D. Building of Passenger Ships

50. Transportation of passengers in such vast archipelago nation is one of the national fundamental requirements to the domestic shipping in order to keep a unity in economy, plitics, culture and national defence which are explicitly mentioned in National concept such as Wawasan Nusantara.

51. Adequate tonnage of passenger ships for trunk and semi-trunk routes should be prepared according to such national requirement and development of socio-economic condition in the area as same as the Perintis line for local services. The future prospect for passenger ships traffic in the Eastern Indonesia is mentioned in Chapter 3 of this Part.

52. Basic procurement plan of passenger ships which is already authorized by the Indonesian Government through Directorate General of Sea Communication in Ministry of communications includes the building of 13 ships between 1995 and 2000 in addition to 4 ships to be delivered by 1995. Following table shows the contents and building program of 13 ships, in which 4 ships marked with * will be engaged in Western Indonesia and 9 ships will be in Eastern Indonesia.

Year of Build	1995	1996	1997	1998	1999	2000	SUM
Ship's Type : 500	1*	1*	2*	2	2	2	10
Do. : 1000		1					1
Do. : 2000		1	1	1			2
SUM	1	2	3	3	2	2	13

53. The design of each type are better to follow the present passneger ships which are operated by PT.Pelni in Indonesian domestic services because their service records do not show any problems and their experiences in operation and maintenance can be fully utilized to assure good services and cost savings. main particulars of each types and general arrangement of 1000 type are shown in Figure 4-7.

54. The 500 type can be built by Indonesian shipyard in respect of their size, however, suppy of design and major equipments as "package deal" and technical assistance at construction stage should be carried out by advanced foreign shipyards. The 1000 and 2000 type may be difficult to be built in domestic shipyards in this period because of their complexity of the specificaiton and less experiences for big passenger ship, but according to the accumulation of experiences of 500 type construction, bigger type will be able to be built in future. needles to say, the development of Indonesian shipbuilding industry as mentioned before must be essentially necessary.

55. The cost of each type are estimated as follows by the actual records in previous construction of present ships.

500 Type: 72 Billion rp.
1000 Type: 118 Billion Rp.
2000 Type: 196 Billion Rp.

E. Supporting Facilities in Eastern Indonesia

Necessity of the Facilities

56. As shown in the Table 7-8 in Chapter 7 of Part 1, at present, there are neither graving docks nor slipways having more than 500 TLC (Tons Lifting Capacity) except at shipyards owned by other industries. This means that certain size of the ships engaging in the area in the future would not be handled in dry conditions for repairing or inspection because of lifting capacity. Thus, ships will have to go outside of Eastern Indonesia despite it being less efficiency in terms of operation.

57. Other reasons for ships avoiding repairs in this area are higher costs and the availability of the facilities. This is because shipyards are giving priority to fishing boats to be repaired at near sites in their working area. This is suggesting an insufficiency of facilities.

58. The above points suggest the need for a well-equipped and balanced shipyard to act as a "Key Yard" to serve the local fleet in Eastern Indonesia. This yard must be large enough for the drying of ship bottoms to allow repairs or inspection with self-supporting installations. This will enable the complete repair work and enough storage space for spare parts of materials.

59. The "Key Yard" should provide reinforcement for a certain shipyard located in the central area of Eastern Indonesia, and the facility should be capable of drying the ships up to about 2,500 DWT class (M-Type of the standard ship) which will serve on semi-trunk routes in the future.

60. This shipyard will provide services for all kind of ships engaging in the area with proper technique and reasonable cost which will be created through continuous and steady work and some scale merits. This must contribute to the fleet in the area in order to increase efficiency in operation and also to give greater opportunities for inspection by Authorities.

PT. Waiame Shipyard as a "Key Yard"

61. According to field surveys and meetings with the shipyard management, PT. Waiame shipyard is a proper candidate to become the "Key Yard" in Eastern Indonesia for the following reasons.

(a) It is located in the center of Eastern Indonesia and surrounded by a busy fishing area. Distances from various main places are as follows. For this reason, Sorong, Ternate and Tual can be expected as the market area.

Ambon-Surabaya:	986sm.	Ambon-Sorong:	345sm.
Ambon-Ujung Pandang:	611sm.	Ambon-Ternate:	323sm.
Ambon-Bitung:	502sm.	Ambon-Tual:	325sm.
Ambon-Kupang:	491sm.		

(b) Port of Ambon is a major calling port for various service routes from other main ports and has a water depth good enough to receive big ships. Many local ferry services exist around Ambon and the following Perintis

Lines have been based in Ambon, Sorong, and Ternate since April 1993. In addition, two lines based in Jayapura and four lines based in Merauke are also expected to be within the service area of Ambon.

Perintis Line based	Ambon:	R15 by 750 DWT type
		R16 by 750 DWT type
		R17 by 750 DWT type
		R18 by 750 DWT type
		R19 by 750 DWT type
Do.	based Sorong:	R25A/B by 350 DWT type
		R26 by 500 DWT type
		R27 by 750 DWT type
Do.	based Ternate:	R20A/B by 500 DWT type
		R21 by 500 DWT type
		R22 by 500 DWT type
Do.	based Bitung:	R7 by 750 DWT type
		R8 by 750 DWT type

(c) In the last five years, the shipyard has maintained profits through sound management. About 150 million Rp. of before-tax profit was recorded in 1992. There were 53 medium-sized fishing boats (average 200GT, 30 m length) docked in 1992.

(d) The area of the shipyard is about 4 Ha. (PT IKI Bitung has 2.5 Ha. in the area.) and has two normal-type slipways each 500 TLC which can lift up two fishing boats at the same time. Spare land for new facilities remain wide enough in the present shipyard.

(e) The shipyard is usually in busy condition because the repairing capa city for fishing boats in Maluku area is insufficient at present compared to the demand. As reported by a fishing company, about 120 ships for shrimp, 200 ships for trawling and 100 ships for tuna fishing are working in the area. Furthermore, both the number and size of the fishing ships are expected to increase in the near future.

(f) A national university called Pattimura in Ambon is one of the three universities having shipbuilding faculties in this country. One of the eleven Polytechniques in this country is also located near the University. The establishment of "Key Yard" may be a boast to the local employment, and recruiting of prospective work force may not be difficult.

(g) The cost of materials may be higher than that in Ujung Pandang due to the distance from the main industrial area, yet as far as repairing works are concerned, the higher costs can be offset by less non- commission days.

62. It is feasible to draw an about 2,500 DWT type general cargo ship (M-Type) onto a slipway for repairs. The slipway is more effective than a floating or graving dock because several ships can simultaneously be put to drying up.

63. The new slipway has a capacity of 1,500TLC with 1 shifter of 90 meters in width which is moved between the sea and the shore by a winch. The shifter can bring an M-type standard ship to a side truck, which is 90 meters in length and about 40 meters in breadth, with several lines of rails to accommodate 2 ships of

the M-type or several smaller ships simultaneously. This type of slipway is similar to that in PT.IKI Ujung Pandang. The layout of the shipyard with the new slipway is shown in Fig. 4-8.

64. The slipway can be built in the present unused space in the shipyard. The sea depth in the front of the slipway is about 8 meters at present. There will be very little dredging work.

65. The total budget for the building of the slipway together with other necessary facilities is about 12.4 billion Rp. (12,400,000,000 Rp.) at the mid-1993's level. This budget covers the construction of the slipway with a shifter and cradles together with the necessary winches and steel wires, an oxygen plant, a 25 tons mobile crane, a new plate shop, a plate rolling machine, a boring machine, and a pipe bending machine, but the consultation fee for the implementation of the work and the training of the workers are not included.

66. The time of the construction of the slipway, which will be dne by a local constructor, is estimated to be about 1 year. however, a detailed study and preparations for the construction work will be started earlier. Aiming to complete the whole facilities upto the year of 1999, it is better to start the basic design in 1997. Accordingly, finincial arrangement should be made by 1996 at latest.

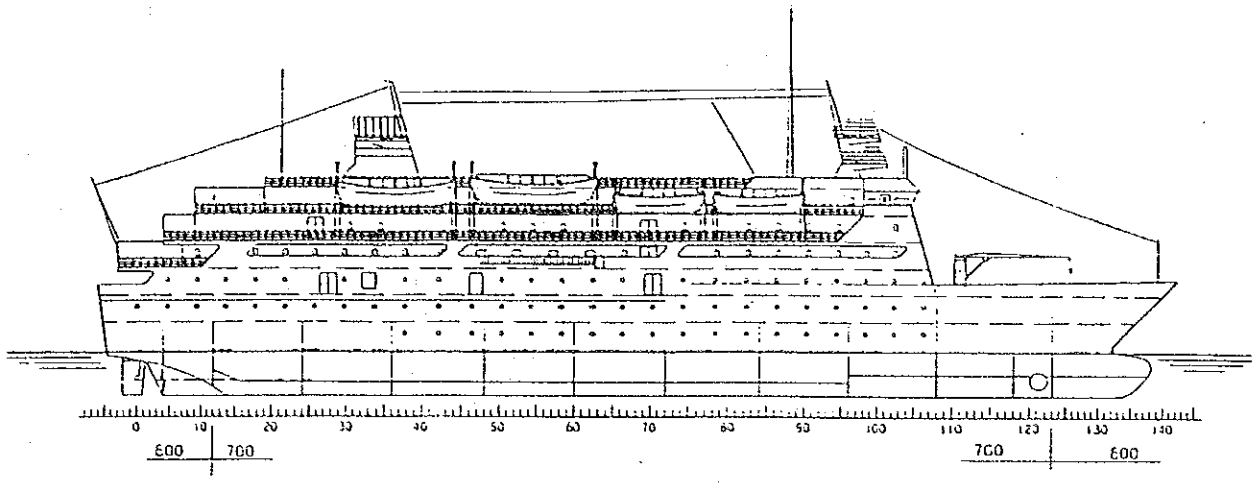
67. The total lifting capacity of the slipways in the shipyard is increased to 2,500TLC from 1,000TLC at present. The number of ships being repaired at same time will be 10 ships, provided they are medium size fishing ships instead of 2 ships at present, because the new slipway can hold 8 ships at the side trucks. According to an estimation by the shipyard, the sales in 2001 will amount to about 9 billion Rp. instead of 1.5 billion Rp. in 1992.

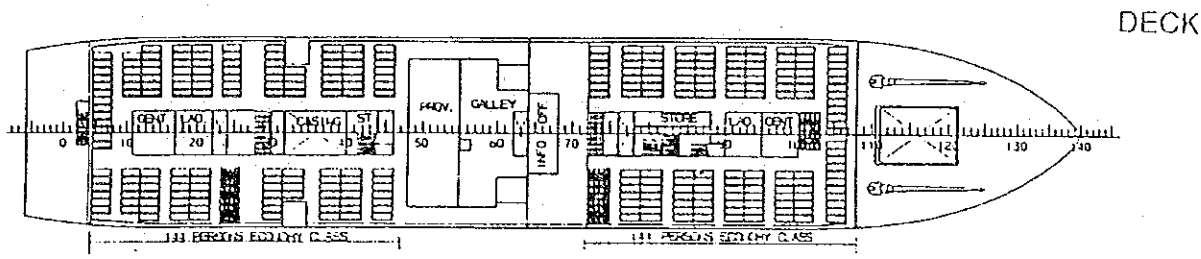
68. The minimum number of employees required will be about 200, instead of 80 at present. Additionally, workers from subcontractors will have to be employed, depending on the circumstances.

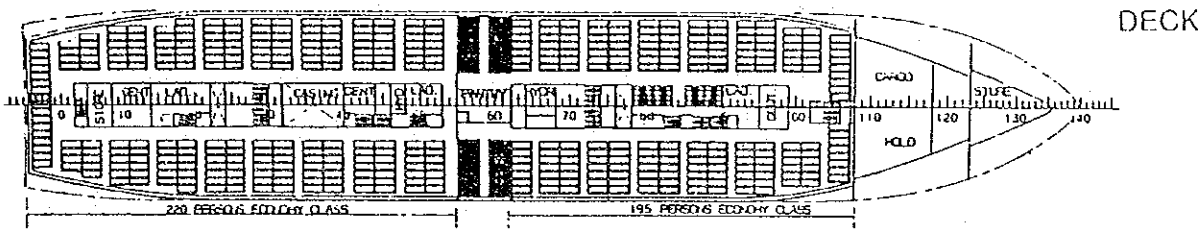
69. Due to the increase in the yard capacity, re-education of middle management and workers is necessary to improve productivity, to cut down costs and to ensure reliability. Foreign education programs and assistance should be applied for.

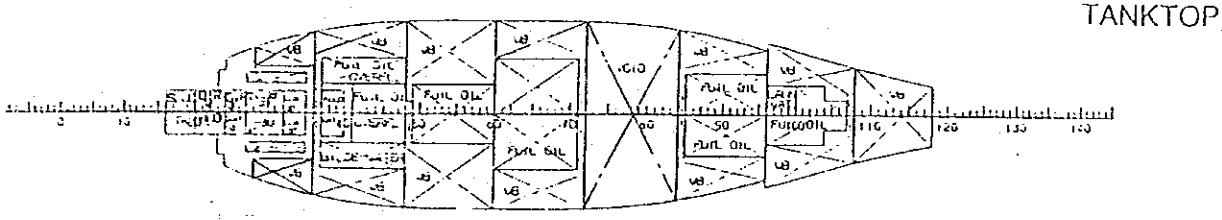
70. The new facilities will provide more scope for the ship operators in carrying out repairs or inspections without extended non-commission periods, and it will render the operation more economical and safer. About a week of cruising days in one return voyage and, additionally, one more week in waiting days for dock availability will be saved, if the ship is inspected in Ambon instead of Surabaya where heavy congestion of dock situation is generally reported. The amount of saving by such conditions may be calculated about 6 million Rp. per year if 20 merchant ships are involved and, top of this, more earnings can be expected by the increase of working days.

71. A well-written report titled "Advisory Services for the Development of the PT. IKI Shipyards in Bitung and Ambon" which was prepared by the State University of Liege, Belgium in 1992, has been given as reference for this study. The report recommends that PT. Waiame install a new slipway for repairing mainly fishing boats as promissing future market. This study team hopes that both the Belgian report and this report will be useful in achieving good results in the future.









SHIP's TYPE	500	1000	2000
Length (O.A.)	74m.	100.0m	147.0m
Breadth (mld.)	15.2m	18.0m	23.4m
Draft desined	2.8m	4.2m	5.9m
Dead Weight	400tons	1,400tons	3,200tons
Main Engine	1,200kw x 2	1,600kw x 2	6,400kw x 2
Service Speed	14 knots	15.6 knots	20.3 knots
No.of Passengers	500	970	1970

Figure 4-7 General Arrangement of 1000 type and Principal Paticulars of Each Type Passenger Ship

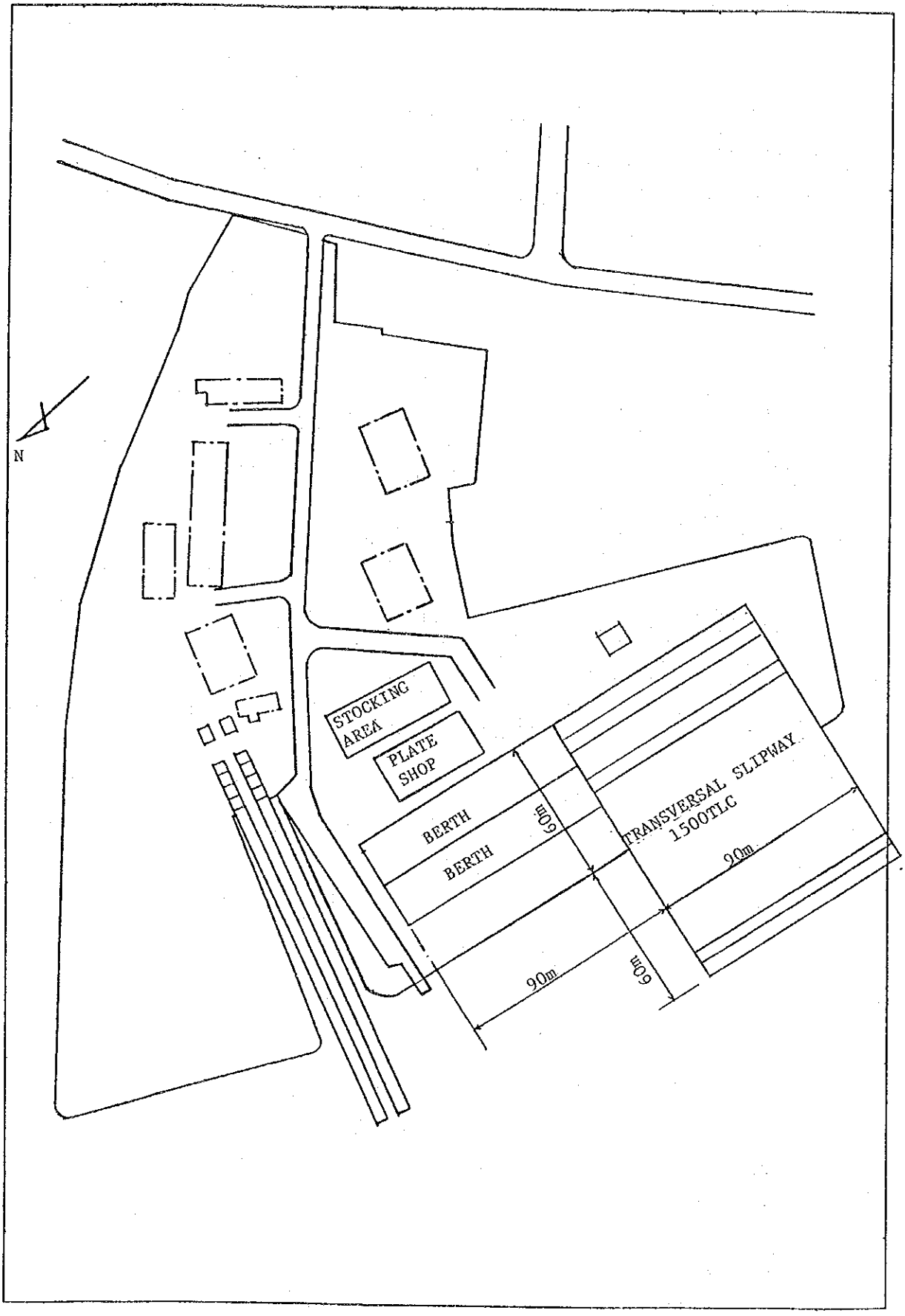


Figure 4-8 P.T. DOK & PERKAPALAN "WAIAME" AMBON

F. General on Ship Inspection Development Plan

Ship inspections in Indonesia

72. Ship inspections purport to secure the ships' safety, seaworthiness and pollution prevention in order to protect the assets and the people by imposing obligating safety and pollution prevention standards. Also,

1. entries and departures in the ports are checked, which contributes as a result to exclude the activities of sub-standard ships,

2. imposing the rules of international conventions, to a mild degree, will promote the modernization of on-board equipment, and

3. using quality control on structures, machinery and electrical appliances will guarantee that secondhand ships comply with agreed standards and prevent importation of inferior quality secondhand ships from abroad.

