Chapter 4 SHIPBUILDING AND SHIP INSPECTION SUB-SECTOR DEVELOPMENT PLAN

A. Preface

1. For modernization of sea transportation in Eastern Indonesia, followings are proposed in this report.

(1) A new building program with its budget for fleet renewal or addition in case of common caro carriers and passenger ships

(2) Building-up of a master plan for development of shipbuilding industry.

(3) Additional slipway at PT. Waiame in Ambon as a supporting facility for the fleet together with a budget for construction.

B. Newbuilding Program of Common Cargo Carriers

2. Following 4 types of standard ship are designed as the most suitable type for the service in Eastern Indoensia. They are general cargo ships with second deck, cargo gears and capability for future demand of carrying containers. P type has the same dimensions as S type but specially equipped with an accomodation for 250 deck passengers for Perintis services.

3. Required total newbuildings by year of 2005 are estimated 138 ships (S-type 37, P-type 20, M-type 50, L-type 31) and 335,000DWT on appraisal of traffic increase and replacement of aged ships and foreign ships. Newbuilding program has been made on the basis that all ships should be built in this country by a series construction method in 10 years between 1995 and 2004 so that the program can most contribute to development of the domestic shipbuilders.

Table 4-1 Principal Dimension of Cargo Ship

SHIPS TYPE	S	P	M	L
Dead Weight	1,000	900	2,500	5,000
Gross Ton.	about 1,000	about 1,000	about 2,500	about 4,200
Length (PP)	60	60	83	100
Breadth (mld)	11.5	11.5	14.8	17
Draft	3.8	3.8	4.6	6.5
Main Engine	Diesel 1,300hp	Diesel 1,300hp	Diesel 1,900hp	Diesel 3,200hp
Speed (serv.)	11	11	11.5	12.0
Cargo gear	Derrick 15tx2	Do.10tx1,15tx1	Do.25tx3	Do.25tx3
No. of crew	12	12	18	21

4. The sizes of the standard ships are in the range of experience of domestic shipyards, however, the whole building volume in the program will occupy about 60% of domestic production capacity during the 10 years, unless the actual building volume in 1992 will be increased in the period. thus, the production capacity should necessarily be improved because other demands from various projects can be expected in future. In order to keep the occupancy rate not more than 30% of the total production capacity only by this program, the annual growth rate of 10% in production capacity is required.

5. Supply of design and major equipments of reuqired specification with right deliveyr from reliable sources by means of "package deal" and technical assistance at construction stage is necessary in order to make the building period shorter and carry out smooth implementation of the program. Activation of middle management, upgrading of designning capacity, promoting of workers' will to work, improvement of yard's facilities etc. are also suggested as countermeasures at shipyards.

6. Required budget for the program which is based upon the unit cost of each standard type is 2,576 billion Rp. for all ships including 306 billion Rp. for the P type. In this estimation, series construction effect is considered but no cost deviation due to inflation and foreign exchange rate in future considered. Design cost is included in the ships built in the first year only but cost for technical assistance is considered for the first 2 years. The unit cost of each first ship and average cost of each type resulted from series construction are as follows.

S type	17.9 billion Rp.	and	13.7 billion Rp.
P type	18.4 billion Rp.	and	15.3 billion Rp.
M type	26.1 billion Rp.	and	19.7 billion Rp.
S type	31.4 billion Rp.	and	25.2 billion Rp.

7. Necessity of a master plan for the development of the shipbuilding industry which should incorporate the whole future demand nationwide and establish an appropriate and concrete target for th shipbuilding industry is also proposed.

C. Building of Passenger Ships

8. In addition to the Perintis line, passenger ships for trunk or sub-trunk services are also important means for passenger traffic as national requirement. 13 ships (500 type x 10, 1000 type x 1, 2000 type x 2) are necessary to be procured by the year of 2000 due to traffic increase and 9 out of 13 will be engaged in Eastern Indonesia. The design of each type will follow those of existing types and their building cost based upon previous records are estimated as follows.

500 type	72 billion Rp.
1,000 type	118 billion Rp.
2,000 type	196 billion Rp.

D. Repairing Facility in Esatern Indonesia

9. For the improvement of working efficiency and safety for the merchant ships, new installation of aslipway with 1,500 TLC for 2,500DWT class cargo ship in PT Waiame shipyard in Ambon is proposed. Estimated cost for the construction is about 12 billion Rp..

E. Ship Inspection Development Plan

General on ship inspections in Eastern Indonesia

10. Ship inspections are intended to secure the ship's safety, seaworthiness and marine pollution prevention in order to protect people and assets by imposing safety and pollution prevention standards.

Table 4-2 Newbuilding Program for the Required Tonnage for Eastern Indonesian Sea Transportation

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Sum
S-Type No. of ship	4	4	4	5	5	5	5	5			37 ships
No. of berth	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)			37,000 DWT
P-Type No. of ship	4	4	4	4	4						20 ships
No. of berth	(2)	(2)	(2)	(2)	(2)						18,000 DWT
M-Type No. of ship		2	2	3	3	6	8	8	9	9	50 ships
No. of berth		(2)	(2)	(2)	(2)	(4)	(4)	(4)	(4)	(4)	125,000 DWT
L-Type No. of ship		2	2	3	3	3	4	4	5	5	31 ships
No. of berth		(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	155,000 DWT
Total No. of ship	8	12	12	15	15	14	17	17	14	14	138 ships
No. of berth	(4)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(6)	(6)	
Total DWT	7,600	22,600	22,600	31,100	31,100	35,000	45,000	45,000	47,500	47,500	335,000 DWT
GT [1]	8,000	21,400	21,400	29,100	29,100	32,600	41,800	41,800	43,500	43,500	312,200 GT
Annual Production in all Indonesia by 10% growth/year [2] GT	67,900	74,700	82,200	90,400	99,500	109,400	120,300	132,400	145,600	160,200	1,082,600 GT
Occupancy rate [1]/[2]	0.118	0.287	0.260	0.323	0.292	0.299	0.348	0.316	0.299	0.271	0.288

11. Ship inspections are important from the view point of modernization of shipping in Eastern Indonesia. The government's ships inspection system in Indonesia is performed mainly through surveillance of ships entering and leaving ports. Periodical inspections at shipyards are performed either by the government or Biro Klasifikasi Indonesia (BKI).

