PN-AAH-189

THE PALEMBANG PORT AND SHIPPING STUDY

VOLUME II

TRANSPORT SURVEY

PART 1

Transport System
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1.0 INTRODUCTION

A detailed analysis of the transport sector of the Port of Palembang hinterland was undertaken comprising road, rail, pipeline, river and ocean shipping transport. For each mode we derived the condition of the available network, service quality, transport capacity and costs as well as planned developments. The transport system in the port hinterland was found deficient particularly in the road transport sector. Roads are generally of low quality, not well maintained, narrow and designed for very marginal axle loads. The truck inventory has essentially no vehicles with capacities in excess of 5 tons and average vehicle age is about 10 years.

The rail network is fairly well maintained, but used largely obsolete rolling stock and prime movers. As a result, both road and rail transport cannot compete with waterborne freight carriage which provides well over 90% of the hinterland ton-mile transport capacity for nonliquid cargoes. Oil and gas are piped from the wells to the refineries and fertilizer plants respectively by proprietary pipelines. River transport consists largely of towed barges which fall into two major categories of 50 ton wooden barges and 200 ton steel lighters with the former comprising 70% of the available tonnage capacity. There are also a small number of larger push tow barges owned by the oil and fertilizer companies. Available river draft and width as well as waterborne tonnage moved should encourage the use of much larger barges and lighters in the future.

There is significant interinsular and local shipping performed by wooden sailing and RLS vessels

(coasters) which also handle the large percentage of foreign trade which is transshipped via Singapore or Tanjung Priok.

Passenger transport using the port is still small, but rapidly increasing. It is already significant enough to demand a specialized passenger terminal.

In this volume we present our findings and recommendations pertaining to the Transport Sector of the hinterland of the port of Palembang including requirements for transport access, level of service, quality of service and cost.

2.0 ROAD TRANSPORT SYSTEM

2.1 Road Network Existing Conditions

South Sumatra has about 6,005 km of roads, consisting of 666.5 km National roads, 2,634.5 km Provincial roads and 2,704 km Kabupaten and other tertiary roads. Out of the total, 22% are paved with asphalt, 26% gravel/earth and 52% are earth roads. About one-third of these earth roads are impassable by motor vehicles during rainy season.

A total of 4,040 km of the road network is in the mainland areas of the Province: here 21% of the roads have asphalt surface, 28% have gravel/earth surface and more than half (51%) are earth roads. Almost 38% of the roads are impassable by motor vehicles.

About 1,112 km of the network is on Bangka Island and another 831 km on Belitung Island. Fifty-one percent of the Bangka network is Provincial road, while the rest is Kabupaten road. In Belitung these are 40% Provincial and 60% Kabupaten roads. There are no National roads on either island. In Bangka, 30% of the network is paved, 25% gravel/earth and 40% earth. A little more than one-fifth of the dirt roads are impassable by motor vehicles. The island of Belitung has 32% of its road network paved with asphalt, 15% gravel/earth and 51% earth roads. Of the latter one-fourth is impassable by motor vehicles.

The National roads are all-weather roads, consisting of 450.7 km asphalt, and 211.8 km gravel/earth surfaced roads. However, only the Palembang-Prabumulih route can one travel with ease and safety (good asphalt surfaces, speed more than 50 km per hour, carriageway width of more or less two-lane capacity, no sharp curves).

Further inland from Prabumulih, up to the borders with Jambi and Lampung, the roads become interchanging stretches of asphalt sections (of varying conditions) and gravel/earth sections. The length of each asphalt section rarely exceeds 20 km and is commonly between 5-10 km. The slowest roads to travel on are the routes from Lubuk Linggau to Jambi border and Baturaja to Muara Enim, where the average speed is only 20-30 km per hour. The rest are only slightly better.

Of the total Provincial roads on the mainland, 1,115 km are all-weather, 529 km fair-weather, and 60 km non motorable roads. Only a little more than half of the all-weather roads are paved. The impassable roads are in the Muara Dua Kissam-Bayur (Kabupaten OKU), Simpang Kemiling-Pulau Beringin (OKU), Sugihwaras-Pulau Panggung (LIOT) and Tanjung Sakti-Bengkulu border (Lahat) routes. The fair-weather roads are mostly on the vast alluvial lands in the eastern half of the Province. The more important routes here are the Sungai Lilin-Jambi border (MUBA), Sekayu-Muara Kelingi (MUBA/MURA), Sekayu-Simpang Belimbing (MUBA/LIOT), Tanjung Raja-Beringin (OKI/LIOT) and Kayu Aging-Cempaka (OKI/OKU). The good asphalt roads are the Lahat-Pagar Alam-Jarai and Pagar Alam-Tanjung Sakti routes; the others are again gravel/earth roads interspersed with asphalt sections. The tertiary system (Kabupaten and other roads) on the mainland is much worse. There is no asphalt road to speak of and only 11% of the total system is all-weather road.

Except for the Palembang-Prabumulih route, all the National and Provincial roads provide only one-lane capacity (carriageway width less than 4.5 m), about

1.5-2.0 m shoulders on each side and 12-24 m right-of-way width. All the asphalt roads are Class III roadways (maximum axle load 3.5 tons); however, the natural fluctuations of the load-bearing capacity of gravel/earth roads make such legal classifications meaningless. Open ditches are the most common drainage method of the National, Provincial and Kabupaten roads, if they are provided at all. The Kabupaten and other tertiary roads are commonly provided with a carriageway width of 3.0 m or less, 1.5 m shoulder and 8-12 m right-of-way. The majority are little more than open earth tracks.

The National road system connects Palembang to the regional (Kabupaten) capital cities of Muara Enim, Lahat, Lubuk Linggau and Baturaja. The Provinces of Lampung, Jambi and Bengkulu are also connected by the National roads from South Sumatra. Trips to Jambi, Lampung and Bengkulu from Palembang are few as the poor road conditions and the long travel times are a discouragement. Listed below are distances between the major cities of South Sumatra along the national road.

Palembang to Prabumulih	- 86	km
Prabumulih to Muara Enim	- 90	km
Muara Enim to Lahat	- 43	km
Lahat north to Lubuk Linggau	- 154	km
Lubuk Linggau to Jambi border	- 135	km
Muara Enim south to Baturaja	- 112	km
Baturaja to Lampung border	- 42	km

Most of the Provincial road systems branch out from the National roads. An important leg of the Provincial system (Palembang) lies in the north east corner of South Sumatra. This road connects with the regional capital city of Sekayu and also connects to the Pro-

vincial capital city of Jambi. This road is the shortest distance to Jambi; however, the road is in such bad condition that any traffic between Palembang and Jambi usually takes the National road which is considerably longer. Some distances along the regional road leg are:

Palembang to Betung	- 61	km
Betung to Sekayu	- 58	km
Betung to Jambi border	- 164	km

An indicator of road conditions is average speed. Table II-2.1-1 shows some typical elapsed time and average speeds to major cities from Palembang.

Average travel speed over the National roads to the borders of Jambi or Lampung range from a low of 20 to a high of 50 km per hour depending on the segments traveled. The Provincial road to the Jambi border has average speeds of only 10 to 30 km per hour.

The Public Works Department has an inventory of all bridges in South Sumatra. The inventory lists the location, length, width, type and general condition of the bridges. There are listed 183 bridges on the National roads and 823 bridges on the Provincial roads. The bridges on the National system vary in width from 3 meters to 4.5 meters with only a few over 6 meters wide. Most of the bridges are listed as Class III which means they have an axle load limit of 3.5 tons.

On more than 90 percent of the bridges, the condition of the superstructure or substructure is listed as damaged. Several bridges are listed as dangerous. The highest classification is Class I which has an axle load limit of 7 tons.

Table II - 2.1-1

Travel Times on National Road and Provincial Road to Jambi

	Time	Average Speed
National Road		
Palembang to Prabumulih	1.7 hours	50.6 km/hr
Palembang to Muara Enim	5.5 hours	25.1 km/hr
Palembang to Lahat	7.0 hours	32.3 km/hr
Palembang to Lubuk Linggau	12.0 hours	31.7 km/hr
Palembang to Jambi border	16 hours	32.2 km/hr
Palembang to Betung	1.5 hours	40.7 km/hr
Palembang to Sekayu	3.0 hours	41.3 km/hr
Provincial Road		
Palembang to Jambi border	9.0 hours	22.2 km/hr

2.2 Traffic

Traffic counts are taken twice a year by the Public Works Department at selected stations along the highway network. Table II-2.2-1 shows traffic counts for the years 1973, 1974 and 1975. The location of the traffic count stations are shown in Figure II-2.2-1. The volumes are not high by most standards though the percentage of trucks is high. Table II-2.2-2 shows what percentage of the vehicles are trucks and also what the traffic increase or decrease has been during those years.

From the data provided it is not clear whether the traffic volumes are representative of the entire segments of road between the larger towns or if the counts may be affected by some traffic generators which were close to the census points.

2.3 Truck Tonnage and Road Utilization

The University of Bonn has made some rough estimates based upon major agricultural production and population distribution of the volumes of cargo on the roads network. They have calculated that about 181,000 tons move outwards and about 133,000 tons move inwards. These figures do not apply to Palembang but only to the mainland province. These total tonnages were assigned to the individual road sections of the national network. These are shown in Figure II-2.3-1.

The heaviest traffic is on Palembang-Prabumulih road section with 140-185,000 tons per year. The tonnages then drop quickly on Prabumulih-Muara Enim section with 85-110,000 tons per year and Prabumulih-Baturaja with 48-64,000 tons per year. On Lahat-

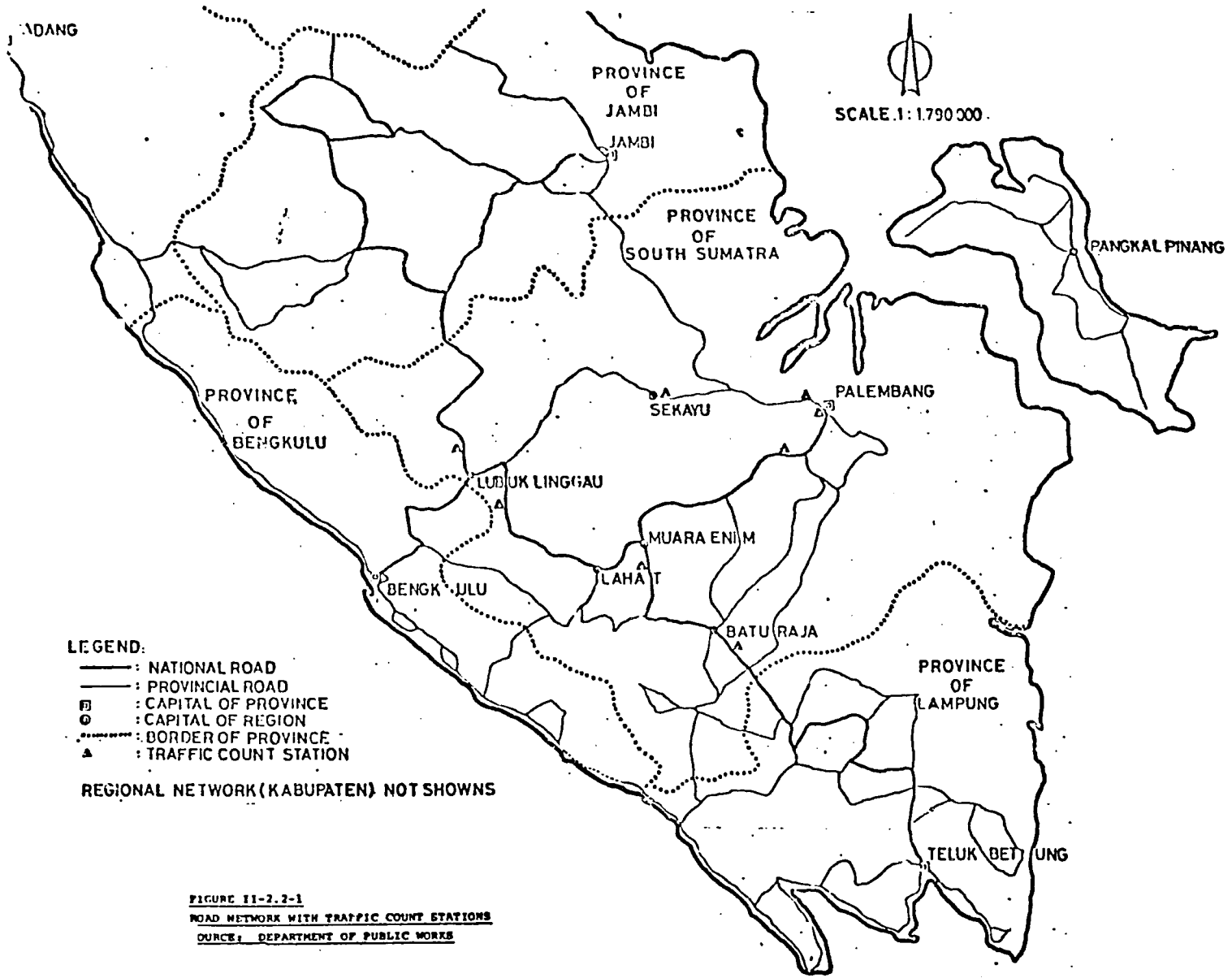


FIGURE II-2.2-1
ROAD NETWORK WITH TRAFFIC COUNT STATIONS
SOURCE: DEPARTMENT OF PUBLIC WORKS

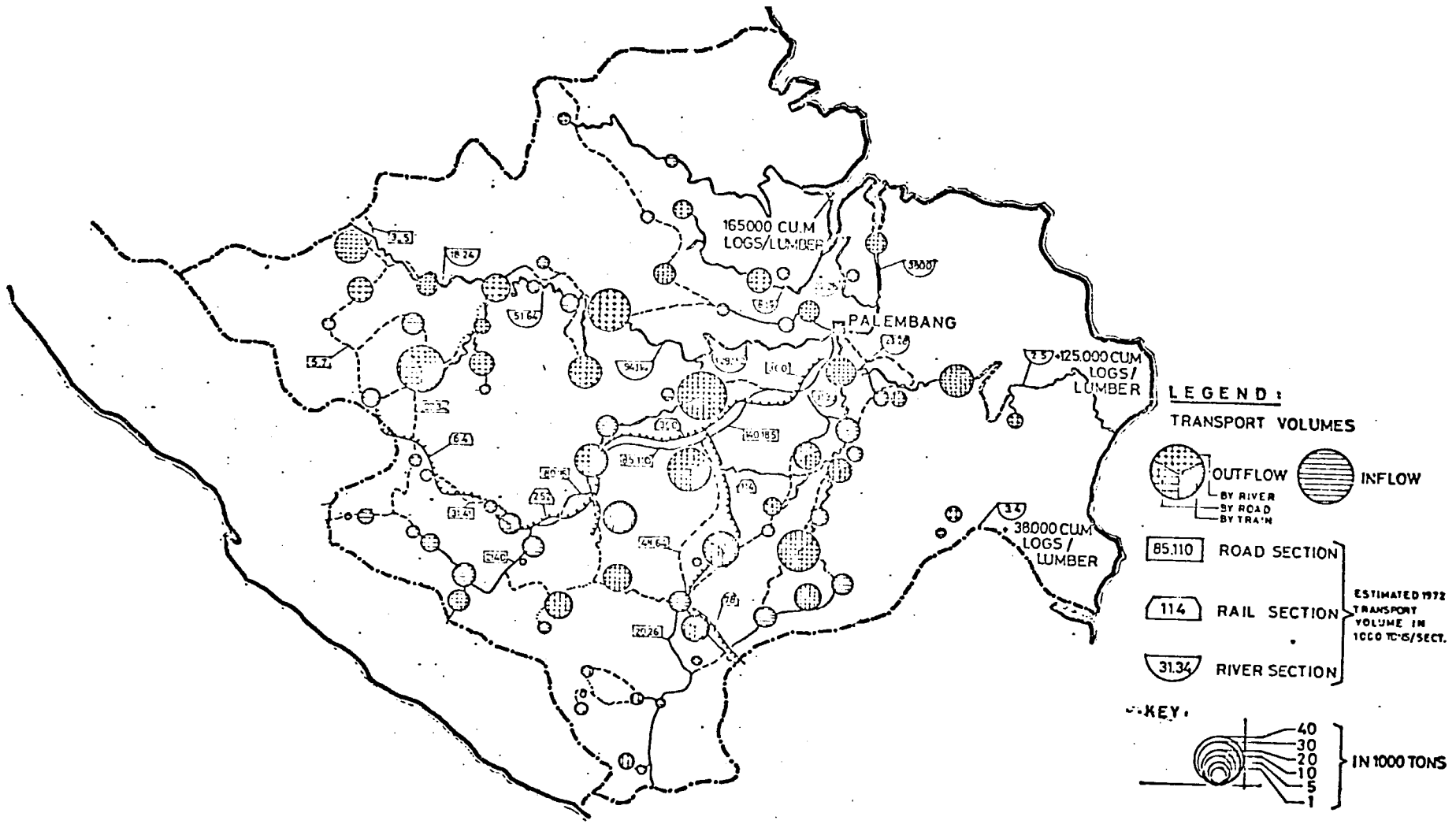


FIGURE : II-2.3-1
TRANSPORT VOLUMES BY MODE FOR SOUTH SUMATRA
SOURCE : SUMATRA REGIONAL PLANNING STUDY.

Table II-2.2-1

Traffic Counts on National Roads and Main Provincial Roads, by Public Works Department

		1973			1974			1975			
Road Location	At Km.	Light Vehicles	Buses	Trucks	Light Vehicles	Buses	Trucks	Light Vehicles	Buses	Trucks	Total for 1975
National Road											
Palembang-Simpang	12	192	368	205	243	362	189	407	433	200	1040
Simpang-Prabumulih	50	214	126	243	78	180	349	105	177	320	602
Tebing Tinggi-Lubuk Linggau	320	76	50	68	69	58	63	69	54	46	169
Lubuk Linggau-Boundary Jambi	410	26	60	36	18	82	62	24	41	39	104
Tanjung Enim-Baturaja	205	44	47	62	82	87	176	80	65	71	216
Baturaja-Border Lampung	307	-	-	-	-	-	-	59	18	29	106
Provincial Road											
Palembang-Betung	25	202	60	7	194	40	104	199	44	98	337
Betung-Sekayu	115	179	74	7	30	29	37	28	32	35	95

Table II - 2.2-2

Percent Trucks and Percent Total Traffic Increase

Road Location	At Km.	1973 % Trucks	1974 % Trucks	1975 % Trucks	Total Traffic Increase 1973-74	Total Traffic Increase 1974-75
National Road						
Palembang-Simpang	12	27	24	21	3.6	23.6
Simpang-Prabumulih	50	41	57	53	4.0	- 0.6
Tebing Tinggi-Lubuk Linggau	320	35	33	27	- 2.1	-12.4
Lubuk Linggau-Boundary Jambi	410	30	38	38	- 2.5	-55.7
Tanjung Enim-Baturaja	205	41	51	33	69	-130.5
Baturaja-Border Lampung	307	-	-	27	-	-
Provincial Road						
Palembang-Betung	25	3	31	29	20	- .09
Betung-Sekayu	115	3	54	37	170	- 1.0

Teging Tinggi section the load is 31-41,000 tons per year, Lahat-Pagar Alam 21-40,000 tons per year and Baturaja-Muara Dua 20-26,000 tons per year. All other sections have less than 10,000 tons per year utilized capacity.

The assignment procedure has also taken the intrazonal movement into account. The considerable importance of this movement is largely caused by availability of more than one transportation mode (road, rail, river) in one place. Thus Palembang, Prabumulih, Baturaja, Muara Enim, Lubuk Linggau and in some respect Lahat, all spring up as centers for commodities collection and distribution. While the intermodal handling of goods is quite difficult to determine for each center, it can be safely concluded that most tonnages of an individual road section result actually from local traffic. This is confirmed by the surprisingly little amount of through (road) traffic to Palembang by truck. Also the condition of the roads is not very uniformly good for the whole area for the trucking business to utilize its advantage of "door-to-door" service compared to the other modes of land transport".

2.3.1 Origin and Destination of Cargo

The major exports from South Sumatra are dry rubber, coffee, lumber, oil, tin and coal. Oil comes into Palembang by pipeline and tin comes from the islands of Bangka and Belitung which does not affect the mainland roads. Coal is carried to Palembang by train, lumber comes by rivers. Over the roads, the commodities carried are only rubber (mostly by river),

coffee, foodstuffs and other agricultural products. Most of the rubber comes into Palembang but very little comes over the road in trucks. About 2-3,000 tons come from Bengkulu via Lubuk Linggau annually. Coffee comes from the Ogan Komering Ulu and Lahat area. Only about 2,000 tons come from Bengkulu via Lubuk Linggau annually. As coffee is a high value product per unit of weight, it is transported mostly by truck and train.

In 1972 the Department of Public Work. conducted an origin and destination survey on the South Sumatra road network. Figure II-2.3-2 shows the results of the tonnages which come into Palembang from various regions. These are average daily tonnages.

2.3.2 Adequacy and Expansion Capability

According to the traffic counts provided by the Department of Public Works at the selected stations, the percentage of trucks range from 21 to over 50 percent of the vehicles counted. See Table II-2.3-1. Included in this table are the percent yearly increase or decrease in volume counts at these locations. Most of the locations have shown a decrease in the counts for the year 1975. Future trends, of course, are impossible to predict upon such a small data base and falls beyond the scope of this study. However, these stations do show volume counts in the 100 to 200 vehicles per day range. The significance of this volume range is that if this volume is continuous over the entire segments of road, it would be inconsistent with the widths of

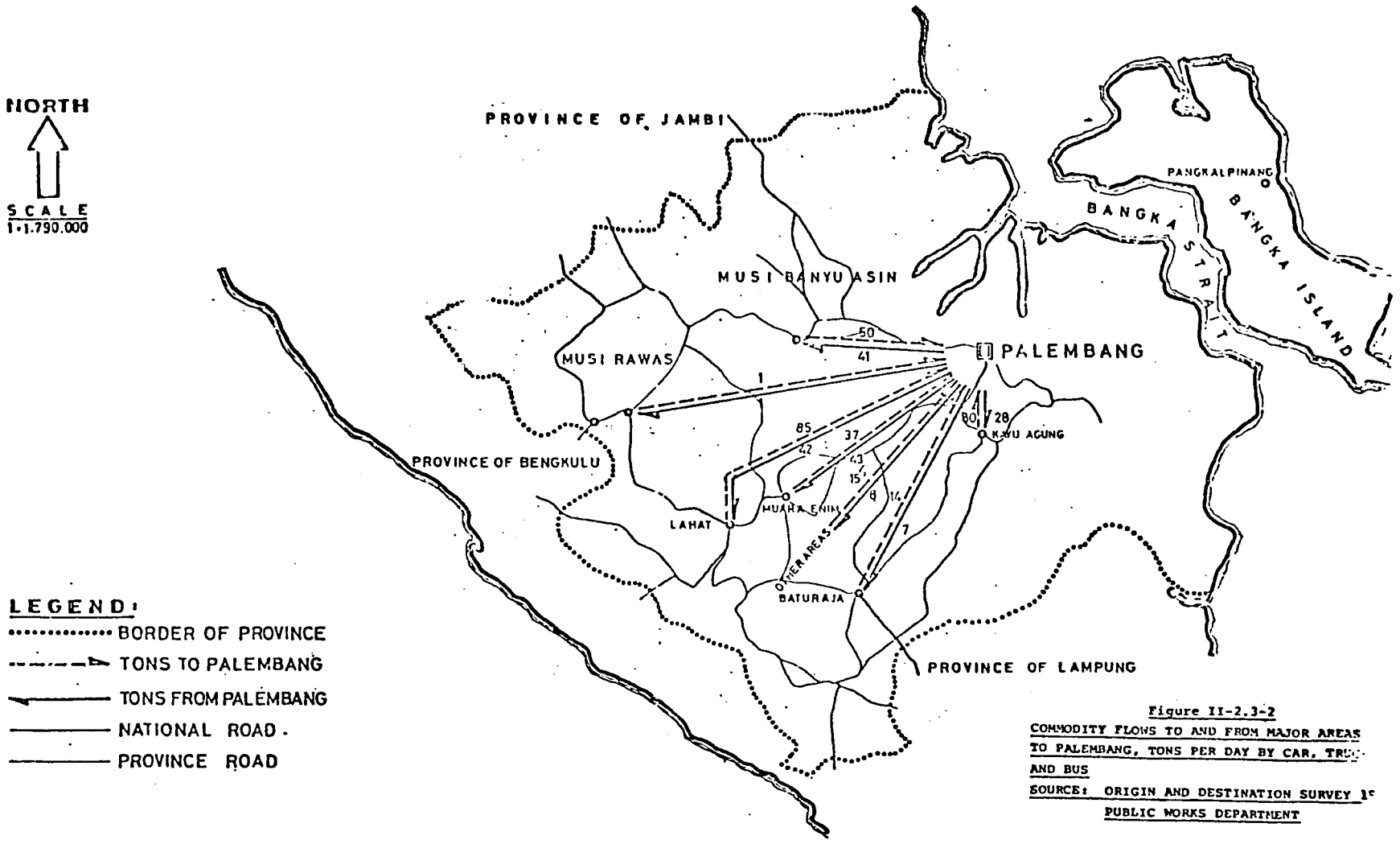


Figure II-2.3-2
COMMODITY FLOWS TO AND FROM MAJOR AREAS TO PALEMBANG, TONS PER DAY BY CAR, TRUCK AND BUS
SOURCE: ORIGIN AND DESTINATION SURVEY 1[illegible]
PUBLIC WORKS DEPARTMENT

Table II-2.3-1

Percent Yearly Increase/Decrease in Volume Counts

To Be Included in the Final Report

roadway which are only one lane throughout most of the network.

The capacity of a one lane road is difficult to define, because it may vary depending on national situations. Practice in the United States places a practical capacity of a one lane road at between 100 and 125 vehicles per day. This is done mainly for safety reasons. Other considerations such as funding, accident statistics, national priorities, etc. could postpone the widening of a one land road till traffic is over the 200 vehicle per day range. Acceptance of a lower level of service is tolerated when priorities dictate. The point to be made here is that if the volumes of traffic rise over the next few years then decisions will have to be faced regarding the level of service that is tolerable before the road is made two lanes.

The very high percentage of trucks makes the one lane roads even more critical in terms of capacity. Possibly, in the future, the number and percentage of trucks may go down because total tonnage carried per truck will rise. At present the average tonnage carried by trucks is only between 2.1 and 2.3 tons. The extremely high number of bridges with limiting axle loads under 3.5 tons prevents any usage of high capacity trucks in the very near future.

The inference that may be drawn from the limited amount of traffic data and future projections is that data gathering by the Department of Public Works should be continued vigilantly because critical decisions in the near years will have to be made regarding investments in road construction. The movement of traffic in South

Sumatra appears oriented towards the direction of Palembang. Port destined traffic possibly will not be the major factor in the need of upgrading of East-West road facilities but the growth and attraction of Palembang as the capital of South Sumatra may.

In almost all locations where the volume of traffic is too much for a one lane road, but too little for major reconstruction to higher standards, the road can be widened to two lanes. This is a somewhat temporary solution.

Widening of the one lane bridges presents a different problem. The bridges cannot be widened without reconstructing the whole bridge. If bridges are reconstructed then high design loads should be used. These higher design standard bridges then may not be in proper locations for the longer term solutions, therefore the investment would be wasted. Reconstruction of the bridges for traffic volume reasons may prove uneconomical except in individual cases where traffic is very high and the bridge can be made consistent with longer term plans.

2.4 Planned Improvements to Highway Network

The National highway from Lubuk Linggau in South Sumatra north to Muarabungo in Jambi is in very poor condition. During periods of heavy rains it is sometimes impassable. The road was bad enough to require that a feasibility study be made for its improvements. The original study concluded that a major improvement should be made and the road rebuilt to much higher standards. The government went so far as to employ an engineering firm who completed the design to the

higher standards. Before construction began the Government decided to reevaluate the road within the framework of a regional development study.

Robert R. Nathan, economic consultant of Washington, D.C., was retained to do what is called the "Sumatra Regional Planning Study". Robert R. Nathan has published a progress report on their study and it contains a preliminary evaluation of the proposal for improving the highway from Lubuk Linggau in South Sumatra to Muarabungo in Jambi. The preliminary conclusion is to not implement the proposed high standard improvement. The reason for the negative recommendation given is that there is little in the way of development benefits and only insufficient amounts of user cost savings. The Nathan study team felt that there were other land areas in Jambi, along existing roads, which should be developed first before the land along the Lubuk Linggau - Muarabungo road is developed. Although these recommendations were given as preliminary, the team felt that the final recommendations would not be different.

Another feasibility study was made of the highway from Lubuk Linggau south to Teluk Betung by ENEX consultants of New Zealand. This study was completed in June 1973. The total length of the existing road is about 590 km. For the study, the road was designated into five geographical sections and each section was then subdivided into a number of segments. The segments of road were then subjected to economic and road design analysis in order to achieve an optimal investment program for the improvement of the road. A part of the relevant summary of recommendations from the report

is quoted below.

