Kalimantan	10.3	10.7	11.0	11.4	11.8	12.2
Sulawesi	4.8	4.8	4.8	4.9	4.9	4.9
Others	4.7	5.0	5.4	5.7	6.1	6.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

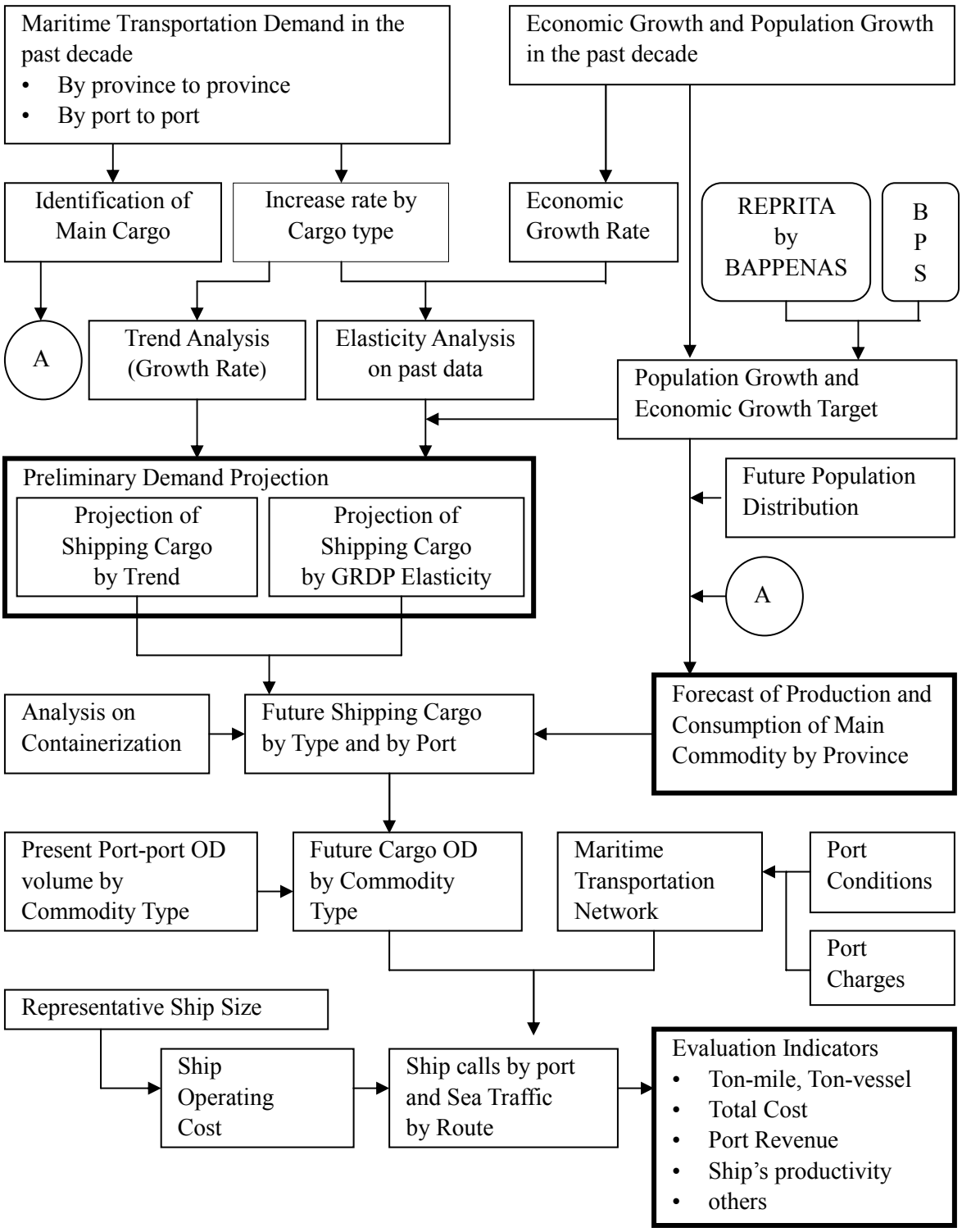
Annual Growth Rate by Region

Region	2000-05	2005-25	
	Both Cases	High	Low
Sumatra	3.7	6.4	3.4
Jawa and Bali	4.1	6.9	3.9
Kalimantan	4.9	7.7	4.7
Sulawesi	4.4	7.1	4.1
Others	5.6	8.4	5.4
Total	4.2	7.0	4.0

4.3. Cargo Forecast

This section details the methodology and assumption used in the forecast of cargo traffic. Figure illustrates the approach made for the cargo forecast. Two approaches are used (1) Macro-approach and (2) micro-approach. The macro-approach forecasts future demand by forecasting sea traffic directly. The micro-approach firstly forecasts the growth in production and consumption of each key commodity and uses the result to forecast sea traffic. The two results will generally not lead to the same result, so a technical meeting attended by experienced authorities deliberated on the results of the two approaches and decided on which result will be the basis of the master plan.

Figure 4.4 Work Flow for STRAMINDO Demand Forecast



4.3.1. Demand Forecast by Macro-Approach

This section presents, the forecast of cargo and passenger demand – using a macroscopic approach. Fundamentally, it means that the demand for transportation is forecasted by directly extrapolating cargo and passenger demand based on national (or regional) level socio-economic properties (e.g. GDP and population). The purpose of this type of forecast is to set a baseline for which detailed "microscopic" models can be compared to or even adjusted to.

The first sub-section present the forecast for domestic seaborne cargo and the second sub-section deals with passenger transport demand..

(1) Seaborne Cargo

(a) Input Data

The DGSC annual statistic is the only data source in Indonesia on sea-borne cargoes available in a consistent form for a long time period. Table 4.3.1 is the input for this analysis obtained from that statistic. Prior to 1996, the cargo type categories of general cargo, bulk cargo and container cargo were combined into one category only (termed as dry cargo). In order to make use of larger data set for model calibration, it was decided to use only two classifications for cargo: (1) dry cargo, which includes – container, break bulk and dry bulk cargo; and, (2) liquid cargo.

(b) Macro-model for Sea-borne Cargo Projection

Figure 4.3.1 shows the correlation between GDP and the cargo volume. Before the 1997 crisis, a clear linear correlation is observed for both cargo types but after the 1997 financial crisis, the linear trend no longer applied. If applying linear equations to explain the relationship between sea cargo and GDP, the R-square value (a measure of the goodness of fit - with 0 being a poor fit and 1.0 being a perfect fit) is 0.46 for dry cargo and 0.83 for liquid cargo – considered to be too low for practical purposes.

After a series of trial and error, a semi-log linear equation was obtained to explain sea-borne cargo volume with explanatory variables of GDP and GDP growth. A dummy variable was applied to exclude the impact of economic crisis, giving the value 1.0 for the years before 1997, 10.0 for 1997 and 1998 when the economy was most severely affected and 2.0 afterwards to account for the lowered impact of the crisis.

The parameters of the two models are shown in Table 4.3.2. The correlation coefficient (R) is 0.93 for dry cargo and 0.97 for liquid cargo, which is considered to be a very good fit, even though a dummy variable was used.

Figure 4.3.3 compares actual volumes and estimates by the models. The high correlation between actual volumes and model estimates gives confidence in the model's applicability for future demand projection.