F. Proposals on Ship Safety

Trimming of rules

12. All the ship safety related rules should be collected to form a neatly edited and complete set.

13. Various rules on ship safety should be formulated to present clear requirements for ship safety separately as to the ships under SOLAS regulation and the ships otherwise by having discussion with scholars, shipowners, shipbuilders, ship operators, classification societies, etc.

14. The edited set should be given to all ship inspectors and relevant parties to make it possible to carry out smooth ship inspections.

Reinforcement in port state control

15. Port state control should be established legislatively and guidelines should be formulated with regard to ship inspector jobs in this regard. They should be distributed among them.

16. Necessary equipment to be carried by PSC teams such as communication means and safety gears should be provided in local offices.

17. Training persons to form PSC teams should be planned and performed.

Preparation for introducing GMDSS

18. GMDSS is expected to be applied worldwide in international and domestic trades. Preparation for ship inspection regarding GMDSS should be considered.

Establishment of type approval system

19. As required by the provisions of SOLAS 74, the legislation should include type approval system and it should be enacted to form a part of ship inspections of Indonesia.

System and organization of ship inspection

20. The number of ship inspectors can be worked out by referring to their work and time required to perform their jobs. In addition to the time spent for actually being engaged in the inspection such as design examination, on-the-spot examination, traveling to the inspection site, and report making of inspection, other matters in which ship inspectors are involved are in existence. They are of course to be taken into consideration when the number of ship inspectors is studied to cope with the situation in which work load has increased due to the development of shipping and industries.

21. Job distribution between the headquarters and local offices should be considered so that the administration, policy and legislation may be handled by the headquarters and routine inspection may be principally handled by local inspectors.

22. Training for upgrading the ship inspectors of local offices, as well as headquarters, who should be well informed of new regulations and technology is important.

23. Guidance and check list for inspection and port state control should be formulated and given to ship inspectors to allow for smoother inspections.

G. Proposals on Pollution Prevention

Trimming of pollution prevention rules

24. The rules and regulations regarding pollution prevention should be made convenient physically to ship inspectors and other related parties by trimming and editing relevant documents.

Port state control

25. Port state control should be included in the Indonesian legislation and implemented accordingly. To do this it is necessary to formulated a good guideline for PSC teams, prescribing the procedure of port state control to distribute them properly, to arrange an appropriate number of people, to provide necessary equipment, and to train persons.

H. Proposals related to Ship Safety and Pollution Prevention (dangerous goods carrier relevance)

26. It is necessary to include in the national legislation all the necessary provisions provided by international requirements regarding dangerous goods carriage by ships.

27. Training should include the relevant techniques in inspection.

28. It is necessary to provide equipment to ship inspectors such as protective clothing and gas detectors as necessary.

Cost estimation

29. Rough cost estimation has been done. This does not necessarily originate from the request or team's study, but just made tentatively. So the result is not considered to reflect the existing situation. But it can contribute the future investigation in this regard.

J. Technical and Non-technical Support in Eastern Indonesia

30. Technical and non-technical support to the ship inspection sector is considered necessary in Eastern Indonesia. Technical support would comprise drafting of rules, trim edition of documents and training, whereas non-technical support would cover the supply of equipment and facilities necessary for ship inspections, servicing liferafts, pollution prevention as well as peripheral equipment related to ship inspections.

Chapter 5 PORT SUB-SECTOR DEVELOPMENT PLAN

A. Basic Policy on Port Development in Eastern Indonesia

Increased roles of special ports

1. With the progress of industrialization in Eastern Indonesia, more attention should be paid to special ports because percentage of cargo volume handled at the special ports will increase with the progress of industrialization. It is recommended that DGSC realize the increasing importance of the special ports and that their future roles be examined as deeply as possible.

Diversified roles of over middle class public ports

2. Ports and harbors in Eastern Indonesia should be improved or developed to promote regional industrial development, considering general environment and policy directions for industrialization of regions, and so on.

3. Berthing facilities to accommodate vessels which transport construction materials such as gravel, sand and cement shall be installed at major ports in Eastern Indonesia. Cargo handling equipment and storage areas for these types of cargoes shall be also installed.

4. Commercial ports in Eastern Indonesia should strengthen functions as intra-regional distribution centers. In addition, some of the major commercial ports should carry gateway functions to the regions in the domestic sea transportation as well as in international trade.

5. Ports and harbors facilities should be renovated, and a new function should be added to help port cities grow as regional centers for daily life, taking account of the special characteristics and roles which each port city has been playing.

6. In order to reduce high transportation cost, container handling facilities shall be provided at the major ports in Eastern Indonesia. In addition, some of the ports and harbors shall prepare for the introduction of Ro/Ro ferry traffic.

7. Ports and harbors which carry marine recreation functions shall be placed in suitable locations, taking account of such factors as natural conditions, sightseeing attractions and the directions of regional promotion through tourism development. This function will become more important as the society progresses.

Basic roles of small class ports

8. Construction and development of small/pioneering port facilities are required to achieve equal distribution of development benefits. Furthermore, provision of infrastructures are necessary to help stimulate and develop economic and social activities in the transmigration areas and boundary areas.

9. To secure connections between remote islands and the major island, necessary port facilities shall be provided at least on the inhabited islands in such a way

that vessels of the requisite scale can safely enter and leave. It is also important to consider present and future roles and functions of individual ports in respective regions. Some small ports may be expected to act as transition points for passengers, and others as shipment points for natural resources.