"Initially six alternative construction options representing increasing levels of improvement within the Bina Marga Class highway standard were designed and costed. However, on the basis of a positive net present value and a benefit cost ratio of greater than one, calculated at 15 percent per annum discount rate, construction to this standard could only be economically justified over the 60 kilometers of road between Teluk Betung and Terbanggi Besar.

The reasons for this result relate to the high level of construction costs, the low level of base traffic, low level of vehicle operating costs savings, and a high discount rate of 15 percent. In addition, development benefits were attributed to improving the present road since it is considered that, as a main transport link supplemented by both rail and river, the existing road does not at present inhibit economic development in the area.

Considering the condition of the remaining 530 kilometers, which varies between poor and extremely bad, it was considered a lesser level of improvement should be evaluated. A further three alternative road states, consistent with the Bina Marga Class III highway Standard and a program of road "betterment" were then evaluated for the remainder of the road.

Initially these were proposed in an effort to find an economically feasible level of construction investment, although it was realized that further investigation could show that one or more of them were not feasible from an engineering viewpoint. The results of this phase formed the preliminary recommend-

ations presented in the Interim Report. Subsequently these road states were refined for the final analysis.

The final recommendations provide for a substantially improved sealed road over the full 590 kilometers from Teluk Betung to Lubuk Linggau. Wherever a minimal level of improvement is recommended, it has been scheduled for construction as soon as possible, consistent with a cost benefit ratio of greater than one. This is not the optimal investment in terms of timing, but with only a small difference in the results, it is considered this represents a better policy decision. However, the improvements above the minimal level, the optimal schedule has generally been followed. If the additional costs of construction to a better road state, or the construction of the same road state earlier in time, were equated with additional benefits, that investment program was recommended. This criteria was varied in some cases where the existing road was in good condition.

The recommendations are detailed fully in the text and tables of this report but are summarized below:

2.4.1 Rural Road Construction

1. For the 292 kilometers between Lubuk Linggau South ahd Baturaja, the minimal level of improvement is recommended. This involves construction by local forces of a 4.5 meter wide pavement on top of the existing road with a nominal life of 10 years. The road should be constructed in 1975-76 and has an initial construction cost of Rp. 2276 x 10^6. The net present value is Rp. 450 x 10^6 and the Benefit Cost ratio is

1.20 calculated at a 15 percent discount rate. This distance represents three construction projects.

2. Between Baturaja and Kotabumi a distance of 159 kilometers a similar level of improvement is recommended, but with the addition of 1 meter shoulders. Construction should also be carried out by local forces in 1975-76 with an initial cost of Rp. 1928 x 10^6. The net present value is Rp. 834 x 10^6 and the Benefit Cost ratio is 1.46.

3. Further south between Kotabumi and Terbanggi Besar, a distance of 38 kilometere, the construction option recommended is a 6 meter sealed pavement with 1 meter shoulders and with low and medium speed curves removed from the existing road. Construction should be with local forces in 1976 with an initial cost of Rp. 477 x 10^6 and a net present value of Rp. 583 x 10^6. The Benefit Cost ratio is 2.36.

4. For the remaining 63 kilometers between Terbanggi Besar and Teluk Betung, it is recommended that a new highway with a sweeping alignment, 7 meter seal width and 2 - 2 1/2 meter shoulders, have construction commenced in 1979. This contract would be designed by foreign consultants and constructed by foreign contractors and would have a design life of 20 years. The initial construction cost is Rp. 2522 x 10^6 spread over four years with a net present value of Rp. 1982 x 10^6 and a Benefit Cost ratio of 2.79.

The total initial investment in the rural road segments is Rp. 7208 x 10^6 with an overall rate of return of approximately 23 percent."

2.4.2 Feeder Roads

Part of the report on the "Lubuk Linggau-Teluk Betung Highway Feasibility Study" was devoted to the rural feeder roads within the area of influence of the highway. Pertinent excerpts are here quoted.

"The projections of economic activity in the influence area assumes that where necessary, the present network of feeder roads will be upgraded and in a limited number of cases, extended.

The condition of existing feeder roads in Lampung Province is adequate for present and immediate production although a considerable upgrading program in North Lampung is assumed. In South Sumatra and Bengkulu, feeder road conditions generally are very poor with either clay or poor gravel pavements. Transport costs on these roads are very high. An example is the recently upgraded road between Bengkulu and Curup, a distance of 80 km which previously took upwards of one day with a freight tariff of approximately Rp. 70 per ton km. The trip now takes only two hours and the freight tariff is Rp. 25 per ton km.

Considerable variation was reported in the price of urea fertilizer. In Lubuk Linggau it was the average national price of Rp. 26.5 per kg. while 65 km north on a feeder road at Binginteluk it was Rp. 45 per kg. At Tugumuljo, 20 km north it was Rp. 33 per kg. At Semendo in the LIOT kabupaten the price was reported to be Rp. 70 per kg. Semendo is 100 km from Muara Enim and this distance takes 4 hours by truck. A considerable proportion of the price difference is due to a present shortage in supply of fertilizer although freight rates for other crops confirm that poor

communication is equally important. Again freight rates upwards of Rp. 80 per ton km were reported.

With freight rates of only Rp. 12-15 per ton km on the main road, it is evident that the condition of the feeder roads is a major inhibiting factor to realizing the potantial of the South Sumatra and Bengkulu areas.

Local government officials are aware of this and in all cases are undertaking a rehabilitation and upgrading program, frequently with the assistance of IDA credits. It is considered that major feeder roads will be upgraded by the end of Repelita II."

2.4.3 Identifications of Feeder Roads

2.4.3.1 "South and Central Lampung"

Generally this area is already well served by feeder roads. New road construction is envisaged to servicethe ferry terminal at Bakauhuni and this will stimulate agricultural production in that area. The proposed feeder road from Panjang to Sribawono will considerably reduce transport costs for an important maize growing area. It is also proposed to eventually link Teluk Betung, Kotajaya and Kota Agung around the coast to fully realize the potential of this rich clove and coconut producing area. A further new road will link Kota Agung is South Lampung to Kotajawa located in the West Coast of Lampung. This road will be developed initially for a timber concession and, together with further rehabilitation of the road along the West Coast, will serve to assist development in this area. The feeder road to Runbia in Central Lampung will be extended and upgraded to service irrigation

schemes in this area.

2.4.3.2 "North Lampung"

This ares is poorly served with feeder roads. A considerable upgrading program together with some new reconstruction is envisaged, consistent with present Provincial Bina Marga planning. The main area is north and north west of Kotabumi where there is a large area with potential for cash and food crop production. Close to the Lampung border roads have already been formed to exploit large forestry concessions in this area.

2.4.3.3 "OKU Region"

The major emphasis on development in this kabupaten is in the south west and south east. The former is a large coffee producing area, with good potential for other cash crops. Considerable upgrading of feeder roads is at present being undertaken in this area and eventually it is envisaged that the road network will link with project road close to Sugihwaras. In the south east area the development is linked to the rehabilitation and extension of irrigation facilities. An important development in the kabupaten is the intention of the provincial government to upgrade the two major feeder roads linking Baturaja and Martapura to Palembang. This provides a direct link to Palembang and considerably reduces the potential traffic on the project road from Baturaja to Muara Enim.

2.4.3.4 "LIOT Region"

Little development in excess of natural population

growth is projected for this kabupaten. The area east of the project road has a very low fertility and there are large areas of abandoned rubber trees. Feeder road requirements for this area have not been identified as any development would not place a transport demand on the project road. West of the project road, the road linking Sugihwaras and Tanjung Agung in the Lahat kabupaten will be upgraded in the near future to realize the cash crop potential of the Semendo area.

2.4.3.5 "Lahat Region"

The major economic activity in the Lahat kabupaten is located west of the project road in the Pagaralam valley. The present road linking Pagaralam from Lahat is in good condition and it is intended to further upgrade the road through to Kepahiang in Bengkulu province. This represents an alternative road to the project road between Lubuk Linggau and Lahat for goods moving between Palembang and Bengkulu.

2.4.3.6 "MURA Region"

The feeder roads in this area mainly follow the tributaries of the Musi River and are in very poor condition. It is intended that these roads will be upgraded during Repelita II allowing the road transport of slab rubber to a projected new processing plant in Lubuk Linggau. It is not the intention of the provincial government to upgrade the road from Palembang via Sekayu to MURA except for that section of road acting as a feeder road in the MURA area. For this analysis the road has not been considered a valid alternative for goods moving between Palembang and MURA. Exploit-

ation of forestry concessions in the MURA area will also serve to open up new areas for transmigrant settlement.

2.4.3.7 "Bengkulu"

The major factor inhibiting the development of the Bengkulu province is the condition of the main feeder roads running north and south along the coast. The intended upgrading of these roads will stimulate surplus production of food crops and some cash crops.

The shortest road distance from Palembang to Jambi is on the provincial road, north through Betung. However, the stretch of road from Betung to Jambi is earth and in very bad condition. During wet weather the road is often impassable. There is very little traffic movement between Palembang and Jambi but some of the drivers elect to drive the national route through Lahat which is over twice the distance. At present a foreign consultant is studying the feasibility of improving the existing provincial road. No doubt the eventual upgrading of this road will improve the land communication between Palembang and Jambi but estimated increases in economic and highway activity must await the results of the study.

The Public Works Department has selected a number of roads in South Sumatra which are to be repaired, reconstructed or rebuilt on new alignment. This program is shown in Figure II-2.4-1. No time table was given for routes to be constructed or the standards to be used. Decisions will probably be made when the results of the various feasibility studies are weighed and evaluated in terms of the total regional

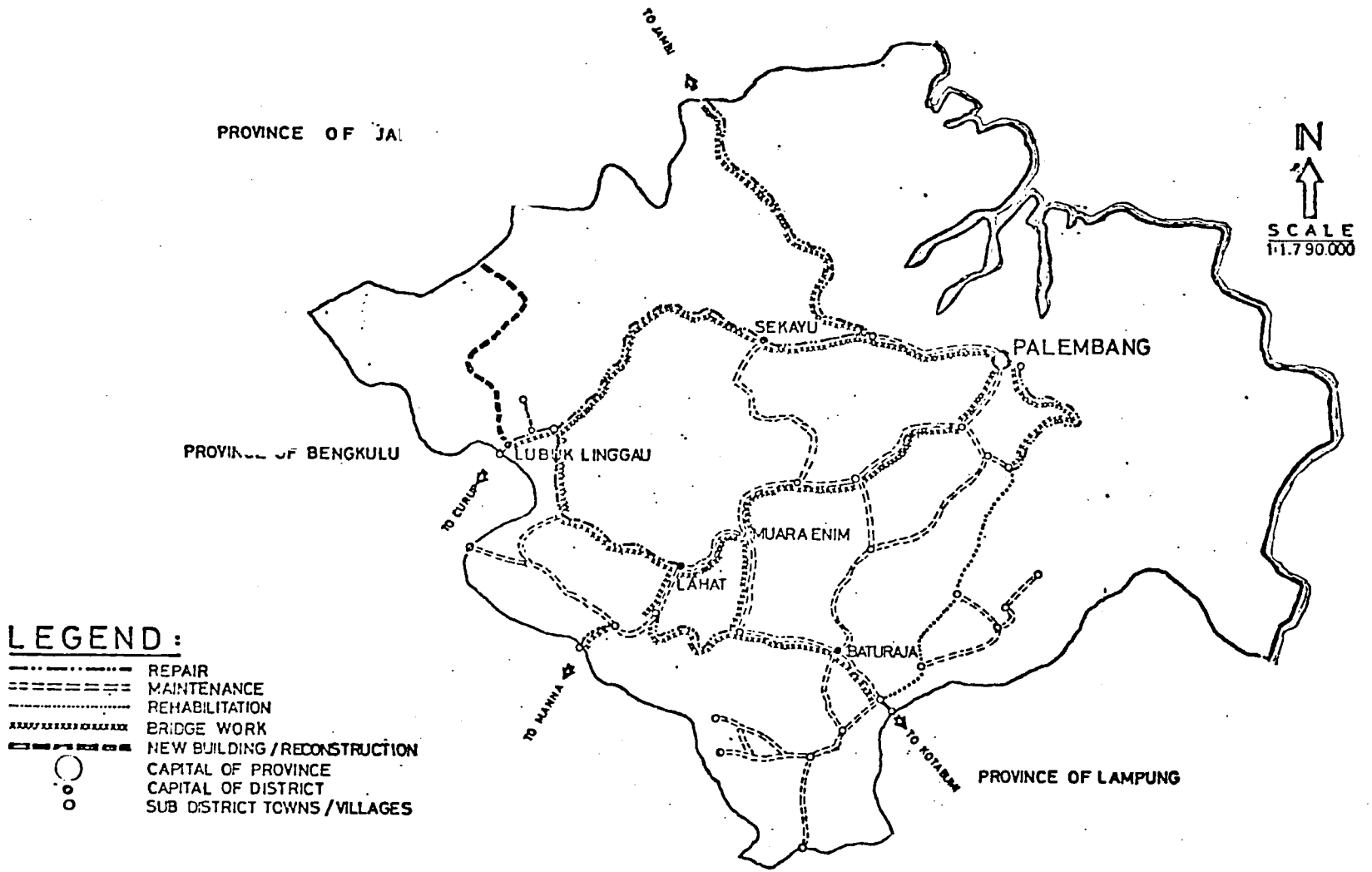


FIGURE : II-2.4-1
PRESENTLY PLANNED ROAD PROJECTS SOUTH SUMATRA BY DEPARTMENT OF PUBLIC WORKS
SOURCE : DEPARTMENT OF PUBLIC WORKS (BINA - MARGA)

development and the availability of funding.

2.4.4 Banyuasin Road Survey

The Public Works Department (Bina Marga) has published a report which examines the feasibility of constructing a new road from Sungai Rengit to Tanjung Api-Api on the Musi Banyuasin River Bank. The report is undated but was completed sometime after October 1974. The feasibility study was made to investigate the problems and costs of providing land access to the proposed port on the delta of the Banyuasin River.

For the engineering feasibility a ground survey line was run through the jungle peninsular from Sungai Rengit to the proposed port site, a distance of approximately 80 km. Sungai Rengit is at about 20 km from Palembang on the Palembang-Betung road. About 34 bore holes were made along the survey with soil samples taken. The bore holes were taken to a maximum depth of 8 meters. The soil samples were subjected to laboratory analysis for liquid limit, plastic limit, vane shear test, unconfined compression test and consolidation tests. Also California Bearing Ratios were taken of borrow material.

A difficult English translation of the Indonesian report was used to assess the laboratory results to the meanings were not always clear. The subsurface investigations showed that the soil consists mostly of various forms of clay with very low compressive strengths and high liquid limits. Almost the whole length of the survey line was under water.

The report states that the top 4 meters of clay are not suitable as a road foundation and should be

removed. The grey clay which exists from about 4 meters to 15 meters is soft but can be consolidated with a fill embankment. The recommended method for consolidating the underlying clay is to dig a canal on each side of the roadway embankment to provide for the drainage of water from the clay. The drainage canals are to flow to the Telang River on the south of the proposed roadway. Suitable fill material was to be used for the embankment and road subbase in place of the removed unsuitable clays. The fill material was to be hauled from borrow sites which were found around kilometers 3 to 7.

The road cross-section used was 32 meters of embankment consisting of two 7 meter roadways, two 2 meter shoulders and a 4 meter median. About 12,251,100 cubic meters of borrow was estimated to be used for the embankment.

The estimated costs of constructing the highway was Rp. 3,451,000,000 or about $84,000,000. The time for the necessary consolidation to take place and the completion of construction of the highway was estimated to be 5 years.

The amount of engineering that was spent on the survey line, soils analysis, and making of the final report was considerable. However, roads built upon deep layers of soft clays present particularly complex problems. A full engineering assessment of the report is also made difficult because of the inadequate English translation of the methods used and of insufficient backup data of the soils analysis and methods of sampling. The bore holes were driven to maximum depths of only 8 meters. In these poor soils, samples should be taken at greater depths and possibly more often

although an approximate soils profile may be inferred from the present soils logs. Sampling of the clay should follow a standard procedure and the clays should be subjected to more rigorous consolidation tests and time analysis. It is not known whether the water in the deeper layers of clay will ever be driven out of the clay into the drainage canals. Sometimes a soft clay will displace transversly under a heavy overburden rather than consolidate vertically.

For the reasons given above, it is impossible to say whether the estimated costs of $84,000,000 are realistic or not. The report appears to be an adequate reconnaissance report, but further soils analysis is needed and a construction method analysis is needed to more accurately determine the costs of a complex project. A summary of the Reconnaissance Report of the Banyuasin Road is given in Appendix II-1.

2.5 City of Palembang and City Streets

Palembang, the capital of South Sumatra Province, has a present population of 600,000 and lies near the eastern side of the province. All roads to the west, south and north emanate from Palembang. The Port of Palembang is located on the Musi River about 85 km from the sea. Palembang is located on the west bank of the Musi River where the many private piers for rubber, coffee and saw mills are located. The area of Ulu, which is the name given to the east bank of the river, where the wharves of Kertajati Pertamina and other private loading facilities are located.

The main provincial road which comes from the northern cities of Sekayu and Jambi enters Palembang from the north and becomes the principal street, General

Sudirman. General Sudirman Street passes through the center of Palembang and continues over the Musi River Bridge to Ulu, to the wharves on the east bank and to the national roads.

The national roads which lead to the cities of Lubuk Linggau, Lahat, Muara Enim and Baturaja pass through Ulu on the east bank of the Musi River to the Musi River Bridge. From this area trucks disperse to the different terminals of Palembang.

The terminals which receive cargo for import or export are scattered along both banks of the Musi River. The largest of the port facilities, operated by the Port Administration, is Boom Baru in the middle of Palembang. Trucks mostly pick up import cargo from this terminal as export goods are handled by other wharves or barges. Only a small number of loaded trucks come into Boom Baru for interisland export.

Trucks which leave Boom Baru and who may be headed for the north east hinterland have several optional routes to leave the city. The widest roads, and the most direct route, is by Harapan, Veteran and then north on Sudirman Street. Another option would be Harapan, Kenten, Lingkaran IV and Sudirman. A third option would be Major Memet to Lemabang, then Duku to Kenten, Lingkaran IV and Sudirman. See Figure II-2.5-1.

Trucks leaving Boom Baru and are headed south would use Harapan, Veteran, Sudirman, Musi River Bridge and Ogan.

As part of this study, the major street routes of Palembang were traveled to determine their effectiveness to serve import-export related traffic to the wharves.

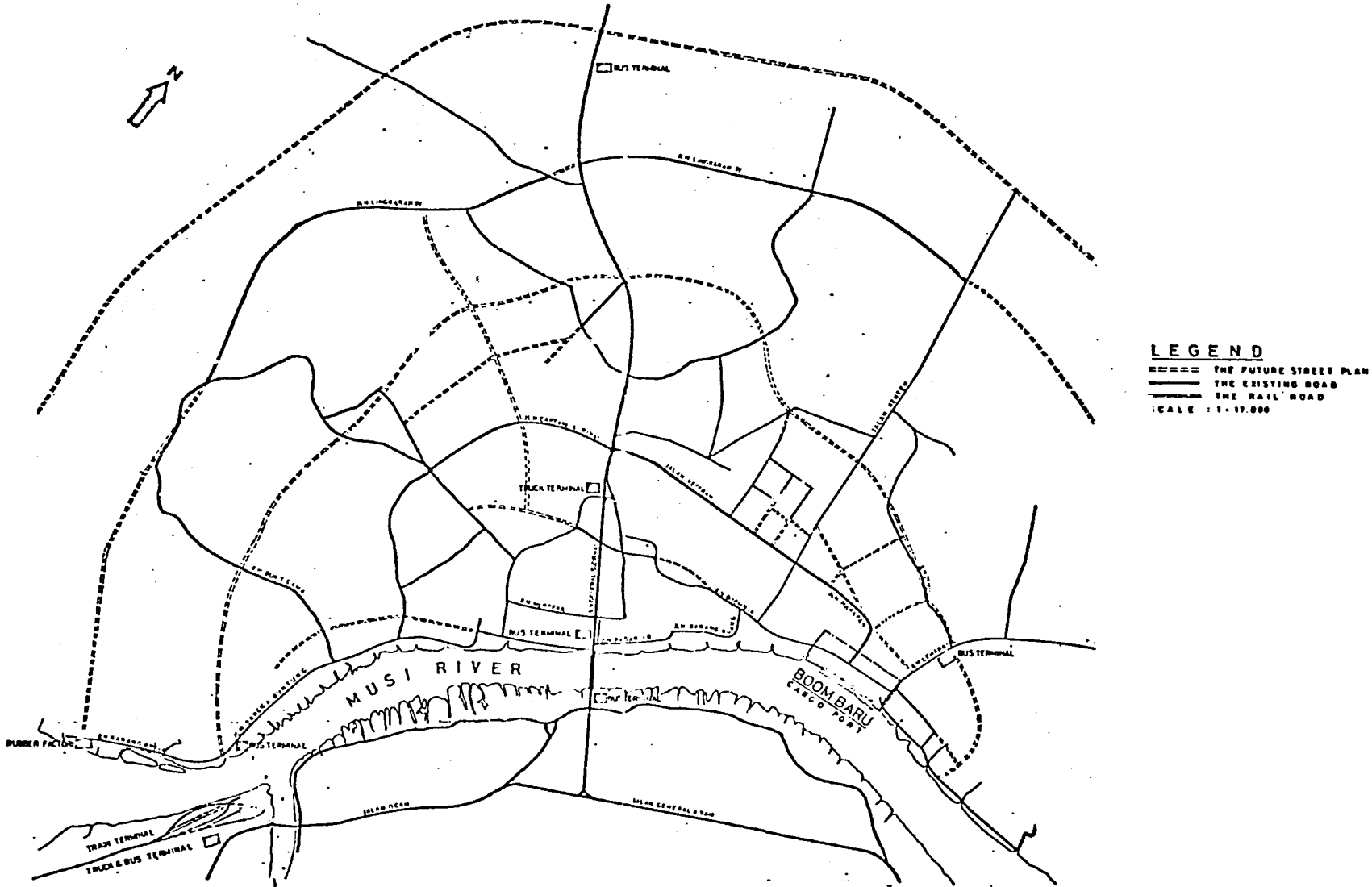


FIGURE : II-2.5-1

PLANNED FUTURE STREET NETWORK

SOURCE : DEPARTMENT OF PUBLIC WORKS (BINA MARGA)

The pavement widths were measured at average locations, right-of-way (fence lines) measured and general condition noted. The following average widths and approximate rights-of-way were noted.

Street	Roadway Width Meters	Apparant Row Meters	Surface & Condition
Mayor Memet	7.0	14	Asphalt stone-good
Mayor Memet	12.4	16.5	Asphalt stone-good
Lamabang	9.3	-	Asphalt stone-good
Duku	7.3	13.8	Being resurfaced
Kenten	7.75	14.75	Asphalt stone-good
Kenten	6.5	13.6	Asphalt stone-good
Lingkaran IV east	5.8	38.45	Varies - very bad
Lingkaran IV west	5.9	10.75	Earth - very bad
Sudirman	12.1	31.75	Asphalt stone-good
Sudirman down-town	26.55	40.25	Asphalt stone-good
Bukit Siguntang	6.7	-	Earth - very bad
Bukit Lama	6.7	-	Earth - very bad
Tangga Buntung	6±	-	Very bad
Karang Baru	6±	-	Very bad
Talang Kerangga	7.4	14.8	Asphalt stone-good
Capt. Rifai	12.0	22.95	Asphalt stone-good
Veteran	12.0	22.5	Asphalt stone-good
Harapan	12.0	20.6±	Asphalt stone-good
Pasar 16	12.25	15.4	Asphalt stone-good
Karang Bang-kuang	5.7	8.2	Bad
Boom Baru (West)	8.8	Varies	Varies
Ogan	7.4	15.5	Good

The widest streets, Harapan, Veteran, and Sudirman are in good condition and although heavily traveled,

does not appear to break down due to congestion. The laternate routes for going from Boom Baru to the north city limits are narrow, congested with mixed traffic, have weak bridges, poor surfacing and travel times are high. The streets bordering the river north of the Musi Bridge, which lead to rubber factories, coffee exporters and saw mills, are extremely bad; however, no truck traffic comes to these locations as the commodities arrive by waterways.

Discussions were held with the city engineer and he felt that Palembang, as yet, has no major congestion problems except with the streets bordering the Musi River. The worst streets are Pasar 16, Karang Bangkuang and Boom Baru. This area is a retail district and the streets are continuously jammed with pedestrians, trishaws and delivery trucks. Any kind of vehicle movement on these streets is bad. The intersection of Boom Baru and Kenten is extremely bad and is a serious bottleneck. Some of the trucks which deliver goods to the retail area come directly from Boom Baru but it is difficult to say how many, or what percentage, or if the congestion on these streets is a direct port related problem.

2.5.1 Planned Improvements

The master plan of Palembang calls for a system of ring roads and radial streets to allow for future traffic growth. Four ring roads are indicated in the plan, some segments of which will follow existing routes and some segments which will be new roads. These ring roads will form approximate concentric semi-circles on the Musi River within the City of Palembang. One

of the ring roads proposed follows the present alignment of streets Harapan, Veteran, Kapten Rifai, and Talang Kerangga. The planned future street network is shown on Figure

The time frame given for the completion of the ring roads in the Ulu side is by 1994. However, no specific time table is given because funding is controlled by the National Government and the streets are built whenever the funding is made available. It appears that trucking of cargo to the export wharves of Palembang (excepting Boom Baru) are not to be made competitive with other forms of transportation until better street access is available and heavier loads can be carried by the trucks.

2.5.2 Boom Baru

Both international and interisland cargo is unloaded at the wharves of Boom Baru. The offloading may be onto barges, directly onto trucks or into the godangs. The barges transfer the cargo to various storage places along the Musi River. Cargo on the trucks and from the godangs mostly go directly to various locations within Palembang. Generally these locations are:

a. Retail market at Pasar 16.
b. Various locations on Sudirman Street.
c. Importers godangs.
d. Rice agents.
e. Special equipment to Pusri, TABA, etc.

The recorded number of trucks leaving the Boom Baru Terminal since 1970 are:

Year	Number of Trucks	Average Per day
1970	37,555	125
1971	34,325	114
1972	32,976	110
1973	29,274	98
1974	31,296	104

Recent typical daily recorded counts are as follows:

	September 1975			
	Date	Number of Trucks	Date	Number of Trucks
Sunday	7	None	14	None
Monday	8	105	15	51
Tuesday	9	115	16	105
Wednesday	10	135	17	190
Thursday	11	64	18	275
Friday	12	116		
Saturday	13	117		
Average per day		110		155

For the past five years the average number of trucks leaving the port ranged from 100 to 125 per day.

On one September morning more than 60 trucks were observed waiting to load at Gudang Number 1 and there was ample parking space in the apron area and port owned street in front of the Gudang. The apron area varies from 25 meters to 38 meters in front of Gudang A. Gudangs A, B, C, D and E have a loading apron distance of 25 meters in front of the Gudangs. These aprons are ample for turning and maneuvering of the single unit trucks which are used presently.

Trucks enter the port near the intersection of Mayor Memer Sastrawirya Street and Lemabang Street.

See Figure II-2.5-2. The traffic path is one way past Gudang I and the other Gudangs and trucks leave through the gates to the south on to Boom Baru Street. At present there are no truck traffic operational difficulties on port property as volumes of traffic are reasonably low and the amount of road area high.

Boom Baru and Mayor Memet Sastrawirya are city streets which presently cut port owned property in two. When plans are made to utilize the far side of the property as upland area, consideration should be given to construction of a new street on the perimeter of port property. This new street may be designed in conjunction with a plan to relieve the badly congested streets which lead to Pasar 16.

2.6 Road Transport Costs

2.6.1 Tariffs

The actual rates paid on freight are based on traditional bargaining between shippers and carriers, even though published rates exist. Thus, the perceived cost to shippers may differ substantially from official rate scales. The University of Bonn has done considerable research on transport costs in South Sumatra and as their work was recent (1974) excerpts from the report are repeated below.

"Transport Costs.

Transport costs depend primarily on the distance and traffic frequency, as well as road condition, means of transport and the kind of goods to be transported.