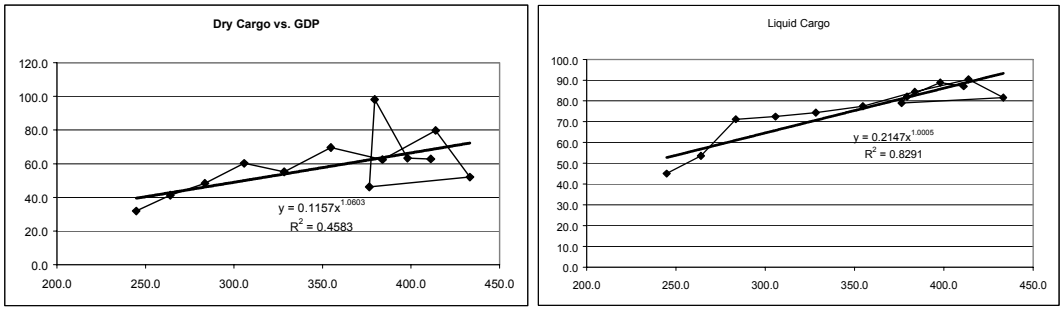
Table 4.5 Basic Data of Economic Growth and Maritime Cargo Transport

(Million ton/year)

	GDP		International Cargo					Domestic				
Year	1993 price (Trillion)	Growth Rate(%)	General	Bulk	Container	Liquid	Total	General	Bulk	Container	Liquid	Total
1988	226.4											
1989	244.7	8.1		37.2		95.0	132.3		31.8		45.1	76.9
1990	264.0	7.9		46.2		92.1	138.2		41.3		53.6	94.9
1991	283.5	7.4		59.6		106.7	166.3		48.3		71.2	119.5
1992	305.7	7.8		72.9		107.9	180.8		60.2		72.5	132.7
1993	328.3	7.4		109.7		107.0	216.7		55.1		74.4	129.5
1994	354.6	8.0		138.1		100.6	238.8		69.6		77.5	147.1
1995	383.8	8.2		189.5		88.7	278.2		62.3		84.4	146.7
1996	413.8	7.8	72.5	62.1	36.4	166.1	337.1	52.6	26.3	0.9	90.4	170.1
1997	433.2	4.7	61.3	39.1	13.4	153.3	267.1	38.6	13.4	0.0	81.6	133.6
1998	376.4	-13.1	40.2	71.5	12.8	142.3	266.8	28.3	14.3	3.5	79.0	125.2
1999	379.4	0.8	47.0	105.0	22.2	164.5	338.8	52.0	38.7	7.5	82.1	180.2
2000	397.9	4.9	53.1	90.8	15.0	205.6	364.5	37.5	22.2	3.5	88.9	152.1
2001	411.1	3.3	55.8	124.9	22.4	209.7	412.7	32.5	26.1	4.3	87.1	149.9
2002	426.3	3.7										
2003	440.8	3.4										
2004	458.5	4.0										

Source: Cargo data are from DGSC annual statistics and economic data are from BPS annual year book.
GDP in 2002 - 2004 are estimates in "Asian Development Outlook 2003" by ADB

Figure 4.5 Correlation between Dry/Liquid Cargo and GDP



Where: $Y_t = \alpha + \beta \ln(X_{1t}) + \gamma \ln(X_{2t}) + \delta \ln(D_t)$

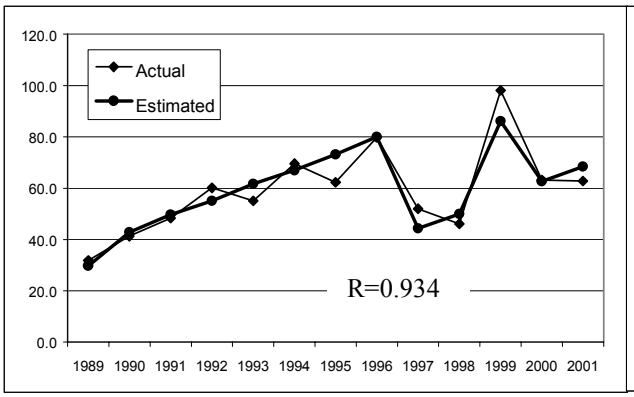
Where Y_t : Sea-borne cargo volume in year t
X_{1t}: GDP in year t at 1993 price
X_{2t} : Economic growth rate in year t (X_{1t}/X_{1t-1})
D_t : Dummy Variable
α , β , γ , δ : parameters

Table 4.6 Parameters of Sea-borne Cargo Model

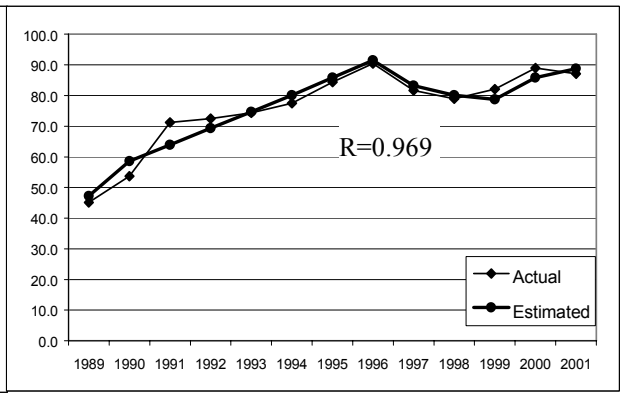
	Dry Cargo	Liquid Cargo
α	86.98	87.38
β	82.55	73.13
γ	-278.44	-111.26
δ	-28.08	-5.50
R	0.9338	0.9693

Figure 4.6 Fitness of the Model

(1) Dry Cargo



(2) Liquid Cargo



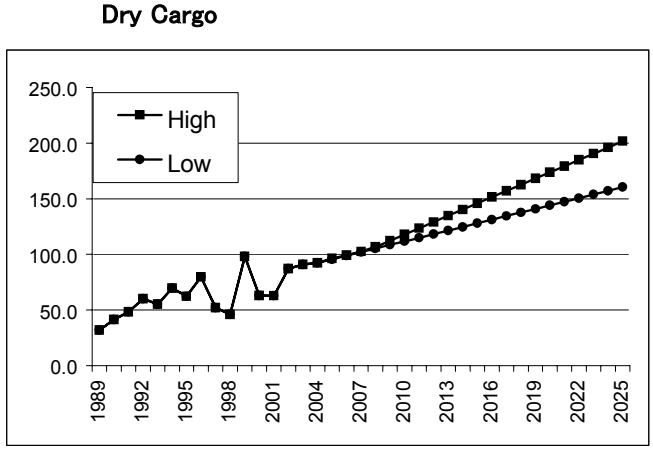
(2) Forecast Results

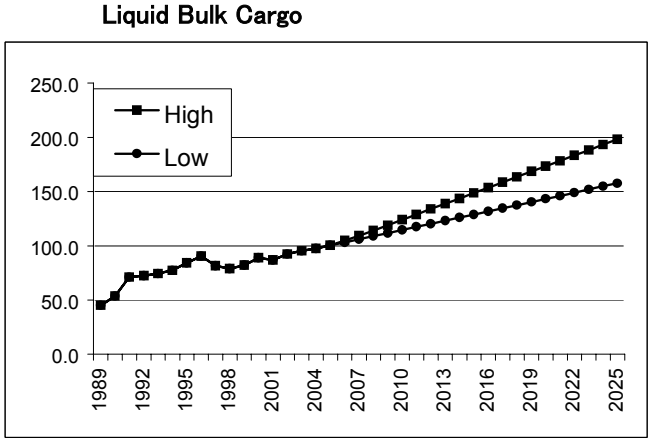
Based on the laid out future socio-economic framework, the macro-models for dry and liquid cargo were used to estimate future seaborne cargo traffic and the results are shown in Figure 4.3.4. In high economic growth case of 7% GDP growth p.a., dry cargo is forecast to increase 3.2 times during 2001 – 2025 from 62.8 million tons to 201.7 million tons. In the low economic growth case of 4% GDP growth p.a., dry cargo will increase 2.6 times or to 160.3 million tons by 2024. Liquid bulk cargo is forecast to grow less moderately than with dry cargo increasing 2.3 times in high growth case and 1.8 times in low growth case. As a result, dry cargo and liquid cargo will become almost equal in volume by year 2025.

It is important to note that these results are provisionary results. These results would have to be compared and unified with the results of the microscopic demand forecast and is shown in the succeeding sections.