10. Even with various limitations, the isolated islands and remote areas will be important in the realization of national unity, resource utilization, and economic development. To achieve the goals mentioned above, comprehensive improvement of the living conditions in such regions is most important. In order to overcome the geographical disadvantages of the isolated regions, transportation and communication facilities should be provided. This includes expansion and strengthening of shipping services and improvements of port facilities.

Other factors to be considered

11. At present there are a total of 129 international ports, comprising 80 public ports and 49 special ports. According to cargo loading and unloading statistics in the latest three years published by BIRO, 23 ports among the 80 public international ports handled less than 1,000 tons of international cargo. It seems that there is little necessity for some ports which hardly handle international cargo to be qualified as international ports.

12. In developing and utilizing ports and harbors, prior evaluations of the effects on the environment of the port and harbor and its surroundings shall be made as the plans are formulated. At the implementation stage measures shall also be devised in order to preserve the environment from a broad regional and long-term point of view. In particular, all due consideration will be paid to the preservation of precious natural resources.

B. Classification of Study Ports

13. A total of 406 study ports managed by DGSC are selected as the study ports based on their significant roles in the sea transportation in Eastern Indonesia.

14. According to the Scope of Work of this study, the study ports should be divided into two categories : Over middle class ports and small ports. For the former conceptual development plans will be presented individually, and for the latter a typical standardized development plan will be presented.

15. JICA Study Team assumed that at least one over middle class port be located in each province in Eastern Indonesia because a strong port hierarchy does not exist in Eastern Indonesia, and because each province wants to have its own deep water port.

16. JICA Study Team set some conditions to select additional ports as over middle class ports. The conditions are as follows:

Condition (1) Over one hundred meter berth length
Condition (2) Variety of commodities handled

17. From the screening by above mentioned process, seventeen over middle class ports shown in Figure 5-1 are identified and the remaining ports are classified as small ports.

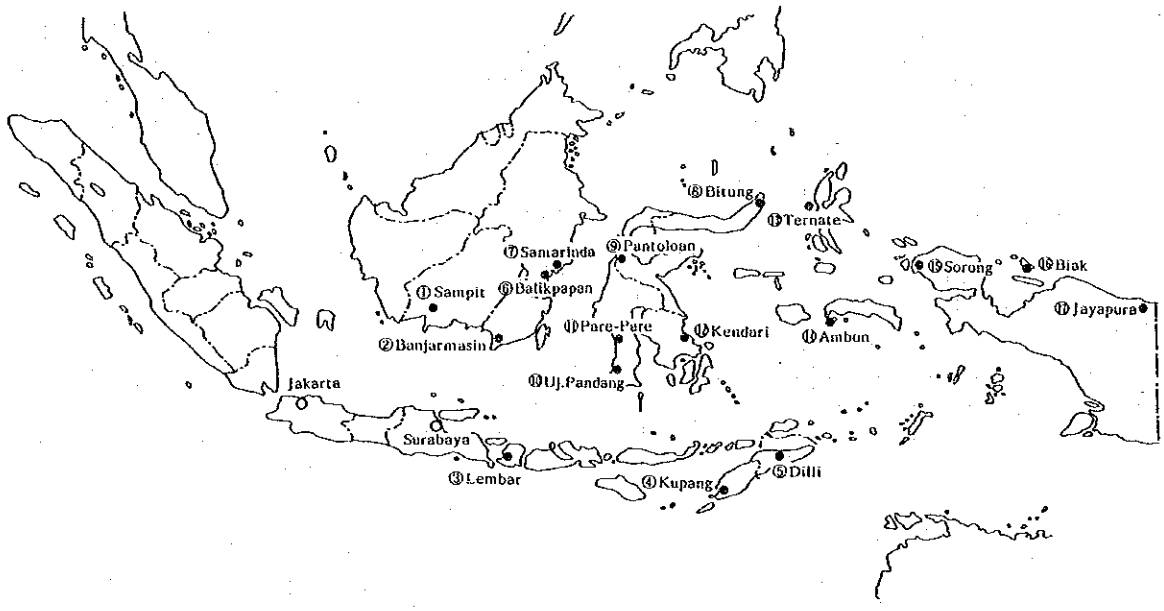

Figure 5-1 Location of Selected Over Middle Class Ports in Eastern Indonesia

C. Conceptual Development Plans for Over Middle Class Ports

Network plan of port functions

18. While the port of Ujung Pandang is expected to sustain its role as the leading port in Eastern Indonesia, regional gateway functions shall be developed at suitable corners in the archipelago.

19. Container facilities at ports should be developed or installed in accordance with expected level of container traffic in 2005. A container terminal with gantry cranes shall be developed at ports handling more than 50,000 TEUs annually. If the container traffic forecast exceeds 25,000 TEUs in 2005, a multipurpose terminal with foundation for future installment of a gantry crane shall be built for the preparation of future container terminal.

20. Industrialization should be promoted in Eastern Indonesia so that this region can catch up with the rest of the nation in economic terms. Prime ports situated in the prosperous industrial growth centers should strengthen the industrial function by installing heavy/bulk cargo berths of minimum 10,000 DWT.

21. People in Eastern Indonesia heavily rely on sea transportation for their interisland and intraisland trips. Transition ports should provide passengers and users with sufficient services so that they can feel comfortable during their stay.

22. Tourism development is one of the prosperous fields in Eastern Indonesia. Ports should help promote this direction by providing necessary facilities and services.