In some areas of South Sumatra these road transport costs are also influenced by the availability of

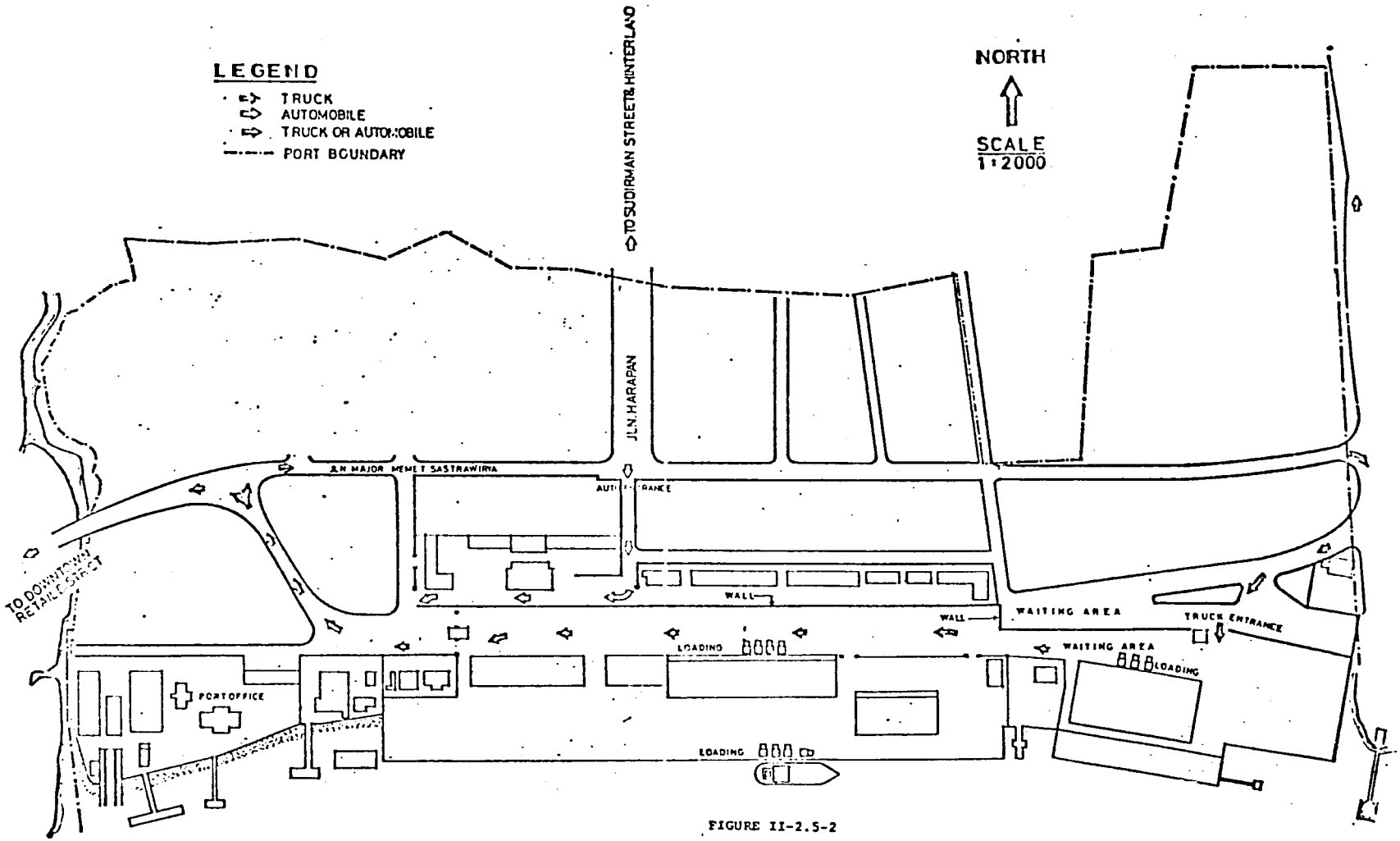


FIGURE II-2.5-2
BOOM BARU EXISTING TRUCK TRAFFIC PATTERN
AND ACCESS ROADS
SOURCE: E.G.F. SURVEY

other modes (such as river and railway transports); or the monopolistic position of some transport enterprises. Over short distances (5-20 km) mainly oplets (here called "taxi") are used, with rates amounting to Rp. 70 to Rp. 160/ton km for goods and Rp. 5 to Rp. 10/passenger km. Trucks are sometimes the only mode available in some areas with difficult terrain and bad road condition, charging from Rp. 160 to Rp. 250/ton km for goods and Rp. 16 to Rp. 25/ passenger km; i.e. from 80% to 150% higher than in situations where taxis are available.

On medium distances (30-100 km) the bus/oplet costs drop down considerably, ranging from Rp. 20 to Rp. 50/ton km and Rp. 3 to Rp. 8/passenger km. Trucks do not offer a real alternative for this range of distance (costing about Rp. 40 to Rp. 80/ton km), however there is still their monopolistic position in some areas to be considered.

Over longer distances (more than 100 km), the trucks with Rp. 22 to Rp. 33/ton km is the least expensive means of transport. Bus transport costs are 14-50% higher, at Rp. 30 to Rp. 50/ton km. However, in difficult areas such as the swampy lands of Musi Banyuasin where only the trucks can go, they may charge up to Rp. 60/ton km. For passenger transport by bus/oplet, the rate is in between Rp. 2 and Rp. 6 km.

On the interregional transport the cost for passenger ranges between Rp. 4 and Rp. 5 km by bus, and cargo Rp. 24 and Rp. 40/ton km by truck. These costs are listed and summarized in Table II-2.6-1 - South Sumatra Costs - University of Bonn, March 1973.

Table II-2.6-1

SOUTH SUMATRA TRANSPORT COSTS- UNIVERSITY OF BONN - MARCH 1973

RUPIAH PER PASSENGER KM OR PER TON KM

Distance range and type of rate / Mode and type of vehicle	Short distance 5-20 km		Medium distance 30-100 km		Long distance 100-250 km		Interregional 250 km		Remarks
	Rp/pax km	Rp/ton km	Rp/pax km	Rp/ton km	Rp/pax km	Rp/ton km	Rp/pax km	Rp/ton km	
ROAD									
a. Motorized									
- Bus/oplet	5,00-10,00	70-160	3,00-8,00	20-50	2,00-6,00	30-50	4,00-5,00	80-100	
- Truck	16,00-25,00	160-250	-	40-80	-	22-33	-	24-40	Pax transport in bad road area
b. Non-motorized									
- Oxcart	-	500	-	-	-	-	-	-	Short distance only
- Pack horse	-	750	-	-	-	-	-	-	
- Porter	-	670-1000	-	-	-	-	-	-	
RIVER									
a. Motorized									
- Motorboat	9,00-15,00	50-90	3,00-6,00	17-40	2,00-6,00	23-31	-	-	(See text for seasonal and directional influences)
- Tug + barge	-	-	-	-	8,00-12,00	7-10	-	-	
- Out boarder	23,00-36,00	200-250	6,00-13,00	95-140	90,00-140,00	-	-	-	Medium and long distance on charter basis only.
b. Non-motorized									
- Raft	-	25	-	11-14	-	9-14	-	-	Downstream only
- Rowboat	-	750-1000	-	-	-	-	-	-	
-"Pinisi" sailboat	-	-	-	-	-	-	-	10-15%	of goods value
RAIL									
- Express	-	-	-	-	2,50-3,47	-	2,95-5,90	6-9	Third class passenger rates
- Non express	1,34-2,66	8-11	1,30-1,83	8-9	1,24-1,40	6-9	-	-	Third class passenger rates

The wide ranges of the transport costs, even within one class of distance, are directly caused by the various conditions of the roads. Not a single area in South Sumatra can be said to have a uniformly good road system. Additional costs for ferry crossing in some areas (Rp. 500 - Rp. 700 for bus and truck per passing) should also be considered. Another complication comes from the availability of other modes (river and rail) which in some areas almost completely take over the long distance transportation of certain commodities. Figure II-2.6-1 shows the charges for general cargo and for rubber to be transported by truck from various locations to Palembang.

Table II-2.6-2, taken from the "Indonesian Ports Study" March 1975, shows alternative transport costs from major hinterland cities to Palembang and Panjang.

Several of the conclusions from the T.C.A.S report pertaining to the problems of road transport costs are summarized and repeated here. The incentive to carriers is strong in relation to possible penalties. The economic consequences are severe as overloading accelerates depreciation of the highway system, especially bridges, increases maintenance cost and represents a misallocation of traffic from railways which can carry some of these cargoes at a lower cost."

"In general there is a widespread need for better traffic law enforcement, driver education, an improved vehicle inspection system and for other related institutional improvements which could result in better utilization of roads and lower operating costs. Regulation of rates, franchises service

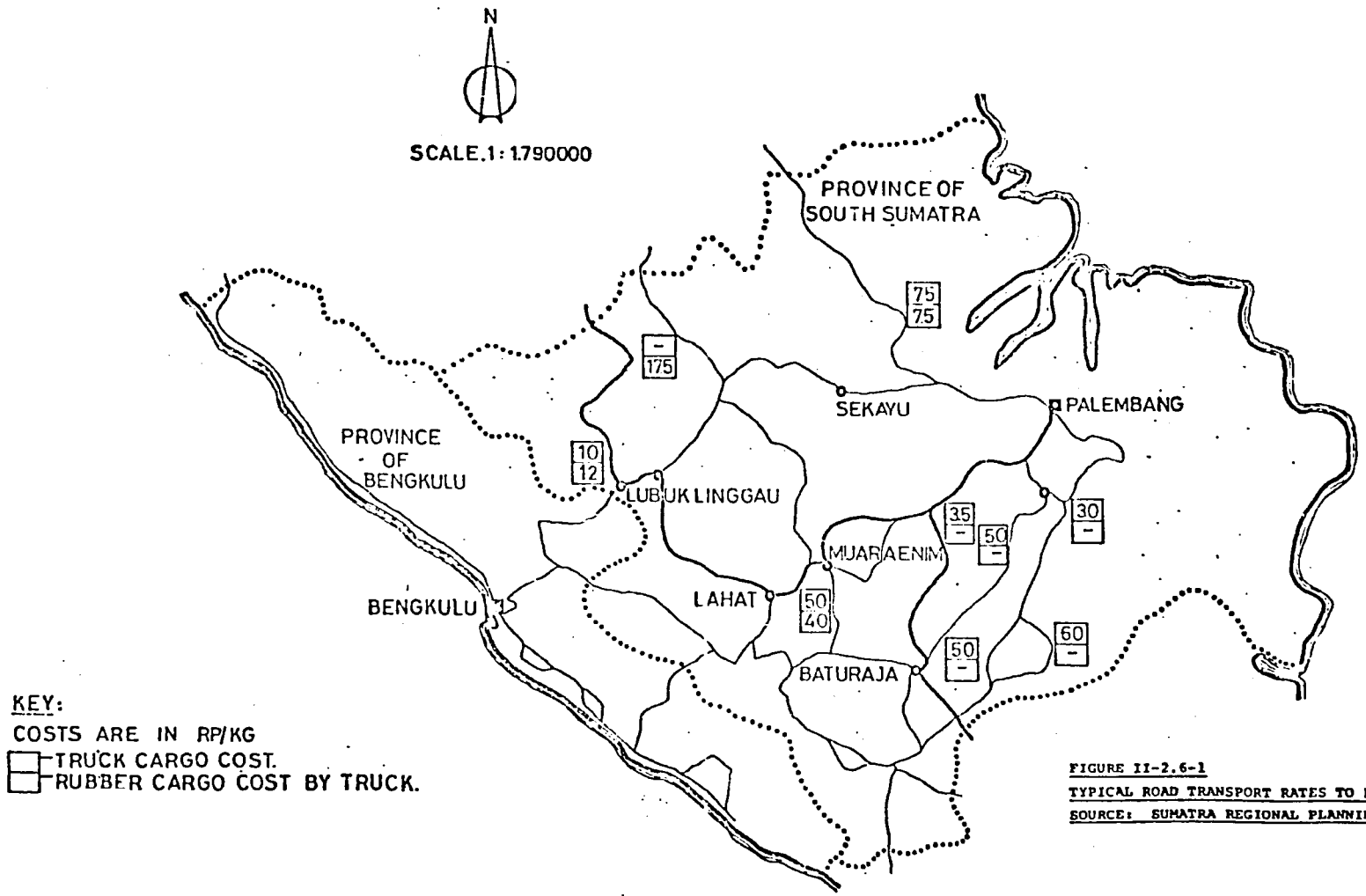


FIGURE II-2.6-1
TYPICAL ROAD TRANSPORT RATES TO PALEMBANG
SOURCE: SUMATRA REGIONAL PLANNING STUDY 197[illegible]

Table II-2.6-2

Transport Costs in the Hinterlands of Palembang and Panjang

(in Rupiah per ton)

Route	Road Transport	Rail	Road/River
Martapura - Palembang	4,730	3,940	no alternative
Martapura - Panjang	4,570	3,450	no alternative
Baturaja - Palembang	4,140	3,710	5,234
Baturaja - Panjang	5,150	3,590	no alternative
Muara Enim - Palembang	3,180	3,560	2,754
Muara Enim - Panjang	7,620	4,910	no alternative
Lahat - Palembang	3,940	3,790	3,166
Lahat - Panjang	6,380	5,300	no alternative
Tebingtinggi - Palembang	5,730	4,330	no alternative
Tebingtinggi - Panjang	10,170	5,880	no alternative
Lubuklinggau - Palembang	7,406	4,840	5,152
Lubuklinggau - Panjang	11,840	6,070	no alternative

standards and safety seems to be generally ineffective. It is not likely that much can be done about this in the near future as attempts to intensify or widen the scope of regulation would increase the basis for unofficial levies on vehicle operators. Thus it is likely that reliance on competitive market forces, if not wholly satisfactory, can protect the interest of consumers better than an expanded bureaucracy."

"The financing of commercial vehicles should be encouraged by means of easier credit terms. The highway industry is at a particular competitive disadvantage as all other major transport modes (except prahus) have credit facilities involving foreign aid which reduces interest rates."

"Further study is required to determine the need for feeder roads in rural areas, mostly in Sumatra, where there is currently no access or only dry-season access. This study, however, should be made in conjunction with the Department of Agriculture."

2.6.2 Bus Tariffs

Published rates to travel by bus from Palembang to various cities in South Sumatra.

Palembang to	Cost Rupiah
Betung	305
Sekayu	560
Prabumulih	420
Muara Enim	825
Lahat	1020
Lubuk Linggau	1710

Baturaja	900
Martapura	975

The cost averages out to be about 4.5 rupiah per kilometer.

2.7 Vehicle Fleet

Vehicle registration are the responsibility of the police. Registrations by Province are divided into four groups: private cars, buses, trucks and motorcycles. Data exist in a time-series from 1966 to 1975. Vehicles of the armed forces and the diplomatic corps are excluded from the list of registrations. A weakness of the registration system is that, except for Jakarta, vehicles have to be registered only once every five years (in Jakarta, once every three years). Thus, as the average vehicle age in Indonesia is estimated at 10 years, it is very difficult to form an estimate of the actual vehicles in operation from the registration records. However, by law, each commercial vehicle is required to be inspected twice per year, and the inspection records give some indication of the number of vehicles in operation.

According to the Police registration, Table II-2.7-1, there was a total of 39,361 motor vehicles by the end of 1974, consisting of 7,331 (19%) sedans and jeeps, 6,959 (17%) trucks, 2,819 (7%) buses, and 22,252 (56%) motorcycles. Out of the total about 70% of the vehicles were in the mainland province, and the remainder in Bangka and Belitung islands.

Estimates of increase rates range from 7-8% for sedans and jeeps, 10-11% for commercial vehicles, and

Table II-2.7-1

Registered Vehicles with Police 1970 to 1974

South Sumatra

Year	Type of Vehicle				Total
	Passenger Vehicles	Trucks	Bus	Motorcycles	
1970	7,675	7,209	4,728	8,570	28,182
1971	8,398	5,801	4,170	28,551	46,920
1972	9,372	8,090	3,707	12,283	33,452
1973	6,625	6,555	2,415	15,327	30,922
1974	7,331	6,959	2,819	22,252	39,361

12-15% for motorcycles, annually.

Although it is impossible to tell from the records what is the average age of the truck fleet in South Sumatra, it is much older than the average in Indonesia. On the morning of September 15, about 60 trucks were observed waiting to load cement from Gudang 1. Most of the trucks had maximum rated carrying capacities of only 2000 kg. The waiting trucks were very old, many dating to pre World War II. More than 70 percent of the trucks appeared to be beyond the normal 10 year expected useful life that are used in economic calculations. Some trucks were being repaired as they waited to load cement. Most of the trucks did not have tread on their tires.

Table II-2.7-2 gives the number of trucks and buses in South Sumatra according to inspection records. The records show a steady increase in the number of trucks inspected from the years 1969 to 1973. The increase is about 7 percent per year. The year 1974 shows a remarkable drop in the number of vehicles inspected while 1975 again shows an increase over 1974.

Table II-2.7-3 shows the breakdown of trucks and buses by regions in South Sumatra with total load capacities for the year 1975.

2.8 Port/Road Transport System Interface

2.8.1 Hinterland

The present hinterland area of the port of Palembang is approximately the boundaries of South Sumatra with the exception of a small quantity of products which come from Bengkulu. The road distance to Lampung province in the south is 337 km and to

Table II-2.7-2

Buses and Trucks - South Sumatra

Inspection Station Records

Year	Buses				Trucks (Effective Load)					Total Trucks and Buses
	3/4 Ton	1 Ton	2 Tons	Total	1 Ton	2 1/2 Tons	5 Tons	More 5 Tons	Total	
1969	635	210	68	913	3,451	2,015	18	--	5,484	6,397
1970	644	235	98	977	3,676	2,130	28	--	5,834	6,811
1971	368	376	119	863	3,968	2,432	32	--	6,432	7,295
1972	920	940	140	2,000	4,402	2,698	35	--	7,135	9,135
1973	1,058	1,084	151	2,293	4,712	2,888	38	--	7,638	9,931
1974	694	713	142	1,549	3,134	1,930	32	2	5,098	6,647
1975	747	763	113	1,623	3,480	2,150	28	--	5,658	7,281

Table II-2.7-3

Number of Truck and Buses by Region - South Sumatra

Inspection Station Records 1975

Region (Kodya/Kabupaten)	Trucks		Buses		Otolet	
	Number	Capacity	Number	Seats	Number	Seats
Palembang / Banyuasin	2,189	5,968	607	11,311	1,094	9,512
Prabumulih / Liot	733	2,486.6	130	1,937	165	1,358
Lahat	283	896.7	156	2,989	306	2,378
Lubuk Linggau	177	899.38	110	3,219	149	1,240
Baturaja/OKU	382	1,059.44	182	2,879	91	790
Pangkal Pinang/Bangka	1,206	3,424.44	172	3,918	288	2,177
Tanjung Pandan/Belitung	463	1,253.66	42	975	39	320
Kayu Agung/OKI	285	1,104.65	225	4,071	94	775
Total - South Sumatra	5,718	17,092.88	1,624	31,299	2,225	18,550

Bengkulu in the west 380 km. To the Jambi border is about 515 km by national road and 230 km by a very bad provincial road. Average transport distances are relatively long, in the 150-200 km range. Trucks account for about 50 percent of all goods transported which is in the range of 300,000 tons per year. The northern part of South Sumatra is poorly served by main roads as is the southeastern part of South Sumatra which is almost exclusively dependent on the river systems.

The only road which allows a reasonable travel time is from Palembang to Prabumulih, a distance of 90 km. Beyond that distance road conditions serve as a discouragement for travel to Palembang although the dominating flow of traffic appears to be in that direction.

The secondary and tertiary road network of South Sumatra are in extremely poor condition with large areas not served at all. Transport of goods on these bad roads are very high. The government is aware of the particular problems of the inaccessibility of land area and economic development and various international sponsored organizations are studying the problems with a view towards plan implementation.

2.8.2 Palembang

Palembang is the chief port for the export/import of goods to South Sumatra. Besides being a port, Palembang is the capital city of South Sumatra which is a large consumer and distributor of goods to the interior. Palembang is also the social and cultural center of South Sumatra with increasingly

larger numbers of people travelling to it by buses. There are very few four lane streets within the city and these streets act as the major distributors of traffic to the whole city. One of these major streets leads to Boom Bau. Although traffic is heavy on these main streets, the traffic keeps moving and major congestion has not been experienced yet.

Branching off from the major distributor streets are smaller distributor streets which lead to residential areas. The smaller streets are usually disjointed and discontinuous. It is on these streets that vehicle traffic experiences much difficulty. Truck traffic to the downtown retail districts during daylight hours is almost impossible. Competition from pedestrians, street hawkers and trishaws for street space increases transport time and costs. Major radical solutions will be needed when the situation reaches a totally intolerable level.

The future planned street network based upon a ring road concept with radial streets connecting the rings is a progressive step in planning for futute city growth. The ring roads will provide a continuity of major distributor streets to all parts of the city. The plan, however, is a long range one and more pressing traffic problems will probably arise in the near future due to increasing traffic volumes and antiquated street system. The water front areas in particular could use better road access.

2.8.3 Boom Baru

Boom Baru with present volumes of truck traffic has not had any difficulties on the port upland areas.

Access to the port which is mainly through Harapan and Veteran Streets has been adequate to date. Some congestion occurs on Boom Baru Street and Mayor Memet Sastrawirya in front of the port area. This is due to the narrow streets, trishaws, and port desinted trucks having to dogleg off Harapan Street in order to reach the port. Direct connections to the port from Harapan Street are planned for the future.

2.9 Appraisal of Existing and Proposed Road Networks in South Sumatra

The existing roads of South Sumatra are generally in poor condition. The geometric standards are outdated. The bridges are narrow with load limits too low for present-day traffic. Most of the bridges are also listed as "in disrepair". Travel times over the principal network is extremely low. The tertiary system, called regional roads, is practically all unpaved. The level of service of the main highways is necessarily very low for the reason cited above; however, the system has not been seriously hampered by extraordinary bottlenecks because the volumes of traffic have been low.

Because of the weight restrictions on both highways and bridges the economic advantage of moving heavy tonnages by truck is lost. In South Sumatra river and rail transportation has provided an alternative service for bulk cargoes thus far. Road transport now carries high value commodities usually articles for private consumption. Almost all of this traffic is intra-South Sumatra traffic.

The most serious implication of the extremely poor road communications, especially the tertiary system, is that for the lack of a better system economic development may be retarded. For this reason a number of studies have been done on the different modes of communications and other development programs. Most of the studies that have been made have been reported within this study. The latest of these studies, being conducted presently, is the Sumatra Regional Planning Study by Robert R. Nathan Associates, Inc. The study plan is expected to be completed in the summer of 1976. When the study is completed a review period by government officials will follow with high level policy decisions on where, how and when to implement a total regional plan. Priorities and funding no doubt will be of major significance. Within this context it is felt that a state of flux now exists and present proposals regarding the road network and other forms of communications will be scrutinized more thoroughly until policy decisions are made on the best program for the development of South Sumatra.

3.0 RAIL TRANSPORT SYSTEM

3.1 General Description of the South Sumatra Railway System

Perusahaan Jawatan Kereta Api or PJKA is the name of the organization which operates the Indonesian railroad.

PJKA was declared a Government agency at the end of 1971. It was placed under the direction of the Ministry of Communications, Directorate General of Land Transport. It has its own management and accounts. Its budget is to be maintained as a separate account in the state budget.

PJKA is divided into six systems. One of these systems, the Exploitasi Sumatra Selatan (ESS), services South Sumatra from Palembang in the east to Lubuk Linggau in the west and Panjang in the South. The headquarters of the system is situated in Palembang. The ESS is divided into six sections: administration, right of way and structures, track and material, trade and traffic, communications and health. In addition, there are three sections which operate directly under the control of the PJKA headquarters at Bandung; these are yards, logistics, and freight forwarding. There are two inspection units within ESS, one is located in Palembang, the other in Tanjung Karang. The former is responsible for the track between Palembang and Lubuk Linggau and the latter between Tanjung Karang and Prabumulih.

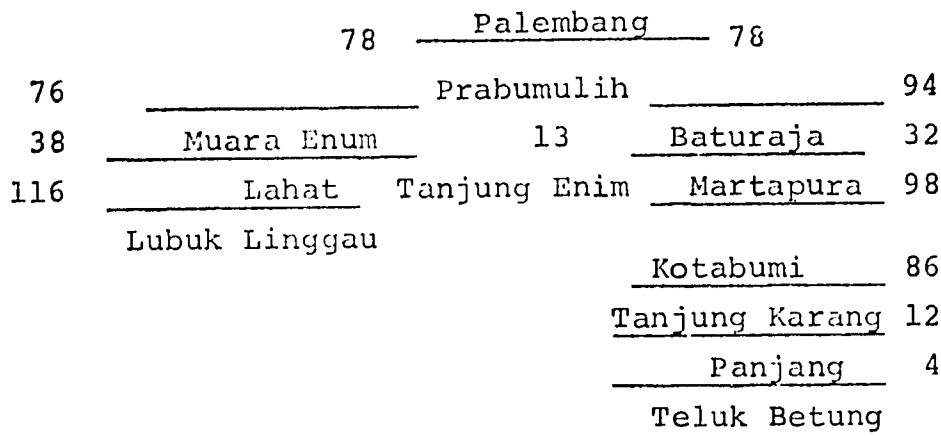
Presently the budgeting for all six systems is performed by the central headquarters at Bandung. ESS pays operating expenses for labor, fuel and interest from its own revenues; however, any additional expenses for maintenance and rehabilitation must be approved by central headquarters. The only exception to this procedure is the Pelita rehabilitation program which involves

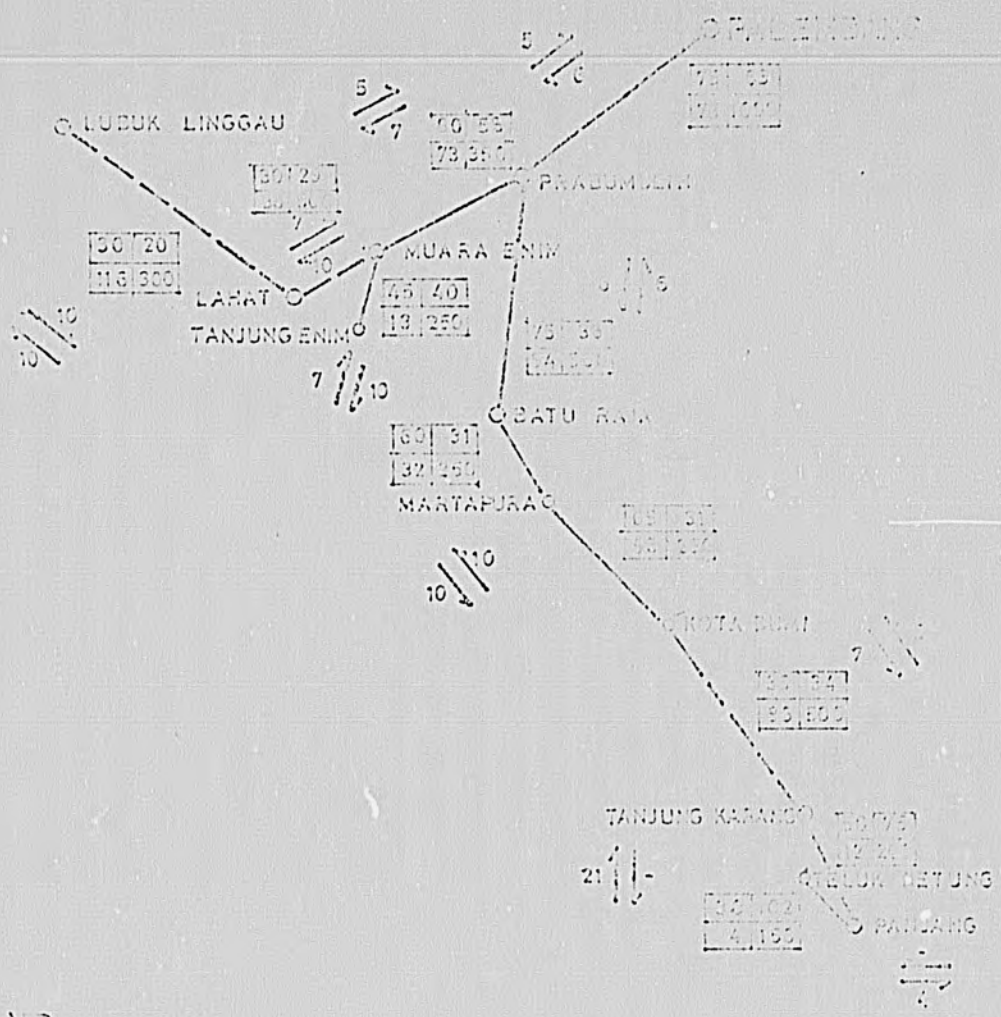
direct central government funding of ESS rehabilitation activities.

The South Sumatra rail system was begun in 1912 with the initial route connecting Teluk Betung and Prabumulih.

3.2 Railway Network and Routes

The railway network of South Sumatra (ESS) consists essentially of two lines branching at Prabumulih 78 Km. from Palembang. One branch leads to Panjang, 322 Km. from Prabumulih and 400 Km. from Palembang while the other goes to Lubuk Linggau which is 227 Km. from Prabumulih and 305 Km. from Palembang as shown in Figure II-3.2-1. There are also two short branch lines from Muara Enim to Tanjung Enim (13 Km.) and from Panjang to Teluk Betung (4 Km.). The lines are all designed for axle loads of 13 tons with the exception of the links between Kotabumi and Tanjung Karang and the link between Lahat and Lubuk Linggau, both of which only permit an axle load of 11 tons. The network connects the following points.