Figure 4.7 Forecast Result (million tons/ year)

Year	Domestic Cargo			
	Dry Cargo		Liquid Bulk	
	High	Low	High	Low
2001	62.8	62.8	87.1	87.1
2002	87.2	87.2	92.5	92.5
2003	90.7	90.7	95.2	95.2
2004	92.4	92.4	97.4	97.4
2005	96.3	95.6	100.5	100.3
2006	99.2	98.8	104.9	103.2
2007	102.6	102.1	109.4	106.1
2008	106.8	105.3	114.1	108.9
2009	112.4	108.5	119.0	111.8
2010	117.9	111.8	124.0	114.7
2011	123.5	115.0	128.9	117.5
2012	129.1	118.3	133.9	120.4
2013	134.7	121.5	138.8	123.3
2014	140.3	124.7	143.8	126.1
2015	145.9	128.0	148.7	129.0
2016	151.5	131.2	153.7	131.9
2017	157.0	134.4	158.6	134.7
2018	162.6	137.7	163.6	137.6
2019	168.2	140.9	168.5	140.5
2020	173.8	144.2	173.5	143.3
2021	179.4	147.4	178.4	146.2
2022	185.0	150.6	183.3	149.1
2023	190.6	153.9	188.3	151.9
2024	196.1	157.1	193.2	154.8
2025	201.7	160.3	198.2	157.7
	3.2	2.6	2.3	1.8





4.3.2. Microscopic Forecast of Sea Cargo Transport Demand

This section presents the results of demand forecast using microscopic approach for cargo. This section provides insight as to the nature and quantity of demand for maritime sea freight services in the future.

(1) Methodology and Assumptions

The demand forecast starts with the forecast of national sea traffic. This is conducted using two approaches. The first approach is the macroscopic approach which is an extrapolation of domestic sea traffic based on the national socio-economic framework. The second approach is the microscopic approach which breaks down the domestic seaborne traffic into commodities and sea traffic is estimated based on prospects of demand and consumption of each commodity. The results of the two approaches would then be combined and used as the control total of other steps.

In the next step, loading and unloading at each zone is predicted based on the socio-economic framework forecast of each zone as well as investment prospects at each zone. The total loading and unloading is corrected such that it conforms to the national seaborne traffic estimated in the first step.

The third step, forecasts the Origin-Destination matrix of sea traffic by commodity. Based on the current OD, the future OD is forecasted based on changes in loading and unloading

at each zone using the Fratar Method.

Three scenarios are used for demand forecast in the microscopic approach case: low, mid and high estimate. For the low and high estimate scenarios, there are two dimensions used in the selection of the high case scenario and the low case scenario. The first dimension is the economic growth and the second is the choice of model parameters. There are several instances wherein there is discrepancy in the value of model parameters – for example, one source suggests that the elasticity of cement consumption to GDP is 0.9 while another suggests 1.4. Since, at times it is not possible to properly discern which parameter to use (largely due to lack of data), it was considered prudent to use very conservative estimates by pairing favorable parameters with high GDP growth scenarios (as the high estimate) and unfavorable parameters with low growth scenarios (as the low estimate). With such approach, the spread of estimates may be too wide in some cases for planning purposes; therefore, a mid-estimate is also calculated. The mid-estimate is the estimate considered to be most likely based on discussions with relevant authorities and review of various references. The high and low estimates should therefore be used as for reference only and can be used to gauge the uncertainties of the mid-estimate and its probable variation.

Table 4.7 Methodology of Maritime Traffic Forecast

STEP	DESCRIPTION	METHODOLOGY	DATA/INPUTS
Step 1: National Seaborne Traffic	Forecast of seaborne traffic by commodity	Trend extrapolation of volume of seaborne commodities.	(1) History of seaborne traffic by commodity (2) Socio-economic environment history and forecast (3) History/forecast of production, consumption, export and import of key commodities
Step 2: Loading and Unloading	Forecast of future loading and unloading activity by commodity	Growth Factor Method or Fratar Method/1 - it assumes that port loading/unloading will increase/decrease in proportion to the increase/decrease of a predictable index or growth factor	(1) Future socio-economic framework (2) Forecasted seaborne traffic by commodity type (3) Future investment prospects of the production of key commodities
Step 3: Origin and Destination	Forecast of the where loaded cargo gets unloaded		

Note: 1/ Growth Factor or Fratar Formula

$$X_t^i = S_t \frac{\left[X_{t0}^i \times GF_t^i\right]}{\sum_x \left[X_{t0}^x \times GF_t^x\right]}$$

$$T_t^{i,j} = X_t^i \frac{T_{t0}^{i,j} \times GF_t^j}{\sum_x T_{t0}^{i,x} \times GF_t^x}$$

$X = Loading\ /\ Unloading$

$T_t^{i,j} = Origin(i)\ Destination(j)\ Volume$

$S = Seaborne\ traffic$

$GF = growth\ factor = \alpha^i \times index_t^i$

$index =$ growth indicator

$\alpha =$ sensitivity factor $\in (0,1)$

$i, j, x = Port$

$t = year$

$t0 = base\ year, 2002$

(2) Domestic Sea Freight Traffic Forecast by Commodity

The forecast of sea traffic of each commodity starts with the forecast of supply and demand. This involves a review of past trend of production, consumption including export and import.

Based on a review of domestic sea traffic, the primary commodities are:

- *Petroleum (52.7%)*
- *General Cargo (14.2%)*
- *Coal (10.6%)*
- *Forestry products (6.7%)*
- *Fertilizer (3.8%)*
- *Cement (3.2%)*
- *CPO (1.6%)*
- *Rice (0.9%)*

Other commodities are likewise included in the demand forecast, but are estimated using extrapolation of current demand based on the overall trend of key commodities without detailed examination of demand and supply.

The following tables (Table 4.4.4, 4.4.5 and 4.4.5) summarize the results of the sea traffic forecast. Detailed outline of the models and the forecast of seaborne traffic per commodity are presented in Annex.

Table 4.8 Sea Traffic Forecast per Commodity - Low Estimate

	Volume in million MT					Volume as ratio to 2002 values				
	2002	2009	2014	2019	2024	2002	2009	2014	2019	2024
Petroleum	95.5	91.0	83.3	76.3	70.0	1.0	1.0	0.9	0.8	0.7
CPO	2.6	3.8	4.8	6.2	7.9	1.0	1.4	1.8	2.3	3.0
Oliquid/1	1.6	1.7	1.8	1.9	2.1	1.0	1.1	1.1	1.2	1.3
Coal	17.3	22.0	24.0	25.7	27.4	1.0	1.3	1.4	1.5	1.6
Mine/2	4.7	5.1	5.3	5.6	6.0	1.0	1.1	1.1	1.2	1.3
Rice	1.3	1.4	1.4	1.4	1.4	1.0	1.0	1.0	1.0	1.0
Agrains/3	1.2	1.3	1.3	1.4	1.5	1.0	1.1	1.1	1.2	1.3
Fertilizer	5.4	4.4	3.9	3.4	3.0	1.0	0.8	0.7	0.6	0.6
Cement	5.2	6.7	8.0	9.7	11.7	1.0	1.3	1.5	1.9	2.2
Ograins/4	2.3	2.4	2.6	2.7	2.9	1.0	1.1	1.1	1.2	1.3
Fresh/5	0.3	0.3	0.3	0.4	0.4	1.0	1.1	1.1	1.2	1.3
Wood	9.1	6.2	6.2	6.2	6.2	1.0	0.7	0.7	0.7	0.7
GC/6	23.2	31.8	40.2	50.9	64.3	1.0	1.4	1.7	2.2	2.8
ALL	169.8	178.1	183.2	191.8	204.8	1.0	1.0	1.1	1.1	1.2

Note: /1 Oliquid = other liquid cargo e.g. liquid chemicals
/2 Mine = other mining and quarrying products e.g. sand and gravel
/3 Agrains = Other agricultural grains e.g. legumes
/4 Ograins = Other grains that is non-agricultural and non-mining/quarrying; e.g., wheat flour
/5 Fresh = fresh products; e.g., fruits, vegetables, meat
/6 GC = general cargo