These points pertain to the modernization of shipping in Eastern Indonesia.

Inspection mode

73. The government's ship inspection system in Indonesia is performed mainly through surveillance of ships entering and leaving ports.

74. Periodical inspections at shipyards are performed either by the government or by Biro Klasifikasi Indonesia (BKI) which is a classification society of Indonesia authorized by the government. BKI's scope of steel ship inspection as suggested by the government is explained in paragraph 72 of Chapter 7, Part I.

Deployment of ship inspectors, etc.

75. The number of ship inspectors, their deployment, the government inspection system, related organizations, ratified conventions, inspection periods, ship inspection certificates, the results of inspections, etc. are being studied. These are shown in the Appendix 4-1, 2 and 5 (Part II).

76. Shipyard distribution, sludge reception facilities, the number of BKI ship inspectors and the local offices as well as inspection results are being studied, and these are shown in the Appendix 4-3, 4 and 5.

District offices

77. Each Kanwil is in charge of administration of its area in the province in which it is located. In Indonesia, the provinces number 27, and accordingly Kanwil number 27. Each Kanwil has an organization comprising of a number of administrative functions. Only a few employ ship inspectors and most do not. Consequently, Kanwil without ship inspectors cannot carry out ship inspection. Kanwil cannot act as an intermediate between its upper and lower organizations. Therefore, Kanwil is short-circuited and in some instances Adpel has to consult SeaCom directly.

78. Adpel are divided into classes. Adpel belonging to Class I is under the jurisdiction of the Ministry of Communications (SeaCom). In Eastern Indonesia, Adpel in Ujungpandang is the only Adpel belonging to Class I. Adpel belonging to Classes III, IV, and V come under Kanwil. Not all Adpel have ship inspectors. Kanpel is also a branch of Kanwil. A few of them have ship inspectors. The locations and number of Kanwil, Adpel and Kanpel, and the deployment of ship inspectors is shown in the appendix. Kanwil is a District Communication Office. Adpel (port administrator) handles SeaCom-related matters such as ports and harbors. Kanpel deals with the administration of non-commercial ports. See Fig. 8-1, Chapter 8 of Part 1.

G. Proposals on Ship Safety

Trimming of rules

79. A number of regulations, decrees, orders, etc. have so far been issued in the matter of ship safety. A lot of governmental orders, etc. have also been issued, and they are not properly documented. These rules should be neatly edited to provide all ship inspectors the whole set of rules always updated and kept in a well trimmed form so that they may use them in the most convenient way.

80. The rules should be appropriately laid down differently either to the ships to which the provisions of SOLAS convention are applied or to the ships which have no application of provisions of SOLAS Convention.

81. In brief, the problems to be solved are:

(1) to collect all the ship safety related rules to form a neatly edited and complete set,

(2) to formulate various rules of (1) to present clear requirements of ship safety separately as to the ships under SOLAS regulation and the ships otherwise, by having meetings attended by scholars, shipowners, shipbuilders, ship operators, classification societies, etc., and

(3) to distribute the finished sets to all ship inspectors and relevant parties.

Reinforcement in port state control

82. Port state control is a recently emerging and spreading activity of the governments of maritime countries to be performed over foreign ships entering ports of a state, in accordance with the provisions of international conventions such as LLC 1966 (Art.21), SOLAS 1974 (Reg. I/19), ILO Convention No. 147, COLREG 1972, STCW 1978, SOLAS Protocol 1978, and IMO's relevant resolutions such as A.466 and A.542.

83. As an example, in some countries active in port state control, in major ports once every week or so a port state control team composed of experts in ship inspections may be dispatched from a maritime office to foreign ships (berthing at the port of the maritime office) to check them in a set procedure. They may carry the identification card of the government. They may also carry tools such as portable two-way radio telephones to communicate with the maritime office, safety

shoes, helmets, electrical torches (in some cases, the explosion proof type), etc. and they may report to ships to be inspected and generally witness the structure and equipment. The government would instruct the ship to carry out necessary repairs or give it a document of order for compliance with technical standards, and, if necessary, give the ship a document of order for detention. The determination of the instruction or the document of order should be made after deliberate consideration by a responsible level official. The government office should formulate a document (guidance or manual) to be followed by port state control teams. The document should provide sufficient necessary information to all team members.

84. In Indonesia, the activities of port state control are low and necessary official guidelines to inspectors are not documented. The legislation does not include the system, which should be established.

85. The document of guidelines should be formualted and may include the following check points for a good reference to inspectors.

Checks will principally be made on the following.

(a) structure,

(b) machinery room,

(c) life-saving appliances,

(d) fire-fighting equipment,

(e) COLREG related equipment,

(f) navigational equipment,

(g) radio equipment, and

(h) load line related matters.

86. In brief, the problems to be solved are:

(1) to establish port state control legislatively, to formulate a guideline prescribing the procedure of PSC and check list for inspection teams and to distribute them properly.

(2) to arrange an appropriate number of qualified persons for PSC teams at appropriate local offices,

(3) to provide necessary equipment to PSC teams such as communication means and safety gears, and

(4) to train persons to form PSC teams.

Preparations for introducing GMDSS

87. Indonesia is now considering preparations of ship inspection for GMDSS. Preparations of ship inspection regarding 1988 Amendments to the 1974 SOLAS Convention concerning Radio Communications for the Global Maritime Distress and Safety System are to be made for international trade ships with some expectation of

the availability by domestic routed ships. So, the preparations of ship inspection regarding GMDSS are important. Anyway, for the preparations, securing human resources can be solved by planning and providing proper training to the existing ship inspectors. preparation of inspection devices should be solved by provoding appropraite inspection devices and facilities at appropriate places (SeaCom, laboratory, local offices) in order to allow the inspection job to be performed properly by using them.

88. Legislation formulation should be based on the 1988 SOLAS amendment and relative IMO resolutions. These things should be taken into the legislation system in a proper speed and detail and these should be made well known to the ship inspectors through training so that the inspection regarding GMDSS should be carried out in a most appropriate manner.

Establishment of type approval system

89. SOLAS Chapter III (lifesaving appliances) requires the introduction of type approval for lifesaving appliances. The legislation of a country should include type approval system in this connection. Indonesia, however, has not instituted the system in its legislation so far. Indonesia has been growing in industries not only in lifesaving appliances but also in other product production. The type approval system will and must occupy an important area in the ship inspection in Indonesia in the future.

90. The problems are to establish the system in the legislation of Indonesia, and the government should formulate in its legislation the requirements regarding type approval to begin type approval of lifesaving appliances and other products of its own domestic manufacture and foreign manufacture.

91. In response to the circumstances in this connection, establishment of a laboratory or institute to carry out tests like tensile strength tests, ageing tests, cold and high temperature tests, vibration tests, leakage tests, pressure tests, light intensity tests, and so on will be desired in future.

System and organization of inspection

92. Ship inspectors are stationed in Eastern Indonesia as explained in paragraph 75. If assumption is made as in the following two paragraphs, it may give a rough idea on the required number of ship inspectors in future.

93. Assumption is made in such a way that in ADPEL classed as I and III, three ship inspectors are stationed respectively. When classed as IV, two ship inspectors are stationed respectively, and when V, one. Additionally one inspector is appointed to each KANPLE".

94. According to the above assumption, the number of ship inspectors is deduced by 3 x number (7) of ADPEL (I and III), 2 x number (8) of ADPEL (IV), 1 x number (29) of ADPLE (V), and then 1 x number (75) of KANPEL. Adding all them up, it numbers 141. But this number should be adjusted by actual work load.

95. From the viewpoint of work load, if the number of ship inspectors is considered inappropriate, increase or decrease in the number of ship inspectors is of course probable. The increase in the work load of ship inspectors is foreseen in Eastern Indonesia, as shipping develops and the inspection sector changes along with

it. Here is how to calculate out the work load of ship inspectors. The following method can be applied to calculate the necessary number of ship inspectors with view to the work load.

96. The required time for ship inspections is composed of 4 phases, namely;

(1) design examination hours,

(2) on-the-spot examination hours,

(3) travelling hours, and

(4) report making hours.

Then,

(required time) x number of ships to be inspected in a year
= total time of ship inspection in a year

Note: For design examination, reference is made to Appendix 4-6, Part II.

97. The required time may vary depending upon the local conditions which greatly affect the travelling time, and other factors such as tonnage and kind of service. In one Adpel, if the required time for a newbuilding is 250 hours for each ship and the number of newbuildings is 10 in a year, then the total required time for newbuildings is, of course,

250 hours x 10 = 2,500 hours a year.

98. The required time may also vary in accordance with the type of ship inspections. For example for a periodical (yearly) inspection of a ship it may be approximately 50 hours.

99. Other kind of ship inspections such as repair inspection should be considered when calculating the necessary number of ship inspectors by dividing the total work load (hours) of all kinds by one man-year.

100. Additionally, inflatable liferaft inspection and servicing, attendance to training, attendance to inspector's meeting and so on should also be considered. For port state control, 7 hours per one visit (2 foreign ships visited for example) by one PSC team consisting of 2 ship inspectors could be appropriate parameters. For product inspections the determining factor is the location of the factory making the product (meaning the distance between a ship inspector's office and the factory) and transportation.

101. By considering all the relative matters, the number of ship inspectors can be determined.

102. Another important point of consideration under the same title is the job distribution between the headquarters and the local offices. The responsibilities of the headquarters (SeaCom) should be limited to administrative and managing areas as far as practicable.

103. Special designs such as submersible ships, hydrofoil boat, and hovercraft should be dealt with by the headquarters ship inspectors, but other areas should be given to local offices where ship inspectors may handle the jobs including design checks of newbuildings as long as the design of the ship is not out of the ordinary.

104. The headquarters, then, may dedicate its ship safety and inspection related sector to rule-making, international contribution, supervision of all ship inspectors, training, and administration.

105. The ship inspectors in the local offices should be qualified for the job, including daily ship inspections, design checks of normal ships such as cargo ships, fishing boats, and passenger ships, port state control, product inspection such as lifesaving appliances, pollution prevention related inspection, etc. In order to have qualified ship inspectors in the local offices, updated information and necessary training should be provided to them.

106. The ship inspection job should be independent. The ship inspections are presently handled mostly by the Harbor Master who performs inspection jobs as well as harbor management. Ship inspectors under him would naturally deal with both jobs. Ship inspection is a specialized and important job which is to be performed without pressure from other jobs.

107. The problems under this item are:

(1) to consider the job distribution between the headquarters and local offices so that the administration, policy and legislation may be handled by the headquarters and routine inspection may be principally handled by local inspectors,

(2) to give training for upgrading the ship inspectors of local offices, as well as headquarters, who should be well informed of new legislation and technology,

(3) to give guidance for survey and check list for ship inspection and port state control,

(4) to make the ship inspection job independent from other jobs such as harbor control so that the ship inspection jobs may not be pressurized by other sector jobs,

(5) to consider the distribution of ship inspectors to strengthen the command line, which will be maintained intact by filling up void positions by inspectors to connect the headquarters and ship inspectors at various locations, and

(6) to foresee the required number of ship inspectors when work load has increased due to the development of shipping and industries.

Availability of foreign classification societies

108. The SOLAS convention requires the inspection and survey of ships to be carried out by officers of the Administration. At the same time the provisions of Regulation I/6 say that the Administration may entrust the inspections and surveys either to surveyors nominated for the purpose or to organizations recognized by the Administration.

109. The government policy with regard to ship inspections varies from country to country. But generally speaking, many governments entrust the ship inspections to organizations recognized by them in accordance with the SOLAS provisions, and in the Republic of Indonesia, Biro Klasifikasi Indonesia (B.K.I.) is a classification society

authorized by the government of Indonesia, having been established in July 1964 according to government decree No. 28/1964. Ministerial instruction (No. IM. 8/AL. 407/PHB-81, dated March 23, 1981) decrees that all Indonesian flag ships (L=20 m or more, GT=100 or more, power = 100 PS or more) are requested to be classed in B.K.I., except for wooden ships the inspection of which is done by the government.

110. In addition to B.K.I., there are some international classification society offices in Indonesia. These classification societies are not able to carry out their inspection jobs for classing ships in their registries on their own force in Indonesia now, but they may feel having a better environment in their inspection activities, if these societies are able to do so.

H. Proposals on Pollution Prevention

Trimming of pollution prevention rules

111. The same description as the paragraphs of "Trimming of rules" of ship safety relevance applies to the document trimming with regard to pollution prevention rules. The problems to solve are (1) to collect all the pollution prevention related rules to form a set, (2) to formulate various rules of (1) to present clear requirements and (3) to distribute the finished sets to all ship inspectors and concerned parties.

Port state control

112. The same description as paragraphs 82 to 86 of "Reinforcement in port state control" of ship safety relevance applies to the port state control regarding pollution prevention. The port state control in this connection originates from the requirements of MARPOL 73 (Art. 3)/78 and relevant IMO resolutions.

113. The problems to solve are (1) to establish legislation regarding port state control, to formulate a good guideline for PSC teams and to distribute it properly, prescribing the procedure of port state control, (2) to arrange an appropriate number of persons qualified for PSC teams, (3) to provide necessary equipment such as communication means and safety gears, and (4) to train persons to form PSC teams.

Acceleration of installation of reception facilities for MARPOL

114. MARPOL 73/78 convention requires in its annex 1, Regulation 12, the government of each party of the convention to ensure provision of oil reception facilities at oil loading facilities, repair ports and other required ports.

115. As shown on a map of Eastern Indonesia of Appendix 4-4, (Part II), principal oil reception facilities are located in two ports (Balikpapan and Sorong). But some ships have to retain the oily residue or mixture on board because of shortage of oil reception facilities in the Eastern Indonesian area, until docking period during which they discharge it to repair yards.

116. Acceleration of building reception facilities is urgently necessary. Reception facilities can be mobile or immobile. Mobile reception facilities may be the ones mounted on a barge. The barge can be moved alongside the ship which needs reception facilities to discharge oily mixture or whatever. This facilitates the

discharge with the ship at any position in a port because of the mobility of a barge. This is considered an advantage of mobile facilities. In this case the barge should be designed to be either self-propelled or not. If not self-propelled a tow boat may be attending or a boat to carry oily residue or mixture, from a ship in need of discharging to a barge with the facilities might be necessary.

117. If immobile reception facilities were built, the ship in need of discharging oily residue or mixture should be moved to the site of the facilities with wharves to have the ship alongside on its own or other power, or any tank boat has to be employed to take in the oily residue or mixture at the ship away from the facilities to fetch it to the facilities. The facilities are fixed on land and stable even in stormy weather. This is an advantage of immobile facilities.

118. There are advantages and disadvantages on either concept, which are quite apparent from their physical and administrative differences in establishment, operation, required peripheral facilities, maintenance and upkeep. The facilities may include some or all of the following:

piping system, pump, tank, purifier, incinerator, boiler, oily water separator, oil/water interface detector, oil content meter.