LEGEND

AXLE LOAD 11 TONS
AXLE LOAD 13 TONS
GRADE (%)

SPEED km/hour	CAPACITY train/day
LENGTH km	MIN. RADIUS m

FIGURE: II-3.2.-1

RAIL NETWORK OF SOUTH SUMATRA

SOURCE : P.J.K.A

3.2.1 Railroad Equipment - Locomotives

Locomotion for the ESS system is provided by a mixture of diesel and steam locomotives. There are eight diesel locomotives with 1000 H.P. each. Three of these were purchased in 1968, the other five in 1971. All are in working order. The ESS also oeprates 67 steam locomotives. Ten are large engines with between 1200 and 2000 H.P. each. Five use wood or coal for fuel, the others use residue. These engines were purchased about 1952 and only 6 of them were working as of the beginning of 1975. The other steam engines include 45 light engines between 350 and 800 H.P. and 12 small engines with less than 350 H.P. All of these engines are over 40 years old. They operate on coal or wood except for six light engines which use residue. At the beginning of 1975 only 42 of these engines were operational. Table II-3.2-1 provides a list of these engines and their operating characteristics.

The railroad has gradually been scrapping older locomotives. In 1968 there were 108 locomotives in use on the ESS network, today there are only 75. However, the average power of these engines increased from 745 H.P. in 1968 to 768 H.P. in 1973. This is comparable with the rest of the PJKA system, which had an average size locomotive of 762 H.P. in 1973.

The diesel locomotives are presently limited to handling 500 tons, assuming 30 ton capacity cars this amount to 10 cars per train, taking into account the weight of the cars and locomotive.

The major workshop, the Bali Yasa workshop, is located at Lahat. This workshop has equipment for performing general purpose repair, maintenance and overhaul

TABLE II-3.2.-1

CONDITION OF POWER EQUIPMENT

LOCOMOTIVES IN USE IN SOUTH SUMATRA

Type	Total	Age		Fuel Consumption per Km			Condition		H.P.	Depot
		<40 yrs	>40 yrs	Fuel HSD liter	Residu liter	Coal & wood kgs	Work	Don't work		
STEAM										
Large D.52	10	10	-	-	16.23 (3)	21.83 (7)	6	4	1200-2000	Kertapati
Light B.51 C.30 D.50	45	-	45		16.40 (6)	28.17 (2) 14.14 (16) 21.17 (21)	33	12	350-800	Various
Small B.16 B.22 B.50 C.11	12	-	12			36.65 (1) 12.86 (8)	3	9	350-200	Various depots
DIESEL										
Medium BB.202	8			1.86			8	-	1000	Tanjung Karang

of steam and diesel locomotives as well as freight and passenger cars. The yard is able to handle 5 passenger cars, 26 freight wagons and 2 locomotives per month. It is estimated to take 3 1/2 months for normal repair and maintenance of a large locomotive and 5 days for a small locomotive. The cost of repair in 1974 averaged 1.8 million rupiahs for a steam engine and 760 thousand rupiahs for a diesel.

3.2.2 Railway Equipment - Wagons

The inventory of rolling stock in use on the ESS system at the beginning of 1975 included 1299 freight cars and 127 passenger cars. Of the freight cars 477 were box cars, 229 sand-carrying cars, 210 coal cars, and 196 flat cars. Only about 30% of the rolling stock was available in good working order; another 34% could be used but was damaged. Of the remainder, 16% was undergoing normal maintenance and repair, 15% was heavily damaged and inoperable, and 5% was waiting to be scrapped. A description of the condition of the various types of rolling stock is given in Table II-3.2-2. A summary of the changes in the rolling stock over the last 15 years is presented in Table II-3.2-3. The number of box cars has declined from a peak of 724 in 1965 to the present low of 447. The number of coal cars has been cut to half ot its 1960 level. These declines are part of an overall decline in the number and condition of the rolling stock since 1965. In most cases the decline has been caused by scrapping equipment which has been obsolete or inoperable for a long time before.

The coal cars operated by ESS are owned by the TABA mine. They have a capacity of about 29 tons, are

TABLE II-3.2-2

CONDITION OF ROLLING STOCK AS OF JANUARY 1975.

Type	Working		Not Working			Total
	Good	Damaged	Heavy Damage	Scrapped	PA-PB[3]	
Box cars	149	134	60	24	80	447
Flat cars	53	67	51	7	18	196
Sand cars	90	93	54	18	44	299
Tank cars [1]	52	13	--	--	6	71
Coal cars [2]	25	116	21	1	47	210
Others Freight	22	18	22	1	13	76
Passenger cars	39	43	9	14	22	127
T o t a l	430	484	217	65	230	1426
Percentage						
Freight	30	34	16	4	16	100
Passenger	31	34	7	11	17	100
T o t a l	30	34	15	5	16	100

1) Owned by Pertamina

2) Owned by TABA

3) PA-PB = Receiving general maintenance and repair.

TABLE II-3.2-3

SUMMARY OF CHANGES IN ROLLING STOCK

Year	Total	Box car	Gondola car	Flat car	Tank car	Coal car	Sand car	Cattle	Other
1961	1707	621	54	179	3	444	377	6	23
1965	1933	724	53	180	89	472	304	6	105
1970	1638	453	18	267	239	278	235	1	147
1975	1299	447		196	71	210	292	-	76

ROLLING STOCK

PASSENGER TRAIN CARS INVENTORY(SOUTH SUMATRA)

Year	All	Class 1	Class 2	Class 2 & 3	Class 3
1961	195	13	7	14	84
1965	193	14	7	13	81
1970	193	16	3	7	84
1973	120	2	1	14	41

PASSENGER TRAIN KILOMETERS (ALL SUMATRA)

Year	Total	Steam	Diesel
1969	4896	3755	1141
1971	4768	2907	1861
1972	5154	2788	2366

10.6 meters long, 2.4 meters wide, and 1.85 meters deep, and have two double axle bogies. Their lightweight is 17 tons. The typical box car has a capacity of 12-15 tons, is 6.8 meters long, 2.5 meters wide and 2 meters in depth. It has two fixed axles and a lightweight of 7.6 tons. All of the coal cars, half of the sand cars and 60% of the flat cars have 4 axles, the rest have only two axles.

Information on the age of the rolling stock is presented in Table II-3.2-4. Although this data is from 1970, it can be assumed to be correct except that the majority of the rolling stock is 5 years older. According to this data, about 30% of the freight cars are over 55 years old, and only 30% are under ten years in age. The average age of the passenger cars is greater than that of the freight cars.

3.2.3 Trackwork

The present rail network in South Sumatra has a total length of 643 Km. The network is made up of single track lines with 1.067 meter gauge (narrow gauge). All of the sidings used for passing and overtaking are located at the stations rather than along the line. Four types of rail are used for the trackwork. They range in length from 6 to 85 meters. About 33% of the rail has a capacity of only 11 tons per axle. The other 67% of the track has a capacity of 13 tons per axle. The ties are primarily hardwood with about 1450 per km. on the main line. It is estimated that about half the ties are in bad condition. The track is ballasted with stones and gravel to a depth of 8-10 inches on the main lines or about 1,250 cubic meters per km. The ballast

TABLE II-3.2-4

1)

AGE AND TYPE OF PASSENGER COACHES AND FREIGHT

CARS IN SOUTH SUMATRA

Passenger cars	First Class Air Brake	First Class Vacuum Brake	Economy Class Air Brake	Economy Class Vacuum Brake	Other Air Brake	Other Vacuum Brake	TOTAL
55	-	4	-	38	1	31	74
46 - 55	-	2	-	10	-	6	18
36 - 45	-	7	-	31	-	5	43
26 - 35	-	-	-	22	-	5	7
16 - 20	4	-	12	-	5	10	31
5 - 10	5	-	20	-	55	-	30
TOTAL	9	13	32	81	11	57	203

Freight Cars	Covered	Flat	Open	Tank	Special	Other	Total
55	131	118	144	46	-	-	439
46 - 55	63	37	45	23	1	-	169
36 - 45	3	-	-	19	-	-	22
16 - 20	96	-	-	-	-	-	96
11 - 15	200	20	-	-	-	-	220
5 - 10	97	10	75	-	-	210*	392
TOTAL	590	185	264	88	1	210*	1338

* Privately owned

1) Based on 1970 data with age up dated for 1975.

Does not include additions since 1970 or exclude cars scrapped since 1970.

has not been maintained for proper drainage, and it is estimated that 50% of the line has poor ballasting. The track is gradually being renewed. Since 1969 approximately 25% of the line has been upgraded.

In addition to the trackwork the system has 239 bridges ranging in length from 2 to 60 meters (average 20 meters) and 2 tunnels, one near Lahart (300 meters) and one near Tebing Tinggi (360 meters). The maximum grade found in the network is 10% and the minimum radius of curvature is 150 meters. Because of the variation in condition and type of rail, grades, and curvatures and distance between stations, the maximum speed and capacity of the line is different for different sections. The track between Palembang and Prabumulih has a maximum permissible speed of 75 Km/hour and a capacity of 68 trains per day, whereas the track between Panjang and Kotabumi has a maximum permissible speed of only 40 Km/hour and a capacity of 34 trains per day. Figure II-3.2-1 provides a description of the characteristics of the major sections of the line.

The ESS line has 147 signalling stations, all hand operated. Of these 24 are Siemens with no section block, 60 are Akman and 63 are wood handle.

The track capacity is dependent on the distance between stations, the allowable speed and the signalling characteristics. The formula for track capacity between stations is:

$$f_t = a \frac{120}{\frac{D}{K} 60 + C}$$

f_t = trains per hour

D = interstation spacing

K = maximum speed

C = handling times

a = signalling safety allowance

With the present telegraph block system C is equal to 6 minutes and a = .34

3.2.4 Railway Interfaces and Service Area

The yard at Kertapati is located on the banks of the Musi and Ogan rivers. The yard includes a passenger terminal, two storage godowns, a workshop for doing small repairs, a coal handling facility with wharf, a wharf for handling freight, and an area for direct loading/unloading of wagons. A layout of the yard is shown in Figure II-3.2-2.

Most of the rail in the main yard is in poor condition. It is old lightweight rail (R^2) with considerable creep. The roadbed is also in poor condition. In the area where gravel is unloaded considerable sections of the roadbed and the track are covered over with stones. The only track in good condition is the mainline running out of the yard. This has new heavy weight rail on well maintained roadbed.

The main yard includes a godown for storing arriving cargo, a covered passenger terminal and a repair yard for doing first level maintenance on the engines and rolling stock. No cargo handling equipment was observed in use at the yard, all cargoes was being handled manually.

The Kertapati Coal Terminal is under the jurisdiction of the Department of Mines, Coal Division. It has muptiple rail connections to the PJKA terminal about 500 meters away. The terminal receives its coal by

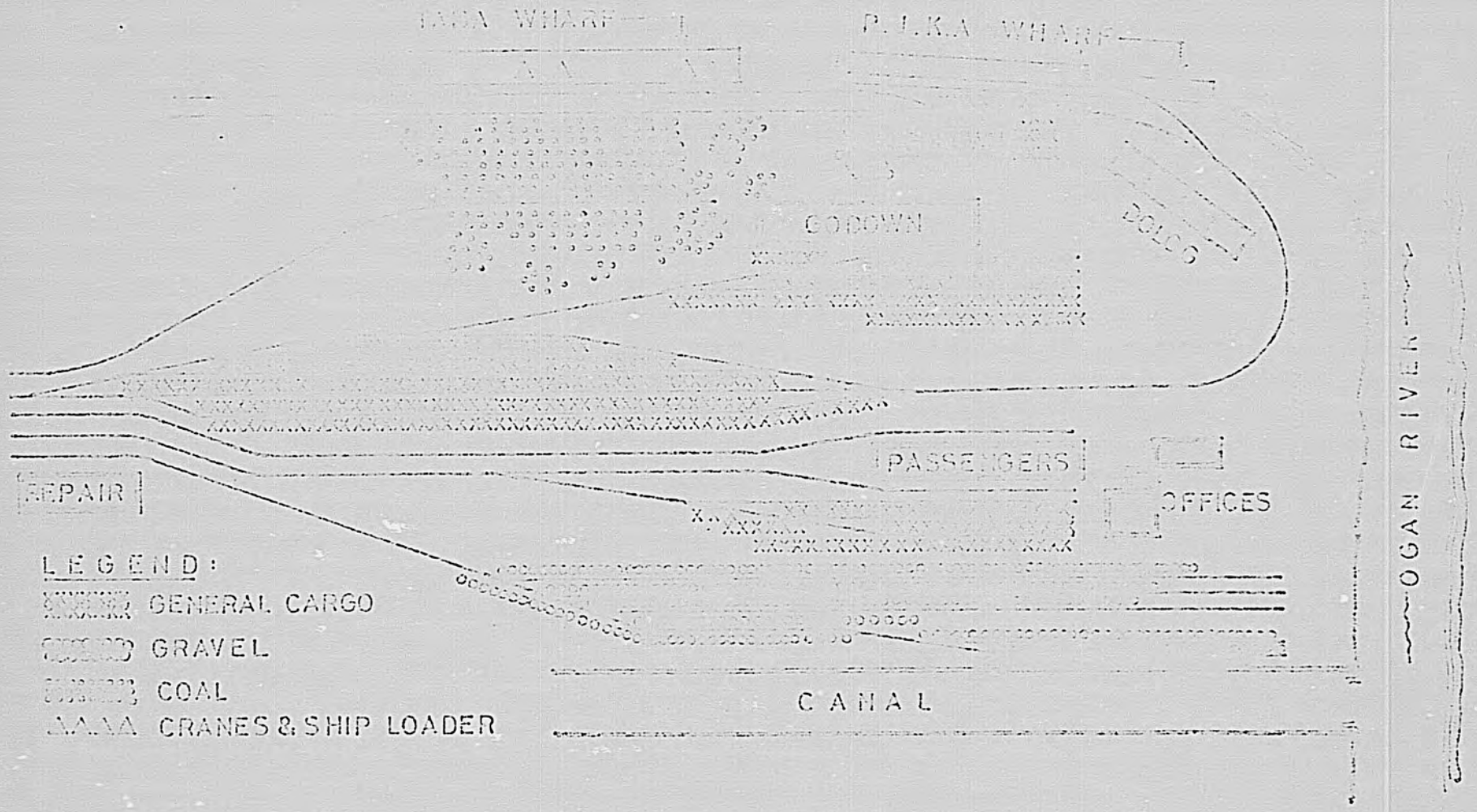


FIGURE: II-32-2

SKETCH OF KERTAPATI YARD

SOURCE : E.O.F SURVEY

railroad car from the Bukit Asam coal mine, a distance of about 173 Km. The coal is transported in open hopper coal cars with a hopper length of about 32 feet, and eight to ten side dumping hopper doors which must be manually opened and closed to unload the cars.

The cars are pulled across a bridge trestle at ground level over depressed V-shaped troughs into which the coal is dumped. The coal is then trimmed back to pits, where it is picked up by a system of conveyors, about 1.2 meters in width, and transported either directly to the shiploader or to the coal stacker 800 to 1000 meters in distance.

Four coal cars can be pulled into position on the trestle for simultaneous dumping. Dumping is done manually by a large gang of men. The discharge of coal hopper cars by manual operation of the side hopper doors can be a very slow and somewhat dangerous operation.

The speed of unloading the coal cars is a function of the skill of the men and the number of men involved in the operation. The terminal normally works one shift. The rate of unloading coal from railway and transporting it to the stacker is about 1000 to 1500 tons per shift. Additional workers can be added for a second shift, if required.

To accomplish the above rate the following equipment must be operable; the train locomotive, the coal cars, two mechanical troughs, trimmers, the conveyor system from the coal pits to the stacker, the stacker, and two of the three 300 kilowatt diesel powered generators which service the terminal equipment.

The terminal now has one hopper car unloading trestle, trough, pit and conveyor system in operation

and has a second unused system which could be rehabilitated.

The coal upon arrival at the stacker is stacked in a coal pile with a capacity of 80,000 tons. This coal is then picked up by two reclaimers and transported via a second conveyor system to the shiploader at the wharf. The main conveyor is worn and there are damaged rollers and gearbox. The shiploader unit moves on rails at the wharf and has a loading arm with a radius of 27 meters or about 88.6 feet.

The nominal capacity of the conveyors and shiploader is 1000 tons per hour; however, the actual capacity is closer to 350 tons per hour.

Originally, the coal terminal had about 240 meters of coal pier (wharf) on which ran four large gantry cranes. There were, in addition, four large gantry cranes in the coal unloading, conveyor and stacking operation. All of these cranes were steam cranes, only one is in operation today. The remaining seven were last in operation in 1952 and are now beyond repair.

The present coal pier consists of about 120 meters of stone quay wharf in fair and serviceable condition and about 120 meters of deteriorated unusable old wharf. The coal pier is serviced by bulk ship loader and the one remaining operable steam crane. The latter is used for handling equipment and general cargo. The depth along the wharf is presently estimated to be 5 meters.

The conveyor-shiploader unit has an actual ship loading capacity of about 350 tons per hour. The rate for manually loading coal onto a ship or barge is only about 30 tons per hour. The latter operation is usually performed by contract labor at the expense of the coal purchaser.

Approximately 500 tons of coal are bagged per month for the tin mine on Bangka Island due to the difficulty of landing coal in bulk quantities at that facility. During the last few months the tin mine has been obtaining its coal from Taiwan, but is expected to receive coal again from Kertapati starting about 1 January 1976.

Other regular deliveries of coal are made to Muntok and Belinyu, both on Bangka Island.

The normal crew required to fully operate the coal terminal at its present capacity of about 350 tons of coal per hour into a ship is 33 men per shift. The terminal has 33 men permanently employed.

PJKA operates a wharf downstream from the TABA wharf. This wharf has three sections. The first is a continuation of the TABA wharf. This wharf collapsed in the mid-60's while some railroad equipment was being unloaded from barges. All that remains of this 65 meter section are the piles protruding above the water. The two cranes which formerly operated on this wharf were removed to the TABA wharf. They are electric cranes with four ton capacity, 2.5 tons at 16 meters, which move along rails located on the wharf. One of the cranes has not been operated since the mid-60's and has had most of its motor stolen. The other crane is operational, but cannot be moved because the damaged crane is blocking its path. Formerly the cranes were used to handle imported railroad equipment, but now this traffic is handled more conveniently through Panjang.

The second section of wharf is a 90 meter long concrete wharf built on concrete piles. This section has a rail track running along the face of the wharf and

also has a small pump house for unloading residue fuels from lighters to be used for powering the steam locomotives. The third section is a bulkhead quay constructed behind a concrete wall. The quay is about 50 meters long and has an asphalt surface. Neither the second nor the third sections have cranes. Cargo handling is performed manually by the railroad employees. The rail along the wharf is in fair condition with considerable creep in the rails. The rail along the second section of the wharf is too close to the edge of the wharf to permit any cargo handling on the wharf; instead the cargo is thrown directly from the rail car into the lighter.

Two godowns are located near the PJKA wharf. One is just in back of the second section and is used for storage of local rice and rubber. The godown has a storage area of about 500 square meters, but it is presently not in use because half of the roof was blown away in October. The other godown is the DOLOG facility for storing the rice which has been brought over from Boom Baru by lighter to be distributed inland via the railroad.

The primary commodities handled at the PJKA wharf are rubber, coffee, rice, fertilizer and gravel. The coffee and rubber are brought in by rail from the hinterland and are transferred to lighters for export. The rice, if it is local, is brought in by rail and truck and transferred to DOLOG storage. Fertilizer is lightered from PUSRI and moved inland by rail. The gravel is brought in by rail from Tanjungenim, but is transferred to truck rather than lighter. It is not clear why this operation is performed near the wharf. Most of the gravel is handled in the main yard where the

trucks have better access and valuable waterfront space is not wasted.

At present both the coal facility and the PJKA wharf are underutilized and poorly maintained. There is adequate backup area for expansion, but this land is presently occupied by housing, both official and unofficial.

The plans for constructing a clinker grinding plant in Palembang propose locating the plant along the Musi River just upstream from the TABA wharf. If this plan is implemented, then presumably an additional wharf would be constructed specifically for handling the cement. In this case, there would still be spare capacity at the PJKA wharf for handling rail cargo.

3.3 Procedure for the Shipment of Freight

The arrangements for shipping freight may be made through a freight forwarder (E.M.K.L.) or, if the shipment is large enough, the arrangements may be made directly by the shipper. In order to obtain a rail car a request must be filled out and submitted to the station master. This request includes information on the number, size and type of cars requested, as well as the origin and destination of the cargo. If the request is approved, the shipper sends his cargo to the station. The loading is done by the shipper under the supervision of railroad personnel who ensure that the cargo loaded agrees with the original requisition. The shipper also presents to the station master a copy of the bill of lading (Surat Angkutan) which accompanies the cargo and is used to verify the receipt of cargo by the consignee.

3.4 Level of Service

ESS provides five levels of service. For passenger trains there are express service and mixed service; for freight trains there are mixed service, express service and block (unit) train service. The present schedule for Palembang is shown in Table II-3.4-1. Freight trains BT1-4 and Passenger trains 8100-1 are express diesel service. Panjang is served by two passenger trains and one freight train going in each direction each day. The travel time ranges between 9.5 and 13.5 hours. Lubuk Linggau is serviced by one passenger train and one freight train daily in each direction. The travel time is between nine and ten hours. The other major service is to Tanjungenim with two freight trains making the approximately six hour trip daily in each direction. The unit trains, or block trains as they are referred to locally, run daily between Palembang and both Panjang and Lubuk Linggau. There is one train in each direction on every day except Monday when the service to Panjang is not provided. The railroad personnel estimate that the schedules are reasonably well maintained, but their estimate of an average delay of one hour is probably optimistic.

The service provided along each major section of the ESS line is shown in Figure II-3.4-1 based on information collected in mid-1975.

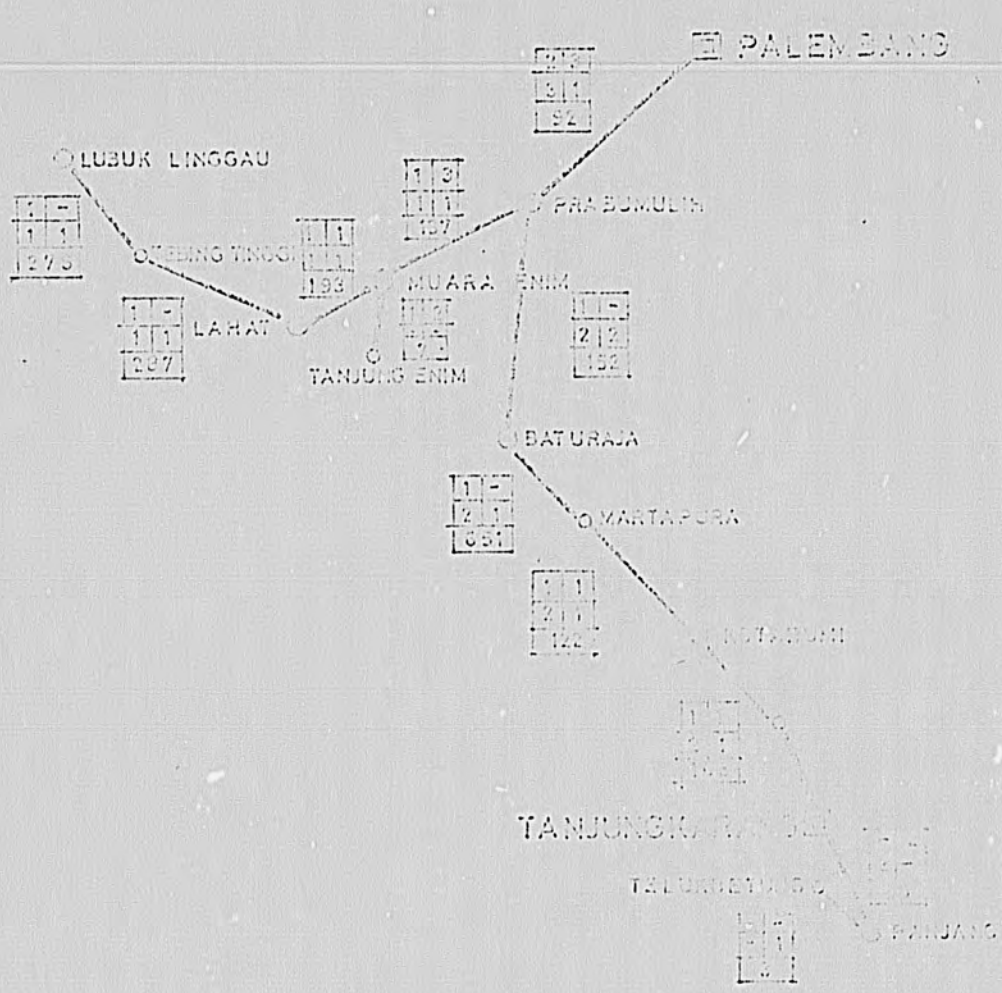
3.4.1 Freight Handled by ESS

The total cargo handled by the railroads in South Sumatra declined significantly during the 1960's and it was not until 1973 that the tonnage handled equaled the volume handled in 1961. However, the recovery in demand

TABLE ...II-3.4-1...

Railroad Schedule for Palembang (10/75)

Train Number	From	To	Departing	Arriving	Type	Travel time (hours)
6	Panjang	Kertapati	18:oo	05:15	X	11.3
4	Lubuklinggau	Kertapati	21:05	05:55	X	8.8
3	Kertapati	Lubuklinggau	20:10	05:02	X	9.0
5	Kertapati	Panjang	20:55	06:40	X	9.8
1303	Kertapati	Prabumulih	06:10	08:40	M	2.3
8101	Kertapati	Panjang	08:50	19:10	X	10.3
-	Prabumulih	Kertapati	13:14	16:26	M	3.2
8100	Panjang	Kertapati	08:25	17:45	X	9.3
BT 1	Kertapati	Lubuklinggau	07:15	17:00	F	9.8
BT 3	Kertapati	Tanjung Karang	09:45	23:20	F	13.6
21303	Kertapati	Tanjungenim	10:40	17:10	F	6.5
21305	Kertapati	Prabumulih	12:00	14:33	F	2.6
-	Kertapati	Tanjungenim	15:48	21:24	F	5.6
21300	Tanjungenim	Kertapati	06:45	13:23	F	6.6
21302	Tanjungenim	Kertapati	08:05	14:55	F	6.8
BT 2	Tanjungenim	Kerapati	07:45	15:35	F	12.8
21304	Lahat	Kertapati	09:20	17:05	F	7.8
BT 4	Lubuklinggau	Kertapati	08:35	18:20	F	9.8



LEGEND:

NON STOP FREIGHT ROUND TRIPS

PASSENGER EXPRESS ROUND TRIPS

LOCAL FREIGHT ROUND TRIPS

MIXED ROUND TRIPS

TONNAGE PER ROUND TRIP

FIGURE: II-34-1

LEVEL OF SERVICE ON SOUTH SUMATRA RAILWAY

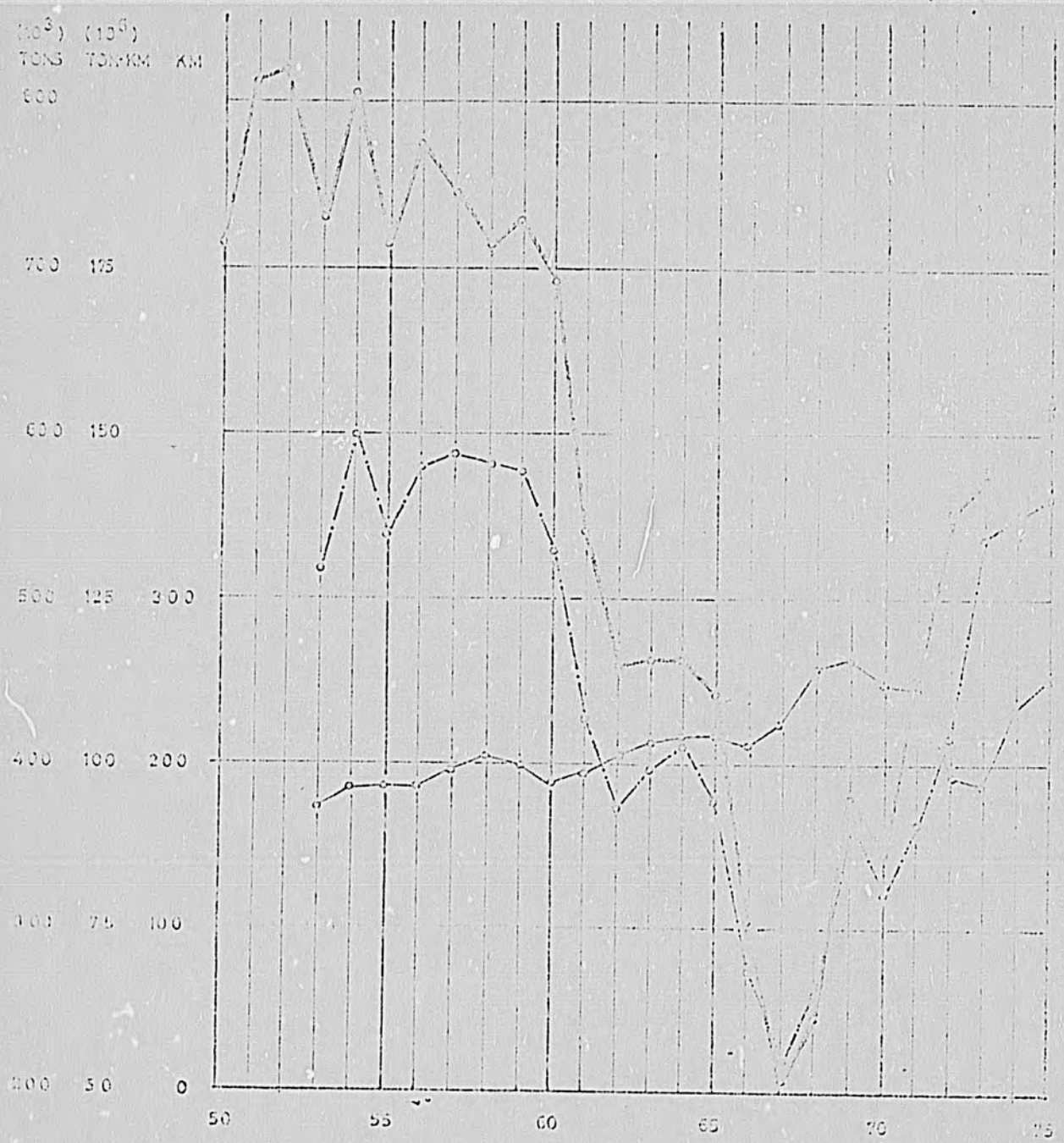
SOURCE : P.J.K.A

since the nadir in 1967 has averaged 14.5% per year. The demand cycle is shown in Figure II-3.4-2 and summarized in Table II-3.4-2.