Table 4.9 Sea Traffic Forecast per Commodity - Mid Estimate

	Volume in million MT					Volume as ratio to 2002 values				
	2002	2009	2014	2019	2024	2002	2009	2014	2019	2024
Petroleum	95.6	98.7	96.4	93.7	91.0	1.0	1.0	1.0	1.0	1.0
CPO	2.6	4.1	5.7	8.0	11.1	1.0	1.6	2.2	3.0	4.2
Oliquid/1	1.6	2.0	2.3	2.6	3.2	1.0	1.2	1.4	1.6	1.9
Coal	18.0	27.4	31.4	34.7	38.1	1.0	1.5	1.7	1.9	2.1
Mine/2	4.8	5.8	6.6	7.8	9.4	1.0	1.2	1.4	1.6	1.9
Rice	1.4	1.4	1.5	1.5	1.5	1.0	1.0	1.1	1.1	1.1
Agrains/3	1.2	1.5	1.7	2.0	2.4	1.0	1.2	1.4	1.6	1.9
Fertilizer	6.0	6.1	6.2	6.2	6.2	1.0	1.0	1.0	1.0	1.0
Cement	5.2	8.0	11.0	15.1	20.9	1.0	1.5	2.1	2.9	4.0
Ograins/4	2.3	2.8	3.2	3.7	4.5	1.0	1.2	1.4	1.6	1.9
Fresh/5	0.3	0.4	0.4	0.5	0.6	1.0	1.2	1.4	1.6	1.9
Wood	9.8	8.3	8.3	8.3	8.3	1.0	0.9	0.9	0.9	0.9
GC/6	23.4	39.7	59.5	89.0	133.2	1.0	1.7	2.5	3.8	5.7
ALL	172.3	206.2	234.1	273.2	330.5	1.0	1.2	1.4	1.6	1.9

Table 4.10 Sea Traffic Forecast per Commodity - High Estimate

	Volume in million MT					Volume as ratio to 2002 values				
	2002	2009	2014	2019	2024	2002	2009	2014	2019	2024
Petroleum	95.6	102.7	103.8	103.0	101.5	1.0	1.1	1.1	1.1	1.1
CPO	2.7	4.5	6.6	9.8	14.3	1.0	1.7	2.5	3.7	5.4
Oliquid/1	1.7	2.3	2.8	3.6	4.8	1.0	1.4	1.7	2.1	2.9
Coal	19.3	38.1	46.1	52.8	59.5	1.0	2.0	2.4	2.7	3.1
Mine/2	4.9	6.6	8.2	10.4	14.0	1.0	1.4	1.7	2.1	2.9
Rice	1.4	1.5	1.6	1.7	1.8	1.0	1.1	1.2	1.2	1.3
Agrains/3	1.2	1.7	2.1	2.7	3.6	1.0	1.4	1.7	2.1	2.9
Fertilizer	6.2	6.7	7.1	7.4	7.8	1.0	1.1	1.1	1.2	1.3
Cement	5.3	10.0	16.1	25.9	41.7	1.0	1.9	3.0	4.9	7.8
Ograins/4	2.4	3.2	3.9	5.0	6.8	1.0	1.4	1.7	2.1	2.9
Fresh/5	0.3	0.4	0.5	0.7	0.9	1.0	1.4	1.7	2.1	2.9
Wood	10.4	10.4	10.4	10.4	10.4	1.0	1.0	1.0	1.0	1.0
GC/6	23.6	45.6	75.1	123.8	204.0	1.0	1.9	3.2	5.2	8.6
ALL	175.1	233.8	284.3	357.3	471.0	1.0	1.3	1.6	2.0	2.7

4.3.3. Comparison and Unification of the Macroscopic and Microscopic Demand Forecast

For the demand forecast to proceed the macroscopic demand forecast and microscopic demand forecast needs to be unified as the forecast sea traffic is the basis for all other steps in the demand forecast. The following figures illustrate the comparison between the macroscopic demand forecast and the microscopic demand forecast.

Figure 4.8 Dry Cargo Sea Traffic - Macroscopic vs. Microscopic Approach

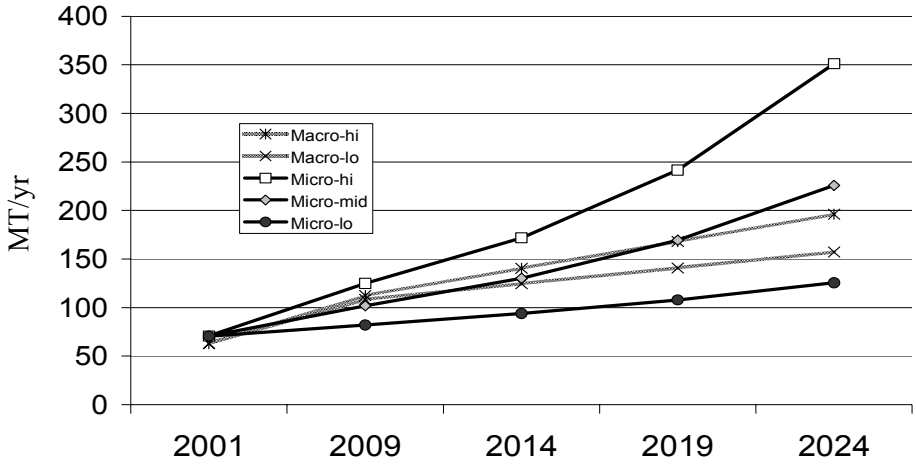
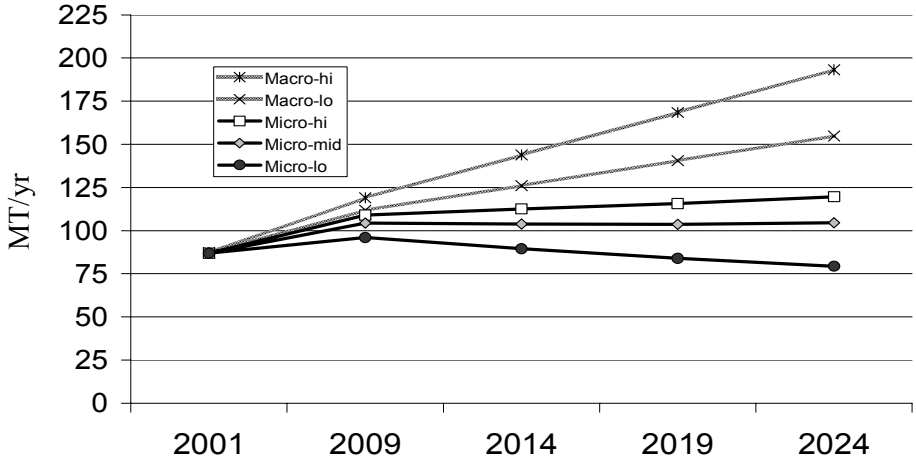


Figure 4.9 Liquid Cargo Sea Traffic – Macroscopic vs. Microscopic Approach



A technical workshop was held between the Study Team and relevant experts from DGSC as well as from INSA to decide on which forecast will be used as the basis for the master plan.

In the case of dry cargo, the macroscopic high growth forecast was chosen. Dry cargo is not significantly constrained by raw materials availability and the forecast using GDP as basis was considered reasonable – in other words dry cargo is demand driven. In any case, the microscopic forecast (i.e. mid-forecast) is in general agreement with the results of the macroscopic forecast for dry cargo. Adjustments were made on the microscopic forecast to conform to the macroscopic forecast.

In the case of liquid cargo, there is a very large difference between the macroscopic forecast and the microscopic forecast. The large difference is because, the macroscopic forecast does not consider the resource constraints whereas the microscopic forecast considers that domestic production of liquid cargo will not increase significantly. It was therefore decided that the microscopic forecast is more reasonable. In other words, liquid cargo is supply driven rather than demand driven. The high growth microscopic forecast was adopted. Table 4.3.7 summarizes the conclusion of the freight sea traffic forecast.