Oily residue or mixture can be disposed of through incineration, or it can also be sold as fuel or lubricating oil.

119. The problems to solve in this connection are:

(1) to study where to locate reception facilities (what ports, how many ports, when) and utilization,

(2) to determine design to use and capacity, and

(3) to study the availability of oily residue or mixture.

Type approval system

120. In paragraphs 89 to 91 of "Establishment of type approval system", the necessity of the system is described. This applies to pollution prevention equipment.

System and organization of inspection

121. The description of "System and organization of inspection" of ship safety relevance applies to the system and organization of inspection regarding pollution prevention.

I. Proposals on Ship Safety and Pollution Prevention

Ship inspection system for dangerous goods carrier

122. A new Shipping Act No.21, 1992 of the Republic of Indonesia, signed by the President is to enter into force on September 17, 1994. Articles 35 to 43 and 65 to 68 of the same act are considered to be the fundamental provisions which require the seaworthiness of a ship and prevention of marine pollution. Under these

provisions a new system of regulatory control pertaining to dangerous goods carriers will be formulated. Because of the limited period of time, legislative work is being considered to adopt a method of referring to original provisions in the related international conventions translated into the Indonesian language.

123. After completing the whole spectrum of legislation by referring to conventions, the domestic rules will have taken in all the necessary provisions into the legislation of the Republic of Indonesia. At the next stage, another effort should be made to formulate the requirements not by referring to the conventions (SOLAS, IBC, IGC, BC, GC, MARPOL Annex III, etc.) but by drawing up the whole legislation in full detail in itself without relying upon reference to conventions, which should be observed not only in formulating requirements for dangerous goods carriage but also in formulating requirements for other safety and pollution prevention matters. In addition the legislation should include the detailed method of inspection by laying down in detail the guidance and check list. Now these things are not in existence, and relevant inspections are not well performed.

124. The problems to be solved in this regard are:

(1) to lay down the requirements in the whole legislation without referring to conventions and IMO guidelines and to include detailed requirements and methods on inspection,

(2) to plan training for ship inspectors regarding dangerous goods carrier inspections, and

(3) to provide necessary equipment to ship inspectors (e.g., protective clothing, gas detector).

J. Reinforcement of Ship Inspectors

125. Probable investment in shipping and shipbuilding in the next decade, and the additional building of 1,000 GT to 4,200 GT ships will increase the number of newly built ships by 138 (See Table 4-5). The ships are subjected to ship inspections during construction. The required time for the inspection of a newly built ship would be approximately 250 hours as shown in the paragraph of "System and organization of inspection".

126. Nearly 140 ships in 10 years would mean annual construction of 10 to 20, which means in turn 250 hours x number of ships = required time for the ship inspections of newly built ships. 250 hours of inspection for one ship may seem very long, but presently there exists neither an established type approval system nor a system of preparatory inspections in Indonesia. These systems, if existing, will notably shorten the ship inspections.

127. In countries where these systems have been adopted, the inspection of a newly built ship may require as short a time as 50 hours. In Indonesia, it may be 250 hours instead of 50 hours. If 10 ~ 20 ships are built each year, the inspection time per year would be (250 x 10 =) 2,500 hours to (250 x 20 =) 5,000 hours for the period of ten years up to 2005.

128. There may also be annual periodical inspections. With all these points in mind, the number of the ship inspectors at present and the total work load should be closely examined to determine the required number of ship inspectors.

129. Oil slicks and other kinds of pollution, in the marine environment constitute another important area in the ship inspection system. Continual increase in oil consumption and waterborne transport as well as of petrochemical industries is expected in Eastern Indonesia.

130. The ship inspectors should be deployed throughout the country bearing in mind the increase in the related industries and the number of ships.

131. Port state control as required by international conventions adds a new dimension to ship inspection. This will effectively give a blow to sub-standard ships. Inspection of this area should be increased at an accelerated pace. The number of ship inspectors should therefore be increased by considering port state control jobs. In Indonesia, port state control over foreign vessels is not prevailing, but this job should be made active. The future policy of the government determines the extent of the activity which influences the work load thereof, rendering change in the number of ship inspectors.

K. Cost Estimation

132. The volumes of equipment and facilities required by the headquarters and local offices, should be gauged to calculate the total cost by the unit prices of the items.

133. The following table shows the equipment and facilities with examples of unit prices.

134. Travel budget for inspection should be based on the standard of the government. Meeting and training are other items in the planning of budget.

135. Budget should also be made for printing certificates, booklets, meeting documentation, etc., with reference to available government budgetary standards.

136. The Japanese Government has budgeted Rp. 2,567.5 x 10^6 per year for ship inspectors, covering 60,000 visits of inspections, and including travel costs and other related expenditure. No preparations are required for equipment, because of perfect availability of inspection instruments offered by shipowners or shiprepair yards. NK's recent budget for approximately 6,000 classed ships (80 x 10^6GT) is Rp. 148,000 x 10^6, excluding personnel budget but including host computer fees, etc.

137. Other budgets have to be studied closely on transport means, housing, pollution prevention ships, etc. for the ship inspection or pollution prevention purposes in Eastern Indonesia.

138. Indonesia does not collect fee from ship inspection and inspection certificate issuance. The budget of the Indonesian government in ship inspections is quite limited. The government inspection system should keep itself to the best efficiency.

Items	Unit price (Rp. x 10^6)	Number	Sum (Rp. x 10^6)	Remarks
Thickness gauge	11.85	50	592.5	1 per inspection station
Ultrasonic detector	25.675	2	51.35	Ujungpandang, Ambon
X-ray machine set	59.25	2	118.5	Ujungpandang, Ambon
Other non-destructive testing devices	2.37	50	118.5	1 set per inspection station
Safety apparel	1.3825	13	17.9725	1 set for each Kanwil
Gas detectors (inflammable, CO, O_2)	15.8	13	205.4	1 set for each Kanwil
Two-way radio telephones	5.925	26	154.05	2 sets for each Kanwil
Oil content meter	14.615	13	189.995	1 set for each Kanwil
Peripheral equipment	19.75	50	987.5	1 set per inspection station
Total			2,435.7675	

Items	Unit price (Rp. x 10^6)	Number	Sum (Rp. x 10^6)	Remarks
Oil sludge and residue reception facilities	19,750 on down	1	19,750 on down	Ujungpandang

L. Technical and Non-technical Support

139. 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 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. Industrialization shall be promoted in Eastern Indonesia in pursuit of reducing the economic gap between Eastern Indonesia and the rest of the nation. With the progress of industrialization in Eastern Indonesia, more attention should be paid to special ports.

2. One of the reasons for the above remark is that percentage of cargo volume handled at the special ports will be increased with the progress of industrialization. Manufacturing activities usually require importation of raw materials from other regions and shipment of finished products to markets in other regions, both of which likely pass through the special ports.

3. It is reported that there are nearly one hundred special ports in Eastern Indonesia, which are owned and operated by private companies, and handle special commodities such as oil, timber and coal.

4. Furthermore, over eighty percent of seaborne cargoes are transported by special shipping in Eastern Indonesia. It can be safely assumed that most of the special shipping vessels are loading and unloading at the special ports. These figures support the importance of the special ports in the national port system, and industrialization will contribute to increase the share of cargoes handled at the special ports.

5. Special attention should also be paid to effective coastal zone management in connection with the special port development. With the progress of regional economic development which is led by industrialization, conflicts among several types of land/water use may occur.

6. The regional economic development induces demands both for various types of land use and for larger areas for these activities. Ports and harbors comprising land areas and water areas are usually located in the sheltered areas, which are also good places for other types of economic activities. Therefore, coordination among various kinds of land/water use is necessary.

7. Because of the nature of the technical cooperation programs undertaken, planning efforts in this study should be focussed on public ports which are owned and operated by public entities. 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

1) To support regional industrial development

8. 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.

9. As shown in Table 2-2 in Part I of this report, the agricultural sector has been dominating in the sectoral distribution of the Gross Regional Domestic Product in Eastern Indonesia. Manufacturing industries have been playing a limited role in the economic activities in most of the provinces in the study area although East Kalimantan and Irian Jaya are exceptions. For minimizing the economic discrepancy between provinces in Java and in Eastern Indonesia, every effort should be made to generate a favorable environment for the secondary sector in Eastern Indonesia.

10. One of the basic functions of the ports and harbors is to promote industrial development in the vicinity of the ports. As per capita income grows, people reach a point beyond which additional income is not used primarily to purchase agricultural products but is increasingly utilized to acquire manufactured goods. This development phase requires the intensive utilization of regional and imported raw resources.

11. One of the critical factors necessary for advancement into this phase is the existence of good transfer facilities like ocean ports. And total transfer costs associated with production at transshipment points are often less than or equal to total transfer costs realized at alternative production locations. Thus, some ocean ports have high potential to become important production centres. Through close coordination with Ministry of Industry, industrialization shall be pursued in Eastern Indonesia.

12. Although most resource oriented industries will be located in adjacent areas of special ports, industrialization also affects activities of neighboring public ports. At construction stage of the firms, many construction related materials such as cement, steel and heavy machinery will be unloaded at neighboring public ports. Even at operation stage of the firms, considerable volume of cargoes relating to the firms' operation such as parts of machinery as well as consumer goods for workers will pass through the public ports. Public port facilities have to be improved to promote regional industry development.

2) To support construction works of social infrastructure

13. 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.

14. Generally speaking the major ports and harbors in Eastern Indonesia presently function only for distribution of consumer goods, shipment of local resources and their products, and for embarkation or disembarkation of sea traffic passengers. Level of existing port facilities and their layout just match such required functions.

15. Eastern Indonesia is in general a less developed area. Development of social infrastructures such as ports, airports and roads has been kept at a low level. Since the beginning of the 1990s special attention has been paid to the Eastern part of Indonesia in hopes of achieving national unity and efficient utilization of resources. It is expected that development works will accelerate in the foreseeable future, and a considerable volume of construction materials have to be transported by ships because many of them are not available at construction sites.

16. From the view point of both safety and efficiency in the port area, it is not suitable to handle these types of cargoes at the same berth where passenger ships or general cargo ships are usually accommodated. Wide back up areas are also required to handle and stock these types of cargoes. With the increase of volume of these types of cargoes, provision of berths for exclusive use of these types of cargoes is recommended.

3) To stimulate regional gateway function

17. 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.

18. Because of the archipelagic nature of the nation and poor condition of the road system throughout most of the eastern part of the country, maritime transportation has been given an extremely important role both for passenger and cargo movement. This mission of the maritime transportation will not be changed in the foreseeable future.

19. Commercial ports in Eastern Indonesia have been functioning as commercial and distribution centers for their vicinities although service has not reached satisfactory levels. Cargoes originally shipped from other regions are unloaded at these commercial ports and transshipped to non-commercial ports in isolated islands or remote areas. It is important to reinforce the distribution function at these ports to promote regional development and improve the living standard of residents in these areas.

20. Another important issue concerning the port's distribution function is to help improve gateway functions at core ports in several corners in Eastern Indonesia.

21. As explained earlier Ujung Pandang is the largest city in terms of population size, and Port of Ujung Pandang is the busiest general cargo port in Eastern Indonesia. The port of Ujung Pandang, however, is not placed at the top of the hierarchy of the port system in Eastern Indonesia. Each province or each port in the study area directly trades with Surabaya, and to a lesser extent with Jakarta. Common market or hierarchy within Eastern Indonesia seems not to exist.

22. It is said that proposals for port development are still driven partly by the desire of individual provinces to have their own deep sea ports. It is rather realistic, therefore, for the provinces to be dealt with as individual units, not as parts of some overall Eastern Indonesian region.

23. Although the role of the port of Ujung Pandang has been significant, it is very hard for this port to fulfill all of the gateway functions in Eastern Indonesia because Eastern Indonesia is so large in area and so diverse in culture and historical backgrounds. Therefore, gateway functions shall be developed at a few suitable ports in other corners of the study area.

4) To support growth of provincial centers

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

25. High-speed vessels will be introduced for short- or medium- distance routes connecting neighbouring regions and islands to strengthen the functions of the port city as a regional center for daily life. Passenger terminals will serve as community centres while providing chances for shopping and entertainment.

26. In the long run it is of great importance to assure a harmonious development and extension of both the port and the city. Long range city planning should be strictly coordinated with master plans for the port and vice versa. Port activities act as a powerful stimulant for development of various functions of a city which otherwise would take years to materialize. The ultimate goal in development of a port city is to establish a prosperous center of daily life, business and trade.

5) To introduce modernized maritime transport technology

27. 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.

28. The conventional method of general cargo transport by sea in break-bulk form, that is as a great variety of boxes, crates or cartons, was strongly challenged during the last decade by the new transportation method. Shipment in containers has shown until now rapid and successful progress, and a total of ten ports in Eastern Indonesia handled containers as of 1991.

29. All countries with ports will certainly not escape from the prevailing trend towards cargo transport in unit loads. Container traffic, even in domestic trade, will gradually appear at Eastern Indonesian seaports with a higher volume of trade, although the rate of growth will not be as spectacular as at international hub ports.

30. Another field of the maritime transport technology is Ro/Ro transportation system. Ro/Ro transportation can be defined as a mode of marine transport in which the cargo comprises a series of units each capable of being loaded into and unloaded from the ship by essentially horizontal movements, every unit being moved on its own wheels or by a temporary mobile system which may or may not be carried with the unit on the ship for use at both ends of the voyage.

31. Ro/Ro transportation services greatly facilitate the movement of cargoes since no intermediate handling and storage is required. The movement of cargoes is dependent only on ship departure schedule, as on ship arrival it continues directly to its destination. For similar reasons, bus and car traffic also benefit from such services.

32. Ro/Ro transportation can be considered as an advanced form of shipping, suitable for short or medium distance routes, not as mere bridges to connect two points which are separated by narrow channels. Ports and harbors in Eastern Indonesia should monitor the growth of the intermodal traffic of this type, and examine the necessity for the introduction of the port facilities to accommodate Ro/Ro vessels when appropriate. Administrative demarcation between DGSC and DGLT on this transportation system needs careful reexamination.

6) Provision of recreational functions and to promote tourism development

33. 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.

34. In particular, consideration shall be given to forming a network of port calls by cruisers. Recently a sea voyage, which offers sea-viewing in a relaxed atmosphere and comfortable cabin stay, is attracting a lot of attention, leading to the growing popularity of cruisers sailing around the country and the world. Several ports which are situated in Sulawesi, Maluku, Irian Jaya and Nusa Tenggara seem to have high potential to hold such function.

35. Ports and harbors which serve as a base for marine recreation activities such as sailing shall be placed in suitable places, in consideration of the progress of tourism development in the nation as well as in the region. Although few ports in Eastern Indonesia presently carry this function, many ports and harbors will require this function in the long run.

36. It is said that a proposal was made to convert Port of Manado into a marine recreational and supporting facility complex. Such a proposal should be supported, provided that the region is going to promote tourism development and that the redevelopment of the obsolete port facilities is expected to play a crucial role in this project.

Basic roles of small class ports

37. 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.

38. 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.

39. 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, improvement of the comprehensive 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. They include expansion and strengthening of shipping services and improvements of port facilities.

Other factors to be considered

1) Reexamination of roles of the international ports

40. As a part of the Presidential Instruction 4/1985 (INPRES 85), a set of measures for deregulation reform, the so-called Four Gateway System was modified and gates of 117 ports were opened to international trade by decrees of Ministers of Communications, Trade and Finance. At present there are total 129 international ports, comprising 80 public ports and 49 special ports.

41. However, some of them are supposed to be qualified as international ports regardless of their actual low activities. According to cargo loading and unloading statistics in latest three years published by BIRO, 23 ports of total 80 public international ports handled only less than 1000 tons of international cargo, as shown in Appendix 8-1. Some of them which handle special international cargo such as livestock, mining, forestry and marine products may be recognized as international ports in spite of their small cargo volume, but there seem to be no necessity for some ports which hardly handle international cargo to be qualified as international ports.

2) Conservation of the environment in ports and harbors

42. 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.

43. In accordance with international conventions on the prevention of marine pollution (MARPOL 73/78), the construction of a reception facility for ship waste oil and refuse shall be implemented at major ports and harbors in Eastern Indonesia.

3) Natural conditions

44. Natural condition is one of the major factors to be considered in the formation of the master plans of individual ports because severe natural conditions may limit further development, and because careful evaluation of natural conditions at a port is necessary to avoid excess construction cost.

45. There exist river ports and estuary ports in Kalimantan and Irian Jaya. Draught of calling vessels at these ports has been limited by the water depth of the rivers, hence these ports usually cannot enjoy reduction of transportation cost by enlargement of vessel size. Furthermore, these ports usually require maintenance dredging, which is a heavy financial burden for port management bodies.

46. Many ports in Eastern Indonesia are sheltered by islands or peninsula. With the progress of economic activities in the hinterland, however, the port will require additional areas to handle the larger volume of cargoes and to accommodate new functions. If sufficient land and water area for future development cannot be found nearby, the possibility of port relocation must be explored. Natural conditions often play a crucial role in the decision process on such occasions.