The primary reason for the reduction in demand was the loss of coal as a primary cargo. The amount of coal decreased from an average of 550,000 tons in the first half of the 1950's to 450,000 in the second half, then 220,000 in the first half of the 60's, 30,000 in the second half, and finally, to its present level of 20,000 tons per year. If coal were excluded from the tonnage carried, then the total cargo handled would have increased during the period 1950-1974 from 213,000 tons per year to 520,000 tons. The amount of rubber carried has also decreased during this period from over 80,000 tons per year to under 50,000 tons. The major increases in tonnage handled have included stones and gravel, fuel, timber and miscellaneous. A summary of the tonnages carried per commodity is given in Table 3.4-3.

The annual average distance travelled by freight varied between 180 and 220 miles during the period 1953-1974. Coal and gravel travel relatively short distances while fuel and agricultural products such as rubber, rice and sugar travel longer distances.

Palembang is the largest station in the ESS system and handles the largest amount of tonnage, approximately 60% of the total. In 1973 the tonnage received was 204,000 tons versus 134,000 for Panjang. The amount dispatched is less than half that of the amount received, but over the last five years it averaged 88,000 tons which is greater than either Panjang or Tanjungenim. The total amount of cargo and number of passengers handled



LEGEND :

TOTAL CARGO (TON)
FREIGHT TRAFFIC (TON.KM)
AVERAGE TRIP (KM)

FIGURE-II-3A-2

FREIGHT HANDLED BY ESS 1950-75

SOURCE: RAILWAY STATISTICS CENTRAL BUREAU

TABLE II-3.4-2

RAILROAD FREIGHT LOADED IN SOUTH SUMATRA (10^3 tons)

Year	Tons Loaded (10^3)	Ton Kilometers (10^6)	Average Haul (KM)
1950	715	-	-
1961	543	108	198
1965	446	95	213
1970	352	86	244
1973	575	135	235
1974		131	

TABLE II-3.4-3

RAILROAD FREIGHT LOADED BY COMMODITY (10^3 tons) - SOUTH SUMATRA

Type	Year 1950	Year 1960	Year 1965	Year 1970	Year 1973	Year 1974
Coal and Lignite	502	431	167	26	9	20
Stone and gravel	21	31	6	96	159	143
Rice	16	19	21	17	26	26
Flour	-		16	12	4	
Coffee	2	13	33	20	13	14
Sugar	2	10	8	10	8	
Fuel	17	34	32	28	58	70
Rubber, crude sheet	84	71	81	64	51	48
Logs, timber, lumber	3	70	6	3	71	56
Bricks and tiles	-		6	2	2	
Cement	3	8	3	5	11	
Other	64	69	69	58	160	159

at the six major ESS stations is listed for the years 1969-1974 in Table II-3.4-4. The breakdown by commodity for Palembang in 1974 is given in Table II-3.4-5 which shows the major commodities as a percentage of the total handled on the ESS system, and Table II-3.4-6 which indicates the direction of the flows to and from Palembang. The major commodities handled at Palembang (Kertapati) in 1974 were stones and gravel for local consumption, and fuel from Pertamina refineries. Other large tonnages include rubber sent to Palembang for milling, rice distributed from Palembang to South Sumatra, and coal transported from the Bukit Asam mine. In addition, 12,000 tons of asphalt from Pertamina and 13,000 tons of fertilizer from Pusri were shipped out, while 10,000 tons of coffee from throughout South Sumatra and 23,000 tons of household goods from Lampung were shipped in.

3.4.2 Passengers Carried on ESS

The total number of passengers carried on the ESS system has decreased considerably in the last two decades. In the 50's an average of 3 million passengers was transported each year, in the 60's this had declined to 2 million, and by the 70's only about 1 million were being carried each year. The majority of the passengers travel in either first or second class and the average trip length was 168 km in 1973. (Table II-3.4-7) The three main stations through which passengers travel are Palembang, Panjang and Tanjung Karang. In 1973 Palembang received 230,000 and sent off 230,000. The numbers for Panjang are approximately double this.

TABLE ..II-3.4-4....

FREIGHT AND PASSENGERS HANDLED AT SELECTED RAILROAD STATIONS.

Year	Palembang	Prabumulih	Baturaja	Tanjung Enim	Panjang	Tanjung Karang	Lubuk Lingga
PASSENGERS (10^3)							
Departing							
1969	210	58	39	13	209	92	95
1970	210	44	28	8	304	79	75
1971	181	26	34	7	306	75	71
1972	235	24	35	7	352	79	80
1973	272	27	29	1	519	103	97
Arriving							
1969	187	60	51	11	19	379	77
1970	171	56	35	8	151	337	62
1971	126	56	37	7	61	287	62
1972	196	54	37	6	94	317	70
1973	230	42	42	--	553	357	111
CARGO (10^3 tons)							
Dispatched							
1969	94	7	26	51	17	6	40
1970	72	4	20	16	19	6	25
1971	76	6	19	107	25	6	25
1972	107	5	21	73	28	9	30
1973	41	3	20	67	63	9	38
1974*	143						
Received							
1969	163	6	23	2	62	5	40
1970	184	8	24	3	53	1	37
1971	221	8	27	3	94	2	39
1972	217	12	33	3	123	4	46
1973	204	15	41	4	134	12	65
1974*	206						

* Estimate

TABLE ..LL-3..4-5....

RAILROAD FREIGHT HANDLED IN 1974.

	Palembang (000's tons)	% of S.Sumatra Total
Rubber	34	70
Coffee	10	70
Rice	26	100
Stone	142.6	100
Oil	69.2	100
Coal	20.9 (for Bangka)	100
Fertilizer	13.4	100
General Cargo	37.3	18

TABLE II-3.4-6

RAIL CARGO FLOWS TO/FROM PALEMBANG 1974.

Type Commodity	From Palembang to:		To Palembang from :	
	Lampung	Lubuk Linggau	Lampung	Lubuk Linggau
Asphalt	5932	5977	--	--
Gasoline	5229	19630	--	--
Oil	11232	29877	160	--
Household goods	671	24	22514	20
Rice	4276	12834	4327	12
Stones	--	--	114	72875
Cement	3445	3084	637	--
Sugar	2129[1)]	2973[1)]	--	2464
Flour	159	216	13923	24
Nuts, beans	83	385	2647	3062
Coffee	96	--	7273	3012
Rubber	17	49	2909	31182
Fertilizer	9066	3020	754	--
Coal	29	--	--	20912
Others	12530	9875	7764	8976
Total	54894	87944	63022	142544

1) Refined.

Table II-3.4-7

PASSENGERS MOVED BY RAIL IN SOUTH SUMATRA

Year	Passengers (10^3)	Passenger Km (10^6)	Average trip (Km)
1960	3368	367	107
1965	1945	345	177
1970	1072	150	159
1973	1148	210	168
1974		222	

3.5 Finances

3.5.1 Revenue and Expenditures

From 1970 to 1974 the railroad revenues were derived in approximately equal shares from passengers and from freight. During this period the income per passenger-kilometer increased by 38% to 4.4 Rp/passenger-km. while the freight revenue fluctuated about 6 Rp. per ton-km. until 1974 when the introduction of a new freight tariff increased freight revenues by about 50% to 9.5 Rp/ton-km. In the first half of 1975 the revenues per unit-kilometer continued to rise to 5.3 Rp/passenger-km and 10.3 Rp/ton-km. Despite these increases in rates per unit-kilometer, the total flow of passengers continued to increase while the flow of freight declined only slightly in 1974 and recovered in 1975. As a result the revenues of the ESS railroad increased 133% from 1970 to 1974; passenger revenues increased 122% and freight 143%. The history of the changes in income is shown in Table II-3.5-1.

The reason for the poor condition of the railroad can be seen from the level of expenditures on maintenance and renewal over the past 15 years. The average annual capital expenditure was about 200 million rupiahs per year. Approximately 37% of that was spent on track and right-of-way, only 115,000 Rp. per kilometer per year. The only major investment in rolling stock was made in 1971 when 446 million rupiahs was spent on diesels. A sample of the distribution of capital expenditures is shown for four sample years in Table II-3.5-2.

3.5.2 Tariff

The tariff for the South Sumatra Railroad was revised in May 1975. The tariff is subdivided by commodity

TABLE ...II-3.5-1.....

I N C O M E (10^6 Rp.)

Year	Total Passengers	Per Pass.KM	Total Freight	Per ton KM
1969	447	2.8	587	6.2
1970	479	3.2	510	5.9
1971	552	3.5	560	6.1
1972	623	3.6	660	6.3
1973	860	4.1	876	6.5
1974	1065	4.4	1239	9.5
1975*	628	5.3	847	10.3

* Through July.

Table II-3.5-2

CAPITAL EXPENDITURE (1000 Rp.) SOUTH SUMATRA

Year	Total	New Rolling Stock			Track & R.O.W.	Other
		Total	Locomotive	Freight & pass.cars		
1961	155399	56996	56920	76	62784	35619
1965	825992	8942	271	8671	474687	342363
1970	18445	-	-	-	14020	4425
1973	67478	-	-	-	-	-

class, type of service, weight of cargo and distance. Three commodity classes are designated: the first includes packed non-essential and luxury goods, such as cosmetics and glassware; the second includes intermediate industrial and agricultural products such as tires, onions and cork; and, the third includes raw materials, such as rice, logs, sugar and copra. Minimum charges are based on a load of ten tons for a double axle car (20 tons for a four axle car) and a journey of 100 km. The two types of service offered are local and block trains. A higher charge including a higher percentage surcharge is made for block trains.

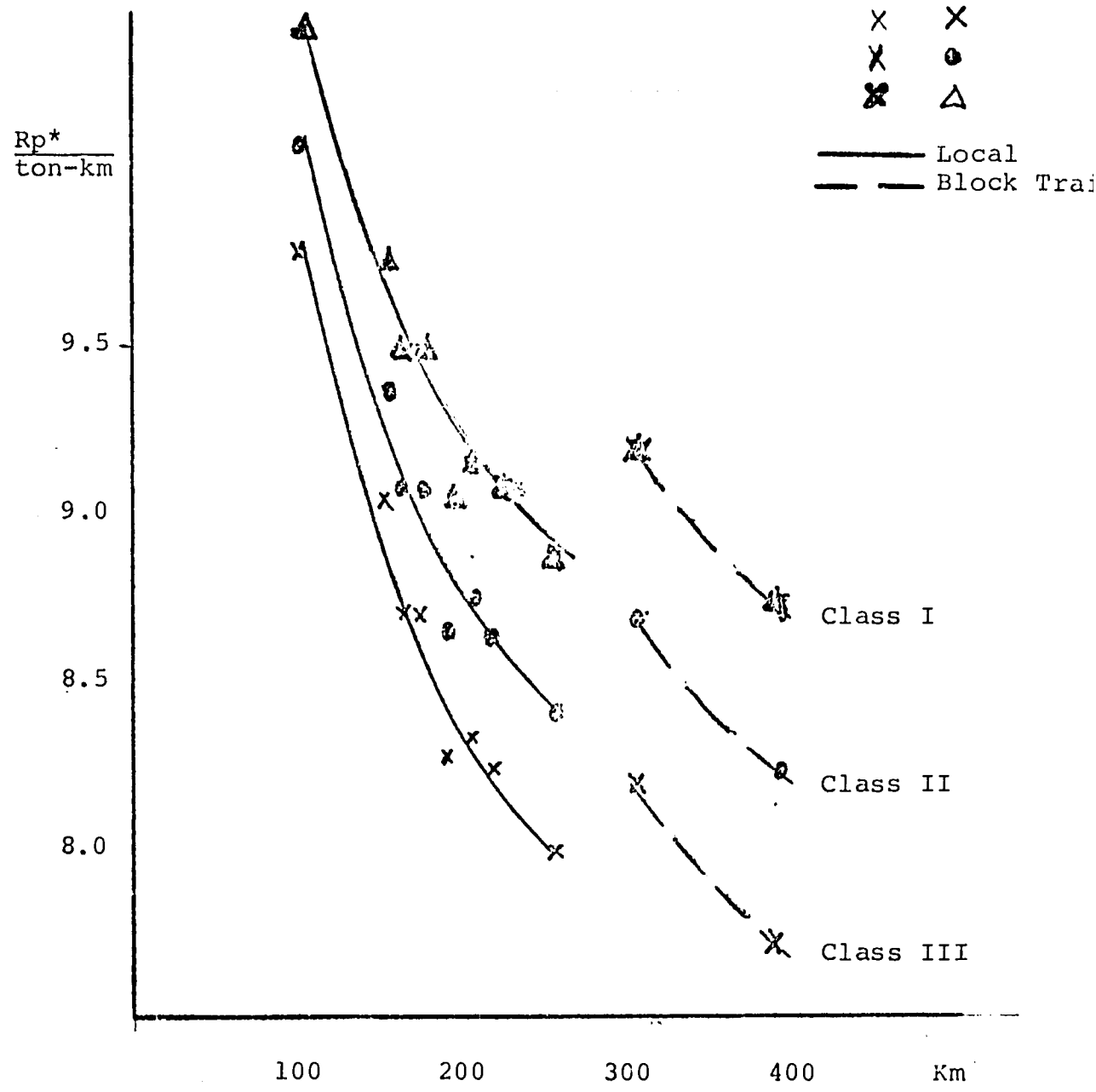
The charge per ton-kilometer is shown in Figure II-3.5-1 for two axle cars for both local and block trains and for several distances. The charges range between 7 and 11 Rp. per ton-km. and they decrease as the distance travelled increases.

An additional charge of 450 Rp. is made for documentation related to obtaining the wagon. A 10% surcharge (20% for block trains) is also added.

In the event that loading or unloading of a wagon is slow or delayed because of the actions of shipper or consignee, a per diem is charged for the wagon. For two axle wagons the rate per day is:

first day	Rp. 1100.-
second day	Rp. 2200.-
third day	Rp. 4400.-
fourth day	Rp. 6600.-

For four axle wagons this rate is doubled. Both the freight rate and the per diem charge are the same for all types of cars with the same number of axles.



*excludes tax (10% local - 20% express), 450 Rp. documentation
minimum load 10 tons
minimum distance 100 Km

Figure II-3.5-1
Freight Tariff for ESS

The shipper is responsible for providing the labor to load the wagons, but this labor is drawn from a pool of railroad laborers.

The recent tariff revision has made several improvements. It has introduced minimum rates for tonnage and distance, thereby compensating for the diseconomies of movements of less than 100 km. and less than 10 tons per wagon. Also the per ton-km. tariff decreases for longer hauls thereby encouraging more economical use of the railroad. The structure of the tariff into rate classes charges higher rates for more valuable (per ton) commodities thereby reflecting more accurately the shipper's demand elasticity. Unfortunately the proportional increase in rate with tonnage above 10 tons does not encourage efficient utilization of the wagon, since no discounts are offered for higher load factors.

In addition to railroad related charges, there is also a charge for using the TABA and PJKA wharves. This charge is the wharf charge listed in the Port tariff.

3.5.3 Cost Per Ton-Mile

Two methods have been used to estimate the operating costs of the railroad. One method uses the annual out-of-pocket operating costs, separates it into passenger and freight related costs and divides the latter by the total ton-km of freight handled. Using this method the De Consult Railroad Study came up with the following costs: 1968 - Rp. 4.5, 1969 - Rp. 3.9, 1970 - Rp. 6.3 and 1971 Rp. 7.0 (estimated). A subsequent estimate was made by the World Bank in 1973 for the Java system and the resulting cost per ton-km was Rp. 4.1 long run variable cost and Rp. 6.7 fixed cost. The 1974 ESS data indicate

Freight car cost	Rp. 14,460
	Rp. 30,120
Service train cost	Rp. 10,400
Administration	Rp. 6,520
Fuel	Rp. 16,380
Total	Rp. 266,328
Cost per freight-ton	Rp. 4.42

This cost is comparable to the long run variable cost of Rp. 4.1 mentioned above. If the 1973 costs are taken as about Rp. 10.5 per ton-km for long run variable plus fixed cost and this figure is inflated by 25% to approximate 1975 prices and Rp. 2.5 per ton-km is added for interest and renewal (approximately 3 times the present level) then the total cost per ton-km in 1975 was Rp. 15.6 per ton-kilometer. This figure is considerably higher than the freight tariff which ranges between Rp. 8 and Rp. 10 per ton-kilometer.

3.6 Developments

Several developments are planned for the remainder of the decade. In 1976 the upgrading of the track between Palembang and Panjang with 85 meter heavy rail will be completed. Only a 40 km section near Kotabumi remains to be finished. However, the upgrading began in 1960 and some of the earlier work is in poor state of repair because the ties which are used are not made of teak and are not protected with creosote or other preservatives. These ties begin to rot after ten years. The Pelita plan for 1975/76 also includes replacing 408 thousand ties and 211 thousand cubic meters of ballast. Work is also planned for improving and strengthening the bridges.

The De Consult Railroad study recommended and PJKA has agreed that ESS should receive 34 more diesel locomotives by 1979. Some of these locomotives will be second-hand from Java which will be made available following the major rehabilitation of the Java system now being sponsored by the World Bank. As yet no locomotives have been received by ESS.

Two major developments which will affect the operation of ESS are the plans to rehabilitate the Bukit Asam mine and to haul clinker from Baturaka to grinding mills at Palembang and Panjang. By 1979 as much as 850,000 tons of coal is expected to be shipped to Kertapati along with 250,000 tons of clinker, while an equal amount of clinker will be shipped to Panjang. In order to handle this additional traffic, PJKA has proposed the following expansion program for 1976-77:

1. rehabilitate the rails from Tanjungenim to Kertapati
2. extend the rail lines at Palembang and Panjang to the new grinding mills
3. purchase six 1500 HP diesel locomotives for hauling coal and six more for hauling cement
4. purchase 101 cement cars
5. rehabilitate 150 wagons (KKBH/KKBRU) and install 53 sets of airbreaks
6. improve unloading facilities at Kertapati and loading facilities at Tanjungenim
7. extend the rail lines at Baturaja

The expected cost of this program is 350 million rupiahs in local expense and 4.2 million US$ in foreign expense. The PJKA proposal anticipated a coal movement of 300,000 tons in 1975 increasing to 850,000 tons in

1978; however, the present plans for Bukit Asam call for major shipments to start in 1976 rather than 1975. The shipment of clinker is expected to begin in 1977.

In Shell's report to P. N. Batubara concerning coal transportation from Bukit Asam, they estimate that 7 trains per day will be required to move 1 million tons of coal per year from Tanjungenim to Kertapati, an average of 350 tons per train. They also assume a 12 hour per day operation at the TABA wharf loading coal into 6000-8000 ton DWT ships. In order to handle the additional trains a crossing loop near Muara Enim is proposed as well as clearing and repairing the arrival and departure tracks at Kertapati. Of the .85-1.0 million tons/year to be hauled to Kertapati about 500,000 tons/year is planned to be exported initially and later to be consumed domestically probably in Western Java. The reverse shipment of equipment (gibs) and fuel is expected to average 28,000 tons/year.

The present plan for the Batuaja cement project is to establish clinker grinding mills with 250,000 ton/year capacity each at Palembang and Panjang. The proposed site for the mill is just southwest of the TABA wharf at Kertapati. The hinterland to be served by this plant is eastern Sumatra including Jambi and possibly Belawan and Jakarta which will receive any excess supply. The movement of clinker is projected to rise from 100,000 tons in 1978 to 250,000 tons in 1979 and beyond.

Pelita II proposed a 100 billion rupiahs investment in the rehabilitation of the rail system. From 1974-1975 65 billion rupiahs is to be invested in Java and North and South Sumatra which together have 55% of the total 6800 km of the Indonesian system. The project includes a

large track rehabilitation project in Java and the dieselization of service in Java and on the majority of main lines in Sumatra. The latter is to be accomplished through the rehabilitation of 59 engines and the purchase of an additional 40. The schedule for withdrawal from service of steam main line locomotives (other than those awaiting scrapping) in all of Sumatra is 40 in 1974/75, 40 in 75/75 and 30 in 76/77. This would leave 110 retained in service.

Appendix A

1.0 Review of Banyuasin Road Survey

A survey of the potential alignment and conceptual design of a road to Banyuasin was performed by P. T. Meluai - Chip Guan of Palembang and Singapore starting in November 1973 on instruction of the Governor of South Sumatra. The incentive for this survey was provided by the increasing amounts of dry bulk cargoes handled through Palembang.

The basic alignment recommendations were provided by the Public Works Department of the Province of South Sumatra. The objectives of the survey were in addition to route determination, conceptual design, derivation of basic construction method, cost estimate and work plan for the implementation of such a project.

Two alternative alignments were investigated:

A. From Dusun Kenten - Gasin - Middle of Sebalik Canal to Tanjung Api-Api

B. From point 20 km. from Palembang (Crossroad to Simpang) - Betung towards Sungai Rengit - Middle of Sebalik Canal to Tanjung Api-Api

Alternative A alignment was found to have excessively deep marshes between Gasin and the Sebalik Canal which require excessive fill. It also requires two large bridges. As a result of these findings, this alternative was dropped from detailed soil and route survey. Alternative B was also found to be under water most of the way, but submergence was only about 1.5 M at high tide over 72 Km. of the 79.85 Km. of the distance of this route. The route has a total of 8 curves and 8 small bridges with a total combined span of 146 M.

Field tests included handboring to 8 M, soundings at frequent intervals, cone penetrometer tests, and shear samplings. Test samples were evaluated at the geological and road laboratory of the Public Works Department, Province of South Sumatra for % water, shear strength, compression, solid content, CBR, consolidation, etc.

The top soil in the first 7 Km. is mainly lateritic clay, while the rest of the route is mostly marsh with 0.5 M of greyish peat clay followed by about 2.0 M of greyish soft clay (Vane shear 0.1-0.2 Kg/cm^2). The laboratory tests confirmed that the average compressive strength in the marshy parts to 8 M was only 0.1-0.2 Kg/cm^2.

The survey concluded that a road could feasibly be constructed on this alignment but with great difficulty and at great cost. It will be necessary to remove all material on top the greyish clay to 2-8 M. All fill material will have to be brought in, some over long distances, and open drainage channels will have to be constructed to reduce settling time. Even so, the road will require lengthy settling and stabilization periods.

The proposed road is a divided highway with a 2 x 7 M lanes divided by a 4 M grass strip and with a 2 x 2 M shoulders for a total top width of 22 M. It was designed for a speed of 80 Km/hr. On the left side of the road, which has an elevation of 3 M above high tide level, is a drainage channel 4 M wide at the bottom and 12 M at the top. The right side drainage channel is only 3 M wide at the bottom and 6 M at the top. There are frequent cross channels installed.

Fill is available at about 40 Km. from the start

of the road and could be brought in by dumptruck. Crushed stone for base though is only available at Muara Enim/Lahat and Tanjung Enim which is about 260 Km. distant. As a result use of 4% PC soil cement as a subbase is recommended with 8% PC soil cement for base (35% CBR and 80% CBR respectively).

The estimated Quantities and Costs for the Banyuasin road are listed in Table IIA-1.0-1.

Table IIA-1.0-1

BANYUASIN ROAD WORK PROGRAM

		Volume or Area		Unit cost	Total cost Rps. Million
1.	Removal of Organic Matter	13,211,300	M^3	190	2,514
2.	Mud Removal	11,200,000	M^3	329	3,684
3.	Fill	12,251,100	M^3	1466	17,885
4.	Soil cement sub-base	233,225	M^3	5367	78
5.	Soil cement base	238,125	M^3	8557	1,869
6.	Prime coat	1,117,900	M^3	136.50	152
7.	Hot mix surface penetration	1,117,900	M^3	1474	1,648
8.					
8.	Concrete protection	21,940	M^3	51024	1,629
9.	Grass Layers	1,105,040	M^3	161	177
10.	8 Bridges	146	M	6000000	876
11.	Cross channels	32	M	5000000	160
12.	Other incl. overhead and contingencies				4,674
	TOTAL ESTIMATED COST			Rps.	35,655
			=	US $ 86.9 million	

If the road width were reduced from 2 x 7 M with a 4 M dividing strip and 2 x 2 M shoulders to a road of 8 M width with 2 x 2 M shoulders, including the above channels, bridges etc. the estimated cost would be reduced to Rps. 21 billion or $ 51.2 million.

PN-AAH-189

THE PALEMBANG PORT AND SHIPPING STUDY

VOLUME II

TRANSPORT SURVEY

PART 2

Volume II
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4.0 PIPELINE TRANSPORT SYSTEM

4.1 General

Gas pipelines supply all the gas requirements of Pusri, Pertamina and the electric power station while crude pipelines are used to pump in about 40% of the average crude input into the Plaju and Sungai Gerong Pertamina refineries. The rapid expansions of the Pusri fertilizer (urea) plant has resulted in a great increase in the gas pipeline network as more gas fields were brought into production and tied into the system. By now five separate fields are connected to the network as shown in Figure II-4.1-1(a). Prabumulith is the collection center of the South Sumatra gas production and Palembang is the principal user of the bas products.

4.2 Gas Lines

The low pressure gas collecting pipelines, high pressure gas distribution lines and the high pressure gas transmission pipelines are indicated in Figure II-4.1-1(b) in sizes from a minimum of four inches to a maximum of 14 inches. The primary use for the natural gas is for the manufacture of urea fertilizer at Pusri I and II now and Pusri III and IV later. Another major use of the gas is at Plaju and Sungai Gerong where the gas is converted into petrochemicals.

During the next few years the gas consumption will be about 450 million M^3 per day for Pusri and about 2000 million M^3 per day for other requirements including the Palembang electric companies, gas and steam plants and the Plaju and Sungai Gerong plants. The gas consumption is expected to rise to about 3800 million M^3 per day in the foreseeable future.