Table 4.11 Unified Sea Traffic Forecast

	Volume in million MT					2002 = 1.0				
	2002	2009	2014	2019	2024	2002	2009	2014	2019	2024
Petroleum	82.6	103.3	105.1	105.7	106.1	1.0	1.3	1.3	1.3	1.3
CPO	2.5	4.1	5.7	8.0	11.1	1.0	1.6	2.3	3.2	4.4
Other liquid	1.6	2.0	2.3	2.6	3.2	1.0	1.2	1.4	1.7	2.0
Coal	16.7	27.4	31.4	34.7	38.1	1.0	1.6	1.9	2.1	2.3
Mine and Quarry	4.7	5.8	6.6	7.8	9.4	1.0	1.2	1.4	1.7	2.0
Rice	1.3	1.4	1.5	1.5	1.5	1.0	1.1	1.1	1.1	1.1
Agri grains	1.2	1.5	1.7	2.0	2.4	1.0	1.2	1.4	1.7	2.0
Fertilizer	5.9	6.1	6.2	6.2	6.2	1.0	1.0	1.0	1.1	1.1
Cement	5.0	8.0	11.0	15.1	20.9	1.0	1.6	2.2	3.0	4.1
Other grains	2.3	2.8	3.2	3.7	4.5	1.0	1.2	1.4	1.7	2.0
Fresh products	0.3	0.4	0.4	0.5	0.6	1.0	1.2	1.4	1.7	2.0
Wood	10.4	8.3	8.3	8.3	8.3	1.0	0.8	0.8	0.8	0.8
General Cargo	22.3	39.7	59.5	89.0	104.1	1.0	1.8	2.7	4.0	4.7
Dry Cargo	70.1	101.4	129.7	168.9	196.0	1.0	1.4	1.9	2.4	2.8
Liquid Cargo	86.7	109.4	113.1	116.3	120.4	1.0	1.3	1.3	1.3	1.4
All Cargo	156.8	210.8	242.8	285.1	316.5	1.0	1.3	1.5	1.8	2.0

4.3.4. Loading and Unloading Forecast

This section presents the results of forecast in change in loading and unloading at each zone. Forecast of loading and unloading is calculated based on the following formula. It is a rather simple and intuitive approach (vis-à-vis statistical approach) in which it assumes that loading and unloading will increase or decrease in direct proportion to the increase or decrease of some measurable growth index or growth factors. The assumed growth factors are summarized in Table 3.4.6 and 3.4.7.

$$X_t^i = S_t \frac{\left[X_{t0}^i \times GF_t^i\right]}{\sum_x \left[X_{t0}^x \times GF_t^x\right]}$$

$$X = Loading / Unloading$$

$$S = Seaborne traffic$$

$$GF = growth\ factor = \alpha^i \times index_t^i$$

$$index = \text{growth indicator}$$

$$\alpha = \text{sensitivity factor} \in (0,1)$$

$$i, j, x = Port$$

$$t = year$$

$$t0 = base\ year, 2002$$

Note: Sensitivity factor is the sensitivity of loading/unloading of a commodity at a zone in reference to a growth index; e.g., volume of coal loaded per unit production of coal at a zone

Table 4.12 Assumed Growth Factors in the Forecast of Loading per Key Commodity

Commodity	Assumption
Petroleum, Coal, Wood, Cement, Fertilizer, CPO, Rice	Change in loading at ports in a zone is directly proportional to the change in production multiplied by the elasticity of loading to production activities at the base year. The total loading at each zone is then adjusted to conform to the calculated sea traffic.
General Cargo	Change in loading of general cargo at ports in a zone is directly proportional to the change in GDP multiplied by the elasticity of loading to GDP at the base year. The total of loading of each zone is then adjusted to conform to the calculated sea traffic.
Non-Key Commodities	Loading at each zone will increase/decrease in proportion to the increase/decrease in sea traffic of non-key commodities

Table 4.13 Assumed Growth Factors in the Forecast of Unloading per Key Commodity

Commodity	Assumption
Petroleum, General Cargo, Wood, Cement, Rice	Change in unloading at ports in a zone is directly proportional to the change in population multiplied by the elasticity of loading to population at the base year – thereby assuming constant sea traffic consumption per capita at each zone. The total unloading at each zone is then adjusted to conform to the calculated sea traffic.
Coal, CPO	Change in unloading is directly proportional to the change in usage requirements of industries – estimated based on the time series trend of the last five years. The total unloading at each zone is then adjusted to conform to the calculated sea traffic.
Non-Key Commodities	Unloading at each zone will increase/decrease in proportion to the increase/decrease in sea traffic of non-key commodities

4.3.5. OD Forecast of Maritime Freight

Based on the current OD pattern and the forecasted loading and unloading volume, the future OD pattern is forecasted using the Fratar Method. For the purpose of illustrating the results, the commodities are grouped into dry cargo and liquid cargo. Forecasted OD patterns are illustrated as follows:

4.4. Passenger Demand Forecast

This section presents the results in demand forecast for domestic sea passenger traffic. There are two major classes of sea passenger, first is ferry passengers and the other is inter-island passengers (though it also includes coastal traffic). Strictly speaking the difference between the two is more of administrative in nature rather than functionality – ferry vessels are registered under the DGLT while inter-island vessels are registered under DGSC. In any case, ferry services typically serve short distance travel needs while inter-island sea services typically handle longer distance travel – thus the two types of passenger sea services serve different segments of the market. Ferry trips are initially included in the analysis to be able to account for inter-regional traffic but later on segregated. On the other hand, it has been observed that there exists some competitive interaction between airline and inter-island sea services as they, unlike ferry vessels, serve almost the same segment of the passenger travel market. Airline trips are therefore included in the detailed analysis of inter-island sea trips up to modal split. Land based modes are not included in the analysis due to the difference in market segments served compared to inter-island sea services as earlier explained.

4.4.1. Methodology

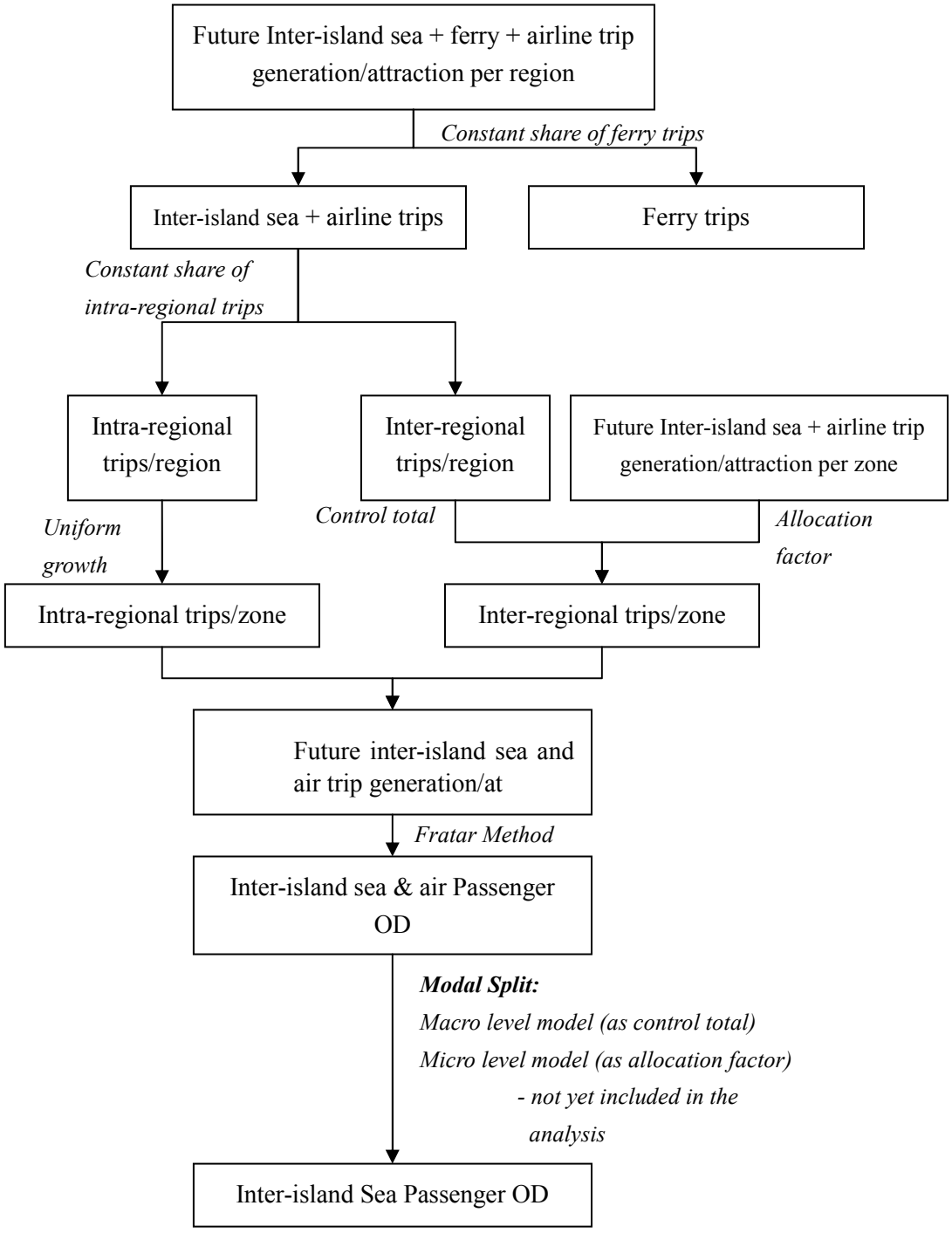
Table 4.4.1 and Figure 4.4.1 details the methodology in the forecast of inter-island passenger demand. The first step is the forecast of generation and attraction of trips on a per region basis. From the total trips generated and attracted, it is then decomposed in a step-wise manner until the inter-island trips are extracted.