B. Classification of Study Ports

Study Ports

47. Indonesian ports are classified broadly into three categories based on their management system. (i.e., Public ports managed by DGSC, Ferry terminals managed by DGLT and Special ports managed by private companies.) These ports have been playing important roles in sea transportation in Indonesia, corresponding to their characteristics and functions.

48. One of the main objectives of this study is to formulate the "Integrated Modernization Plan For Sea Transportation In Eastern Indonesia". The study ports should be selected taking account of the main objectives of this study.

49. In this study, JICA Study Team selected the public ports managed by DGSC as the study ports because of the following reasons.

(a) The public ports managed by DGSC play the most important roles in the sea transportation in Eastern Indonesia for the general public.
(b) Ferry terminals managed by DGLT also have important roles in the sea transportation in this area. A JICA study on Ro/Ro ferry terminals has, however, been implemented under a separate Scope of Work.
(c) The special ports managed by private companies handle a considerable portions of seaborne cargoes. Their future improvement plans, however, will be proposed in principle by private companies.

50. These considerations led to the conclusion that the public ports managed by DGSC should be selected as the study ports. The 406 study ports are shown in "Part I Chapter 8 Table 8-1".

Concept of port classification

51. DGSC already has a port classification system for the Indonesian ports. This port classification system was established to pursue effective port administration and management in Indonesia.

52. 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.

53. The results of field surveys and analysis of the existing data also led to the conclusion that there exists a large gap between the over middle class port and the small port with regard to the roles in the sea transportation.

54. Functions of the over middle class ports can be considered as follows.

(a) The over middle class ports serve as transition points in the sea transportation in respective provinces.
(b) The ports play an important role as socio-economic centers in a province.
(c) Condition of port facilities at present is moderate.

55. On the other hand, the concept of the small ports is as follow.

(a) The small ports play a locally important role in the sea transportation.
(b) Condition of port facilities at present is poor.

Port classification

56. The study ports were classified into the over middle class ports and the small ports using the following method. First of all, cargo handling volumes at each port in Eastern Indonesia are shown in Figure 5-1. These data are based on "Biro Pusat Statistik" and they include 102 ports (excluding the special ports) in the study area. According to this figure, a boundary between the over middle class ports and the small ports is found in the neighborhood of 0.2 million tons. Therefore, the ports which handled over 0.2 million tons of cargoes were selected as preliminary candidates for the over middle class ports. Names of these ports are shown in Table 5-1.

57. Secondly, JICA Study Team assumed that at least one over middle class port has to 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. Therefore, twelve ports were selected as the over middle class ports at this stage. (see Table 5-1)

58. Furthermore, it seems that some of the ports in Table 5-1 are as important as the twelve selected ports. So JICA Study Team set some conditions to select additional ports as over middle class ports. The conditions are as follows.

(a) Condition (1)
Berth length (excluding private berth) is over one hundred meters.
(b) Condition (2)
Various commodities are handled at the port.(i.e., most of cargoes are not specific commodity.)

59. The reasons why the above-mentioned conditions were adopted for screening are as follows.

(a) The over middle class ports are provincial or regional mini hub ports in the provinces, therefore it is necessary to have facilities at which more than two vessels (for example an interisland liner ship and a local feeder ship) can berth at the same time.
(b) The ports which handled specific commodity only cannot be regarded as socio-economic centers for regions.

60. From the screening by above mentioned process, seventeen over middle class ports in Eastern Indonesia are identified and the remaining ports are classified as small ports. (see Table 5-1 and Figure 5-2)

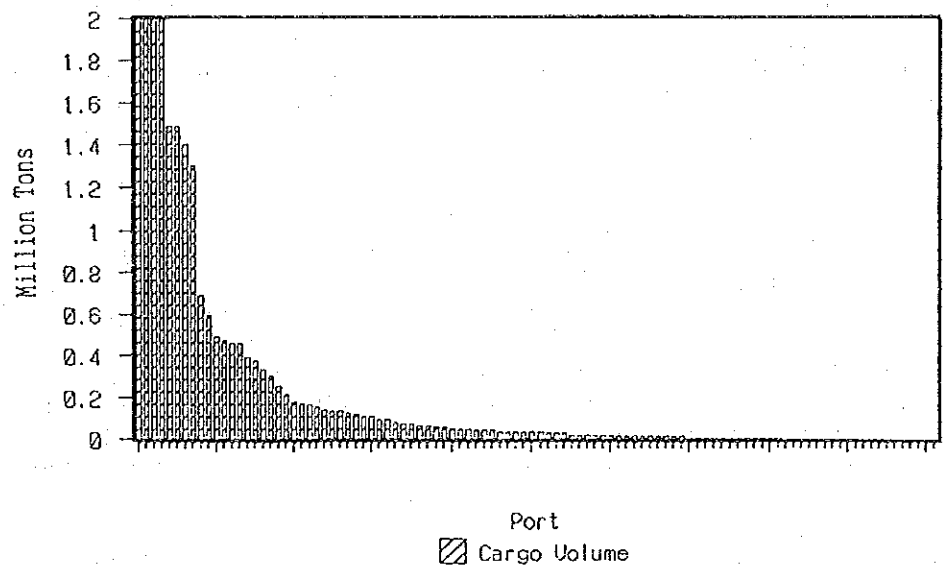


Figure 5-1 Cargo Handling Volume at Each Port in Eastern Indonesia

Table 5-1 Selection of Over Middle Class Ports in Eastern Indonesia

(In 1991)

No.	Port No.	Province	Port	Cargo (Tons)	Berth Length(m)	Condition (1)	Condition (2)
1	①	C.Kalimantan	Sampit	1,121,577	269	-	-
2	②	S.Kalimantan	Banjarmasin	4,275,764	1,218	-	-
3	③	W.N.T	Lembar	455,149	228	-	-
4	④	E.N.T	Kupang	296,476	323	-	-
5	⑤	E.Timor	Dilli	222,694	180	-	-
6	⑥	E.Kalimantan	Balikpapan	32,257,825	269	-	-
7	⑧	N.Sulawesi	Bitung	1,953,006	1,167	-	-
8	⑨	C.Sulawesi	Pantoloan	738,357	150	-	-
9	⑩	S.Sulawesi	Uj.Pandang	3,734,167	1,900	-	-
10	⑫	SE.Sulawesi	Kendari	284,839	220	-	-
11	⑬	Maluku	Ternate	2,195,082	248	-	-
12	⑮	Irian Jaya	Sorong	1,464,662	200	-	-
13	⑦	E.Kalimantan	Samarinda	5,388,110	550	○	○
		S.Kalimantan	Kota Baru	2,212,413	122	○	×
14	⑭	Maluku	Ambon	1,599,000	676	○	○
		E.Kalimantan	Tarakan	1,136,494	175	○	×
		E.Kalimantan	Tg. Redeb	587,155	89	×	×
15	⑪	S.Sulawesi	Pare-Pare	525,282	191	○	○
16	⑯	Irian Jaya	Biak	403,494	202	○	○
		C.Kalimantan	Pangkalan Bun	348,329	86	×	×
		S.Sulawesi	Palopo	334,498	15	×	×
		N.Sulawesi	Gorontalo	263,981	99	×	×
17	⑰	Irian Jaya	Jayapura	255,719	165	○	○

Source: DGSC, PERSERO

Figure 5-2 Location of Selected Over Middle Class Ports in Eastern Indonesia

C. Conceptual Development Plans for Over Middle Class Ports

Network plan of port functions

1) Distribution

61. Port of Ujung Pandang was designated as one of the four gateway ports in Indonesia. In reality, however, most of the ports in Eastern Indonesia have stronger ties with Jakarta and Surabaya because manufacturing and service industries exist in Java, especially around Surabaya. In future, it is hoped that the roles of the Surabaya port can be decreased step by step as some cities in Eastern Indonesia grow and become the nucleus of regional development.

62. 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 ports. Taking into consideration geographical balance and potentials, regional distribution and collection function shall be strengthened at the following ports:

Ujung Pandang, Bitung, Ambon, Balikpapan, Sorong, Kupang.

2) Container port

63. Containerization of interisland maritime transportation in Indonesia has been rather slow compared with the neighboring archipelago where about 34 % of the total domestic cargoes handled at the public wharves have been containerized. With the progress of the deregulation policy in the shipping sector however, this maritime transportation technology has gained sharply in popularity. The wave of containerization has been moving also in Eastern Indonesia. Annual growth rate of container cargoes shows 50 % during 1984-1991 at the 17 Eastern Indonesian ports which are selected as the over middle class ports in this study.

64. 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 the ports with 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. The rest of the over middle class ports shall be also ready for handling and storing containers. Actual timing for the construction, however, will depend on specific port condition.

Container terminal: Ujung Pandang
Terminal candidate: Balikpapan, Bitung, Ambon

3) Industrial base port

65. Industrialization should be promoted in Eastern Indonesia so that this region can catch up with the rest of the nation in economic terms. Ports can support regional industrialization directly or indirectly if ports can handle raw materials, finished goods, or heavy machinery and equipment under low handling cost.

66. East Kalimantan and Sulawesi have been industrial growth centers, and efforts will be required to establish the new growth centers at Maluku-Irian Jaya, and Nusa Tenggara. Prime ports situated in those areas should strengthen the industrial function by installing heavy/bulk cargo berth of 10,000 DWT. Candidate ports are:

Balikpapan, Ujung Pandang, Bitung, Ambon, Sorong, Kupang.

4) Passenger transition port

67. People in Eastern Indonesia heavily rely on sea transportation for their interisland and intraisland trips. Because interisland vessels only anchor at prime ports, port's transition function is very important to people who live in remote areas. Transition ports should provide passengers and users with sufficient services so that they can feel comfortable during their stay. Following ports are expected to improve functions as major transition ports.

Banjarmasin, Balikpapan, Bitung, Ujung Pandang, Kendari, Ternate, Ambon, Sorong.

5) Tourism base port

68. Tourism development is one of the prosperous fields in Eastern Indonesia. Ports should help promote this direction by providing necessary facilities and services. It is currently observed that a berth is utilized both for cargo ships and passenger ships. It is advisable to establish a berth, when matured, for exclusive use of passenger ships and cruise ships for the sake of passenger's safety and comfort, and that higher services such as shopping opportunities be provided at cruise/ passenger terminals. Following ports shall be improved as tourism base ports:

Lembar, Bitung, Ujung Pandang, Kupang, Ternate, Ambon, Biak, Jayapura.

6) Summary

69. Distribution of the major port functions is summarized in Table 5-2.

Table 5-2 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 Ternate		●			●		●	●
14 Ambon	●			●		●	●	●
15 Sorong	●				●	●	●	
16 Biak		●			●			●
17 Jayapura		●			●			●

Traffic demand forecast

1) Cargo flow

70. Demand forecast of each port in 2005 aims at forecasting cargo volume which will be handled at " public wharves " because the scope of this study is to prepare master plans of public port facilities. Master plans of special ports and special wharves should be prepared separately.

71. Data of cargo traffic are obtained from PERSERO III,IV. These data in principal, however, show only total public cargo from 1984. Cargo volume by package type is aggregated into total cargo.

72. Therefore historical traffic data on public cargo volume by package type was established by the JICA study team using related information. Demand forecast is carried out based on the estimation of the historical traffic volume above.

73. Total demand of the public cargo traffic of each port in 2005 was forecast based on the following single regression model. Assumed GRDP for each province in 2005 (Interim report I , Part II Chapter 2 B.Socio-Economic Framework) was applied to these models.

$$Y = a \times X + b$$

where, Y: Cargo demand at each port (ton)
X: GRDP by province (Milli. RP at 1983 const. price)
a,b Constants by each port

74. Annual growth models were applied to some cases in which linear regression models did not show high correlation coefficients of a satisfactory level. Traffic demand elasticity for GRDP was derived from the regression model and set to be 1.13 through the target year.

75. The cargo volume by package type for the target year was also forecast based on a single regression model. When it did not show high correlation coefficients of a satisfactory level, annual growth models were applied. The total cargo traffic forecast was utilized as a control total for the forecast of the cargo volume by package type.

76. 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.

2) Passenger flow

77. Total demand for sea passenger traffic in 2005 was forecast based on a single regression model in the same manner as the projection of sea cargo traffic.

78. Annual growth models were applied when correlation coefficients of the models were not sufficiently high. Trip demand elasticity for GRDP was derived from the regression analysis, and was set to be 1.5 through the target year.

3) Result of the demand forecast

79. Result of the demand forecast is summarized in Table 5-3.

Table 5-3 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 in 1990.
Note 2): Existing data at Balikpapan is in 1991.

Estimation of berthing capacity

80. Capacity estimation of the existing berthing facilities is a necessary step for the determination of magnitude of additional berthing facilities to accommodate the anticipated traffic in 2005.

81. The capacity of the berthing facilities is defined as cargo volume when the berthing facilities are optimally utilized. The optimal berth occupancy is the berth occupancy for which annual costs and benefits of berth extension are equal to each other. The optimal berth occupancy depends on the cost of new quays (including back-up facilities), the waiting cost of vessels in port and the number of interchangeable berths. To provide a preliminary indication of quay extension requirements, provisional optimal berth occupancies have been obtained from the ISTS study:

Number of berths	1	2	3	4
Optimal berth occupancy	55%	59%	61%	63%

82. According to UNCTAD monograph, the figures given below are suggested in principle to be regarded as desirable occupancy rates for multipurpose terminals:

Number of berths	Utilization rate (percentage)
1	30
2	50
3	65

83. On the other hand, the berthing capacity can be estimated by the following empirical formula:

$$C = N \times 24 \times U \times BPI / L$$

in which

C = annual berthing capacity in tons
N = number of working days per year
U = berth utilization
BPI = cargo loaded/discharged per ship-hour at berth
L = quay length occupied by a berthing vessel

84. It is reported that break-bulk operations of the interisland trade ships at Indonesian ports had median BPI of 26.2 ton/ship-hour in 1985. Assuming N = 350, U = 0.6, BPI = 26.2, L = 130 (standard quay length of a -7.5 m berth), annual berthing capacity is estimated at 1,016 ton/m.

85. According to Jean-Georges Baudelaire (1986), it is said that as far as conventional break-bulk cargo is concerned, a 700 tonnes per running metre, per year, would be satisfactory; 1,000 tonnes would be excellent.

86. Figure 5-3 and Figure 5-4 show the relationship between berth occupancy rate (BOR) and berth throughput (BTP). The data of Figure 5-3 represents port activities at main wharves of Ujung Pandang, Bitung, and Ambon for the period of 1984-1992, and those of the Figure 5-4 represents port activities at local wharves of several ports in Eastern Indonesia. At the point of BOR being equal to 60 percent, BTP is in the neighborhood of 1,100 ton/m for the former, and 400 ton/m for the latter.

87. For rakyat/sailing wharves, BTP is reported to be 613 ton/m at Paotere of Ujung Pandang, 1,914 ton/m at Donggala of Pantoloan where natural beach is utilized for cargo handling, and 885 ton/m at Lembar. These wharves are fully utilized by calling boats.