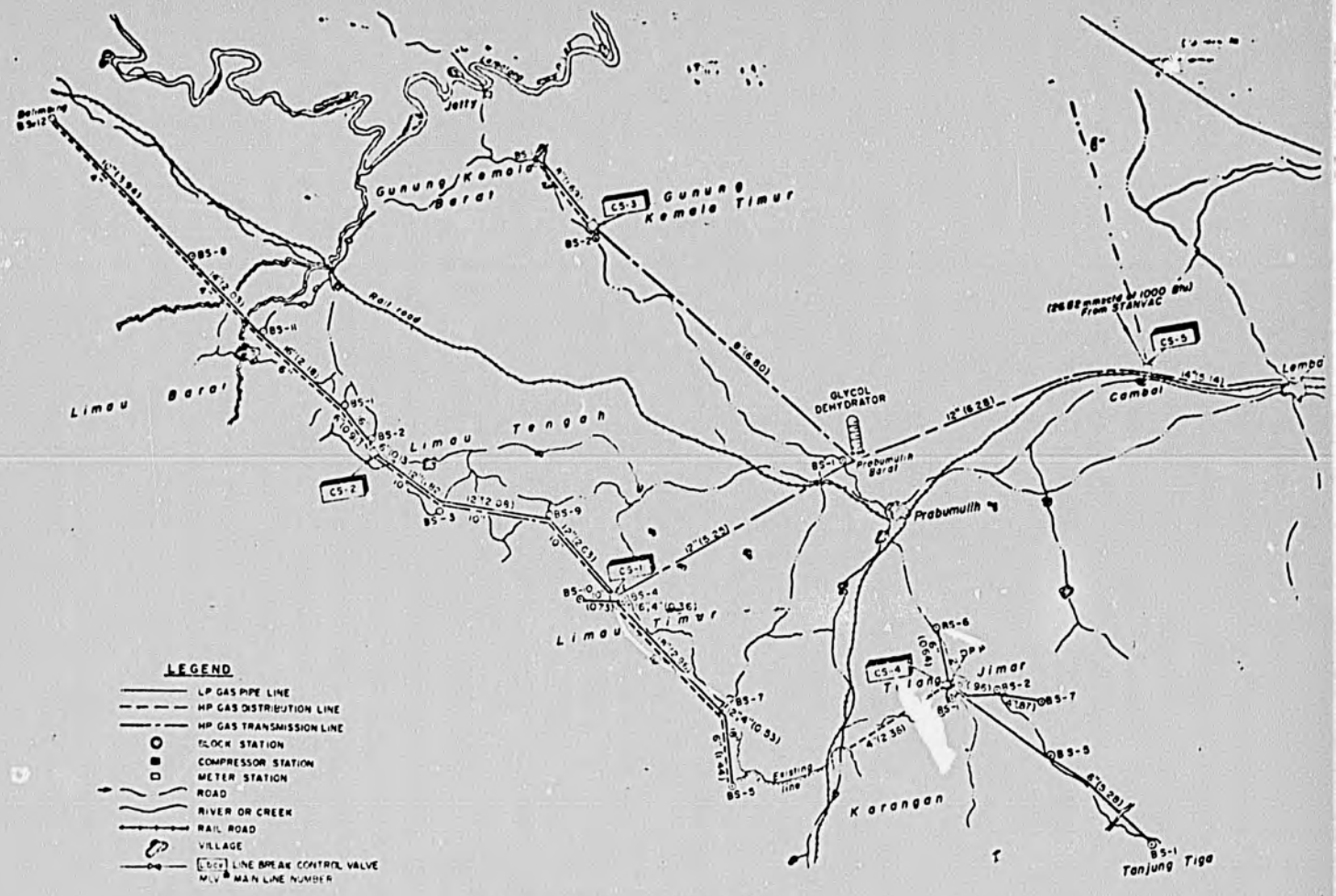


Figure II-4.1-1(a)

Gas Pipeline Network (Southwestern Section)

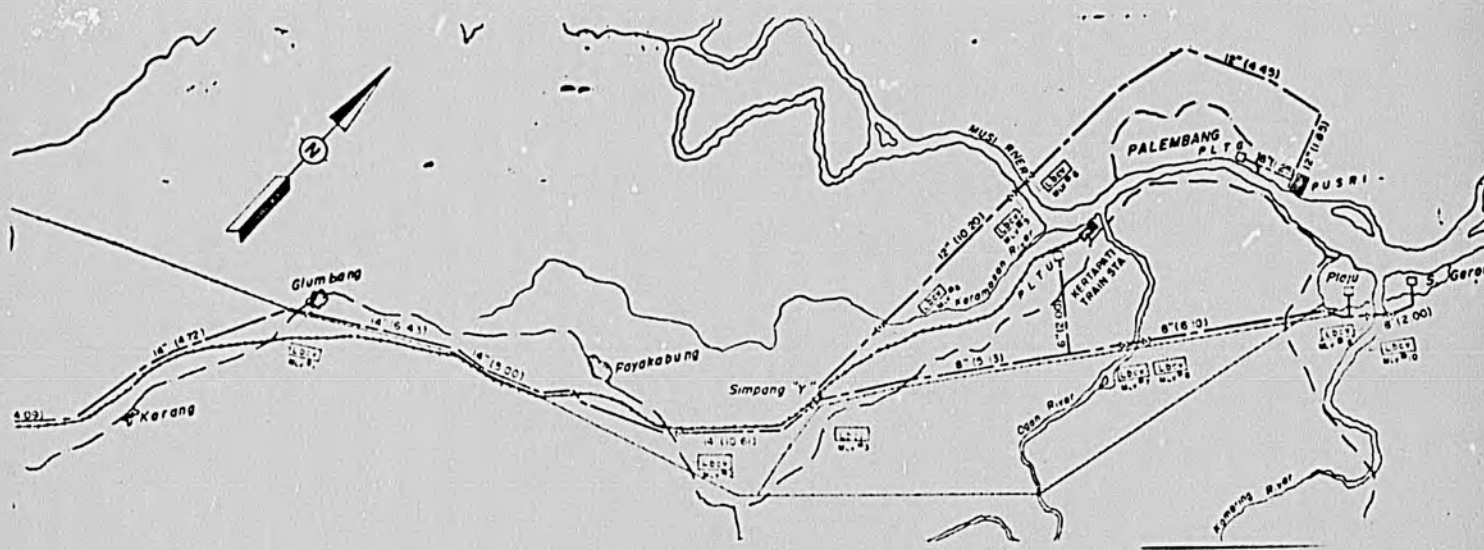


Figure II-4.1-1(b)

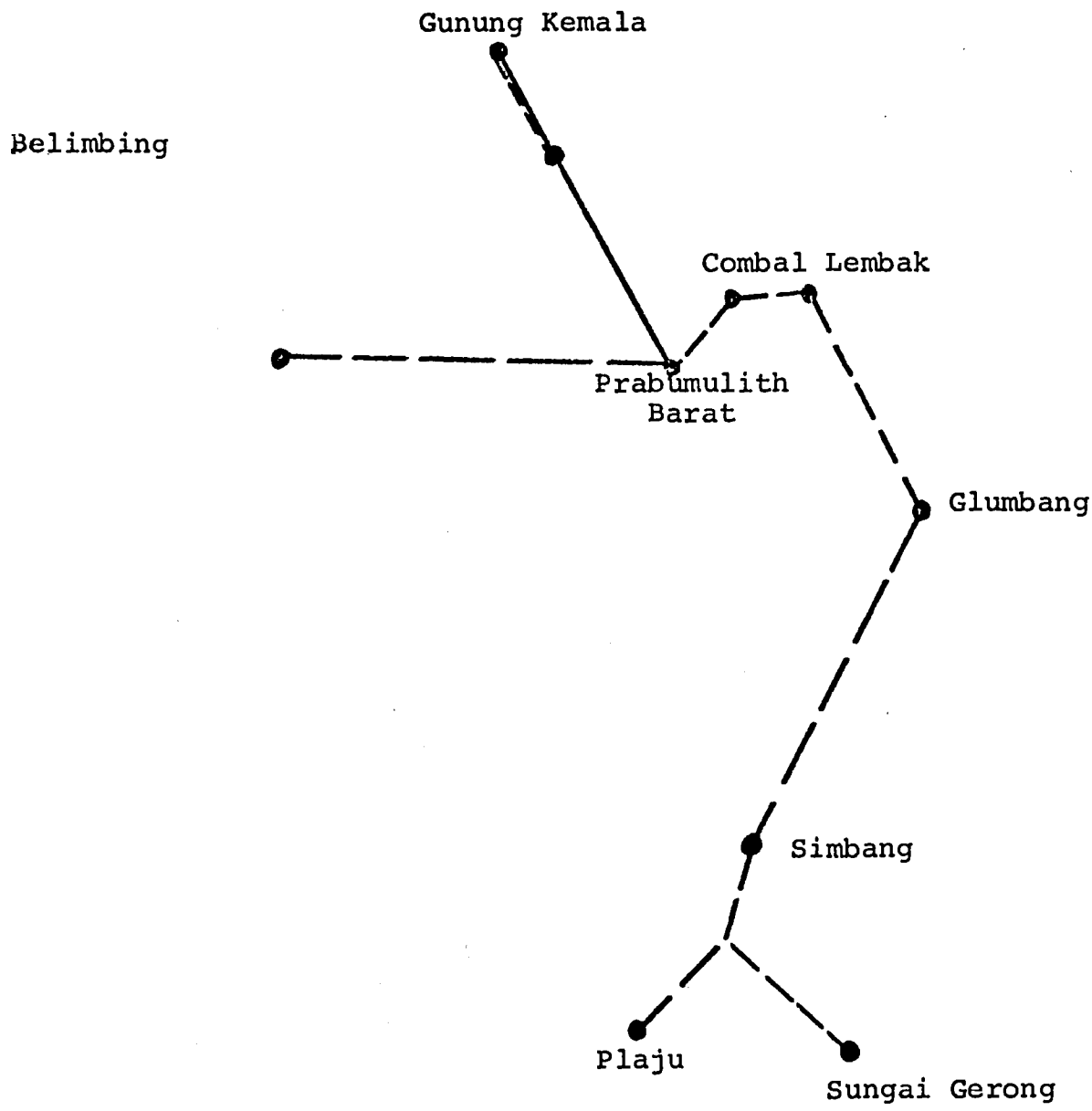
Gas Pipeline Network (Northeastern Section)

4.3 Oil Lines

Crude oil is piped into the Palembang area from two general areas in South Sumatra: one is the Prabumulith - Baturaja area which is served by two six inch pipelines and the other is the Basubang - Jambi area which is served by one eight inch pipeline. Generally speaking the pipelines run somewhat parallel to the gas lines indicated in Figure IV-4.2-1. The three crude oil pipelines into the Palembang area deliver about 10.5 million barrels of crude oil per year.

The pipelines in the vicinity of Palembang pass under the Musi River at a depth of six to seven meters LWS. If necessary to lower the pipelines, should the depth of the river be increased, it could be readily accomplished by adding sections into the pipes in way of the river or river banks.

Future plans for South Sumatra include a crude oil pipeline to the Panjang area of Lampung Province.



(Preliminary - to be completed)

Figure II-4.2-1

Oil Pipe Lines
Prabumulith - Palembang
Source: Bulletin Pertamina II

5.0 MARITIME NAVIGATION SYSTEM

5.1 General - Structure of Shipping Industry

Shipping in the Indonesian Archipelago is divided into two broad categories - Domestic Navigation and International Navigation. Domestic Navigation includes all traffic between Indonesian ports and with nearby foreign ports, such as Singapore or Penang. As one would expect, given the geography of Indonesia, the domestic sector is the more developed. Its first and most important market is short haul movement of commercial and light industrial goods. In the United States, this market is served by medium and long haul trucking and to a smaller extent by American railroads. As such, it is part of a complicated physical distribution system, and factors such as the size of wholesaling business strongly effect ship operations. The second market served is trade with Singapore. Currently this trade consists principally of imports and exports which are transshipped through the port of Singapore. The third market served by domestic shipping is the transport of bulk commodities. These include oil, cement, coal, rice, salt and sugar.

There are four main subgroups of domestic shipping:

1) Pelayaran Nusantara (Interisland shipping). This sector is made up of all vessels over 500 m^3 gross tons. Traffic on routes longer than 200 miles is allocated to this group. Most of the activities of the Regular Liner Service (RLS) are confined to this sphere.
2) Pelayaran Local (Local Navigation). Vessels in this category are larger than 100 m^3 but smaller than 500 m^3 GRT. This shipping is intended to support interisland

shipping activities. In general, trips by local shipping are less than 200 miles long.

3) Pelayaran Rakyat (peoples shipping). This sector consists of sailing vessels and motor driven vessels less than 100 m^3 GRT.

4) Special Shipping. This sector consists largely of bulk carriers, tankers and other shipping involved in dedicated support of industrial activity.

Table IV-5.1-1 shows the approximate deadweight tonnage operating in each sector.

International shipping is broken into two classes: "close by" meaning a one way distance of less than 3000 miles, and Ocean Navigation taking up the remainder. Currently 15 Indonesian vessels totalling 72,500 DWT are operating on close by routes. 52 Indonesian vessels totalling 458,011 DWT operate in the ocean sector. All of these ships are liners. Tonnage operating in the ocean sector is shown in Table IV-5.1-2.

The principal operators of liner tonnage are shown in Table IV-5.1-3. Six chartered vessels are also operated by these companies.

About 72 percent of Indonesian shipping operates as liners, so this leaves a small fleet of about ten vessels operating in the bulk trades.

5.1.1 Regulation of Shipping

The principal tool used to enforce governmental shipping policy is a system of permits. Other sources of control include financial aid (mostly P.T. PANN)

Table II-5.1-1

Available Capacity Domestic Shipping Sector

Sector	Number of vessels in 1973	Total Deadweight	Average Deadweight
Interisland	318	377,784	1,188
Local	680	86,000	126
Peoples (sailing)	18,000*	?	?
Special	454**	2,251,634	4,960

* Estimate Based on 1935 Census

**Includes tankers and timber ships operating internationally

Source: Transportation in Indonesia Volume I - 1974

Table II-5.1-2

Ocean Shipping Capacity - Indonesian Flag Liners

Route	Number	Total DWT	Average DWT
Japan	21	162,619	7,743
Australia	3	16,756	5,652
America	5	61,025	12,205
Europe	15	156,188	10,412
Other (incl. 3 pilgrim vessels)	8	61,222	7,652
Total	52	458,011	

Source: Transportation in Indonesia

Table II-5.1-3

Indonesian Liner Operators

Jakarta Lloyd	16 ships
Gesuri Lloyd	6 ships
Arafat	6 ships
Samudera Indonesia	6 ships
Others	12 ships

to encourage rational development of the industry, and the two state owned shipping companies, P. T. Pelni and P. T. Jakarta Lloyd.

5.1.1.1 Regulation of Domestic Shipping

In the domestic sector, the system of permits functions to encourage the development of the Regular Liner Service using local and peoples shipping as a support base.

To obtain a permit to sail in the interisland trade, an operator must:

1) own at least one vessel of at least 3000 m^3 gross tonnage
2) keep adequate accounting records
3) have sufficient working capital
4) carry out government transportation policy

Once involved in the trade, the company is required to:

1) publish routes, tariff and conditions of carriage
2) accept cargo that it is able to carry
3) give priority to the transport of clothing, food, industrial and export goods
4) furnish the government information concerning manifests and actual freight charged
5) inform the government of its member ship in conferences or other rate making organization

Permits can be suspended for a variety of reasons.

Special permission can be given to shipping not

permanently involved in the trade to carry interisland cargo. The major thrust of interisland shipping is to operate the Regular Liner Service (RLS). This consists of twenty-six trunk routes, fifteen routes to Singapore, and seventeen feeder routes on which scheduled service is maintained. Sailings on the routes are assigned by the Directorate of Sea Communications. Unprofitable routes can be assigned to companies as a condition to maintain their operational permits. Sailing frequencies and route assignments are agreed between operating companies and the government.

Foreign flag shipping is permitted to sail on domestic routes if there is a shortage of shipping capacity.

5.1.1.2 Regulation of International Shipping

"Close by" navigation consists of trade with Thailand, Cambodia, India, Pakistan, Hongkong, the Phillipines, Japan and Australia. Companies operating in the RLS are permitted to sail to close by ports, but not on longer routes. This option was granted as a form of subsidization of the RLS service.

For an Indonesian company to operate either form of ocean shipping, it must obtain a permit. To do this it must own more than one vessel of over 28,000 m^3 GRT and meet the same general conditions for operation in the interisland trade.

Foreign shipping calling at Indonesian ports must obtain a permit. When a vessel calls regularly, a permit valid for one year can be issued. Otherwise, a short term permit can be obtained. Shipping conferences are not extensively regulated in Indonesia and generally shipping conditions in the conference tariff

and bill of lading are based on general practice and regulations by other countries served by the conferences.

5.1.1.3 Vessel Registration and Classification

The majority of vessels sailing under the Indonesian flag are classed by the Bureau Classification Indonesia (BKI). The construction rules used are those of Germanisher Lloyd, the German classification society.

During the period of 1961 to 1969, the group failed to enforce adequate maintenance standards. As a result the condition of the fleet deteriorated to the extent that it was not possible to insure a vessel classed by BKI that was not also classed by another society.

In 1969 the standards were again enforced. After 6 years of adequate supervision, the condition of most of the RLS fleet is acceptable, considering the ages of these vessels. However, there exists a large block of local shipping that still shows the mark of an extended period of abuse. The existence of this tonnage presents a difficult problem for the industry.

As an operator of these ships has no insurance, and virtually no financial costs, his operating costs are only the crew, fuel and what repairs are required to keep the engine going. For this reason, these small ships are able to compete with new, larger, more technically efficient tonnage even on fairly long routes. This is bad from an economic point of view as no provision can be made by insurance for the eventual loss of the vessel, cargo and crew. Were regulation to require that every operating vessel be insured, the bulk of this tonnage would be scrapped within two years as its oper-

ation would no longer be economically feasible.

5.2 Ocean (International) Shipping

Shipping operating in Indonesia's foreign trade serves three basic markets: 1) oil exports to Japan and to a much lesser extent the USA, 2) timber exports to Japan, Taiwan and South Korea, and 3) the remaining exports and all imports. The first two are bulk markets and transportation is usually arranged by the owner of the cargo using either his tonnage or ships chartered on the international market. The third market is served mostly by liner companies operating in conferences. The liner sector does manage to book significant cargoes of timber (especially sawn timber and small logs) and import petroleum products which are mostly special purpose lubes. Tramp shipping is used somewhat for the transportation of large consignments of cement and fertilizer. The approximate site of each market in 1972 is shown in Table II-5.2-1.

Tables II-5.2-2 and II-5.2-3 give the imports and exports of Indonesia by cargo type for 1972. There are several events which have changed the picture since 1972. The first is that all new automobiles sold in Indonesia are assembled domestically from imported parts. Previously assembled vehicles were imported. While this leaves the tonnage roughly unchanged, it reduces substantially the volume required for transport. Second Indonesia has invested heavily in cement and fertilizer plants. While the tonnage of these products imported in 1975 could conceivably be the same as 1972, their percentage of total consumption is surely much less.

Tables II-5.2-4 and II-5.2-5 give the percentage

Table II-5.2-1

Shipments by Market Sector -1972

	Export	Import
Oil	41,080	861
Timber	9,912	
Liner	10,194	5,169
Total	61,186	6,030

Table II-5.2-2

Exports of Indonesia by Destination and Type - 1972

Unit - 1000 tons metric

Commodity	Japan	U.S.A.	Europe*	Singapore	Other	Grand Total
Rubber	21.9	177.8	165	389	20.3	
Copra	8.2		19.6	.2	14.6	
Coffee	3.3	43.5	42.1		18.1	
Palm Oil	37.0	67.6	94.6	.2	37.6	
Tea		10.3	26.5	1.6	5.6	
Wood	7,358	9.1	271.6	507	2,693	
Oil	32,038	8,362	512.5	340	2,172	
Miscell.	2,513	998	1,780	415	10.6	
Total	41,980	9,669	2,912	1,653	4,972	61,186

*Including USSR, Czechoslovakia and Yugoslavia

Source: Statistical Pocketbook of Indonesia

Table II-5.2-3

Imports of Indonesia by Type and Origin

Commodity	Japan	U.S.A.	Europe*	Singapore	Thailand	Others	Grand Total
Rice		71.2			104	158	
Wheat	1.8	8.3	5.5	2.3		3.2	
Cotton-cloth-yarn	7.7	3.7	2.4	0.6		5.9	
Cement	325	3.3	9.9	16.1		845	
Fertilizer	284	89.4	158.8				
Oil	16.8	26.5	49.6	504		265	
Iron & Steel	86.3	6.9	13.9	5		16.2	
Machinery	36	23.8	19.7				
Venicles**	19040	2208	7588	1739		866	
Other	852	299	396	276		101	
Total	20695	2745	8257	2547	104	2260.3	38608.3

Unit - 1000 tons metric

*Including USSR and Eastern Europe

**Assumed Vehicle weight 2 tons

Source: Statistical Pocketbook of Indonesia

Table II-5.2-4

Exports by Destination and Transport Market - 1972

Units Percentage by Weight

Country	Liner	Oil	Timber	Total
Japan	5	52	12	69
Thailand	Nil	Nil	Nil	Nil
Hongkong	Nil	Nil	Nil	Nil
Phillipines	Nil	Nil	Nil	Nil
Singapore	1.6	.6	.8	3
Other Asia	Nil	Nil	3	3
Australia	2	Nil	Nil	2
U.S.A.	3	13	Nil	16
Other North America	2	Nil	Nil	2
Europe	3.8	.8	.4	5
Total	17.4	66.4	16.2	100

Source: Statistical Pocketbook of Indonesia

Table II-5.2-5

Imports by Origin - All Liner

Unit Percentage by Weight

Country	Liner
Japan	27.3*
Hongkong	1
Singapore	13.4
Thailand	6
China	3
Other Asia	26
Australia	4
America	8.9*
United Kingdom	2
Holland	3
West Germany	2
U.S.S.R.	2
Other Europe	2

* A small portion of this is tramp shipments of cement, fertilizer or grain.

Source: Statistical Handbook of Indonesia

of cargo by country and transport market by country or region for exports and imports.

5.2.1 Ship Construction Costs

Figure II-5.2-1 gives the construction costs in 1975 dollars for tonnage ordered in 1975. New ship prices are extremely volatile - rising rapidly when shipping is in short supply and falling to less than the shipyard's costs in bad times. The situation in 1975 is a transition from high prices to low. Most shipyards still have order backlogs, but have been unable to book sufficient new construction to keep busy in the future. As a result there has been a strong downward pressure on ship prices. In 1973 a VLCC sold for about $55,000,000. In 1975 the price had fallen to $44,000,000. The price of an identical used vessel 2 years old was about $14,000,000.

During the tanker boom many shipyards were built in areas with low wage costs, but little experience in ship construction. At the time these yards were able to secure orders with early delivery and low prices. However, many of these vessels are of low quality and will not be bought by operators when satisfactory quality is available at a small premium from countries experienced in ship construction. Many of these new yards will simply fail or be converted to repair yards. In the long term, the trend in ship purchase prices would seem to be to approach the shipyard's costs in Japan plus a small percentage. This makes the most important determinant of ship construction costs the value of the Yen and the rate of inflation in Japan. On the whole the price of ships will be gently downward for the next 5 years.

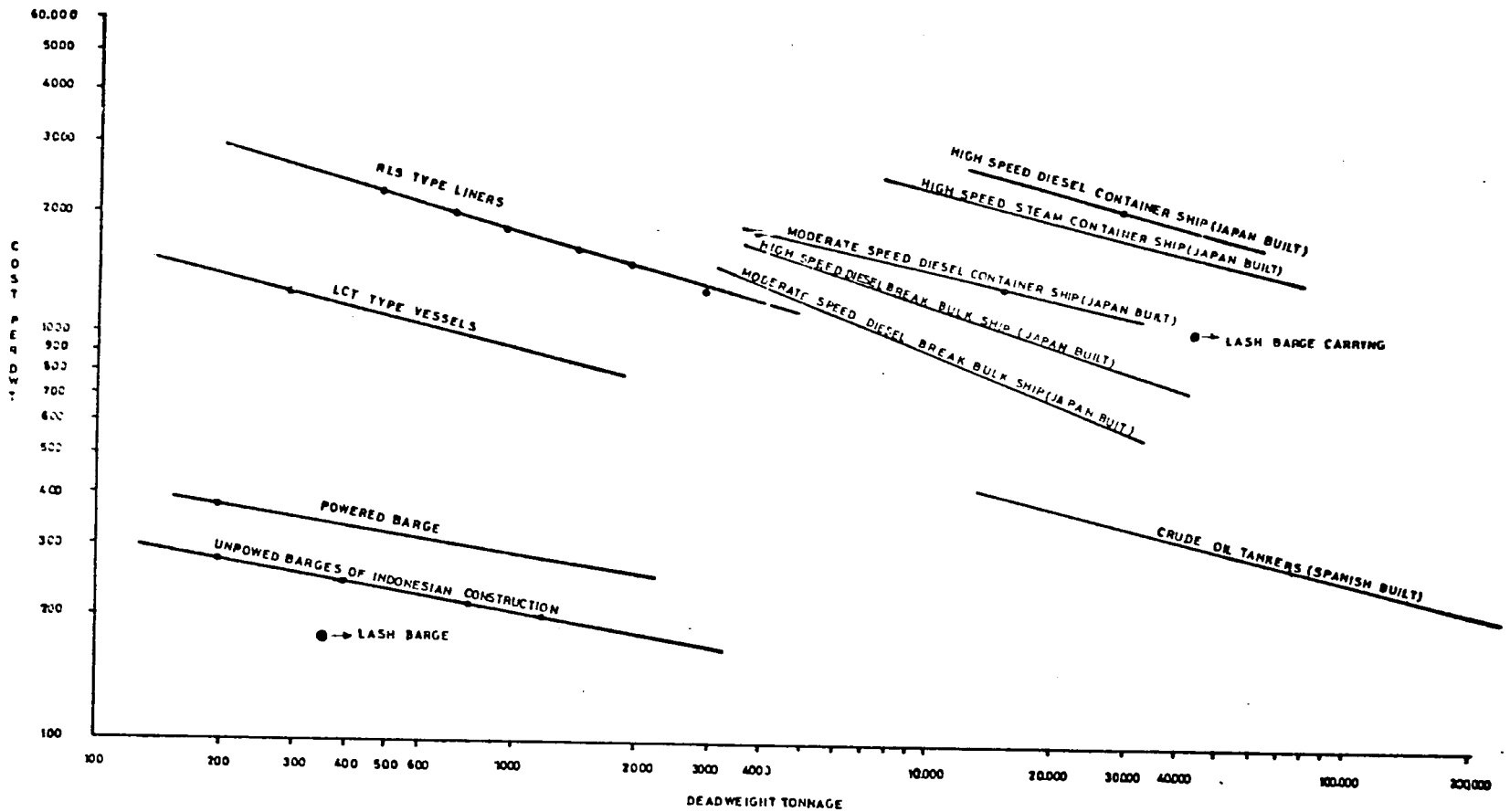


Figure II-5.2-1

Cost of Various Ship Types 1975 Prices

5.2.2 Organization of Liner Shipping

As is typical in maritime commerce, companies or operating liner services in Indonesia's foreign trade are organized in a system of steamship conferences. The function of these conferences is to regulate the tariffs, terms of carriage, and frequency of sailings on a given route. The freight rates charged by all members of a conference are set by its rate making committee. Generally competitive forces within conferences result in excess capacity as member lines try to compete with additional sailings and faster vessels, rather than with price reductions.

There are eight major conferences operating in Indonesia's foreign trade. They are:

a) Java-New York and New York-Java

b) Indonesia-Europe and Europe-Indonesia

c) Indonesia-Japan and Japan-Indonesia

d) Indonesia-Australia and Australia-Indonesia

While generally outward and inward conferences have the same members, the conditions of carriage need not be the same and many times freight rates are different. The freight rate on Japanese beer to Indonesia would be different than for Indonesian beer to Japan if there is a significant increase in revenue by having such a tariff. Tables II-5.2.2-1 through II-5.2.2-3 give the membership of three of the above conferences.

Approximately eighty percent of Indonesian owned tonnage operates within the conference system. Presently, Indonesian companies benefit from the conference system as they operate relatively small ships and could not compete were shipping priced on a competitive basis.

Table II-5.2.2-1

Members New York-Java/Java-New York Conferences

Shipping Company	Nationality
American President Lines	American
Barber Blue Sea Lines	English
Jakarta Lloyd	Indonesian
Viterwyk Lines	American
Hoegh Lines	Norwegian
Maersk Lines	Danish
Koninklijke Nedlloyd	Dutch
Sterling Navigation Company	English
Orient Overseas Lines	Hongkong

Source: Tariff of Java-New York Conference

Table II-5.2.2-2

Members of Indonesia-Europe/Europe-Indonesia Conferences

Shipping Company	Nationality
Jakarta Lloyd	Indonesian
Gesuri Lloyd	Indonesian
Samudera Indonesian	Indonesian
Trioka Lloyd	Indonesian
Ben Line	English
Hapag Lloyd	German
Ocean Line B.V.	Dutch
Koninklijke Nedlloyd	Dutch
Blue Funnel Line	English
East Asiatic Company	English
Swedish East Asia Company	Swedish
Jugoslavensk Linijska Plovleba	Jugoslav

Source: Tariff of Indonesian-Europe Conference

Table II-5.2.2-3

Members* of Indonesia-Japan/Japan-Indonesia Conference

Shipping Company	Nationality
Admiral Lines	Indonesian
Gesuri Lloyd	Indonesian
Samudera Indonesia	Indonesian
Jakarta Lloyd	Indonesian
Maersk Line Ltd.	Danish
Tokyo Sen Paku Kabushi Kaisha Ltd.	Japan

*List not complete

Source: Tariff of Indonesia-Japan Conference

5.2.2.1 Liner Pricing Policy

The basic function of a steamship conference is to ensure that all operators on the same route charge the same rate. While there are many reasons why operators wish this, the basic one is that in the past when the price cutting occurred, large losses were incurred. Conferences publish tariffs which give commodities (with detailed descriptions) and corresponding freight rates.

In order to ensure continuous use of their services, conference operators provide a discount to shippers exclusively using member lines. One form is for the shipper to receive a deferred rebate (now generally ten percent). The full freight is paid at the time of shipment. At the end of a six month period, the rebate is refunded if the shipper has not used shippers competing with the conference. Should the conference discover that competing carriers were used, the rebate is lost. A second system is for the shipper to sign a contract to ship all his cargo in conference vessels. In exchange, he receives a cash discount (now generally 9 1/2 percent). Damages for breach of contract are generally agreed in the contract to be the entire freight for shipments not sent by conference vessels. Indonesia permits either system.