Table 4.14 Methodology for Maritime Passenger Forecast

STEP	DESCRIPTION	METHODOLOGY	DATA/INPUTS
Step 1: Generation and Attraction/1	Forecast of passenger volumes generated and attracted per zone	Trip generation and attraction is first forecasted based on the future socio-economic framework, using a two-step model (i.e. a control total is first forecasted then it is decomposed using more detailed models)	(1) Ferry, Airline, and Maritime Passenger Trips (coming from and going to) per province. (2) Historical and forecasted socio-economic environment per province.
Step 2: Origin-Destination	Forecast of passenger volume traveling from one zone to another.	Growth Factor Method or Fratar Method (see explanation above)	(1) Forecasted socio-economic framework
Step 3: Modal choice/1	Determination of selection of mode choice between airline and maritime modes	Choice Model based on travel time and fare	(1) Fare and travel time of air and maritime transport between provinces or zones
Step 4: Traffic Assignment	Vessel traffic		

Note: /1 Passenger demand forecast models are detailed in Appendix 8.2

Figure 4.10 Flow of Computation for Maritime Passenger Traffic Demand Forecast



4.4.2. Passenger Trip Generation

This section presents the results of the macroscopic level domestic passenger trip generation forecast.

Since this Study deals with maritime transportation on a national level, long-distance inter-provincial trips is of key interest vis-à-vis short distance intra-provincial trips. As such, it is assumed not to include land-based modes as land based modes are typically used for short distance travel only, for example rail-based trips on average are only about 100-km in distance. Moreover, the topography of Indonesia and the current low level of land-based transportation in most regions add to the acceptability of simplifying the analysis by the exclusion of land-based transportation especially that that the main concern of the Study is the inter-island type of sea transport as opposed to ferry services.

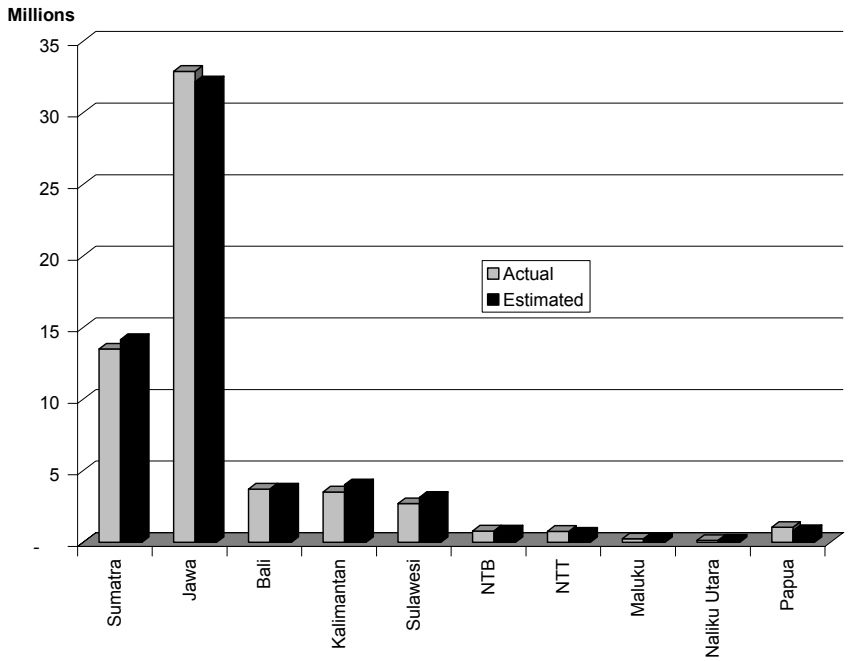
(1) Methodology

Several approaches were tried and tested; and, the approach that yields the most reasonable result is to use a regional-level trip generation model. The process starts by aggregating zones into regions and for this purpose; the country is divided into ten regions: Sumatra, Jawa, Bali, Kalimantan, Sulawesi, NTT, NTB, Maluku, Maluku Utara, and Papua. Modeling trip generation per region is then based on a function of each region's corresponding socio-economic properties (i.e. GDP and population). Using cross-sectional data of trip generation of air, ferry, and inter-island maritime modes derived form various statistics and STRAMINDO survey, the trip generation model is calibrated (Table 4.4.2). The model has a reasonably good fit with an R-square of 0.95. Comparison of the estimated and actual results is shown in Figure 4.4.2.

Table 4.15 Calibration Summary of Macro-Passenger Forecast Model

Model Form	$Trate_r = \exp(a)G^bD^c$ $Trate_r$ = Air + Interisland + Ferry trip per 100 population G = Gross Domestic Product Per Capital D = 2 (if Bali), 0 (otherwise) r = region a, b, c = parameters
Calibration Data Set	Trips generated and attracted per region (2002) Population per region (2002) GDP per region (2002)
Observations	10
Model fitness	$R^2 = 0.95$
Parameters	a = 2.92 t-stat = 40.8 b = 0.51 t-stat = 5.4 c = 2.03 t-stat = 8.4

Figure 4.11 Comparison of Estimated and Actual Trip Generation/Attraction per Region



(2) Forecast Results

As GDP increases, people will travel more. In the low growth case, air and sea based trips will increase by 1.7 times by 2024 or an average growth rate of about 2.6% per annum, whereas GDP is assumed to increase by 4% per annum. In the high growth case, air and sea trip generation will increase by 2.3 times by 2024 or an equivalent of about 4.1 % growth per annum whereas GDP is assumed to increase by 7% per annum. In subsequent sections, this aggregated passenger trip forecast will be further analyzed to be able to determine the share of sea trips through the use modal split models.

Table 4.16 Air + Sea Domestic Trip Generation

Year	Low Growth Case		High Growth Case	
	Trips	Ratio to 2002	Trips	Ratio to 2002
2002	59,337,878	1.00	59,337,878	1.00
2009	70,740,239	1.19	77,156,679	1.30
2014	80,104,529	1.35	93,919,799	1.58
2019	90,335,978	1.52	113,863,324	1.92
2024	101,568,719	1.71	137,625,746	2.32

(3) Inter-island Sea + Ferry + Airline Trip Generation per Region

The calculation starts with the regional forecast of total trip generation and attraction (it is assumed that passenger OD is triangular – trips from zone 1 to 2 = trips from zone 2 to 1). Included in the trips are ferry trips, inter-island sea trips and airline trips.