23. Distribution of the major port functions is summarized in Table 5-1.

Table 5-1 Major Functions of Each Port

	Distribution		Container			Industrial	Passenger	Tourism
	Regional Gateway	Provincial Center	Terminal Port	Terminal Candidate	Handling Port	Base Port	Transition Port	Base Port
1 Sampit		●						
2 Banjarmasin		●			●		●	
3 Lembar		●			●			●
4 Kupang	●				●	●		●
5 Dilli		●						
6 Balikpapan	●			●		●	●	
7 Samarinda		●			●			
8 Bitung	●			●		●	●	●
9 Pantoloan		●			●			
10 Uj.Pandang	●		●			●	●	●
11 Pare-Pare		●			●			
12 Kendari		●			●		●	
13 Tarnate		●			●		●	●
14 Ambon	●			●		●	●	●
15 Sorong	●				●	●	●	
16 Biak		●			●			●
17 Jayapura		●			●			●

Traffic demand forecast

24. Total demand of the public cargo traffic of each port in 2005 was forecast based on single regression models. Annual growth models were applied to some cases in which linear regression models did not show high correlation coefficients of a satisfactory level.

25. The cargo volume by package type for the target year was also forecast. The total cargo traffic forecast was utilized as a control total for the forecast of the cargo volume by package type.

26. Container traffic is forecast, assuming that some portion of the general cargo will be containerized. The containerization rates in 2005 are forecast based on the logistic curve method for the ports where containers have been handled for many years.

27. Total demand for sea passenger traffic in 2005 was forecast in the same manner as the projection of sea cargo traffic. Result of the demand forecast is summarized in Table 5-2.

Table 5-2 Traffic Demand Forecast

Port	1992			2005		
	Total Cargo (Tons)	Container Cargo (TEUs)	Passenger (Persons)	Total Cargo (Tons)	Container Cargo (TEUs)	Passenger (Persons)
Sampit	180,000	-	10,000	740,000	0	120,000
Banjarmasin	1,760,000	9,200	250,000	5,250,000	23,000	760,000
Lembar	370,000	-	40,000	1,100,000	1,000	140,000
Kupang	310,000	100	50,000	790,000	8,000	270,000
Dilli	270,000	-	60,000	510,000	0	100,000
Balikpapan	600,000	800	300,000	2,060,000	42,000	1,200,000
Samarinda	850,000	3,800	80,000	2,280,000	12,000	230,000
Bitung	1,180,000	5,900	200,000	2,680,000	45,000	550,000
Pantoloan	440,000	0	290,000	800,000	5,000	550,000
Uj.Pandang	2,770,000	21,000	730,000	6,030,000	152,000	2,540,000
Pare-Pare	330,000	-	200,000	910,000	4,000	470,000
Kendari	230,000	-	270,000	430,000	2,000	580,000
Ternate	240,000	0	610,000	480,000	3,000	650,000
Ambon	860,000	500	390,000	2,820,000	33,000	1,130,000
Sorong	140,000	400	170,000	300,000	2,000	450,000
Biak	180,000	800	40,000	360,000	2,000	80,000
Jayapura	240,000	0	100,000	480,000	3,000	290,000
TOTAL	10,950,000	42,500	3,790,000	28,020,000	337,000	10,110,000

Note 1): Existing data at Sampit is from 1990
Note 2): Existing data at Balikpapan is from 1990

Estimation of berthing capacity

28. Based on the actual ship productivity and empirical relationship between Berth Occupancy Ratio and Berth Throughput at Indonesian ports, optimum berthing capacity is assumed in this study as follows:

Main wharf	1,100 ton/m
Local	400 ton/m
Rakyat/sailing	800 ton/m

Facility planning

29. New berthing facilities should be built to meet the difference between traffic demand forecast in 2005 and the present capacity of the existing berthing facilities calculated by the standard capacity discussed above.

30. JICA study team proposes that Perseros should own cargo handling equipment capable of handling 20 foot containers and heavy cargoes at the container terminal, terminal candidate ports, and the industrial base ports. At the other ports, it is assumed that additional equipment may be purchased and owned by the private sector.

31. Required facilities of each over middle class port are summarized in Table 5-3.

Table 5-3 Required Port Facility

Port	Main Berth		Local/Rakyat		Container Yard		Passenger Terminal	
	Existing (1992) (m)	Total (2005) (m)	Existing (1992) (m)	Total (2005) (m)	Existing (1992) (m2)	Total (2005) (m2)	Existing (1992) (m2)	Total (2005) (m2)
Sampit	155	645	-	-	-	-	180	300
Banjarmasin	440	4,440	778	778	10,226	25,000	-	2,000
Lembar	228	878	150	250	-	2,500	120	300
Kupang	223	733	100	100	1,265	10,000	760	760
Dilli	180	440	-	-	-	-	300	300
Balikpapan	329	1,959	40	40	-	50,000	1,250	2,000
Samarinda	550	2,090	-	-	-	10,000	-	1,000
Bitung	605	2,045	708	708	4,000	50,000	2,195	2,195
Pantoloan	150	540	80	180	-	5,000	2,792	2,792
Uj.Pandang	1,910	3,960	700	820	22,800	100,000	3,600	3,600
Pare-Pare	191	711	204	254	-	5,000	1,120	1,000
Kendari	220	350	61	61	-	2,500	500	2,000
Ternate	248	568	271	271	-	2,500	600	2,000
Ambon	576	1,526	100	400	6,000	50,000	3,000	3,000
Sorong	200	370	-	-	-	2,500	-	1,800
Biak	142	312	-	-	-	2,500	-	400
Jayapura	132	392	33	33	-	2,500	400	1,600
TOTAL	6,479	21,959	3,225	3,895	44,291	320,000	16,817	27,047

Initial Environmental Examination (IEE)

32. Initial Environmental Examination of the over middle class ports was carried out. According to the results, it seems that each port development will have an impact on the environment, corresponding to the scale of the development. Therefore, it seems that it will be necessary to investigate the enforcement, methodology and etc. of Environmental Impact Assessment (EIA) at the feasibility study stage.