88. From the foregoing discussions, optimum berthing capacity is assumed in this study as follows:

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

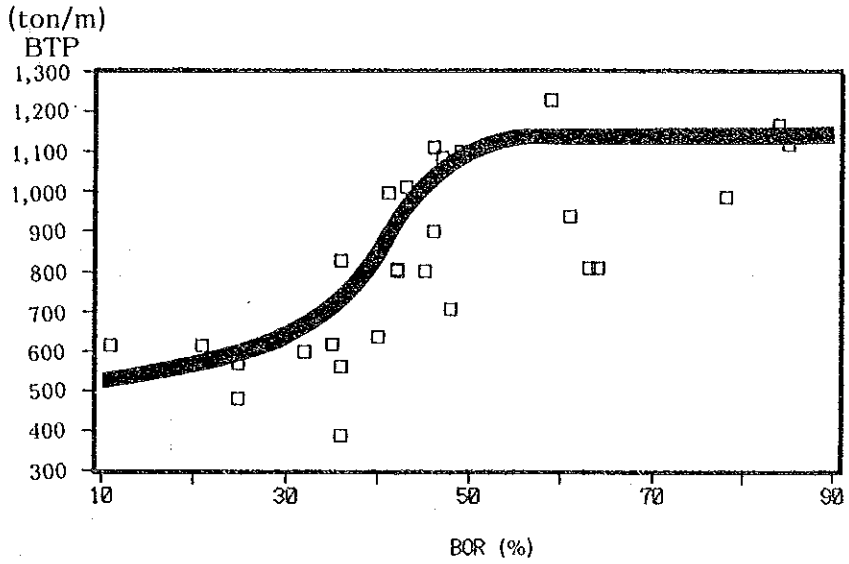


Figure 5-3 Relationship between BOR and BTP of Main Wharf

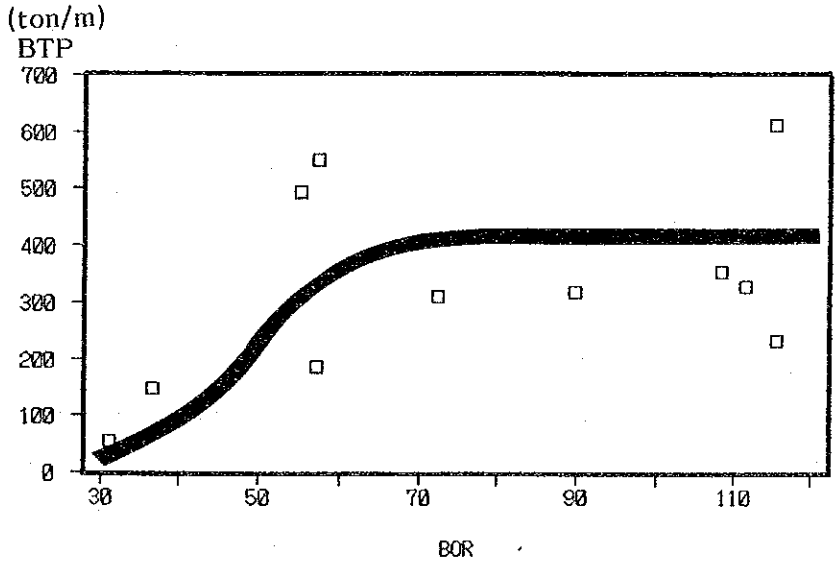


Figure 5-4 Relationship between BOR and BTP of Local Wharf

Facility planning

1) Main berthing facility

89. New berthing facilities should be built to meet the difference between traffic demand forecast in 2005 and the cargo handling capacity of the existing berthing facilities. Magnitude of the required berthing facilities is expressed by number of the standard berths. Dimensions of the standard berths are as follows;

Ship size	Berth length	Water depth
5,000 DWT	130 m	- 7.5 m
10,000 DWT	170 m	-10.0 m
20,000 DWT	250 m	-10 to -12 m

2) Other berthing facility

90. Sailing ships or rakyat have been playing significant roles for both interisland and intra-regional shipping because freight rate of this type of shipping is cheaper than the others. The roles of this shipping type will not be diminished even in the foreseeable future.

91. On the other hand, modernization of this shipping type is necessary in order to pursue the improvement of working conditions for seamen. With the economic progress in Indonesia, employment of seamen for this type of shipping will become harder and harder.
In addition to that, it is getting more and more difficult to acquire timbers for building wooden vessels.

92. Therefore, in this particular study, construction of jetties for sailing/rakyat vessels will only be proposed for certain ports such as Lembar and Ambon where construction schedules have been already set.

3) Container yard

93. Estimation of land area for container yard at each port was carried out taking into consideration the planning elements such as the container handling volume forecast and type of land side cargo handling equipment. Container yard area at each port is calculated by following formula.

$$A = (My \times S \times Ds \times p) / (H \times e \times Dy \times a)$$

Where
- A : Required container yard area (m2)
- My: Container handling volume (TEUs)
- S : Storage area per TEUs (m2/TEU)
- Ds: Dwelling time (Days)
- p : Peak ratio
- H : Average stacking height
- e : Working area factor
- Dy: Operating days (Days)
- a : Effective storage area ratio by handling system

94. In this study, the standard container handling conditions were determined based on the present practices in Eastern Indonesian ports. Using above formula and conditions, the requirements of container yard areas in 2005 were calculated.

4) Cargo handling equipment

95. There is an argument whether Persero should further purchase and own cargo handling equipment because existing equipment has not been utilized in a financially sound manner. It is claimed that purchasing new cargo handling equipment will only exacervate Persero's financial problems.

96. On the other hand, it is obvious that many ports in Eastern Indonesia need more cargo handling equipment, especially for heavy cargoes, to attain more efficient handling. Considering the possible increase of wage rates of the port labors, mechanization of the cargo handling will be inevitable.

97. Taking into consideration these two factors mentioned above, JICA study team proposes that Perseros should own cargo handling equipment to handle 20 feet 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.

5) Tug boats and pilot boats

98. The ministerial decree by which the port perums (former institutions of Perseros) were set up states that the perums shall act as autonomous entities responsible for the piloting and towing. In order to fulfill the duties mentioned above, it is necessary for Perseros to have sufficient number of supporting vessels such as pilot boats and tug boats with adequate function and quality.

99. When JICA study team made site visits to Eastern Indonesian ports, it was found that some of the existing pilot boats were superannuated, and replacement is seemingly needed. Improvement of capacities of the ships may also be required.

100. Determination of the capacities of the tug boats requires detailed information on number and size of calling vessels in the target year. Therefore, procurement of pilot boats and tug boats at each port shall be analyzed in the feasibility studies.

6) Summary of required facilities and berth capacity

101. Required facilities, and existing and future port facilities, berth capacities are summarized in Table 5-4, Table 5-5, and Table 5-6, respectively.

Table 5-4 Required Berthing Facility

Port	Container Terminal	Heavy Cargo/ Container Berth		Conventional Berth			Passenger Ship Berth		TOTAL	
	250 m (-10~-12m) 20,000DWT	250 m (-10~-12m) 20,000DWT	170 m (-10m) 10,000DWT	170 m (-10m) 10,000DWT	130 m (-7.5m) 5,000DWT	70/110 m (-4.5~-6m) 700/3,000DWT	190 m (-7.0m) 10,000GT	150 m (-6.0m) 5,000GT	No. of Berth	Berth Length (m)
Sampit	-	-	-	-	-	7	-	-	7	490
Banjarmasin	-	-	-	-	-	35	-	1	36	4,000
Lembar	-	-	-	-	5	-	-	-	5	650
Kupang	-	-	1	2	-	-	-	-	3	510
Dilli	-	-	-	-	2	-	-	-	2	260
Balikpapan	-	1	-	7	-	-	1	-	9	1,630
Samarinda	-	-	-	-	-	14	-	-	14	1,540
Bitung	-	1	-	7	-	-	-	-	8	1,440
Pantoloan	-	-	-	-	3	-	-	-	3	390
Uj.Pandang	2	-	1	7	-	-	1	-	11	2,050
Pare-Pare	-	-	-	-	4	-	-	-	4	520
Kendari	-	-	-	-	1	-	-	-	1	130
Ternate	-	-	-	-	1	-	1	-	2	320
Ambon	-	1	-	3	-	-	1	-	5	950
Sorong	-	-	1	-	-	-	-	-	1	170
Biak	-	-	-	1	-	-	-	-	1	170
Jayapura	-	-	-	-	2	-	-	-	2	260
TOTAL	2	3	3	27	18	56	4	1	114	15,480

Table 5-5 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

Table 5-6 Standard Capacity

Port	1992		2005	
	Total Cargo (Tons)	Standard Capacity (Tons)	Total Cargo (Tons)	Standard Capacity (Tons)
Sampit	180,000	170,000	740,000	710,000
Banjarmasin	1,760,000	970,000	5,250,000	5,210,000
Lembar	370,000	370,000	1,100,000	1,170,000
Kupang	310,000	290,000	790,000	850,000
Dilli	270,000	200,000	510,000	490,000
Balikpapan	600,000	380,000	2,060,000	2,060,000
Samarinda	850,000	610,000	2,280,000	2,300,000
Bitung	1,180,000	950,000	2,680,000	2,630,000
Pantoloan	440,000	230,000	800,000	740,000
Uj.Pandang	2,770,000	2,400,000	6,030,000	5,990,000
Pare-Pare	330,000	290,000	910,000	880,000
Kendari	230,000	270,000	430,000	410,000
Ternate	240,000	380,000	480,000	520,000
Ambon	860,000	1,010,000	2,820,000	2,900,000
Sorong	140,000	220,000	300,000	410,000
Biak	180,000	160,000	360,000	350,000
Jayapura	240,000	160,000	480,000	450,000
TOTAL	10,950,000	9,060,000	28,020,000	28,070,000

Note 1): Existing data of total cargo at Sampit is in 1990
Note 2): Existing data of total cargo at Balikpapan is in 1991

Conceptual development plan of each port

1) Sampit

(1) Sampit is situated roughly in the middle of Central Kalimantan province about 115 km west of Palangkaraya, the capital city of the province. Port of Sampit is located on the west bank of the Mentaya River about 72 km upstream from the mouth of the river, and is the only port of a considerable size in this province. Population of Kotawaringin Timur Regency (Sampit is a part of the Regency) was 378,930 in 1990.

(2) Waves are light in the estuary and cause no problems. The mean range of the spring tide diurnal is 1.80 m. Currents are under 1 m/sec - 1.5 m/sec in the open sea, and slower still in the estuary where they do not exceed 1 m/sec at spring tides. The sea bottom consists of mud and sand. The natural depths in the access channel are the main limiting factor.

(3) The port traffic actually consists of two different types of traffic: specialized traffic and public traffic. The former is essentially related to forestry activities and is handled at private wharves, and the latter is dealt with at public wharves. The public wharves were developed in a linear direction along the river bank in front of the town of Sampit. A total length of 155 m with -4.5 m water depth alongside has been renovated and construction of an additional 161 m of wharves is underway. The port has 1,316 m^2 of transit sheds, 3,000 m^2 of open storage and a 180 m^2 passenger terminal.

(4) The public wharves handled 175,475 tons of cargoes in 1990 as shown in Table 5-7. This port was imbalanced in terms of loading and unloading cargo volume. The unloading cargoes accounted for 63 percent of the total, and daily necessities, cement, fertilizer and rice were the major commodities. On the other hand, major commodities of the loading cargoes were rubber and rattan. The average annual growth rate of the public cargoes showed 8.8 percent from 1984 - 1990. No containers have been handled at the port.

Table 5-7 Port Traffic and Utilization (Sampit)

Year	1984	1988	1990	Year	2005
Total C.(ton)	(105,840)	(83,176)	175,475	Total C.(ton)	741,000
Passenger	15,830	12,267	13,475	Passenger	125,000
B O R (%)	96	82	76		
B T P (ton/m)	515	307	379		

Note : ( ) is indicated a rough estimation.

(5) Number of passengers who embarked or disembarked at the port of Sampit reached 54,660 in 1992. The average annual growth rate shows 17 % during 1984 - 1992.

(6) The ships calling at Sampit public berths were mostly Lokal and Rakyat. Utilization levels of the public berths in the past years are also shown in the form of BOR and BTP in Table 5-7. The BOR was 70 % and the BTP was 617 tons/m. The standard cargo handling capacity of the existing berths is estimated at around 170,000 tons per year.

(7) Sampit hinterland is heavily dependent on the forestry activity that is handled at private wharves. The general cargoes and other consumer goods pass through the public wharves. It seems that this basic economic structure will remain unchanged in the future. The fundamental problem of the port lies in the fact that the port is a river port, future expansion of which is generally limited by shallow draught of the channel. Demand for consumer goods and food, however, will increase with the economic progress in the region. The major role and function of the port in 2005 is conceived as follows;

a) Provincial distribution function

(8) Seaborne public cargo is expected to reach about 740,000 tons in 2005, and passenger traffic will be 125,000.

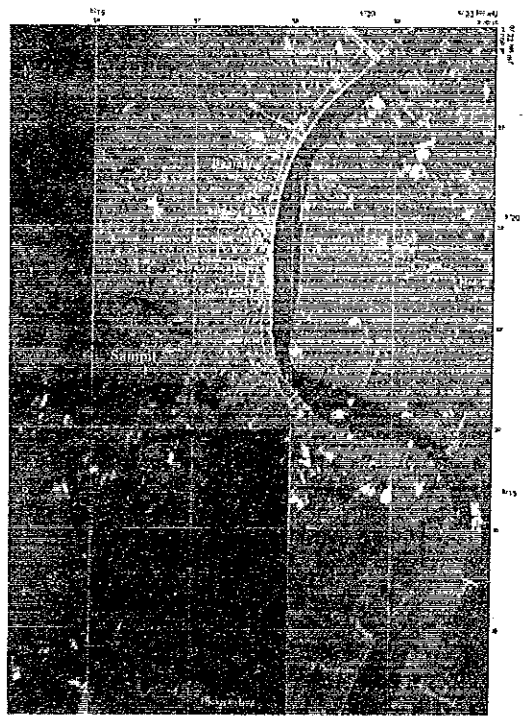
(9) The port of Sampit will require an additional seven berths with a total length of 490 m by 2005 including quays under renovation which can accommodate 700 DWT class vessels. A new passenger terminal should be also built to improve port service to passengers and crews.

Quay (-4.5m)	7 Berths	490 m
Passenger Terminal		300 m^2

(10) Medium scale environmental impact will be anticipated by the port development based on the master plan discussed above in the following facets;

a) Water quality and bottom contamination
b) Marine/coastal ecology
c) Waste management

(11) With the development and improvement of the road system in the hinterland and following the growth of GRDP, demand for consumer goods and foods will increase even after 2005. Roles and functions of the port of Sampit should be reviewed and evaluated within the framework of the total transportation system in Kalimantan island as well as taking consideration of the physical and social constraints of the port.



2) Banjarmasin

(1) Banjarmasin is located along the riverside of Barito and Martapura in South Kalimantan, approximately 20 miles from the sea. Banjarmasin is the capital city of South Kalimantan province. Port of Banjarmasin is the main sea transportation link which plays a key role for the economic development of the province. Population of the municipality of Banjarmasin was 481,371 as of 1990.

(2) Banjarmasin is a river port. It is reported that tidal phenomena can be seen about 200 km upstream of Barito river during the dry season. Tidal range is 1.30 m. At the Barito river, current is created by two kinds of forces; one is an ordinary water flow of the river and the other is tide. Bed materials at Barito river are composed of clay and sand, and those at Martapura river are composed of clay, silt and sand.

(3) The port is basically composed of the two public port areas: Trisakti area for oceangoing/interisland wharves and Martapura area for Rakyat wharf. Trisakti area consists of wharves of 440 m in length, -6.8 m water depth alongside, and a wharf of 350 m in length, -5.0 m water depth. A new passenger wharf of 70 m in length is under construction. On the other hand, Martapura area comprises a Rakyat wharf of 428 m in length. The biggest problem of the port is maintenance dredging, which takes a large portion of the budget. The port at Trisakti area has 8,250 m^2 of transit sheds, 15,601 m^2 of open storage and 10,226 m^2 of container yards. The port at Martapura area has 3,980 m^2 of transit sheds and 9,087 m^2 of open storages. The port is equipped with seven units of forklift, three mobile cranes, two chassis and one top loader.

(4) The public wharves handled 1,755,949 tons of cargoes in 1992 as shown in Table 5-8. About half of the cargoes at this port are general cargoes, and the container cargo volume is ranked third among the over middle class ports in Eastern Indonesia. The average annual growth rate of public cargoes showed 13 percent during 1986 - 1992.

Table 5-8 Port Traffic and Utilization (Banjarmasin)

Year	1986	1990	1992	Year	2005
General C.		720,199		Other G.C.	2,452,000
Unitized C.					
Roll C.					
Solid Bulk		322,637		Solid Bulk	1,171,000
Liquid Bulk		54,595		Liquid Bulk	198,000
Bag C.		286,535		Bag C.	1,040,000
Drum		33,208		Drum	121,000
Container		30,385		Container	272,000
Total C.(ton)	836,890	1,447,479	1,755,949	Total C.(ton)	5,254,000
Passenger	54,043	158,845	246,180	Passenger	756,000
B O R (%)	78	70	90		
B T P (ton/m)	617	1,753	2,535		

(5) Number of passengers that embarked or disembarked reached 246,180 in 1992. Pelni ships "KM. KELIMUTU", "KM. LAWIT", "KM. TATAMAILAU" and "KM. SIRIMAU" regularly call the port.

(6) Utilization levels of the public berths in the past years are also shown in the form of BOR and BTP in Table 5-8, and standard cargo handling capacity of existing berths is estimated at around 970,000 tons per year.

(7) Agricultural sector has by far the highest percentage in GRDP in South Kalimantan. This basic economic structure seems to remain unchanged in the future. Therefore, the port facilities should be improved particularly in concert with agricultural development in the hinterland. On the other hand, this port is handicapped by being a river port, which generally restricts sizes of the calling vessels. Furthermore, passenger traffic by sea transportation is expected to show high growth rates. The port should hold following functions in 2005;

a) Provincial distribution center
b) Container handling capability
c) Passenger transition port

(8) Seaborne traffic is expected to reach about five million tons in 2005, and container traffic will be about 270,000 tons. Passenger traffic will be about 756,000.

(9) The port will require an additional 36 berths with a total length of 4,000 m in 2005 which can accommodate max. 3,000 DWT class vessels. Construction of a new passenger terminal has already been planned. Container handling facilities should also be prepared.