Table II-5.2.2-4 gives conference tariffs for selected commodities for four conferences serving Indonesia. Charges are for weight or volume. This table gives only the base rate. To this base rate a number of adjustments must be made to arrive at the actual tariff. These adjustments include:

1) the discount or rebate
2) port arbitraries (surcharges for calling at

Table II-5.2.2-4

Sample Conference Freight Rates

Commodity	Java/ New York	Indonesia Europe	Indonesia Australia	Indonesia Japan
Latex (drums)	83.25/M^3	61.49/M^3	50.40/m^3	23.75/m^3
Elephants (live) includes food	2715/head	--	--	625/head
Tea (case)	79.50/M^3	63.21/M^3	46.94/m^3	53.50/m^3
Coffee (bags)	102.75/ton	119.54/ton	89.15/ton	53.75/ton
Copra (bags)	60.50/ton	74.39/ton	74.03/ton	27.25/ton
Copra (bulk)	60.50/ton	65.79/ton	58.91/ton	24.50/ton
Nutmeg (case)	130.00/M^3	136.00/M^3	115.29/ton	113.00/ton
Nutmeg (bulk)	231.00/ton	248.00/ton	58.91/m^3	76.25/ton
Rattan (bundle)	318.00/ton	239.00/ton	143.01/ton	87.75/ton
Logs	193.00/M^3	--	--	30.00/m^3
Plywood	73.25/M^3	119.97/ton	46.94/m^3	--
Tires (cases or bales)	103.75/M^3	91.59/M^3	48.51/m^3	--
Timber (logs)	122.00/M^3	55.04/M^3	58.59/m^3	23,50/m^3
Timber (sawn)	57.00/M^3	83.42/M^3	43.16/m^3	24.50/m^3
Timber veneer	167.00/M^3	107.93/M^3	--	--
Tin Ingots	102.00/ton	135.45/ton	--	62.75/ton
Beer in bottles	139.00/M^3	General cargo	51.03/m^3	33.75/ton
Cotton	155.50/M^3	133.73/M^3	70.24/ton	26.75/m^3
Rubber (emergency rate)	66.25/M^3	--	--	--
Rubber general	74.25/M^3	55/M^3	44.10/m^3	22.25/m^3
Rubber granulated in bags	200.00/ton	209.00/ton	44.10/m^3	22.25/m^3
General cargo (NOS)	189.25/ton	185.00/ton	66.78/ton	*
General cargo (NOS)	139.75/M^3	185.00/M^3	66.78/m^3	*

All figures in US dollars.

*Rate for this commodity omitted in oversight

ports with higher costs of small traffic)

3) bunker surcharge (adjustment for fuel price)

4) currency adjustment (adjustment changes in currency values)

5) general increase (adjustment for general increase sometimes used while the tariff is being reprinted with higher rates)

Table II-5.2.2-5 gives the adjustments to the tariffs mentioned in Table II-5.2.2-4. The freight rate for coffee charged by these conferences is calculated in Table II-5.2.2-6. Freight rates for all other commodities are calculated in a similar fashion.

While the going rates in these trades would be very lucrative if vessels were sailing full, because of world economic conditions seldom de vessels sail with full cargoes and most operators do not do well.

At this point in time in order to avoid stopping at more than one port in Europe or the U.S. some operators are accepting cargo requiring transshipment. According to the rate agreements, the freight for this cargo is the same as cargo not requiring transshipment. The total cost of the transshipment approaches the whole freight of the ocean leg and the incremental revenue is extremely small. This is done because cargo is scarce and operators are willing to boon any cargo covering variable costs (stevedoring and transshipment). This indicates that some type of pooling of these carriers by ensuring that cargo loaded on any particular ship is destined only for direct ports of call.

Terms of payment are customarily three days net but this can vary between conferences. Many conference agreements require that member lines report anyone not paying within three days. In practice, allowing longer

Table II-5.2.2-5

Conference Rate Surcharged

Adjustments to Conference Base Rates (November 1975)

All Monetary Figures US Dollars

	Java New York Rate Agreement	Indonesia Europe Conference	Indonesia Australia Conference	Indonesia Japan Conference
1) Cash Discount	9½ %	9½ %	9½%	9½ %
2) Deferred Rebate	10 %	10 %	10 %	10 %
3) Bunker Surcharge	--	17.78%	$5.00/ton or m^3	17.3%
4) Currency Adjustment	--	--	7 %	3 %
5) General Increase	15 %	--	--	--
6) Palembang Arbitrary	See Table Below	$12.90/ton or m^3	$6.30/ton or m^3	$8.00/ton or m^3

Palembang Arbitrary Java New York Rate Agreement

	Palembang Arbitrary US Dollars	Comments
Cinnamon	12.25/m^3	
Coffee	12.25/ton	Emergency Rate
Rubber	18.00/m^3	Normal Rate
Rubber	5.75/m^3	Emergency Rate
Timber	16.75/m^3	
General Cargo	17.75/ton	
General Cargo	18.00/m^3	

Table II-5.2.2-6

Calculation of Conference Freight Rate for Coffee

	Java-New York (US$/ton)	Indonesia Europe (US$/ton)	Indonesia Australia (US$/ton)	Indonesia Japan (US $/ton)
Base Rate	102.75	119.54	89.15	53.75
Palembang Arbitrary	12.25	12.25	6.30	8.00
Subtotal	115.00	131.79	95.45	61.75
General Increase	17.25	--	--	--
Subtotal	132.25	131.79	95.45	61.75
Discount (9½%)	(12.56)	(12.52)	(9.04)	(5.86)
Subtotal	119.69	119.27	86.41	55.89
Bunker surcharge	--	21.20	5.00	9.49
Subtotal	119.69	140.47	91.41	65.38
Currency Adjustment	--	--	6.37	1.96
Final Freight Rate	119.69	140.47	97.78	67.34

terms of payment is one form of competition.

While it is undoubtedly true in most trades that under the table rebates are given, it is interesting to consider the ways which liner companies legitimately compete. The first is with demurrage. Most tariffs specify a minimum loading rate. Should this not be met the shipper pays demurrage. Of times operator will agree to a lower loading rate. This is a very effective means of giving a price reduction to shippers - especially for cargo loaded at anchorage. Allowing timber to be loaded at 500 tons per day instead of 700 tons represents an approximate reduction in freight of 5%. A second common method involves arrangements made between steamship companies and land transportation. Frequently a steamship line can justify reductions in rail and truck tariffs. By doing this it can provide cheaper overall costs than other conference members.

The appearance of containers in trades frequently creates very difficult problems for conferences. Operators of break bulk shipping are indifferent to the introduction of containers as long as no price reduction is passed along to the shipper. On the other hand, container operators have a cost advantage and must pass some of it along to shippers or they will be unable to book desirable cargo for the containers. Generally, the situation results in nominal freight rates staying the same, but with changes in rules for applying these rates. Examples are:

1) Most tariffs specify that when two commodities are carried in the same package, the highest rate applies to the whole consignment. When containers are used, individual rates usually are applied.

2) Prior to containers, the weight or volume of the package was included in calculating the freight. When containers are used, the tare weight of the container is excluded.
3) Containers are usually exempted from heavy lift charges.
4) While only three free days storage of the container generally are provided, the effective rate for leaving material in a container yard is less than in a warehouse.
5) Some conferences offer discounts for cargo carried in containers. The size of the discount depends, of course, on the strength of container operators within the conference.

On the negative side, bills of lading issued by container operators tend not to be as good as those issued by break bulk operators. As bills of lading are negotiable instruments, any uncertainty as to quantity or description of goods actually shipped undermines the bill of ladings value in transferring funds between buyer and seller. As an operator of a container line is unable to open every container and ensure what is said to be inside is actually inside, its bill of lading is not as strong as a break bulk carriers.

There are a number of points concerning tariffs and pricing which have a bearing on the development of the port of Palembang. The first is that for most cargoes, the surcharge for over the conferences base rate ports (Tanjung Priok, Surabaya, etc.) makes transshipment through Palembang to other points unattractive, as the shipper will pay the surcharge plus transshipment costs. As the surcharge is comparable to the cost of

transshipment, it does not handicap Palembang's exports.

The second is that while the introduction of containers always involves total system costs savings, it is unusual when they are passed on to the shipper. This means that the introduction of containers is a slow process. The containerization of America's trade, where very large cost savings were apparent, took over ten years.

The third is that since Indonesia's market share of the conference trades is small and in general comprising inefficient tonnage, the introduction of containers will not result in any large net benefit to Indonesia, unless the pricing policy of container unloading equipment is well thought out.

5.2.2.2 Cost of Liner Shipping Services

Operating expenses of vessels used in liner shipping have importance to port planning both in forecasting the types and numbers of arriving ships and in determining the charges levied against ship owners. The rates for services can be evaluated principally against the cost of a ships time (as measured in lost revenue). For example, an owner of a large vessel is willing to pay a premium for water or fuel delivered in large barges rather than small barges especially if they arrive on time. Another factor affecting the price for port services is the savings their use offers ship owners. For example, the use of launches and helicopters not only reduces the lost time of a vessel to pick up supplies and mail, but also eliminates the port dues that would be paid if the ship physically called at a port. The port dues for vessels using such services are important factors in determining the price charged.

Table II-5.2.2-7 gives typical characteristics of vessels operating on liner trades throughout the world. These vessels include container, semi container, break bulk and LASH. Figure II-5.2.2-1 presents the annual operating costs for these vessels. All costs are based on operation of new tonnage. As current ship prices are about double those of three years ago, actual costs incurred by liner companies for fleet operation are substantially less.

These costs include crew, supplies, repairs, insurance, financing and management. Not included are fuel, port charges, stevedoring and rental for containers or barges.

Table II-5.2.2-8 gives the cost of operating this tonnage between Tanjung Priok and Rotterdam. Passage around South Africa was assumed because the tariff of the Suez Canal was not available. In general, stevedoring costs were calculated using the tariffs of UKA and Rotterdam. For handling containers in Indonesia, the Singapore tariff was used.

It is clear from the table that the larger and faster container ships result in extremely small cost reductions from slower, smaller container vessels. The function of the large, fast container ship is to provide rapid service rather than low cost transport. While container costs are over fifteen percent beneath conventional tonnage, any ship, except extremely small break bulk vessels, will show a good profit on the route if full cargoes are booked for it. When these ships sail without full cargoes, the relative cost advantage of container ships is reduced. See Table II-5.2.2-9. The conclusions are valid only for the long distance trades to Europe and the U.S. The voyage to Japan is short

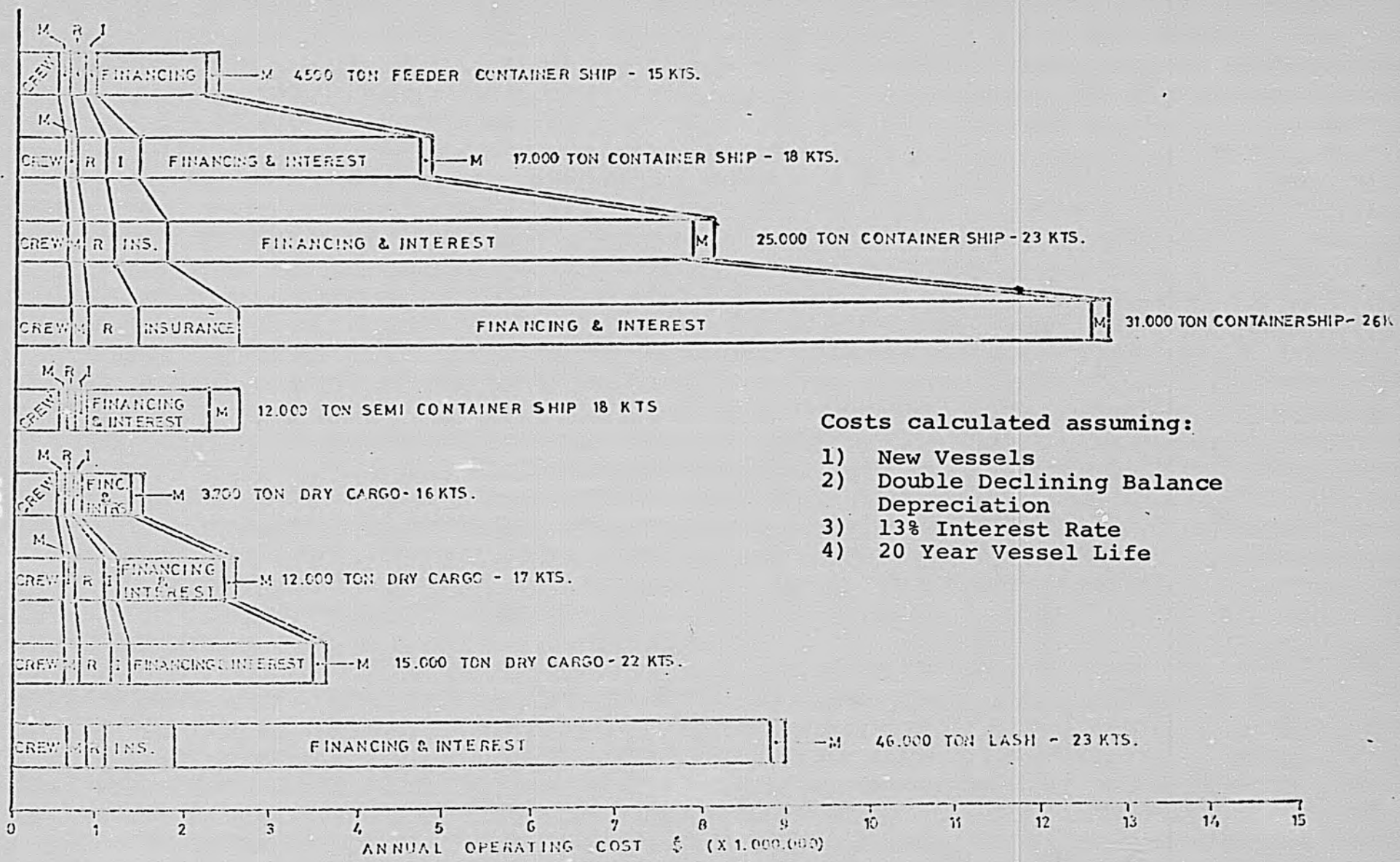
Table II-5.2.2-7

Characteristics of Shipping Operating in Liner Trades

Vessel	DWT	Maximum cargo carried S.F. = 80	Number Hatches	Draft Meters	Speed Kts	Bunner Rate tons/day	Length M	GRT tons
Feeder Containership	4,500	4,200	6	5.7	15	23/ 5	110	2,500
Medium Containership	17,000	9,300	7	9.2	18	61/ 9	170	16,000
Large Containership	25,000	16,000	10	10.3	23	179/13	200	26,000
Super Containership	31,000	24,000	13	11.7	26	250/14	260	39,000
Semi Containership	12,000	7,800	4	8.3	18	61/ 4	140	8,300
Small Dry Cargo	3,700	2,200*	3	6.1	16	18/ 3	110	3,700
Medium Dry Cargo	12,000	7,577*	5	8.7	17	38/ 4	150	9,500
Fast Dry Cargo	15,000	9,996*	5	9.5	22	87/13	180	12,463
LASH	46,000	33,400	-		23	157/15	272	

*This tonnage designed for stowage factor of 60 cu ft/ton

Source: American Bureau Register of Shipping



Costs calculated assuming:

1) New Vessels
2) Double Declining Balance Depreciation
3) 13% Interest Rate
4) 20 Year Vessel Life

Figure II-5.2.2-1

Operating Costs Liner Shipping

Source: Major Liner Company

Table II-5.2.2-8

Cost of Operation - Liner Shipping

Tanjung Priok - Rotterdam

Vessel	Cargo per Trip (Tons)	Port Days Per Trip	Sea Days Per Trip	No. Trips Annually *	Port Costs Per Trip**	Fuel Cost Per Trip***	Portion of Annual Cost Per Trip****	Container or Barge Rental Per Trip*****
Feeder Ship	3,707	7.29	76	4.14	150	102	532	27
Medium Container	9,300	10.39	65	4.58	343	238	1,073	56
Large Container	16,000	13.84	48	5.66	673	515	1,535	92
Super Container	21,656	17.52	43	5.70	743	645	2,163	118
Small Break Bulk	2,200	22.4	72	3.65	114	76	413	-
Medium Break Bulk	7,577	51.15	68	2.90	456	150	880	-
Fast Break Bulk	9,996	64	51	3.00	613	266	1,199	-
LASH*	33,400	6	48	6.48	183	312	927	268

Vessel	Total Cost Per Trip	Cost Per Ton of Cargo	Ton Miles One Way	Cost per Ton Mile
Feeder Ship	811	109	4.5×10^7	.009
Medium Container	1,701	91	1.14×10^8	.0075
Large Container	2,815	87	1.97×10^8	.0074
Super Container	3,669	85	2.66×10^8	.0069
Small Break Bulk	603	137	2.71×10^7	.0111
Medium Break Bulk	1,486	98	9.337×10^7	.0079
Fast Break Bulk	2,078	104	1.23×10^8	.00845
LASH	1,690	25**	4.1×10^8	.00206

*Turbine ships available 350 days/year - diesels 345.

**Included port charges, port fuel, and stevedoring (except for LASH).

***Cost of bunkers and lube oil for whole trip price based on Indonesian prices.

****Includes costs given in Figure II-5.2.2-1 on voyage rather than annual basis. These include depreciation, interest, supplies, crew, supplies and insurance.

*****Container Rental $3 per day per box. This is more or less bench mark used in conference agreements, LASH barge rental estimated on receiving cost of barge in five years.

Stowage Factor = 80 cu ft/ton. All monetary figures in $1000. Passage around Africa Distance Tanjung Priok - Rotterdam 12,300 miles.

Table II-5.2.2-9

Cost of Liner Shipping at Less Than Full Cargoes

Tanjung Priok - Rotterdam

	Voyage Costs Excluding Port Charges	Port Charges Including Stevedoring	Total Voyage Costs	Cargo Carried	Cost Per Ton
Booked Cargo = 75 percent of deadweight					
Feeder Containership	661	120	781	2,780	140
Medium Containership	1,358	274	1,632	6,975	116
Large Containership	2,142	535	2,677	12,000	111
Super Containership	2,926	594	3,520	16,239	108
Small Break Bulk Ship	489	91.2	580	1,650	175
Medium Break Bulk Ship	1,030	364	1,394	5,682	122
Fast Break Bulk Ship	1,465	490	1,955	7,497	130
Booked Cargo = 50 percent of deadweight					
Feeder Containership	661	96	757	1,853	204
Medium Containership	1,358	220	1,578	4,645	169
Large Containership	2,142	428	2,570	7,992	160
Super Containership	2,926	475	3,401	10,815	157
Small Break Bulk Ship	489	73	562	1,098	255
Medium Break Bulk Ship	1,030	291	1,321	3,784	174
Fast Break Bulk Ship	1,465	392	1,857	4,993	135

enough that the decreased port time of the container ship more strongly effects the economics further improving the competitive edge of containerized shipping. This indicates that while container vessels will be calling at Indonesia in increasing numbers, there will be no rapid drive to maximize the use of containers in the Europe or American trades. While the trade with Japan better utilizes container shipping, bulk cargo predominates reducing the real market for containers.

A final point is that most of the economies of containerized shipping stem from decreased stevedoring costs. By the tariff of the port of Rotterdam, for example, general cargo can be unloaded manually for about twenty five dollars per ton. The same cargo can be unloaded with containers at a cost of about $9.00 per ton. Because of this vast price differential, container terminal operators charge rates well over their actual costs. For this reason, it is common in many ports of the world for steamship operators to own terminal and stevedoring companies.

5.2.2.3 Technological Improvements in Liner Shipping

It is clear that the technology of container shipping still has many opportunities for sound engineering to yield cost reductions. Improved lashing designs and stronger container doors will result in higher stacks of deck containers with resulting higher utilization of vessels. One company is experimenting with preloading deck containers in frames and then loading stacks of containers four high with one lift of the container crane. Computer systems will be used more comprehensively to track container cargo and possibly to run automated

container yards. On the American scene, high bunker prices will force experiments with low speed diesel engines and most probably lower service speeds of ships.

However, too great an emphasis on technology and cost reduction directs attention from the true problem of marketing liner shipping. That is to simplify shipping problems. At least in the short run little marketing advantage goes with low operating cost. The real competitive edge goes with the ability to provide flexibility and to use it to circumvent shipping problems. For example, one real service provided by shipping companies in the U.S.A. is aid to customers in obtaining rate adjustments from American rail and trucking companies. Liner operators have helped arrange the import of 180 proof scotch whiskey diluted and bottled in the U.S. at a great reduction of import duty.

One of the characteristics of container shipping is its efficient use of roads to collect all a ships cargo in one place and then to distribute it easily to consignees. This greatly simplifies a shipping line's problems in booking cargo. However, in Indonesia, the road system is not developed enough to serve this function comprehensively. While containers will, of course, find their way to Indonesia in increasing numbers, this means that break bulk shipping will be able to compete effectively for many years.

The one modern shipping system which offers many advantages to Indonesia is the LASH system, not only for exports of rubber, coffee and timber that are very conveniently carried in LASH, but also for imports of heavy machinery which are virtually impossible to

containerize. Many delays involving customs clearance of cargo could be avoided by the use of LASH.

Table II-5.2.2-10 gives an estimate of the cost of a LASH service to Europe for several different ways of handling barges at either terminus.

While the adjustments occurring in both RLS shipping and international shipping could be large as LASH is introduced, the potential gains to the Indonesian economy are large, if only a small portion of the cost reduction could be recouped from LASH operators.

If the market were allowed to determine the market share of specialized shipping would probably be very roughly as found in Table II-5.2.2-11.

The source of this forecast is the pragmatic realities of Indonesia's trade situation. Concerning LASH there is only one European operator with two ships, no more are on order. These vessels are not expected to trade extensively with Indonesia. There is only one operator of LASH shipping serving Japan. This trade is with the U.S. Due to the large distances between ports in Australia, it is thought LASH will not work out well in this environment. In any case no ships are on order for this trade. This leaves only the United States principally trade with the U.S. Gulf. For the U.S. Gulf-Indonesian trade LASH is ideally suited. As the inter-modal carriers on the Mississippi and other rivers are common carriers, the steamship liners operating in this trade would probably be able to secure tariff reductions for Indonesian cargo in LASH barges. However, it is hard to imagine more than one LASH ship completely occupied by Indonesian shipping. At six trips per year about 180,000 tons of exports would then go by

Table II-5.2.2-10

Estimated Cost of LASH Service to Europe

	Method of Use	Cost/Ton (US $/ton)	Cost Per Ton Mile (US $/ton-mile)
I	Call of LASH vessel at Palembang, 50% of European cargo transshipped in Europe	36.63	.003
II	Call of LASH vessel at Batam or Singapore transshipment in LASH Barge, 1,100 ton consignment, No Return Cargo	57.99	.0047
III	Call of LASH at Batam or Singapore transshipment by RLS, 50% of all European cargo transshipped	61.63	.0050
IV	Call of LASH vessel at Batam or Singapore, transshipment by RLS, All cargo in Europe or Asia transshipped	71.00	.0058

Table II-5.2.2-11

Expected Market Share of Liner Service to Indonesia by Technology

Units - Percentage

	Europe	Japan	U.S.A.	Australia
Break Bulk	90	80	81	85
Container	10	20	15	15
LASH	0	0	3	0

LASH. In 1972 1,835,000 tons of liners shipping went to the states assuming this is tripled by 1980 the market share of LASH is at maximum 180,000/ 5,506,000 = 3%. Concerning containers, the bulk of exports are just as efficiently handled in break bulk ships as container. Crumb rubber, for example, arrives in large crates quickly handled by burtoning gear and easily handled by a forklift in the hold. The increased market share of containers is based on the rate it is expected liner companies will retire old tonnage and provide new capacity which will be container.

5.2.2.4 Forecast of Berth Liner Berth Requirements at Palembang

One characteristic of the trade of Palembang is that ships operating in liner services stop infrequently and usually stay only for a day or so. The reason for this is that while Palembang generates substantial amounts of cargo, the amount loaded per month destined for a particular area of the world does not usually justify stopping. The liner freight rates to Palembang include surcharges to adjust for the trip up the river and the relative scarcity of cargo at Palembang. This surcharge is nearly equal to the freight charged by the RLS to Singapore. When shippers consider the frequency of service offered on the Singapore run, they usually choose to export cargo through Singapore rather than direct shipment from Palembang. Liner export cargo consists almost entirely of rubber and coffee. In the future because of increased imports of general cargo, large liners will call at Palembang more frequently; any rapid increase in their numbers will

occur only when it is standard practice to export cargoes directly.

Assume that a liner to Europe were considering calling at Palembang regularly to pick up export rubber without having import cargo to deliver. Ships doing this will first stop at Singapore as without this stop they lose too much inbound cargo. Supposing the operator was using a vessel with a cargo capacity of about 8000 tons, his approximate incremental costs are as follows:

Distance to Singapore	298 miles	
Days steaming at 13 Kts	1.91 days	
2 days to enter & leave Musi	2	
Total incremental time	3.91 days	
Fixed cost/day	$7391	
Cost of vessels tims		$28,922
Fuel 1.91 x $2205		4,213
		$33,206

This must be equal to the revenue he makes from the surcharge plus about 20% as an allowance for possible demurrage for slower loading rate. Since the surcharge is a $12.90/M^3 or $18.00/ton for rubber the minimum cargo that will routinely be accepted is

$$\frac{\$33,206\ (1.2)}{\$18/\text{ton}\ (.91)^*} = 2431 \text{ tons}$$

* conference rebate

Assuming that about one third export cargo is bound either for the U.S., Japan or Europe, and that an exporter does not wish to hold his cargo in a warehouse for more than 3 weeks, the annual volume of export rubber and coffee required to support this service is

$$\frac{2431 \times 3 \times 52}{3} = 126,457 \text{ tons/year}$$

When adjustments are made for the volume of rubber and cargo taken to Singapore or the RLS in spite of the new service, the actual volume required is in the vicinity of 280,000 annually. According to our economic projections, this will not occur until sometime between 1980 and 1985.

To be considered also in this discussion is the RLS tonnage currently operating between Singapore and Palembang. Currently the tariff on exports is about $20.00 U.S. per ton. The current total cost of this service is about $16/ton. However, the variable cost of these operators is about $13.00 per ton. This indicates that RLS operators would be able to undercut the conference surcharge and could continue to carry large volumes of rubber and coffee to Singapore. This conclusion tends to support the opinion that liner ships will not come to Palembang only to pick up exports until 1985.

In the month of November, 1975 nine vessels over 1000 tons deadweight docked at Boom Baru. During the same period 18 vessels of large size used the anchorage, Pusri or Pertamina to unload. As an estimate of requirements for berth space at Boom Baru about 120 large ships will call there in 1975 using about 180 berth days. This figure can be extrapolated using general cargo imports as a guide. This is done in Table II-5.2.2-12. This of course amounts to an extremely rough estimate but considering the small consignments and cargoes actually handled, the estimate is probably within 20% of the actual amount of berth space required. This estimate assumes cargo is not diverted to container ships calling at Tanjung Priok or Batam and then

Table II-5.2.2-12

Berth Requirements for Liner Shipping

Year	General Cargo Imports (Tons)	Berth Days per year for vessels over 1000 DWT
1974	82,000	180
1975	82,000	180
1980	138,000	302
1985	209,000	463
1990	313,000	694
1995	457,000	1014
2000	663,000	1471

transshipped to Palembang in vessels smaller than 1000 tons.

5.2.3 Bulk Shipping

International bulk shipping at the port of Palembang currently centers on two commodities, timber and oil. The bulk of the traffic in oil is domestic. International traffic in oil is small in volume. An additional commodity that may eventually be carried in bulk is rubber. While currently rubber exports are shipped in very small consignments, future volumes of rubber will be large enough to justify bulk shipments.

The distinguishing feature about all bulk shipping using the Musi River is that the ships themselves are very small. Oil products are generally shipped in tankers of about 7,000 tons. In the U.S. product carriers between double and triple this size are common. The largest crude oil carrier to call at the Pertamina facility to date was a light loaded 15,000 ton vessel. While the trade in crude oil between the U.S. and Venezuela is done using similar vessels, they all sail fully laden. The reason for this is of course the 6 meter draft restriction in the Musi River.

Bulk shipping imposes almost no load on port facilities. Ships carrying timber usually load floating logs directly and seldom come to Palembang. Ships calling at Pertamina, while adding to the congestion at the anchorage and to the demand for tug boats, also do not have a large effect on the harbors activities.

5.2.3.1 Lumber Shipping

Lumber is one of the major exports of Palembang. Table II-5.2.3-1 gives the volume and destinations of

Table II-5.2.3-1

Volume of Log Shipments from Indonesia
1975

Country	Volume of Logs (Million M^3)
Japan	3.45
South Korea	1.30
Thailand	.93
Singapore	.66
Hongkong	.13
Other	.85
Total	6.65

Source: Warta Ekonomi Maritim Review

international log shipments in 1974.