Port management and operation

33. There seems to be some areas where improvement is necessary for realization of PERSERO's sufficient autonomy. The following measures are proposed:

a) Control over daily operational activities
b) Reinforcement of marketing function of PERSERO
c) Reinforcement of monitoring functions of PERSERO
d) Sufficient support of central government
e) Introduction of flexibility in labor supply system

Cost estimation and implementation schedule

34. Estimated costs and implementation schedule for civil works, building works and cargo handling equipment procurement for the 17 study ports are given in Table 5-4.

Table 5-4 Implementation Schedule for Over Middle Class Ports

Unit : Billion Rupiah

Package	Port	Cost in Port	Package Cost	Foreign Currency	Local Currency	1st Stage			2nd Stage			3rd Stage			4th Stage		
						1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
I	Kupang Balikpapan Bitung Uj.Pandang Ambon Biak	26.7 72.7 102.7 212.3 26.7 28.0	442.5	275.5	167.0		29.1 413.4		Engineering and Supervising (E/S) Construction (C)								
II	Sampit Banjarmashin Lember Dilli Samarinda Pantoloan Pare Pare Kendari Ternate Sorong Jayapura	50.1 305.3 37.8 17.4 114.8 16.5 29.6 17.0 1.4 33.9 18.9	642.9	401.5	241.4					46.8 596.1		(E/S) (C)					
III	Kupang Balikpapan Bitung Uj.Pandang Ambon	45.2 160.7 138.5 254.6 101.0	700.0	428.3	271.7								48.1 651.9		(E/S) (C)		
IV	Sampit Banjarmashin Lember Dilli Samarinda Pantoloan Pare Pare Ternate Jayapura	37.5 335.0 54.3 12.5 63.3 30.5 27.7 31.4 17.7	614.9	390.0	224.0											45.3 569.6	(E/S) (C)
Total			2,400.3	1,496.2	904.1	442.5			642.9			700.0			614.9		

D. Standardized Development Plans for Small Class Port

Concept of small class port

35. The small class ports in this study are defined as the non-commercial ports. A standardized plan will be presented by analyzing the present situation and future roles of the non-commercial ports in Eastern Indonesia.

Present situation of small class port

36. According to a DGSC publication, number of ports which have some sort of berthing facility accounts for only 24 percent of the total non-commercial ports in Eastern Indonesia. By sub-category, about 50 % of the mother ports have berthing facilities, and about 16 % among the working units.

37. Average quay length for the mother port is 43 m, and that for the working unit is 10 m. Only some 20 % of the working units have berthing facilities although they are Perintis ship calling ports.

Development priority of small class port

38. Priority for port facility improvement should be given to the Perintis ship calling ports. Among the Perintis calling ports, further priority should be given to the mother ports because the mother ports in general have a larger socioeconomic impact than the working units.

39. Among port facilities, berthing facility should be firstly upgraded to a satisfactory level for users: ships, passengers, cargo handling equipment, and workers.

Standardized development plan

40. The JICA study team has proposed in the shipping and shipbuilding sub-sector development plans standard vessels including a type good for Perintis ship, which has 66 m length, 3.8 m draft, and 900 DWT. From the foregoing data, a planned vessel size for the standardized development plan for the small class port should be set as 900 DWT.

41. Berthing facility should have the following dimensions, and its standard section of RC pier is shown in Figure 5-2:

Vessel size : 900 DWT
Quay length : 80 m
Quay width : 12 m
Water depth : -4.5 m

42. Achievement factor of the quay, which is defined as the ratio of the existing quay against the proposed quay standard in terms of quay length or area, is summarized for the Perintis calling ports in Eastern Indonesia as follows;

	Mother ports	Working unit
Av. existing quay length	43.0 m	9.8 m
Proposed quay length	80.0 m	80.0 m
Achievement factor	53.8 %	12.3 %
Av. existing quay area	329.0 m2	76.6 m2
Proposed quay area	960.0 m2	960.0 m2
Achievement factor	34.3 %	8.0 %