Conventional berth (-6.0 m)	35 B, 3,850 m
Passenger ship berth (-6.0 m)	1 B, 170 m
Passenger terminal	2,000 m^2
Container yard	25,000 m^2

(10) Large scale environmental impact will be anticipated by the port development based on the master plan discussed above in the following facets;

a) Water quality and bottom contamination
b) Marine/coastal ecology
c) Visual quality
d) Waste management

(11) With the growth of economic activities and with the improvement of infrastructures in the hinterland, more and more cargo will be attracted to the port. As a river port, however, the port cannot reap benefits by enlargement of the vessel size. Therefore, the port of Banjarmasin should pursue other ways for development such as Ro/Ro transportation and high speed cargo/passenger transport system.

3) Lembar

(1) Lembar is located in the southwest part of Lombok Island, and 25 km south of Mataran, the capital city of West Nusa Tenggara Province. Port of Lembar is situated on the north bank of a small bay which is part of Labuan Tring Bay. This port was built in 1976 to replace the activities of Port of Ampenan near Mataran. Population of Lombok Barat Regency was 859,273 in 1990.

(2) Lembar has a calm basin. Tidal range is 0.90 m , and tidal currents offshore are swift, SW current 2.0 m/s and NE current 2.7 m/s while slight currents are observed inside the port area. Bed materials are composed of mud and coral fragments.

(3) The port is basically composed of three types of berthing facilities: public berths operated by Persero, privately owned jetties, and a DGLT operated ferry terminal. Main public berths comprise an interisland wharf of 128 m in length, -6 m water depth alongside, an interisland passenger wharf of 100 m in length, and local quays of 150 m in length. Some of the shipping companies have their own jetties including one for high speed Jet Foil which comes from and goes to Benoa in Bali Island. About 400 m to the east from the main berths, there is a ferry terminal which DGLT has managed since 1982. Presently Ro/Ro type ferry vessels are servicing eight round trips a day between Lembar and Padangbai in Bali Island. There is also Pertamina jetty, which is far away from Lembar. The port has 720 m^2 of warehouse space, 12,750 m^2 of open storage, and a 120 m^2 temporary passenger terminal. Only one unit of forklift with capacity of 3 tons is working in the port.

(4) The public wharves which are under PERSERO's management handled 366,912 tons of cargoes in 1992 as shown in Table 5-9. This port is also heavily imbalanced in terms of cargo volume of loading and unloading. Of the total, 71 percent was unloaded cargo, cement and fertilizer being the major unloading commodities. On the other hand, pumice stones were a major loading commodity, and rice was shipped to East Nusa Tenggara Province. The annual growth rate of the public cargoes showed 4.1 percent from 1984 - 1992.

Table 5-9 Port Traffic and Utilization (Lembar)

Year	1984	1988	1992	Year	2005
General C.	69,718	60,429	35,777	Other G.C.	126,000
Unitized C.					
Roll C.					
Solid Bulk	19,739	68,962	91,592	Solid Bulk	130,000
Liquid Bulk				Liquid Bulk	
Bag C.	172,238	229,906	230,595	Bag C.	818,000
Drum	4,991	2,067	8,948	Drum	7,000
Container				Container	14,000
Total C.(ton)	266,686	353,364	366,912	Total C.(ton)	1,095,000
Passenger	2,053	66,634	40,745	Passenger	143,000
B O R (%)	62	113	92		
B T P (ton/m)	-	1,123	1,230		

(5) Number of passengers who embarked or disembarked was about 40,000 in 1992. Three passenger ships including Pelni ships "KM. KELIMUTU" and "KM. TATAMAILAU" regularly call the port. In addition to that, two cruise ships also make calls to the port.

(6) Utilization levels of the public berths in the past years are shown in Table 5-9 in the form of BOR and BTP, and standard cargo handling capacity of the existing berthing facilities is estimated at around 370,000 tons per year.

(7) Tourism development in Lombok Island has been promoted, and this move will be intensified in the future. The port of Lembar should support this direction through increasing port capacity to handle construction materials and heavy cargoes. General cargo traffic between Bali and Lombok is likely to shift further to ferry transportation while the port should aim at improving services to longer distance routes by introducing more advanced maritime transportation technologies. High speed maritime transportation modes for passengers are necessary to attract more people to the island. The port should hold following functions;

a) Provincial distribution center
b) Container handling capability
c) Terminal for high speed passenger and cruising vessels

(8) Seaborne traffic is expected to reach 1,095,000 tons including 14,000 tons of container traffic in 2005.

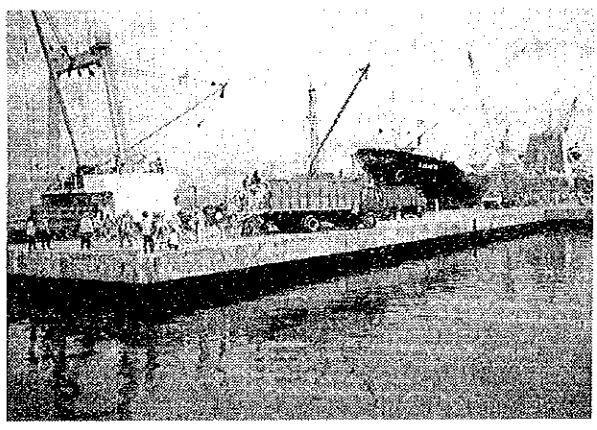
(9) The port will require an additional five berths with a total length of 750 m which can accommodate max. 5,000 DWT class vessels in order to cope with the expected traffic. A new passenger terminal should be also built to improve port service to passengers and crews. Container handling facilities should also be prepared.

Quay (-7.5 m)	5 B, 650 m
Local/Rakyat	100 m
Passenger Terminal	300 m^2
Container yard	2,500 m^2

(10) Medium scale impact will be anticipated by the port development based on the master plan discussed above in the following facets;

a) Water quality and bottom contamination
b) Marine/coastal ecology
c) Socio-cultural condition
d) Waste management

(11) Lombok Island has high potential to become a tourist destination by acting in concert with Bali Island. The port of Lembar will play similar roles for Lombok Island as the port of Benoa for Bali Island. Therefore, it is recommended that historical development of roles and functions of the port of Benoa be reviewed and studied in depth. Roles of the rakyat at Lembar in the interisland shipping will decrease step by step, and roles of the Ro/Ro ferry for the transportation of general cargo will increase steadily. The port of Lembar will be further shifted to a tourism and recreation oriented port in 2015.



4) Kupang

(1) Port of Kupang is situated near the west end of the Timor Island, and faces Senau Strait. The port is the main deepwater port for East Nusa Tenggara (NTT). Because the original port of Kupang, which had been located near downtown Kupang, was rather exposed to northwestern waves, it was decided in 1964 to develop Tenau as the new main port for West Timor. Population of Kupang Regency was 522,944 in 1990 while that of the entire NTT was about 3.37 million.

(2) The port is generally well protected by Semau Island from the waves coming from the west although high waves more than 2.5 m are observed for about five days in December. Tide is semi-diurnal tide, and tidal range is 0.98 m. Tidal currents are swift offshore, and are slight around the port. Layers of loose silty sand mixed with the coral form the bed materials from the surface to the elevation of -25 m.

(3) The port facilities can be subdivided into public facilities and private facilities. The public facilities are composed of Main Quay of 223 m in length for interisland cargo vessels and Local Quay of 100 m in length for sailing ships and passenger vessels. Both have around -8 m water depth alongside. The private port facilities along Semau Strait consist of a fishery jetty and a Pertamina tankfarm. The former is situated about 250 m south of the Main Quay, and the latter has an unloading facility further south of the fishery jetty.

(4) Total of 308,496 tons of cargo was loaded or unloaded at the public facilities in 1992 as shown in Table 5-10. The port of Kupang is characterized as a general cargo port for the East Nusa Tenggara Province as well as an industrial port of the cement factory. The port basically imports consumer goods and foods, and exports cement products to neighboring islands. Container handling started in 1990 at the port, and container vessels with ship gears regularly call the port from Darwin to load containers which are stuffed with sandalwood for foreign markets. Domestic semi-container ships are also plied between Kupang and Surabaya.

Table 5-10 Port Traffic and Utilization (Kupang)

Year	1984	1988	1992	Year	2005
General C.	47,442	70,816	95,460	Other G.C.	222,000
Unitized C.					
Roll C.					
Solid Bulk	6,815	39,412	76,787	Solid Bulk	188,000
Liquid Bulk		188		Liquid Bulk	
Bag C.	62,890	79,857	121,834	Bag C.	270,000
Drum	12,390	4,371	13,095	Drum	12,000
Container			1,320	Container	95,000
Total C.(ton)	129,537	194,644	308,496	Total C.(ton)	787,000
Passenger	25,195	55,651	53,253	Passenger	273,000
B O R (%)	-	70	61		
B T P (ton/m)	-	872	921		

(5) Number of passengers that embarked or disembarked reached 53,253 in 1992. Pelni passenger ship "KELIMUTU" calls the port four times a month.

(6) Utilization level of the public berths in past years is shown in Table 5-10 in the forms of BOR and BTP, which are 60 to 70 % for the former and about 900 ton/m for the latter. The standard cargo handling capacity of the existing berths is estimated at around 290,000 tons per year.

(7) Oil exploration drilling (TIMOR GAP) started in December 1992, and 45 wells will be drilled during the coming five years. It is hoped that some of the investors will use the port of Kupang as their logistic base port. Memorandum of understanding has been exchanged between Czecho (formerly Czechoslovakia) government and East Nusa Tenggara provincial government to construct jointly a new cement factory with production capacity of 1,500,000 ton/year. 200 ha of land have been arranged by the provincial government for the project. In addition to the proposed cement project, the existing PT. Cemen Kupang is reported to have a plan to expand production capacity to 620,000 ton/year from 120,000 ton/year presently. Taking these factors into consideration, it is suggested that the port should hold following functions in 2005:

a) Distribution function as regional gateway
b) Container handling port
c) Industrial base port
d) Tourism base port

(8) Seaborne traffic is expected to reach 787,000 tons including 95,000 tons of container traffic in 2005.

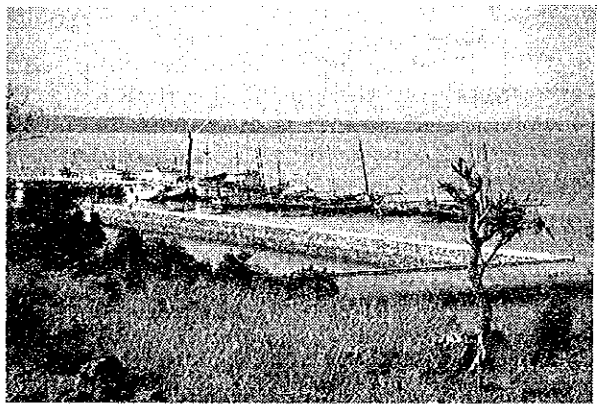
(9) The port will require an additional three berths with a total length of 510 m which can accommodate max. 10,000 DWT class vessels in order to accommodate the traffic forecast. Container handling facilities and equipment should also be prepared.

Heavy cargo/container berth (-10 m)	1 B, 170 m
Conventional berth (-10 m)	2 B, 340 m
Container yard	10,000 m^2
Cargo handling equipment	one set

(10) Medium scale impact will be anticipated by the port development based on the master plan discussed above in the following facets;

a) Visual quality
b) Coastal hydrology
c) Water quality

(11) The port of Kupang should strengthen industrial base function to help promote industrialization in this region. Kupang is the economic and political center in the NTT which is rich in cheap labor forces although usable water resources are limited in this region. Kupang has initiated trade with the northern Australian regions through scheduled shipping. This movement is important for the region to pursue economic development. The port will look for land areas for the expansion of its facilities to the south, therefore relocation of the Pertamina jetty may be required after 2015.



5) Dilli

(1) Port of Dilli is located on the north coast of Timor Island, and is centrally situated in Dilli, the capital of the East Timor Province which had a population of 748,000 in 1990. Population of the Dilli Regency was 123,475.

(2) The Port of Dilli is a natural port which is located among groups of rocky islands which function as breakwaters for the quays of the port. The depth of the port basin is 25 m LWS and at the quayside around 13 m. Tidal range is 1.04 m and tidal currents are swift (SW current 1.5 m and NE current 1.0 m/s) offshore. Because waves break on the coral reef, low waves are observed around the port. Bed materials are composed of loose coarse sand layers from the elevation of -5 m to -11 m.

(3) The existing public quay is 180 m long and 5 m deep alongside. There are five sheds comprising a total area of 3,624 m^2 and a passenger terminal of 300 m^2 both of which are generally well maintained. The port has three units of forklift with capacity of 2 to 5 tons and one unit of mobile crane. To the west of the public wharf, a special (bunker) port of Dilli, which is owned by Pertamina, is located.

(4) The public port handled 274,674 tons of cargo in 1992 as shown in Table 5-11. Rice and cement are the main unloading commodities while coffee, which is the dominant estate crop in the province, is shipped both domestically and internationally.

Table 5-11 Port Traffic and Utilization (Dilli)

Year	1985	1988	1992	Year	2005
Total C.(ton)	208,453	177,535	274,674	Total C.(ton)	506,000
Passenger	517	840	55,215	Passenger	102,000
B O R (%)	-	76	120		
B T P (ton/m)	-	1,020	1,200		

(5) Number of passengers who embarked or disembarked reached about 60,000 in 1992. Pelni passenger ships "KM. KELIMUTU" and "KM. TATAMAILAU" call the port regularly.

(6) Utilization level of the public berth in the past years is also shown in the Table 5-11 in the form of BOR and BTP. The BOR of the port was more than 100 % in 1992, and the BTP was 1,200 tons/m. Standard cargo handling capacity of the existing berth is estimated at around 200,000 tons a year. Considering these indices, it seems that the port has been used beyond its optimum capacity.

(7) Since 1976, when East Timor became the country's twenty- seventh province, the province has received by far the largest central government financial allocations (on a per capita basis) of any region in Indonesia. Agriculture and government sectors still are major sources of economic activity in East Timor. It seems that this basic economic structure will remain unchanged in the foreseeable future. Because high priority seems to continuously be accorded to infrastructure, demand for construction materials such as cement will increase. Demand for consumer goods and food will also increase with the economic progress in the region. Main function of the port in 2005 is summarized as follows:

a) Provincial distribution center

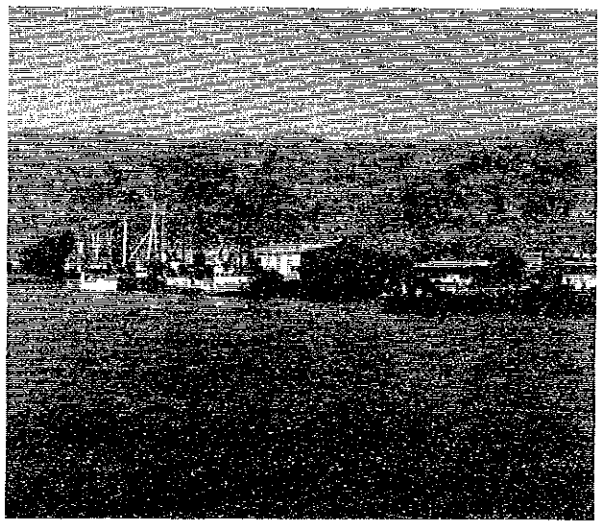
(8) Seaborne cargo traffic is expected to reach 500,000 tons in 2005, and number of passengers who will embark and/or disembark at the port will reach 100,000.

(9) In order to meet the traffic volume forecast in 2005, the port will require an additional two berths, each of which is 130 m long and -7.5 m deep alongside, and can accommodate a 5,000 DWT class vessel.

(10) Small scale environmental impact will be anticipated by the port development based on the master plan discussed above in the following facets;

a) Air quality
b) Coastal hydrology
c) Water quality

(11) With the improvement of the peace and security situation in the province, it is likely that more people will come into the province and hence generate further demands for seaborne traffic. As Dilli is geographically close to Western Daya Islands in Maluku province, it is suggested that the traffic and trade relationship between the two neighboring regions be strengthened around 2015.



6) Balikpapan

(1) Balikpapan is located on the east coast of Kalimantan island about 115 km south of Samarinda, the capital city of East Kalimantan province. Balikpapan is the second largest city in the province. Port of Balikpapan is situated on the north coast of Balikpapan Bay. This port was built in 1957. Population of Balikpapan Municipality was 344,405 in 1990.

(2) In regions near the equator such as Balikpapan, the pressure gradient is extremely gentle and the wind velocity is generally small. Tidal range is 1.40 m, and maximum velocity of currents is 2.0 m/sec in the north direction. Bed material is composed of silt and sand.

(3) The port of Balikpapan consists of three port terminals: two public terminals operated by Persero and an oil terminal operated by Pertamina. Main public berths have a total length of 329 m and water depth of -9 m. They have been used for both ocean going and domestic traffic. The other public terminal has a local quay of 40 m in length and -1.5 m in water depth. The port has 2,880 m^2 of transit sheds and warehouse space, 10,464 m^2 of open storage, and a 1,250 m^2 passenger terminal. Three units of mobile crane with capacity of 10 - 35 tons , nine units of forklift with capacity of 2.5 - 5 tons, and one unit of truck loader with capacity of 4 tons are working in the port.