Figure 4.12 Inter-island Maritime+ Ferry + Air Trips Forecast - Low Growth

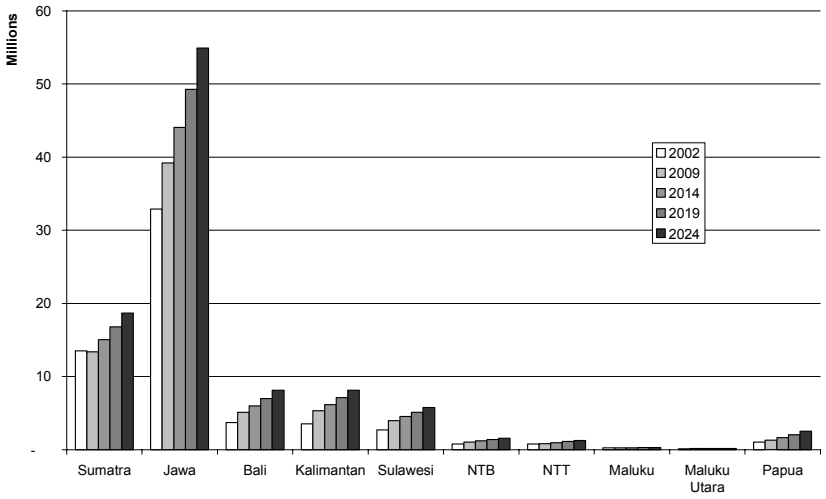
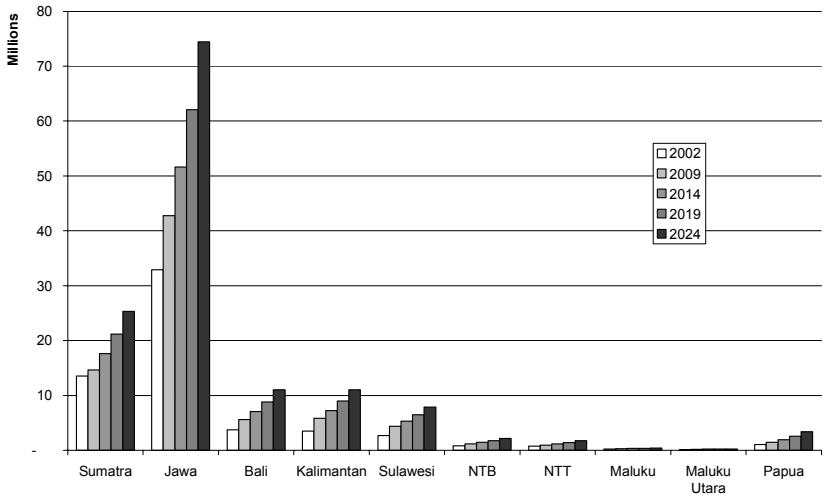


Figure 4.13 Inter-island + Ferry + Air Trips Forecast – High Growth



(4) Inter-island + Airline Trip Generation

To exclude ferry trips from the trip generation/attraction, it assumed that the share of ferry trips remains constant over time per region. The following table summarizes the assumed share of ferry trips which is based on current estimates.

Table 4.17 Share of Ferry Trips Per Region

(1,000 passenger)

	Sumatra	Jawa	Bali	Kalimantan	Sulawesi	NTB	NTT	Maluku	Maluku Utara	Papua
Air + Sea /1Trips	13,500	32,898	3,724	3,518	2,707	794	770	241	131	1,050
Ferry Trips	7,241	25,539	2,988	955	590	522	422	39	46	68
Share of Ferry	54%	78%	80%	27%	22%	66%	55%	16%	36%	7%

Note: /1 Sea trips includes inter-island trips and ferry trips

The following figures summarize the forecasted trip generation/attraction per region. The results indicate increase of trips generation and attraction is more or less uniform across the country, except NTB, NTT, Maluku and Maluku Utara region – where growth is rather flat.

Figure 4.14 Inter-island Sea + Air Trips Forecast Under Low Growth Scenario

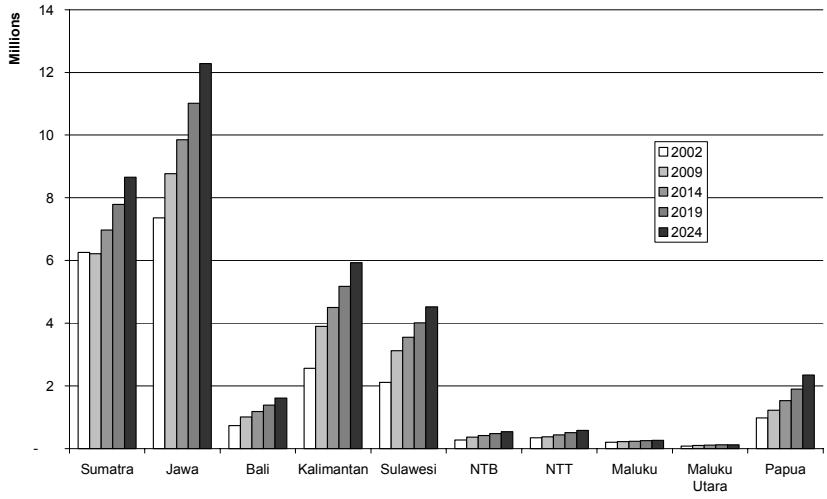
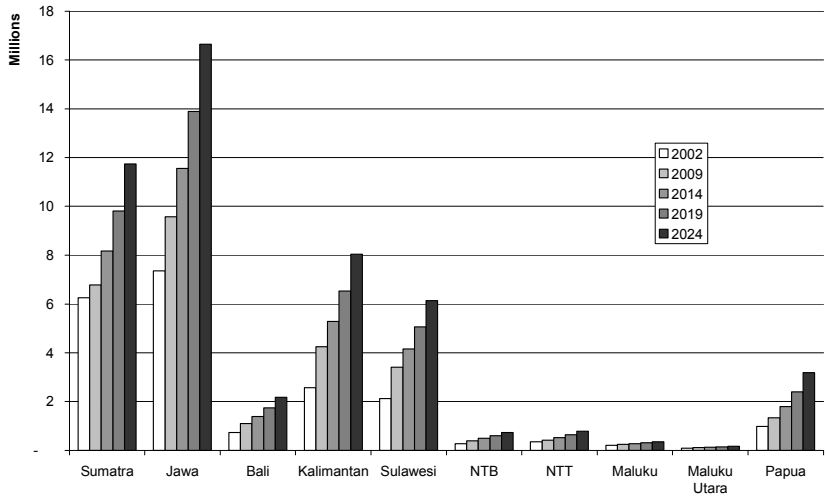


Figure 4.15 Inter-island Sea + Air Trips Forecast Under High Growth Scenario



4.4.3. Modal Split between Air and Sea

Modal split involves the decomposition of the combined inter-island sea and airline trips. The modal split model used is macroscopic in nature in that modal share between air and sea is predicted at the national level. Assuming uniform change in modal share across all OD pairs modal shares are adjusted to conform to the national aggregate modal share.

The following tables illustrate the result of the forecast. It is important to note that with the high GDP growth case, growth in the number of inter-island sea trips actually slows down as the increase in the total number of trips could not compensate for the shift of passengers from inter-island sea services to airline service. In the low GDP growth case, even though the growth of total trips is not as high as the high GDP growth case, but the share of inter-island sea service will not drop as significantly – thereby resulting in a higher number of passengers.