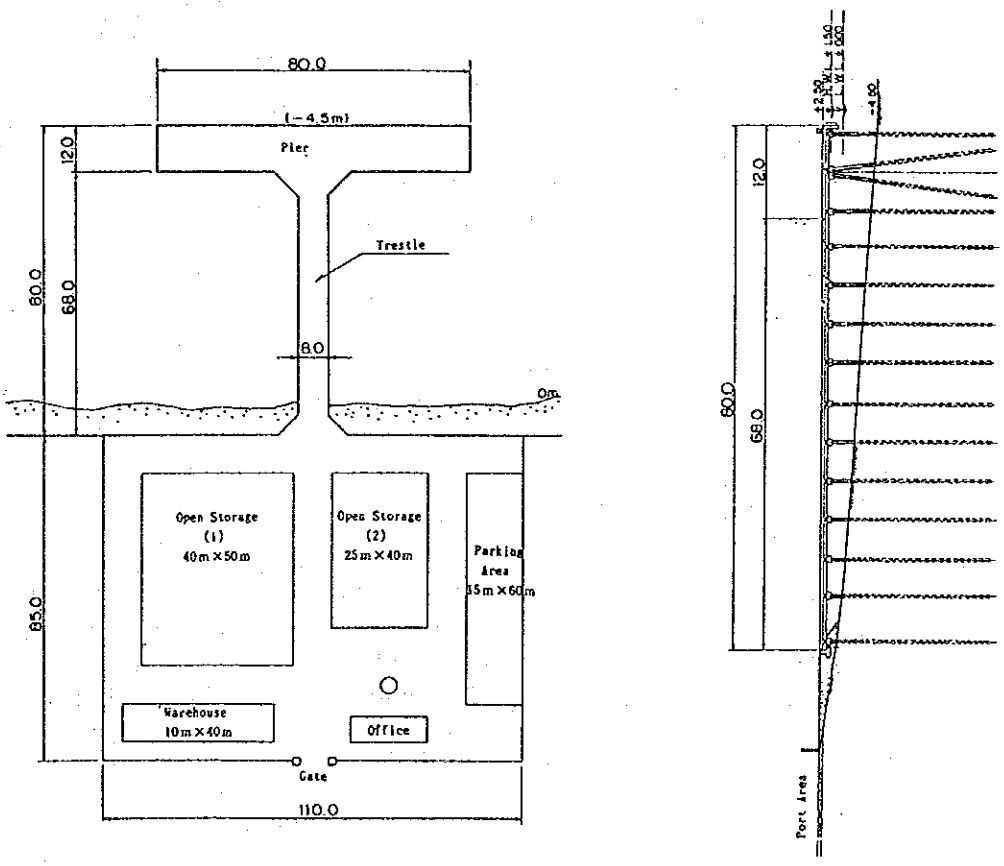

Figure 5-2 General Layout and Side View of Small Class Port

Cost estimation

43. Cost estimation for construction of port facilities for small class ports was made based on the Standard Development Plan described in the preceding section. The construction of small class ports is estimated at Rp. 6.46 billion per port comprising foreign currency portion of Rp. 0.78 billion and local currency portion of Rp. 5.68 billion.

44. Estimation of total construction cost for small class ports was made based on the said estimated cost per port, and the construction cost required under the present project was obtained by applying the non-achievement factor.

45. In working out the implementation schedule for small class ports as shown in Table 5-5, the first priority was given to the construction of mother ports and second priority to the construction of working unit ports, and all of the ports were scheduled to be completed by the target year.

Table 5-5 Implementation Schedule for Small Class Port

Unit : Billion Rupiah

Package	Project Cost	Foreign Currency	Local Currency	1st Stage			2nd Stage			3rd Stage			4th Stage		
				1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
I Mother Port	135.8	16.4	119.4		9.0 (E/S)		Engineering and Supervising (E/S)								
					63.4	63.4	Construction (C)								
II Working Unit - 1	271.4	32.8	238.6					18.0 (E/S)		(E/S)					
								126.7	126.7	(C)					
III Working Unit - 2	271.4	32.8	238.6								18.0 (E/S)		(E/S)		
											126.7	126.7	(C)		
IV Working Unit - 3	271.4	32.8	238.6											18.0 (E/S)	
														126.7	126.7 (C)
Total	950.0	114.8	835.3	135.8			271.4			271.4			271.4		

E. Selection of Feasibility Study Ports

46. Among the over middle class ports, feasibility study ports should be selected, taking into consideration various elements. An agreement has been reached between the Japanese Preparatory Study Team and the Indonesian counterpart that the tentative candidate ports are Bitung, Biak, Ambon, Kupang in order of priority. Taking into consideration the various factors, among others, Bitung and Kupang were proposed and agreed upon as the feasibility study ports.

Chapter 6 MARITIME SAFETY SUB-SECTOR DEVELOPMENT PLAN

A. Aids to Navigation Development Plan

1. The ATN implementation plan is formulated with the target year of 2005 and 2015, respectively, in accordance with the basic concept of implementation plan and due reviewing of the designated ATN Master plan of 1985.

Visual ATN

2. The installation quantity of visual aids required up to 2015 from existing Indonesia conditions is assumed on condition that the development rate of navaid units per 100 n.m. coast line should reach 8 units, the same level as current situation in Malaysia. The length of total coastal line in whole Indonesia and Eastern Indonesia is assumed to be 33,000 n.m. and 22,000 n.m., respectively.

3. As for Eastern Indonesia, density of visual ATN will be 4.3 units per 100 n.m. in 2005. It will be slightly less than the nation-wide one (4.8 units).

Radio ATN

4. Radar Beacon (Racon): Racons have been installed at narrow channels, main ports, etc. They can be installed at the sites of lighthouses and lightbeacons as well as solo sites. Under current urgent situation, around twenty (20) racons should be annually installed. After the racon development come up to the standard of minimum requirement, the development trend will decrease gradually. Finally one racon will be attached to cardinal place of a new visual ATN.

5. Medium Wave Radiobeacon Station: Rehabilitation and improvement works should be prioritized at the existing eighteen (18) medium wave radiobeacon stations while new construction will be withheld for a while.

6. Differential Omega: Checking of differential omegas is to be carried out in parallel with maintenance work for the relevant medium wave radiobeacon stations.

7. Loran-C System: Two (2) chains are planned to cover the two sea lanes in Eastern Indonesia and also the main shipping routes and the fishing areas in the regions. One is the Sulawesi Chain covering Lombok Strait to Makassar Strait through to Molucca Sea and Banda Sea and the other is the Irian Jaya Chain covering Arafura Sea and Halamahera Sea. The Sulawesi Chain will be developed during the second stage (1997-1999) in light of traffic volume. On the other hand, the Irian Jaya Chain will be developed either in the third stage (2000-2002) or the fourth stage (2003-2005) with due consideration of the magnitude of economic activity.

Vessel Traffic Service (VTS)

8. Surabaya port as an origin port to Eastern Indonesia and Banjarmasin and Ujung Pandang ports need the operation of VTS system in the future. As for

Surabaya, it will be of importance to introduce VTS system at its west channel in the fourth stage (2003-2005). Regarding Banjarmasin and Ujung Pandang, VTS system will be developed after 2005 corresponding to economic development.

Supporting vessel

9. The Study Team formulates the deployment plan of supporting vessels on the assumption that existing vessels would be replaced at the age of 25 and above. In addition to existing vessels, additional ones will be newly built to cope with the growing needs derived from the above-mentioned ATN development plan.

10. Particularly in Kupang and Bitung, the large-scale reinforcement of port facilities is a pressing task to catch up with traffic demand. In this connection, both a supply and aids tender and a multi-purpose buoy tender will be newly deployed to these ports, respectively.