(4) The public wharves handled 597,281 tons of cargoes in 1991 as shown in Table 5-12. This port is imbalanced in terms of loading and unloading cargo volume. 77 percent was unloading, with cement and rice being the major commodities. On the other hand, loading cargoes consist of miscellaneous commodities. Average annual growth rate of the public cargoes showed 9.35 percent from 1984 - 1991.

Table 5-12 Port Traffic and Utilization (Balikupapan)

Year	1984	1988	1991	Year	2005
General C.	312,980	295,249	457,450	Other G.C.	1,177,000
Unitized C.			64,164		
Roll C.			2,763		
Solid Bulk				Solid Bulk	174,000
Liquid Bulk				Liquid Bulk	
Bag C.			46,009	Bag C.	192,000
Drum			16,905	Drum	16,000
Container	6,416	1,671	9,990	Container	504,000
Total C.(ton)	319,396	296,920	597,281	Total C.(ton)	2,063,000
Passenger	110,250	135,883	299,939	Passenger	1,065,000
B O R (%)	64	52	91		
B T P (ton/m)	680	756	1,355		

(5) Number of passengers who embarked or disembarked reached 299,939 in 1991. Three passenger ships by Pelni "KM. KAMBUNA", "KM. TIDAR", and "KM. AWU" regularly call the port.

(6) Utilization levels of the public berths in the past years are shown in the form of BOR and BTP in Table 5-12. The BOR was 91 %, and the BTP was 1,355 ton/m, both of which were considerably higher than the general standards. Cargo handling capacity of the existing berths is estimated at around 380,000 tons per year.

(7) The port of Balikpapan is the major seaport in the Kalimantan island where river transportation is dominant. The port is free from maintenance dredging and shallow drought, and has been playing major roles in the transportation system in Kalimantan island. The main industries of the province are forestry, oil mining, agriculture, and fishery. Main functions of the port in 2005 are summarized as follows;

a) Distribution functions as regional gateway
b) Container terminal candidate
c) Industrial base port
d) Passenger transition port

(8) Seaborne traffic is expected to reach about 2 million tons in 2005, and container traffic will be a half million tons. Passenger traffic at the port will be more than 1,200,000.

(9) The port will require an additional nine berths with a total length of 1,630 m which can accommodate max. 20,000 DWT class vessels. A new passenger terminal should be also built to improve port service to passengers and crews. Container handling facilities and equipment should also be prepared.

Heavy cargo/container berth (10-12 m)	1 B,	250 m
Conventional berth (-10 m)	7 B,	1,190 m
Passenger ship berth (-7 m)	1 B,	190 m
Passenger Terminal		2,000 m^2
Container Yard		50,000 m^2
Container Handling Equipment		one set

(10) Large scale environmental impact will be anticipated by the port development based on the master plan discussed above in the following facets;

a) Visual quality
b) Water quality
c) Waste management

(11) With the development and improvement of infrastructures in the hinterland, chemical industry and agro-industry will reap benefits. The growth rate of the population projection (until 2015) of East Kalimantan province ranks 4th in Indonesia. This province has high potential and thus more cargo will be attracted to the port.

7) Samarinda

(1) Samarinda Municipality is located on the east coast of Kalimantan island, 115 km north of Balikpapan. Samarinda is the capital and the largest city in East Kalimantan province. Port of Samarinda is located on the bank of the Mahakam river about 66 km from the Muara Pegah outer basin. A new main berth of this port was built in 1982. Population of Samarinda Municipality was 407,339 in 1990.

(2) The major problem that the port faces is the siltation downstream of the access channel. Maintenance dredging of 2.1 million m3 is annually carried out in the channel to secure the water depth of 4-5 m. The waves at the river mouth are light, generally under 0.5 m. The sea level fluctuation caused by tides is about 1 to 2 m, and velocity of currents is 0.5-1.2 m/s. Bed material is composed of mud and sand.

(3) The public wharves of the port consists of a 450 m long wharf with alongside depth of 7 m below LWS and a 100 m long marginal wharf with alongside depth of 3.5 m below LWS. In addition, there are old wooden jetties. The port has 3,200 m^2 of transit shed space, and 20,368 m^2 of open storage. Rehabilitation and extension works of the port will be completed by 1993 with financial assistance from the Asian Development Bank. Two units of mobile crane with capacity of 12 and 15 tons, six units of forklift with capacity of 1-3 tons are working in the port.

(4) The public wharves handled 853,306 tons of cargoes in 1992 as shown in Table 5-13. 63 percent is unloading cargo, with cement and rice being the major commodities. On the other hand, major commodities of loading are rattan and fish. The average annual growth rate of public cargoes showed 17.3 percent from 1984 - 1992. 45,534 tons of container cargo were handled at the port.

Table 5-13 Port Traffic and Utilization (Samarinda)

Year	1984	1988	1992	Year	2005
General C.	23,610	164,982	531,091	Other G.C.	1,318,000
Unitized C.	35,224	54,400	55,727		
Roll C.					
Solid Bulk				Solid Bulk	
Liquid Bulk				Liquid Bulk	
Bag C.	165,594	255,743	220,954	Bag C.	794,000
Drum	13,499	20,843		Drum	23,000
Container			45,534	Container	146,000
Total C.(ton)	237,927	495,968	853,306	Total C.(ton)	2,281,000
Passenger	30,534	58,282	75,133	Passenger	227,000
B O R (%)	82	95	136		
B T P (ton/m)	657	586	1,443		

(5) Number of passengers who embarked or disembarked at the port reached 75,133 in 1992. A Pelni passenger ship will call the port regularly in 1993 because dredging work to keep the water depth of the channel below -6.0 m has been completed.

(6) Utilization levels of the public berths in the past years are also shown in the form of BOR and BTP in Table 5-13, The BOR was 136 % and the BTP was 1,443 tons/m. Standard cargo handling capacity of the existing berths is estimated at around 610,000 tons per year.

(7) The port of Samarinda is located at the center part of East Kalimantan province with hinterland of forestry industry. The traffic consists of unloading of consumer goods for the needs of the population and equipment for the needs of the industries. In 2005 the port should have the following functions;

a) Provincial distribution center
b) Container handling port

(8) Seaborne traffic is expected to reach about 2,300,000 tons in 2005, and container traffic will be about 150,000 tons, which is 3.2 times more than the present level. Passenger traffic will be more than 200,000.

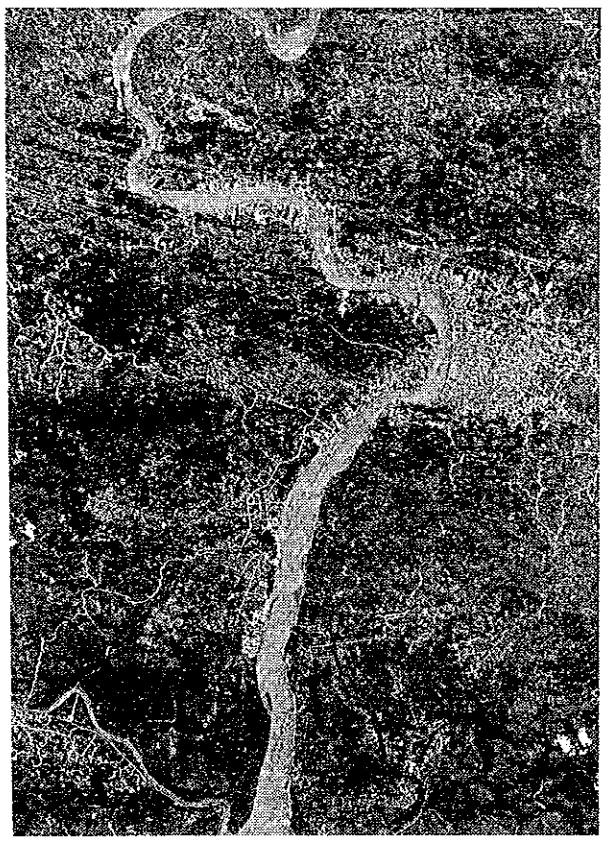
(9) The port will require an additional 14 berths with a total length of 1,540 m which can accommodate max. 3,000 DWT class vessels. A part of the existing shed will be converted to a passenger terminal. Container handling facilities should also be prepared.

Conventional berth (-6.0 m)	14 B,	1,540 m
Passenger Terminal		1,000 m^2
Container Yard		10,000 m^2

(10) Large scale environmental impact will be anticipated by the port development based on the master plan discussed above in the following facets;

a) Water quality and bottom contamination
b) Marine/coastal ecology
c) Waste management

(11) With the development and improvement of the road network in the hinterland, agro-industry and wood processing industry will show significant growth after 2005, and thus cargo will be attracted to the port. Further, with the improvement of the river transportation system, the port will be connected with the neighboring city, thereby improving the traffic flow. As the port has been developed at the site adjacent to the city proper, extensive coordination work will be required to ensure harmonious coexistence of the port and the city.



8) Bitung

(1) Port of Bitung is situated at the northern end of Sulawesi Island. The port is not only the principal port of North Sulawesi Province, but also an important base of sea transport linking Sulawesi, Maluku and West Irian Jaya. Population of the Province was approximately 2.5 million, and that of the Minahasa Regency including Manado and Bitung Municipalities was about 1.13 million in 1990.

(2) The Port of Bitung is situated on sheltered waters of Lembeh Strait. The width of the strait is about 700 m nearest the port location. The port basin is calm, and tidal range is 1.04 m. Tidal currents are regular semi-diurnal currents, and NE and SW currents of 1.2 m/s alongside the wharf are observed. At the eastern side of the existing quay, loose silty sand layers are found from the bed surface with elevation of -2 m to the elevation of -40 m.

(3) At the public port of Bitung, there is an ocean-going quay (-9 m) of 605 m in length, interisland quay (-6 m) of 502 m in length, chemical based industry quay (-6 m) of 146 m in length, and local & sailing quay (-5 m) of 60 m in length. Pertamina Jetty can be found 400 m to the west from the ocean-going quay. To the east of the main quay a new ferry jetty was constructed by DGLT, and its operation commenced on 6 May 1993 between Bitung and Ternate. The port company has two units of mobile crane and 10 units of forklift. There is 12,960 m^2 of transit shed space, 15,500 m^2 of open storage, and 4,000 m^2 of container yard space.

(4) The public wharves handled 1,176,794 tons of cargo in 1992 as shown in Table 5-14. Of the total, about 20 percent was exported cargo. Among the unloading cargoes including both domestic and international, daily necessities, cement and rice are the major commodities and account for 65 %. On the other hand, coconut oil is the leading commodity among the loading cargoes. Container handling at the port of Bitung started before 1984. Since then container traffic has shown a steady increase, and reached 70,226 tons in 1992. The annual growth rate of the container traffic at the port is calculated at about 30 %.

Table 5-14 Port Traffic and Utilization (Bitung)

Year	1984	1988	1992	Year	2005
General C.	255,966	413,849	547,527	Other G.C.	543,000
Unitized C.	24,651	28,400	64,968		
Roll C.	683	4,194			
Solid Bulk	38,933	60,426	69,209	Solid Bulk	214,000
Liquid Bulk	8,830	29,540	52,215	Liquid Bulk	351,000
Bag C.	289,939	356,580	372,649	Bag C.	1,000,000
Drum	14,835	4,283		Drum	24,000
Container	8,850	35,916	70,226	Container	543,000
Total C.(ton)	642,687	933,188	1,176,794	Total C.(ton)	2,675,000
Passenger	79,009	161,786	198,209	Passenger	549,000
B O R (%)	36	35	64		
B T P (ton/m)	387	617	784		

(5) Number of passengers that embarked or disembarked reached 198,209 in 1992. Pelni passenger ship "KM. AWU" calls the port four days a month.

(6) Utilization level of the public berths in the past years is also shown in Table 5-14 in the form of BOR and BTP. The former was 64 % and the latter was 784 tons/m in 1992. It should be noted that many fishing vessels are mooring along the

interisland quay. The standard cargo handling capacity of the existing berths is estimated at around 950,000 tons per year.

(7) Adjacent hinterland areas have been designated as industrial development zones, and many manufacturing firms have been operating. Industrial activities should be further promoted in this region in order to economically catch up with Western Indonesia. The port of Bitung is located at the rim of the Pacific region where economic activities have been more intensified than other regions in the world. The port should use this locational advantage in the process of future development. The port will have the following functions:

a) Distribution function as regional gateway
b) Container terminal candidate
c) Industrial base port
d) Passenger transition port
e) Tourism base port

(8) Seaborne public traffic is expected to reach 2,675,000 tons in 2005, and container traffic will be about 500,000 tons, which is seven or eight times larger than the present.

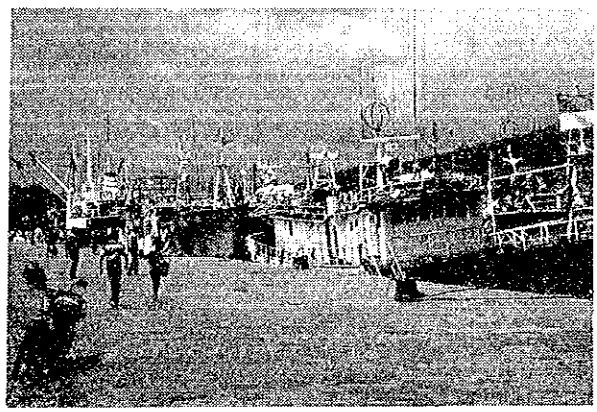
(9) The port will require an additional eight berths with a total length of 1,440 m which can accommodate max. 20,000 DWT class vessels. Container handling facilities and equipment should also be prepared.

Heavy cargo/container berth (-10 to 12m)	250 m
Conventional berth (-10 m)	1,190 m
Container yard	50,000 m^2
Cargo handling equipment	one set

(10) Large scale environmental impact will be anticipated by the port development based on the master plan discussed above in the following facets;

a) Visual quality
b) Water quality

(11) The port of Bitung must play a vital role in the economic development of Eastern Indonesia. One of the problems for the port in fulfilling this expectation is the fact that future development space at the existing site is physically limited. Therefore, it will be necessary for the port management body to negotiate with other institutions about the possibility of relocating their facilities. If it is found that no lands are available for the port expansion along the main land, development of Lembeh Island should be considered after 2005.



9) Pantoloan

(1) Pantoloan is located along the coast of Palu Bay in the Province of Central Sulawesi. An asphalt paved road, about 21 km long, connects the port with Palu which is the capital of the province. Port of Pantoloan includes Donggala port district, which is located on the opposite side of Palu Bay. Population of Donggala Regency where the port of Pantoloan is situated was 784,647 as of 1990.

(2) Palu Bay is a narrow bay that opens to the north, therefore the port is sheltered from the open sea. The coast in the vicinity of the port is steep and is rich in coral. Tidal range is 1.18 m, and tidal currents are in the opposite direction during falling tide. Maximum velocity is 0.4 m/sec during falling tide and 0.25 m/sec during rising tide. Beach sediments are mostly sand and gravel.

(3) The port is basically composed of three types of berthing facilities: public berths operated by Persero, privately owned wharves, and an oil jetty operated by Pertamina. Main public berths comprise an interisland wharf of 150 m in length , -7 m water depth alongside, and local quays located in Donggala of 80 m in length. The extension work of the main public wharf by 110 m is underway with financial assistance from the ADB and is expected to be concluded by February 1993. On the other hand, there are two private wharves which handle logs and wood, twelve private wharves which handle sands and gravels, and one Pertamina oil jetty. The port has 3,350 m^2 of transit sheds, 4,000 m^2 of open storage area, and 2,792 m^2 of passenger terminals. The port is equipped with five units of forklift with capacity 2-5 ton and one mobile crane with capacity of 25 tons.

(4) The public wharves which are under Persero's management handled 440,757 tons of cargoes in 1992 as shown in Table 5-15. Major unloading commodities were cement, asphalt, fertilizer, equipment, vehicles, and spare parts while major loading commodities were copra and rattan. The average annual growth rate of the public cargoes showed three percent during 1984 - 1992.

Table 5-15 Port Traffic and Utilization (Pantoloan)

Year	1984	1988	1992	Year	2005
General C.	182,082	222,626	235,002	Other G.C.	573,000
Unitized C.	10,359	12,911	18,636		
Roll C.					
Solid Bulk				Solid Bulk	
Liquid Bulk			3,792	Liquid Bulk	
Bag C.	155,491	140,321	183,327	Bag C.	155,000
Drum	2,392	4,168		Drum	10,000
Container				Container	64,000
Total C.(ton)	350,324	380,026	440,757	Total C.(ton)	802,000
Passenger	71,094	143,221	285,704	Passenger	351,000
B O R (%)	62	86	83		
B T P (ton/m)	761	1,113	1,387		

(5) Number of passengers that embarked or disembarked at the port reached 285,704 in 1992, and Pelni passenger ships "KM. KAMBUNA" and "KM. TIDAR" call the port regularly.

(6) Utilization levels of the public berths in the past years are also shown in the form of BOR and BTP. The BOR was 83 %, and the BTP was 1,387 ton/m in 1992. Standard cargo handling capacity of the existing berths is estimated at around 230,000 tons per year.