Table 4.18 Forecast of Sea Trips – High Growth Case

Year	Share of Inter-island Sea	Inter-island Sea+ Air Trips	Inter-island Sea Trips	Change as ratio to 2002 values
2002	0.60	20,923,337	12,500,000	1.00
2009	0.51	27,610,602	14,153,913	1.13
2014	0.41	33,770,421	13,785,483	1.10
2019	0.35	41,136,732	14,594,084	1.17
2024	0.33	49,965,087	16,591,194	1.33

Table 4.19 Forecast of Sea Trips – Low Growth Case

Year	Share of Inter-island Sea	Inter-island Sea + Air Trips	Inter-island Sea Trips	Change as ratio to 2002 values
2002	0.60	20,923,337	12,500,000	1.00
2009	0.65	25,314,472	16,382,000	1.31
2014	0.65	28,802,911	18,676,241	1.49
2019	0.59	32,636,733	19,276,271	1.54
2024	0.51	36,874,568	18,747,353	1.50

To proceed to the next stage of demand forecast, a decision has to be made on which forecast will be used for as the basis for OD estimation. A technical workshop was held between the Study Team, relevant experts from DGSC and a representative from INSA to discuss on this matter. It was decided to use the low growth scenario. In any case the difference between the high growth and the low growth case is relatively small and to be conservative and practical, the scenario that yielded the higher estimate was chosen.

4.4.4. Sea Passenger OD

Using the growth in generation and attraction per zone, modal shift and the current OD matrix, the future OD structure of inter-island sea passenger demand can be derived using the Fratar Method.

4.5. Current Domestic Fleet Profile

4.5.1. Definition of the Indonesian Domestic Fleet

The current domestic fleet is an essential input to the estimation of future fleet requirements and the needed investments to modernize Indonesian domestic fleet.

There are many types of vessels operating in domestic trade and are as follows:

- Foreign vessels that are contracted to operate domestically under short-term special permit from DGSC.
- Domestic vessels that sometimes operate domestically and sometimes internationally
- Domestic vessels that fully operate domestically
- Domestic vessels (and foreign vessels) that operate in areas considered out of the scope of this Study such as within rivers, lakes, etc.

The Indonesian domestic fleet covered by this Study only includes all fleet tonnage that transported domestic trade. It should exclude the fleet tonnage or the fraction thereof that is (1) allotted to international trade and domestic demand that is beyond the scope of this

Study such as inland waterway, rivers, lakes, etc.; and, (2) inactive vessels including vessels that are used as off-shore storage facilities or are no longer serviceable.

4.5.2. Estimating the Domestic Fleet

The primary data source used is the DGSC fleet inventory which was updated on year 2002. The DGSC fleet inventory is used as it is considered to be corresponding to the scope of the fleet and demand considered in this Study. The DGSC inventory is also considered not to contain any inactive vessels and it covers both national and foreign flagged vessels. Table 4.5.1 is the summary of the DGSC fleet inventory.

Table 4.20 DGSC Fleet Inventory (2002)

Type	'000 DWT
Container	321
Conventional	2,851
Bulker	581
Barge	722
Tanker	2,146
Passenger	383/1

/1 Passenger vessels are expressed in '000 GT
/2 There are 9 RoRo vessels (not including LCTs and RoRo Ferries) with GT of about 29,000. However, these vessels are mostly industrial car carriers (7) and cattle carriers (2).

An independent inventory was made by this Study using BKI and a DGSC database on foreign flagged vessels operating domestically. The BKI database is composed of Indonesian flagged vessels. Using INSA data sources, the Indonesian flagged vessels operating abroad are deducted from the BKI database and this is taken to be the inventory of national flagged vessels operating domestically. In Indonesia, there are a number of foreign flagged vessels in operation and these vessels are registered in DGSC. These vessels are taken as the inventory of foreign flagged vessels operating domestically. The combination of the two data sources would then comprise the Indonesian domestic fleet and are summarized as follows:

Table 4.21 Indonesian Fleet Estimated from BKI and Foreign Flag Vessel Inventory

('000 DWT)

Type	National Flag/1	Foreign Flag/2	All Flag
Container	315	8	324
Conventional	2,252	1,545	3,797
Bulker	468	2,689	3,158
Barge	3,049	1,803	4,852
Tanker	1,746	2,707	4,453
Passenger	311 (GT)	9 (GT)	321 (GT)

/1 BKI 2002 database adjusted by deducting vessels that operate internationally
/2 DGSC inventory on foreign flagged vessels operating domestically

There is significant difference between the two fleet inventories (Table 4.5.1 and 4.5.2) and Table 4.5.3 illustrates this difference. The rationale behind the differences is largely undetermined. However, based on discussions with DGSC officials, the Study was advised to utilize DGSC data until further analysis clarifies the extent of the domestic fleet.

Table 4.22 Comparison of Domestic Fleet Inventories

('000 DWT)

Type	DGSC (A)	BKI + Foreign Flag (B)	(A)/(B)
Container	321	324	1.0
Conventional	2,851	3,797	0.8
Bulker	581	3,158	**0.2**
Barge	722	4,852	**0.1**
Tanker	2,146	4,453	**0.5**
Passenger	383 (GT)	321 (GT)	1.2

/1 bold figures refer to significant deviation between two inventories

Furthermore, based on discussion with DGSC officials, the number of container vessels is considered to be too low, because many vessels carrying containers are multi-purpose carriers which are classified as conventional vessels. Thus, some conventional vessels have to be reclassified to container vessels. According to the STRAMINDO on-board survey, container vessel efficiency is about 9,800 ton-mile/DWT. Based on the estimated current domestic container traffic of 7.1 billion ton-mile, the estimated container fleet tonnage is about 733,000 DWT which is about two times the figure stipulated in the DGSC inventory. The DGSC fleet inventory is then adjusted such that the 412,000 DWT of conventional vessels are re-classified as container vessels, bringing the container total DWT to be 733,327 and the conventional total DWT to be 2,439,626. The adjusted DGSC domestic fleet is shown in Table 4.5.4.

Table 4.23 Adjusted DGSC Fleet Inventory

Type	'000 DWT
Container	733
Conventional	2,440
Bulker	581
Barge	722
Tanker	2,146
Passenger	383 (GT)

To verify the correspondence of the adjusted fleet inventory and the demand database, the fleet productivity (in terms of ton-mile/DWT) is compared with an independently estimated value. If the two figures match or are closely similar then we could have further confidence in the adjusted fleet inventory.

Based on the adjusted DGSC fleet inventory and the surveyed OD demand the following are the estimated fleet productivity.

Table 4.24 Calculated Fleet Productivity Based on Adjusted DGSC Fleet

Type	'000 ton-mile	'000 DWT	ton-mile/DWT
Container	7,186,602	733	9,804
Conventional	17,195,324	2,440	7,047
Bulker	9,857,397	1303	7,565
Tanker	40,625,575	2,146	18,931

The Voyage Report is a report submitted by active companies to DGSC to report their activities within the service area defined as the scope of this Study. This report details the specific ports visited, cargo carried, time of arrival and departure, ship particulars, activities conducted, etc. Using samples of this report, the fleet productivity per type of vessel could be estimated. This result can then be used for comparison with the estimates made earlier (Table 4.5.5) to check the appropriateness of adjusted fleet inventory and are shown in Table 4.5.6.

Table 4.25 Comparison of Fleet Productivity

Type	ton-mile/DWT (adjusted DGSC fleet)	ton-mile/DWT (voyage report)	Remarks on Voyage Report Estimate
Container	9,804	N/A	Semi-conatiner: 6,867 ton-mile/DWT (34 samples)
Conventional	7,047	8,420	80 samples
Bulker	7,565	7,942 – barge 9,726 – bulker	Barge: 32 samples Bulker: 7 samples
Tanker	18,931	9,366	17 samples

Information on container vessels in the Voyage Report was unfortunately difficult to obtain. Thus the results of the on-board survey were relied upon. Conventional vessels and dry bulk vessels can be said to be within reasonable ranges with the voyage report estimate. Tanker fleet productivity measures however significantly diverge. For guidance, the Pertamina tanker fleet is examined and it was determined that the Pertamina fleet is about 4.3 million which is about double that of the DGSC fleet inventory. However, the DGSC estimate is relied upon and is used in this Study. It is relevant to note that an 18,000 ton-mile/DWT is not abnormally high as the Japanese domestic tanker fleet also exhibits comparable productivity.

Using the adjusted DGSC fleet tonnage total, the vessel-size profile derived from DGSC registry is adjusted to conform to the total tonnage per vessel type. Table 4.5.7 illustrates the profile of the estimated Indonesian domestic fleet.