11. Accordingly a large survey vessel like "Bimasakti" type will not be allocated to Eastern Indonesia. In addition, inspection boats are equipped with electronic positioning system in order to survey the accurate positions of buoys which have been placed by buoy tender vessel.

Workshop and buoy base

12. The 1st Class District of Navigation (DISNAV) located in Samarinda and Sorong in Eastern Indonesia, are responsible for buoy maintenance by means of buoy tenders as well as onshore facilities. The maintenance capability should be strengthened in line with increase in buoys.

13. The 2nd Class DISNAV and Sub-DISNAV have workshops for maintenance works except buoy laying and replacement. The main facilities and devices are machines and tools for mechanical maintenance, test/measuring and maintenance, electronic positioning and hydrographic surveys. Priority should be given to Manado-Bitung (2nd Class DISNAV) and Kupang (Sub-DISNAV).

Training of ATN personnel

14. Aids to Navigation (ATN) training programs consist primarily of domestic and overseas courses. These courses will be held at least triennially between 1994 and 2005. The number of trainees will be arranged taking into account the overall workload of maintenance and operation. The training period for the overseas and domestic courses is designed to be three (3) months and two (2) months, respectively. For further training requirement after 2006, a stationary training school shall be established.

B. Maritime Search and Rescue System Development Plan

Framework of the proposed plan

15. The deployment of additional SAR vessels and aircraft is proposed to execute

SAR operations in Eastern Indonesia where there are a number of islands spread out over vast seas. This should be designed to bear not only within territorial waters but on open seas.

16. To facilitate efficient and effective SAR operations, the development of maritime SAR communication system such as GMDSS and its related facilities, upgrade of communication network and preparation of emergency electric power are proposed.

17. From a long term viewpoint, training system for all personnel of DGSC will be necessary. In the first place, the construction of Maritime Safety Training Center is proposed to provide newcomers and active officers with basic knowledge and specialized technique.

18. It is said that navigators cause around 70% of all maritime accidents. To prevent accidents by human errors, dissemination of safety philosophy is an important means which should be conducted by public and private sectors co-operatively and constantly.

19. For the convenience of effective planning formulation, territorial waters of Benoa and Surabaya (Java East) are regarded as Eastern Indonesia sea waters.

SAR operation plan

1) SAR ship

20. SAR ships deployment plan is formulated by KPLP base as summarized in Table 6-1. This plan is set out based on the analyses on both occurrence of maritime accidents and possible coverage of SAR operations.

Table 6-1 Summary of SAR Ships Improvement Plan

Ship Class	Required (A)	Existing (B)	Scrapped by 2005 (C)	Newly Built by 2005 (A)-(B)+(C)
I - A	4	0	0	4
I - B	3	0	0	3
II	11	0	0	11
III	27	8	1	20
IV	32	15	0	17
V	58	23	2	37
Total	135	46	3	92

2) SAR aircraft and helicopter

21. It is necessary to make use of highly mobile aircraft in case of need for quick dispatch and rescue or lifting up sufferers on the waters of Eastern Indonesia where maritime accidents have occurred increasingly but scattered.

22. The Study Team formulates the aircraft and helicopter deployment plan with due consideration of the their excellent capability. According to this plan, two aircraft shall be deployed in Ujung Pandang and every two helicopters shall be deployed at Ujung Pandang, Ambon and Surabaya, respectively.

3) Special rescue team

23. Special rescue teams have been organized on bases in Surabaya, Ambon and Bitung. Under existing conditions, however, it is noted that sufficient training can not be undertaken due to shortage of necessary equipments. Although one team is ordered to stand-by in Bitung, it is advisable that this team will be transferred to Ujung Pandang because of the convenience of routine training and rescue operation with a helicopter which will be deployed in Ujung Pandang not in Bitung.

24. One team is designed to consist of five (5) persons, that is, one leader and four members. Four (4) teams, total 20 persons, are to be stationed at one base in the light of readiness and training.

Maritime SAR communication system

25. DGSC's internal communication network is formed by the central fixed radio network and regional fixed radio network. The former should be swiftly replaced by satellite communication network and the latter should be improved by automated operation.

26. As for GMDSS communication facilities, DSC and NBDP system will be established for the purpose of medium-range SAR communication within the sea area A2 by MF radio coverage and VHF DSC system on ch70 will be introduced to serve only international port area within the sea area served by VHF range.

27. To utilize COSPAS-SARSAT satellites which enable to grasp the position of vessels in distress instantly and accurately, it is required that inter-island shipping vessels are equipped with satellite EPIRBs compulsorily.

28. Emergency power supply system is very old. In order that Coast Radio Stations can maintain their proper function, emergency generator and blackout-free constant voltage power supply should be urgently introduced.

Maritime Safety Training Center (MSTC)

29. Although the personnel engaged in duties of maritime safety and SAR operation are supposed to have expertise and special skills, unfortunately, the DGSC possesses neither their own courses nor facilities for enough training. From a long-term viewpoint, it is necessary that proper education and training system should be developed in order to train the DGSC personnel systematically and continuously. But from a short-term viewpoint, a Maritime Safety Training Center (MSTC) is proposed in order to train both newly recruited and active personnel swiftly.

30. The functions of the proposed MSTC can be divided into the following three;
(i) general training for maritime safety personnel
(ii) special training for selected personnel, and
(iii) research and development

Chapter 7 SEAFARER EDUCATION SUB-SECTOR DEVELOPMENT PLAN

A. Demand and Supply of Indonesia Seafarers in Future

1. In a field of seafarers' education, not only the vessels deployed in domestic trade but also ocean-going vessels, tugs, landing craft and supply vessels should be encompassed as the Indonesian fleet. Therefore, the future Indonesian fleet in 2005 is estimated to be 3,850 vessels. At the projection of future demand, preference of international seafarers market, necessity of qualified ratings, the manning scale of a vessel and yearly attrition rate are also analyzed and assumed appropriately.