(7) Domination of the agriculture sector in the Central Sulawesi economy has been quite prominent. Main food crops are white maize, sweet potato and rice. On the other hand, main industries are only saw timber, handicrafts and coconut oil. The port of Pantoloan is a general cargo port, and serves the south and central part of the province while the port of Tolitoli serves the northern part of the province. The future traffic demand will be generated with the increase of regional income, which will basically rely on agricultural development. The port should hold following functions;

a) Provincial center of Central Sulawesi
b) Capable of container handling

(8) Seaborne traffic is expected to reach about 800,000 tons in 2005, and some general cargoes will be containerized. Passenger traffic at the port will be about 350,000.

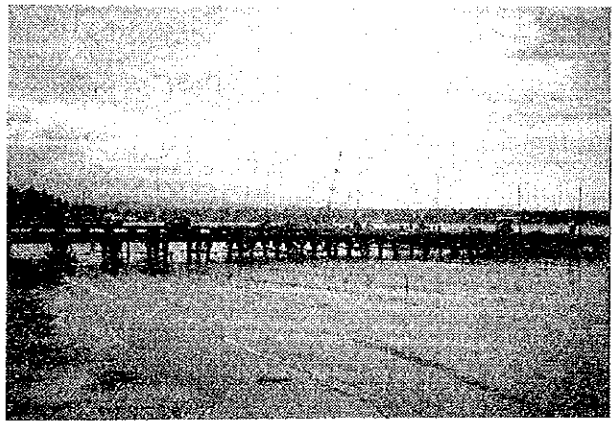
(9) According to the standard discussed previously, the port will require an additional three berths with a total length of 390 m which can accommodate max. 5,000 DWT class vessels. Container handling facilities should also be prepared.

Main berth (-7.5m)	3 B,	390 m
Lokal/Rakyat		100 m
Container yard		5,000 m^2

(10) Small scale environmental impact will be anticipated by the port development based on the master plan discussed above in the following facets;

a) Air quality
b) Coastal hydrology
c) Water quality and bottom contamination

(11) With the development and improvement of road transportation system, agriculture sector can enjoy the development effect. Hinterland of the port of Pantoloan will also expand, and hence more and more cargo will be attracted to the port. On the other hand, water at Palu Bay is still very clear and favorable environmental conditions are preserved. It seems that this area has high potential regarding tourism development. Therefore, the port will hold an additional function for tourism and marine recreation in 2015.



10) Ujung Pandang

(1) The port of Ujung Pandang is situated at the southwest end of Sulawesi Island, facing Makassar Strait. The port is located in Ujung Pandang Municipality, which is the largest city in the Eastern Part of Indonesia as well as the capital of South Sulawesi Province. In 1990, the population of Ujung Pandang Municipality was about 900,000 while that of South Sulawesi Province was about seven million.

(2) One and one-half km southwest of Hatta quay, breakwaters have been built on a coral reef that stretched 1,550 m in length. Tidal range is small, 0.64 m, and currents are ocean currents or wind-driven currents with velocity of 0.7 to 0.8 m/sec, generated by monsoon. Bed material is mud, and sand drift is active at the sandy coasts in the north and south.

(3) The existing facilities of the port of Ujung Pandang consist mainly of three quays: Soekarno Quay, Hatta Quay, and Paotere Piers. The main berths of the port are on the Soekarno Quay, which is 1,360 m long, and used for oceangoing and inter-island vessels. The present water depth alongside is -9.0 m LWS. The second main quay is the Hatta Quay, 550 m long and utilized by inter-island vessels. This quay will be rehabilitated by constructing a new quay structure 102 m seaward to obtain required land for a multi purpose container berth. The Paotere harbor is located 1.8 km northeast of the Soekarno Quay, and provides berthing space for sailing/local vessels. There are five piers of 50 m in length and 10 m in width, and a marginal quay of 200 m in length. The port has a container yard of 22,800 m^2 and owns 10 units of forklift, and one unit of top loader and travel lift each.

(4) The port handled 2,769,586 tons of cargo at the public wharves in 1992 as shown in Table 5-16. Most of the interisland trade cargoes consist of break bulk cargo such as timber and woods, sugar, consumer goods and rice. Annual average growth rate of the cargoes during 1984-1992 is 8.5 %. On the other hand, container traffic has shown an impressive performance, i.e. 66 % an annual average growth rate during the same period.

Table 5-16 Port Traffic and Utilization (Ujung Pandang)

Year	1984	1988	1992	Year	2005
General C.	611,878	1,009,303	934,275	Other G.C.	983,000
Unitized C.	33,662	59,965			
Roll C.	33,021	17,921			
Solid Bulk	334,797	476,358	495,119	Solid Bulk	683,000
Liquid Bulk		69,949	84,021	Liquid Bulk	70,000
Bag C.	376,319	716,639	852,883	Bag C.	2,233,000
Drum	50,576	30,826	154,614	Drum	234,000
Container	4,364	17,628	248,674	Container	1,827,000
Total C.(ton)	1,444,617	2,398,589	2,769,586	Total C.(ton)	6,030,000
Passenger	277,455	422,641	732,552	Passenger	2,542,000
B O R (%)	25	41	82		
B T P (ton/m)	479	999	984		

(5) Passenger traffic at the port was 732,552 in 1992. There are 35 calls of passenger ships entering this port every month. There are seven passenger ships operated by PELNI and two other passenger ships operated by KALLA LINES which regularly call at Makassar Port.

(6) Utilization level of the public berths in the past years is also shown in the form of BOR and BTP in Table 5-16. The former was 62 %, and the latter was

just less than 1,000 tons/m. The standard capacity of the existing berthing facilities is estimated at around 2,400,000 tons per year.

(7) The Makassar Industrial Estate (KIMA), which was established in early 1980, has played a remarkable role in increasing cargo flow in Makassar port. The Estate is located 15 km from the port, of 203 hectors of land space. With the increase of industrial and commercial activities in this zone, more cargoes will pass through the port. The port is connected by quite a good road network, which enables the port to serve the provinces of South Sulawesi and Southeast Sulawesi. The port should have the following functions;

a) Distribution function as regional gateway
b) Container terminal with gantry cranes
c) Industrial base port
d) Passenger transition port
e) Tourism base port

(8) Seaborne traffic is expected to reach about 6 million tons in 2005, and container traffic will be about 1,800,000 tons. Number of passengers who will embark or disembark at the port is forecast at 2,500,000 in the target year.

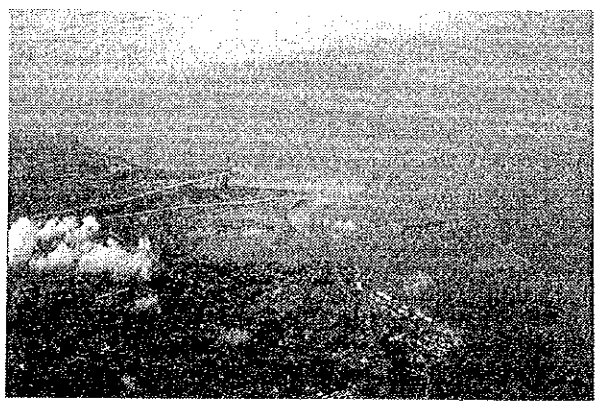
(9) The port will require an additional 11 main berths including two container berths. Required total length of the main quays is 2,050 m, and max. 20,000 DWT class vessels can be accommodated. Container handling facilities and equipment should also be prepared.

Container berth (-10 - 12 m)	2 B,	500 m
Heavy cargo berth (-10 m)	1 B,	170 m
Conventional berth (-10 m)	7 B,	1,190 m
Passenger ship berth (-7 m)	1 B,	190 m
Container yard		100,000 m^2
Cargo handling equipment		one set

(10) Large scale environmental impact will be anticipated by the port development based on the master plan discussed above in the following facets;

a) Visual quality
b) Water quality
c) Waste management

(11) As the port is bounded by residential and commercial areas, it is very hard for the port to find suitable space for the expansion of the required port facilities at adjacent neighboring areas. Therefore, the time will come after 2005 for the port to consider seriously the possibility of diverting some of the functions to another location. Land transportation system should also be constructed to facilitate smooth cargo movement between the separated port locations and industrial estates.



11) Pare-Pare

(1) Pare Pare is situated in the province of South Sulawesi on the east side of Supa Bay about 140 km north of Ujung Pandang. Total population of the municipality and adjacent regencies was 837,860 in 1990 while that of the entire province was about seven million.

(2) Wave height outside the bay is more or less 2 m, and the waves and currents inside the bay are moderate. Tidal range is 0.74 m, and tidal currents are slow (1.0 m/s) outside the bay. Bed materials are composed of mud and sand, and coral reefs are found in small quantity. Annual rainfall reaches 2,133 mm.

(3) The port comprises public facilities located at three separate places, namely, Induk, Capa Ujung, and Lontangnge in addition to a Pertamina owned oil jetty. The public wharf at Induk consists of two separate T-head jetties: a 35 m and a 156 m long jetty both of 15 m width. Depth of water alongside the latter jetty is 7 m below LWS, and rehabilitation and extension works of this jetty were completed in 1992/93 with financial assistance from the Asian Development Bank.

Capa Ujung and Lontangnge ports, which accommodate local vessels and rakyats, are located about 1 km north of Induk. Capa Ujung has three small jetties including a 70 m long one for cattle shipment. All of the jetties are small in scale, have wooden deck on concrete piles, and alongside depth of 4 m below LWS. Local ships mainly come from and go to East Kalimantan or Central Sulawesi.

(4) As shown in Table 5-17, the public wharves handled 327,504 tons of cargoes in 1992, of which about 60% was reportedly handled at Induk. Main out-going commodities are rice and cattle while major in-coming commodity is fertilizer from East Kalimantan.

Table 5-17 Port Traffic and Utilization (Pare-Pare)

Year	1984	1988	1992	Year	2005
General C.	24,695	28,095	74,627	Other G.C.	473,000
Unitized C.	30,955	37,800	73,410		
Roll C.					
Solid Bulk	13,000			Solid Bulk	
Liquid Bulk	2,957	25,487	11,464	Liquid Bulk	
Bag C.	92,344	168,370	168,003	Bag C.	377,000
Drum		4,638		Drum	9,000
Container				Container	53,000
Total C.(ton)	163,951	264,390	327,504	Total C.(ton)	912,000
Passenger	62,272	118,150	198,894	Passenger	469,000
B O R (%)	42	62	99		
B T P (ton/m)	419	1,244	889		

(5) Number of passengers that embarked and/or disembarked at the port reached 194,882 in 1992. Pelni passenger ship "KM. AWU" calls the port regularly as well as coastal passenger ships.

(6) Utilization levels of the public berths in the past years are also shown in Table 5-17 in the form of BOR and BTP. The BOR was 99 %, which indicated that the berths were fully utilized. The standard cargo handling capacity of the existing berths is estimated at around 290,000 tons per year.

(7) The port of Pare Pare is strategically located in the central part of the South Sulawesi Province with hinterland of fertile agricultural fields. The port therefore will have a locally significant role in supporting agricultural development in the hinterland. The function of the port in 2005 is summarized as follows;

a) Distribution function for central part of the Province
b) Base port for agricultural development
c) Container handling capability

(8) Seaborne public cargoes are expected to reach 912,000 tons in 2005 as shown in Table 5-17. Container traffic will be around 50,000 tons. Number of passengers will reach 360,000 in 2005, which is 1.9 times larger than that in 1992.

(9) The port will require an additional four berths with a total length of 570 m which can accommodate 5,000 DWT class vessels in order to meet the expected cargo traffic in 2005. The passenger terminal should be relocated and renovated to offer better port services to passengers. Container handling facilities should also be prepared.

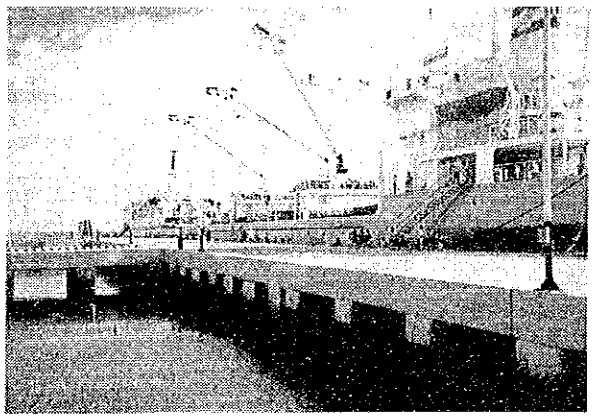
Quay (-7.5 m)	4B,	520 m
Local berth		50 m
Passenger Terminal		1,000 m^2
Container yard		5,000 m^2

(10) Medium scale environmental impact will be anticipated by the port development based on the master plan discussed above in the following facets;

a) Visual quality
b) Water quality
c) Waste management

(11) Currently the port is divided into three districts. In 2015, these districts should be physically combined by reclamation works and construction of waterfront road. The port should address its development direction as being an agro-industry port.

Introduction of Ro/Ro transport system between Kalimantan ports and the port of Pare Pare will also be highly likely with the progress of the road system in the two islands.



12) Kendari

(1) Kendari is located on the east coast of South East Sulawesi, and is the capital city of the province. Port of Kendari is situated on the northern shore of Kendari Bay. As the port of Kendari is the only commercial port in this province, the port has been playing an important role in the sea transportation. Population of Kendari Regency was 488,471 as of 1990.

(2) The port is located along a narrow flat area. Tidal range of the water of Sulawesi fringing Celebes Sea is generally between 1.5 and 2.0 m. The surface tidal currents measured during the past surveys were maximum 0.15, 0.55 and 0.70 knots at the locations of the berths. Sea bottom is covered with a 1 to 3 m thick layer of black mud, organic materials and debris.

(3) The public berthing facilities at Kendari consist of a main wharf of 220 m in length, -6.0 m water depth alongside for interisland traffic and jetties of total 61 m in length, -4.0 m water depth alongside for berthing local and sailing vessels. A part of the main wharf gives priority to Pelni ships. The port has 1,000 m^2 of warehouses, 6,350 m^2 of open storage area, and a 500 m^2 passenger terminal. The port is equipped with two forklifts with capacity of 3 tons and one mobile crane with capacity of 15 tons. These facilities are managed by Persero.

(4) The public wharves, which are under Persero's management, handled 234,631 tons of cargoes in 1992 as shown in Table 5-18. About 70 % of the cargoes at the port were general cargoes. On the other hand, container cargoes have not been handled up to now at the port. The average annual growth rate of the public cargoes showed 11 percent during 1984 - 1992.

Table 5-18 Port Traffic and Utilization (Kendari)

Year	1984	1988	1992	Year	2005
General C.	66,051	76,703	159,121	Other G.C.	201,000
Unitized C.					
Roll C.					
Solid Bulk	2,742		9,250	Solid Bulk	18,000
Liquid Bulk				Liquid Bulk	
Bag C.	35,005	52,842	66,260	Bag C.	184,000
Drum		5,247		Drum	5,000
Container				Container	22,000
Total C.(ton)	103,798	134,792	234,631	Total C.(ton)	430,000
Passenger	93,609	95,980	265,580	Passenger	584,000
B O R (%)	4	41	80		
B T P (ton/m)	281	491	992		

(5) Number of passengers that embarked or disembarked reached 265,580 in 1992, Pelni ships "KM. SIRIMAU" and "KM. AWU" regularly call the port.

(6) Utilization levels of the public berths in the past years are also shown in the form of BOR and BTP. They were 80 % and 992 tons/m in 1992, respectively. Standard cargo handling capacity of the existing berths is estimated at around 270,000 tons per year.

(7) Economies in Southeast Sulawesi province rely heavily on the agriculture sector same as the other provinces in Eastern Indonesia. The main products of manufacturing industries, on the other hand, are small-handicrafts such as furniture and silver handicraft. In addition, petroleum was found in the northeast part of this

province and gold and silver were found in the north part of Bawulu Island. As this province consists of many islands, Kendari should play roles as a development center providing basic services and goods for surrounding islands. The port should hold following functions;

a) Provincial distribution center
b) Container handling capability
c) Passenger transition port

(8) Seaborne traffic is expected to reach 430,000 tons in 2005, and some of the general cargoes will be containerized. Passenger traffic at the port will exceed a half million.

(9) The port will require an additional 130 m long berth which can accommodate max. 5,000 DWT class vessels. A new passenger terminal should be also built to improve port service to passengers and crews. Container handling facilities should also be prepared.

Conventional berth (-7.5m)	1 B,	130 m
Passenger Terminal		2,000 m^2
Container yard		2,500 m^2

(10) Small scale environmental impact will be anticipated by the port development based on the master plan discussed above in the following facets;

a) Air quality
b) Water quality and bottom contamination
c) Waste management

(11) Kendari has a locational advantage being a center of small islands in South East Sulawesi province. Therefore, the islands should be directed to have mutual network of high-speed boats with Kendari. On the other hand, many islands in the province have good natural environment conditions, so they have high potential regarding tourism development. The port may hold a function to receive short-distance cruise ships around 2015.