2. Based on the above mentioned assumptions, future Indonesian seafarers from both demand and supply sides are estimated. On the demand side, officers and ratings from maritime schools will be annually required to be 1,500 and 1,365, respectively. As for the supply side, existing maritime schools send out 1,335 graduates for officers and 385 for ratings based on the averaged result in recent years. By comparison of these figures, some shortage of seafarers will occur in the future. More precisely, 165 officers and 980 ratings will be lacking every year.

B. Development Plan for Seafarer Education

3. To meet future demand in quality and in volume as well as to resolve the identified issues in this study, the development plan for seafarer education is formulated as described below.

4. For the quality aspect, the following four plans are proposed:

   (a) Training facilities and equipments will be upgraded in existing maritime schools.
   (b) Formal education for ratings will be enhanced.
   (c) Three exclusive training ships will be introduced. Among them, one will be mainly utilized by the maritime schools in Eastern Indonesia.
   (d) A multi-purpose institution with a maritime library and a publishing house for higher maritime education, teaching staff's training, retraining for existing seafarers and maritime researchers will be established.

5. For the quantity aspect, the following two plans are proposed:

   (a) Existing schools such as public MMAs and public rating schools will be expanded to meet officers' demand.
   (b) Three rating schools will be constructed to meet qualified ratings' demand. They will be distributed in Western Indonesia, Java and Eastern Indonesia taking account of a geographical balance.

6. For administrative and regulatory aspects, the following two measures are proposed:

   (a) Seafarer database system will be set up for routine administrative works and for planning works.

(b) The proposed improvements as conclusions of an Assessment of Seafarer Education System will be implemented.

7. Among these plans, the following three (3) plans are preliminarily designed in this study.

(a) A rating school in Eastern Indonesia
(b) A training ship
(c) Seafarer database system

1) Site selection and basic design for a rating school

8. As the result of the comparison with candidate sites, Ambon and Sorong are suitable. Since it is difficult to draw the line between them at this time, the Study Team proposes further studies and discussions among the agencies concerned.

9. The purpose of setting up a rating school are basically two-fold, namely: (a) to produce well-educated ratings for larger interisland and ocean-going vessels, and (b) to elevate the competence of officers on-board domestic trade vessels. As for curriculum, the one of BPLPD Barombong will be basically employed. In addition, Catering staff course will be newly introduced.

2) A training ship

10. To meet the demand of apprenticeship trainees, three training ships which are designed to be 3,000 GRT and to accommodate 200 cadets per ship are proposed. Taking account of local demand, one will be served for the maritime schools in Eastern Indonesia. Sectional and deck drawings are designed by the Study Team. Outline of the proposed ships are as follows.

(a)	Principal dimensions	
	(i) length, o.a.	84.0 m
	(ii) length, b.p.	74.0 m
	(iii) breadth, mld	14.8 m
	(iv) depth, mld	6.8 m
	(v) designed draught, mld	4.8 m
(b)	Gross tonnage and deadweight	
	(i) gross tonnage (international admeasurement)	abt. 3,000 tons
	(ii) deadweight	abt. 1,400 metric tons
(c)	Speed	
	(i) service speed	14.0 knots
	(ii) endurance	abt. 7,000 n.m.

3) Seafarer database system

11. In order to grasp the current situation of shipping industry including number of existing seafarers and to make the necessary development plan of seafarers in future, it is necessary to formulate the data base system on seafarers to be connected with the database development of DGSC which covers various data sources such as shipping companies, maritime schools and issuance of certificates.

Chapter 8 IMPLEMENTATION PROGRAM

1. Because Eastern Indonesia is still in a developing stage, the shipping sector and relating infrastructures must initiate the development.

2. According to origin and destination analysis of shipping network in the year 2005, volume of traffic expands in the area more than 300% in cargo and 500% in passengers. Although reliance to Java will continue until year 2005, the commodity distribution pattern will gradually become decentralized.

3. Ferry services as an extension of the road network are expected to supplement shipping network especially for short distance shuttle service.

4. For efficient shipping operation, standardization of vessels in service will be effective. For the main inter-island routes, 5,000 DWT type will be the most appropriate in 2005 as the largest standard type 2,500 DWT type and 1,000 DWT will be operated for the ports without sufficient water depth.

5. In order to maintain stability of shipping business, stricter control over establishment of shipping companies needs to be restored.

6. Reliance on domestic shipbuilding industries for future supply of shipping fleet is preferable, because reliance on foreign source will not promote local shipbuilding industries but will expose local shipping to international market fluctuations. For maintenance and repair facility for vessels greater than 1,000 DWT in Eastern Indonesia, a new slipway for 2,500 DWT class ship is proposed at existing PT. Waiame Ambon shipyard.

7. For maritime safety, strengthening of ship inspection will effectively upgrade existing ships quality and eliminate obscure operators. Introduction of safe operation management system will also be effective.

8. Development of port facilities will not only improve overall transport efficiency, but will also induce potential investors to the project area. Improvement and expansion of the over-middle class ports will attract potential port users and they will become regional centers. Through service of Perintis shipping, most of the small ports will be connected to over-middle class ports in the vicinity and will have even access to a regional centers.

9. Installation and rehabilitation of aids to navigation in the project area is acutely needed as the traffic is expected to increase rapidly during the project period. Search and rescue facilities including communication systems also need substantial enforcement.

10. Improvement of quality of seafarers is essential for safety. For that purpose, establishment of a new rating school in Eastern Indonesia is proposed. A new training ship for common use for maritime academies and rating schools will facilitate upgrading of the training standard.

11. For achievement of the target by the year 2005, project packages, which may have suitability for potential financial assistance, are identified. The package plan and recommendations for each sectors and stages are shown in the section of conclusion and recommendation of this report.