The current value of this timber is about $38 per M^3. Ship arrivals at Palembang in the log traffic are shown in Table II-5.2.3-2. Timber is customarily shipped f.o.b. Palembang. Shipping itself is chartered by the importer of the timber. Almost all tonnage is Japanese flag. The charter rate between Indonesia and Japan is $15 /$M^3$ excluding stevedoring. Current freight rates are extremely low and just covers variable cost. The actual cost of carriage is estimated in Table II-5.2.3-3.

Forecast volume of timber shipping is given in Table II-5.2.3-4.

5.2.3.2 International Tanker Shipping

Because most of the crude and oil product shipments to Pertamina are domestic, international oil shipments are not extremely important to the use of the Musi River. Statistics available break Indonesian flag tankers apart from foreign flags creating the misleading impression that there is a major foreign oil trade. In fact most of these vessels are Norwegian flag tankers obtained by Pertamina on hire/purchase. They are used solely for the domestic distribution of products.

Figure II-5.2.3-1 presents the current cost for efficiently operated tankers in international trade. As the biggest component of any tanner operation is financial charges, the key to success in tanker operations is easy access to inexpensive capital and insurance.

As the size distribution and trade routes of tankers involved in international oil trade with Palembang was not available, no voyage profit and loss

Table II-5.2.3-2

Ships Exporting Logs from Palembang

Year	No. of ships	Average volume per ship (m^3)	% cargo carried in foreign ships	Total volume (m^3)
1970	67	2,358	98	157,992
1971	64	2,255	92	144,346
1972	70	2,199	94	153,956
1973	180	3,069	95	552,340
1974*	133	3,707	99	493,020

*April 1974 - March 1975

Source: B.P.P. Annual Report

Table II-5.2.3-3

Cost of Log Carriage Palembang/Japan

(excluding stevedoring)

DWT	Speed (Knots)	Sea Days	Ship Cost Per Day ($/day)	Fuel Cost/ Sea Day ($/day)	Cost Sea Days ($/voyage)	Waiting Days	Cost Waiting ($/voyage)	Total Cost One Way excluding Cargo Handling ($/voyage)	Cargo Carried (Tons)	Port Days	Cost Port Time ($/voyage)	Total Voyage cost exclud. stevedoring ($/voyage)	Cost/Ton ($/ton)*
3,775	16	7.8	3,780	1,377	40,224	3	12,368	52,592	3,020	7.1	29,200	134,384	44
7,500	17.5	7.1	5,395	2,678	57,318	3	17,898	75,216	6,000	10.8	64,400	214,832	35
12,100	17	7.4	5,764	2,903	64,135	3	18,663	82,798	9,680	14.0	87,000	252,596	26
16,600	17	7.4	6,552	3,502	74,339	3	22,740	97,139	12,800	19.4	142,503	336,781	26

Cost of Log Carriage - Palembang/Yokahama

Sea distance 3,000 miles one way

Stowage Factor 60 cu. ft/ton

*Excludes Stevedoring

**Assumes new tonnage costs of many owners will be much less as most ships in trade are older than ten years.

Table II-5.2.3-4

Forecast Export Shipments of Logs and Timber

In Special Carriers

Year	Vessel Size M^3	Total Export Volume (1000 M^3)	Amount Carried in Specialized Log Carriers (80%)	Number of Calls
1974	3,707	618	494	133
1980	4,305	1,096	876	201
1985	5,000	1,610	1,288	257
1990	5,650	2,365	1,892	334
1995	6,300	3,165	2,532	401
2000	7,000	4,234	3,387	483

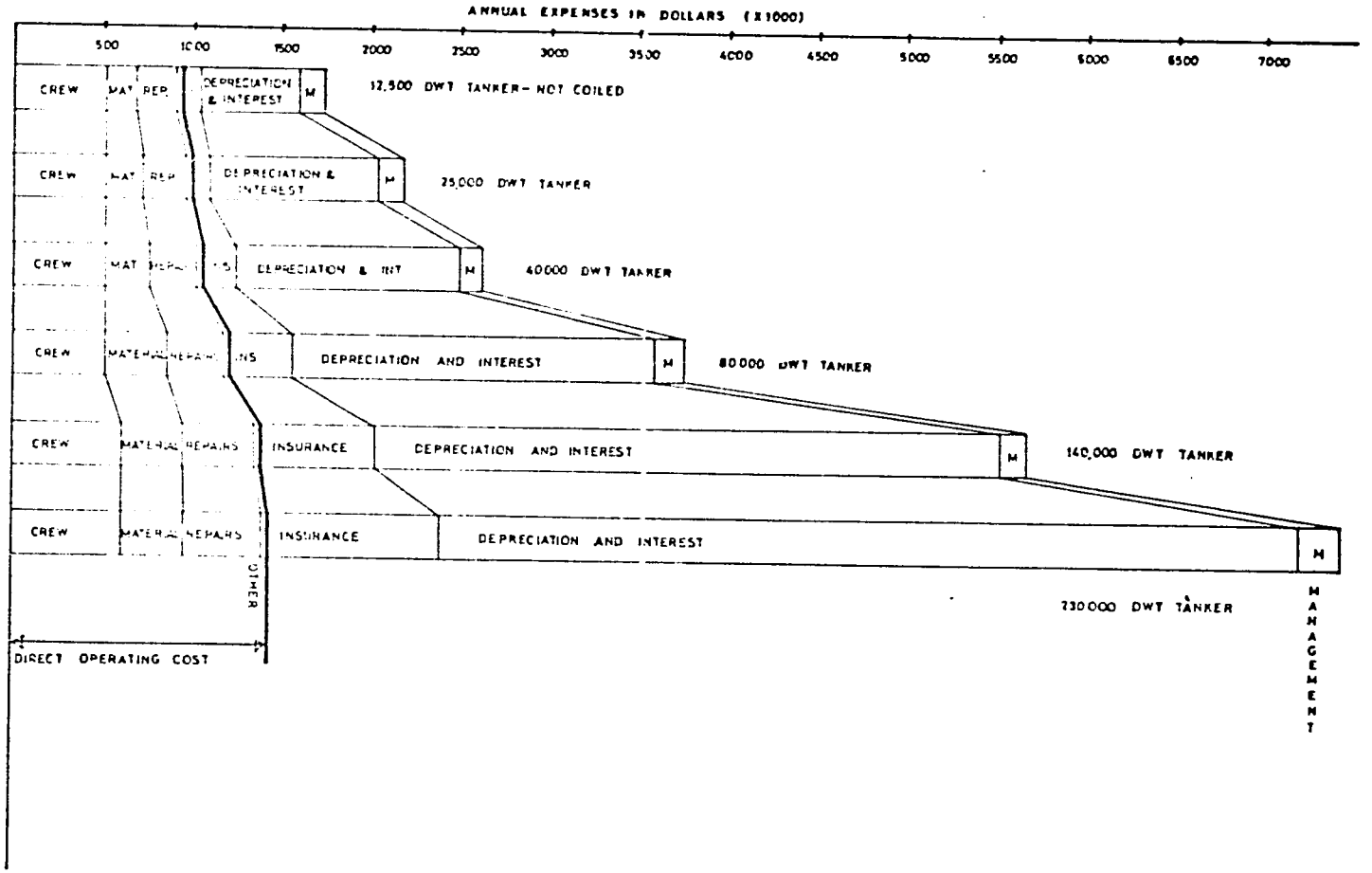


Figure II-5.2.3-1

Annual Operating Cost Crude Oil Carrying Tankers and Bulk Carriers (Excludes Fuel and Port Charges)

Liberian or Pananimanian Flag

Source: Major Oil Company

calculations were made. The section of the report on interisland special shipping should be consulted for a more thorough evaluation of oil carriage in and out of Palembang.

5.3 Domestic Shipping

Roughly 1500 ships are currently operated under Indonesian management. These vessels were built in Indonesia, Japan, Holland, Denmark, Norway, Germany, Italy, Eastern Europe and the U.S.A. The reliable and efficient operation of the domestic shipping industry is vital to the viability of Indonesia as a country, as in general sea transportation is the only transportation possible.

There are 274 ports servicing Indonesian shipping. Of these, 112 could be described as major. The primary ports in the domestic trade are listed in Table IV-5.3-1.

Since this shipping is the life blood of the nation, it carries many commodities which do not ordinarly go by sea. For example, one of the most numerous domestic cargoes is bottled beverages outbound from Jakarta and empty bottles inbound. The average consignment size is small - perhaps ten tons. The distances between ports of call are small. As a result, most of a vessels time is spent working cargo or just waiting. Table IV-5.3-2 shows the Regular Liner Trade Route T-20 which is served by a single 1300 ton vessel.

For this ship, the average sea time between ports is only 17 hours. The average stay in port is probably about two days. The average cargo handled in each port is about 92 tons. The vessel on this route spends about 26 days in port and 9.2 days at sea. In other words,

Table II-5.3-1

Cargo Throughput Selected Indonesian Ports (1973)

Generators of Cargo		
Surabaya	860,160 tons	
Tanjung Priok	434,156 tons	
Palembang	3,720,000 tons	including oil and petrochemicals
	171,000 tons	excluding oil and petrochemicals
Recipients of Cargo		
Belawan	776,000 tons	
Pasar Ikan	547,221 tons	
Surabaya	404,933 tons	
Tanjung Priok	2,789,270 tons	including oil and petrochemicals
	330,420 tons	excluding oil and petrochemicals

Source: Cargo loading & unloading at ports 1969-1973.

Table II-5.3-2

Sailing Distances - RLS Trade Route T-20

Port	Sailing Distance Nautical Miles
Surabaya	160
Buleleng	70
Ampenan	112
Sumbawa	111
Bima	210
Ujung Pandang	293
Cattle Ports	508
Kupang	146
Ende	98
Waingapu	18
Waikelo	243
Ampenan	70
Buleleng	160
Surabaya	

75% of its time is spend loading or discharging cargo.

Indonesian shipping fills the market sector occupied by medium and long haul trucking in the United States. The average size of vessels is not large. This helps to reduce port time. The total length of a voyage is important to the efficiency with which the economy distributes its goods. In the above example, consumer goods destined for Waikelo from Surabaya are on board the ship for one month. Since mail also travels by ship, an order for goods may require two months to fill - one week to mail an order to the wholesaler in Java, four weeks to fill the order and get space on another vessel, and another month to carry the goods by sea to their destination. This means that almost three months of advance planning are necessary for businesses to stock items like beer, margarine and flour. In the U.S.A. one week would be sufficient.

To serve this market efficiently Indonesian vessels tend to be small, slow speed and shallow draft. They usually have big hatches and low freeboard to simplify cargo handling. Scrap is sometimes loaded into ships by throwing it in. While vessels are predominantly of steel construction, wood is competitive especially for ships under 200 tons deadweight. Cargo handling gear is predominantly gasoline or diesel engine driven. Large covered spaces are provided on deck to carry light cargoes conveniently. Medium and high speed diesel engines are used almost exclusively for propulsion.

Figures II-5.3-1 through II-5.3-5 give a rough idea of the characteristics of vessels operating in Indonesia. Figures II-5.3-6 and II-5.3-7 give the age distributions of Indonesian shipping. It is evident from the two graphs that while there are many ships

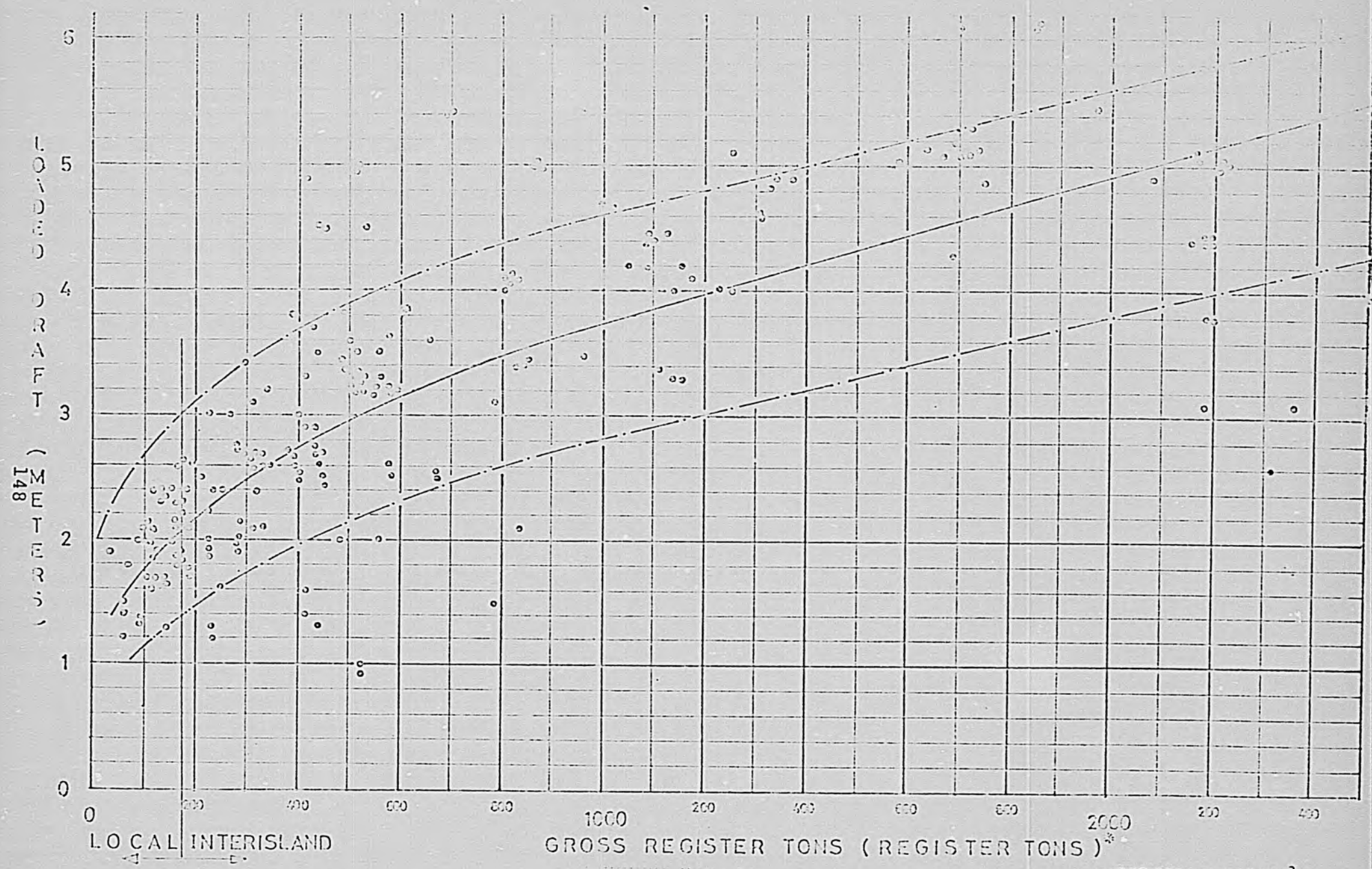


Figure II-5.3-1

Draft of Indonesian Flag (Dry Cargo Ships)

Source: Indonesian Register of Shipping

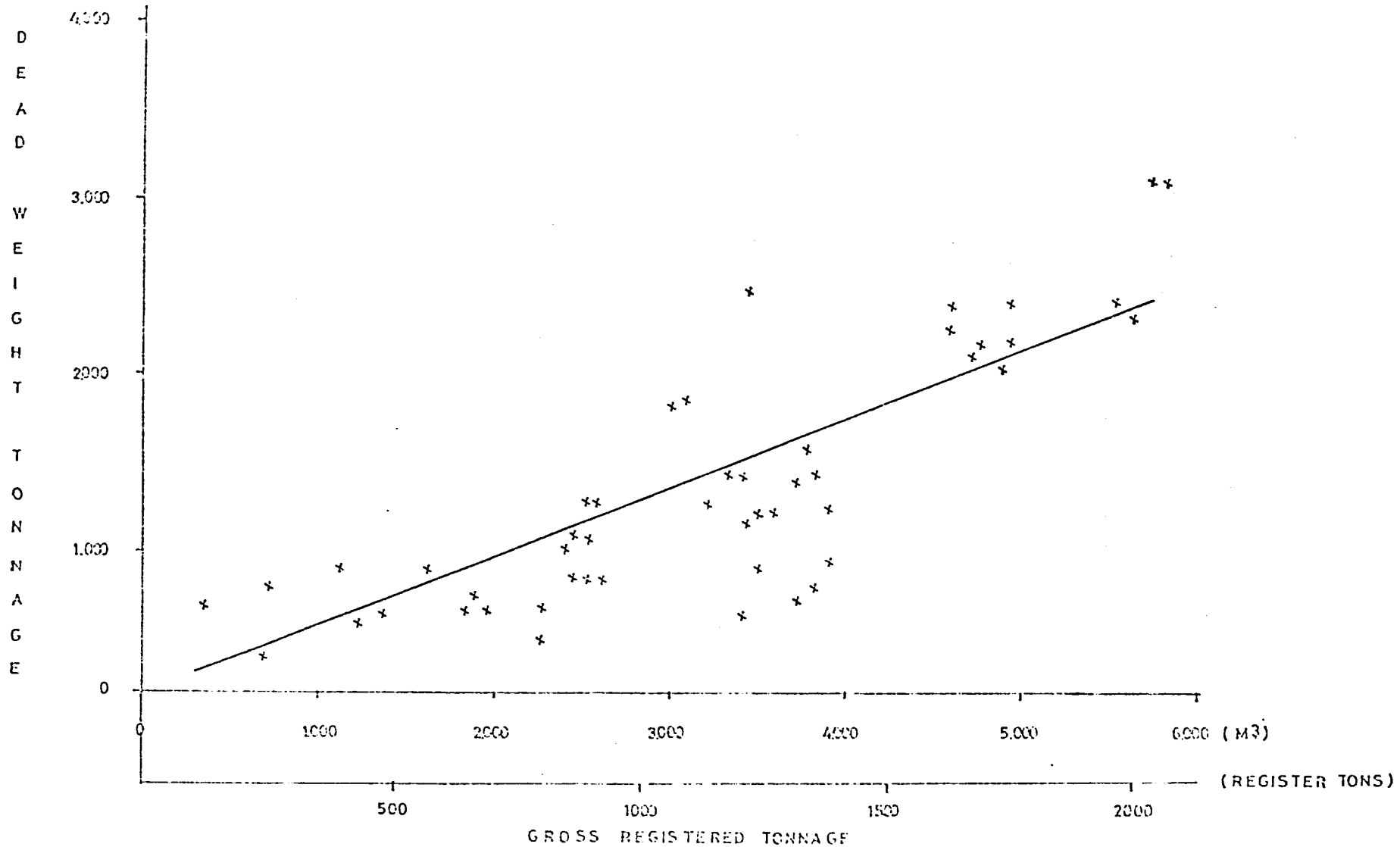


Figure II-5.3-2

Gross Tonnage Vs Deadweight Selected Indonesian Vessels

Figure II-5.3-3

Length Indonesian Flag (Dry Cargo Ships)

Source: Indonesian Register of Shipping

Figure II-5.3-4

Installed Shaft Horsepower Indonesian Flag
(Dry Cargo Ships)

Source: Indonesian Register of Shipping

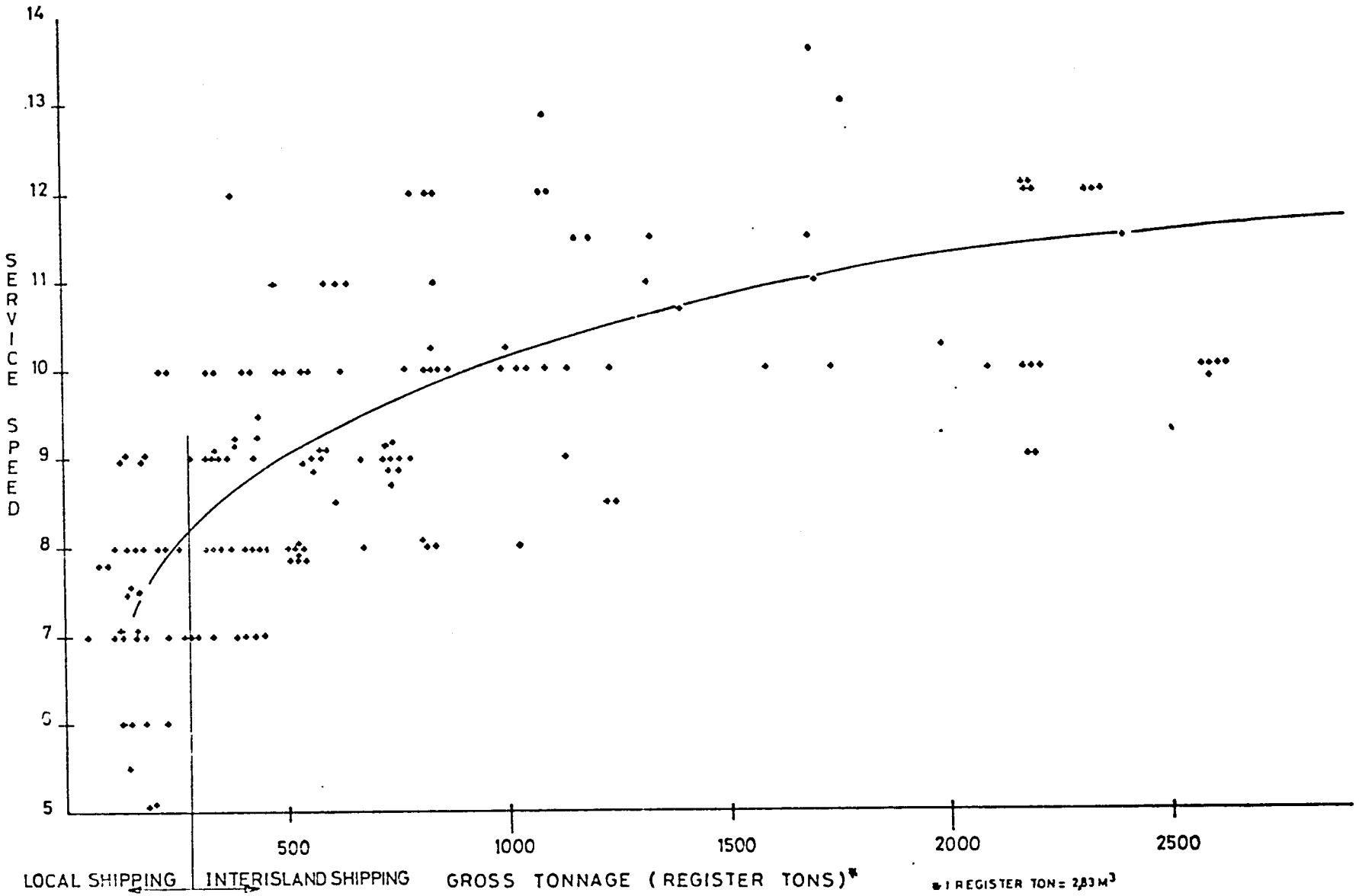


Figure II-5.3-5

Service Speed of Indonesian Flag Vessels

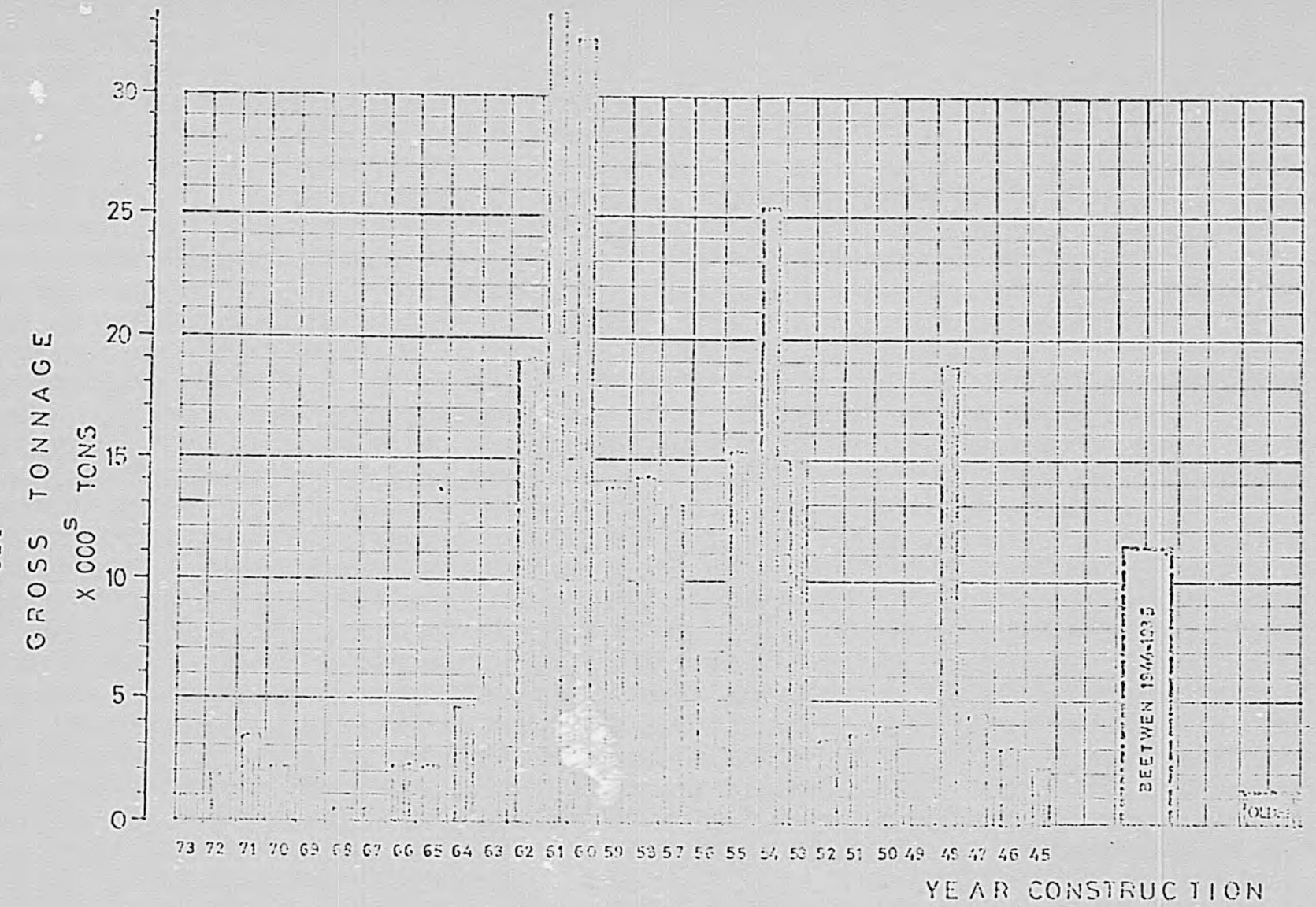


Figure II-5.3-6

Age Distribution Indonesian Fleet ($\frac{\text{Steel Motor Driven}}{\text{Dry Cargo Ships}}$)

Gross Registered Tonnage by Year of Construction

Source: Indonesian Register of Shipping

Figure II-5.3-7

Age Distribution of Indonesian Fleet (Steel Motor Powered Only)

Source: Indonesian Register of Shipping

of comparatively recent construction, they are mostly small vessels. In 1971 the typical vessel to be constructed was 175 m^3 GRT or about 60 deadweight tons. This fact indicates two things. The first if that operators of larger tonnage are short of capital and are not able to replace larger vessels.

The second is that smaller vessels are still competitive in spite of their increased overall cost over larger vessels. One reason for this is the infancy of large scale wholesaling in Indonesia. In order to use large ships efficiently the consignment size must be reasonably large. If the average size of consignments is say ten tons, a 2,000 ton vessel will have 200 consignments on board. This greatly increases the difficulty in stowing the ship. As, of course, the material easily crushed must be on top, but also the material to be unloaded first must be on top. This is not always so easy to do with many consignments of differing cargoes. Also large numbers of similar consignments create problems of mixing up different consignees shipments. It is more difficult to control bills of lading when 200 must be issued instead of twenty.

While these may seem only inconveniences, they do raise operating costs. Because of the short trip distances, larger vessels have only small advantages over small in Indonesia and these inconveniences definitely affect a shipper's willingness to book space on a given vessel.

The dependency of efficient use of larger vessels on efficient wholesaling is made clear by the case of steel products being imported to Palembang from Jakarta.

On almost every ship arriving from Sunda Kelapa (Jakarta) is a consignment of steel products (usually about 15 tons). This means about 4 consignments daily. All are destined for different consignees. Because each shipper has made arrangements with a particular steamship line, the cargo is split between companies from the beginning. Because each shipment is small, the shipping company must consider steel shipments random and would have difficulty planning the use of a larger vessel. Because each shipment is similar unless carried in different ships, the difficulties of keeping consignments separate are large. Were there a large, efficient steel wholesaler in Palembang, it would only be necessary to make a single shipment, say every 2 weeks. In this environment a small ship would be at an extreme disadvantage.

It is evident that the development of Indonesia will bring about larger wholesalers with larger warehouse capacity. This, in turn, will make the introduction of large shipping much easier.

5.3.1 Cargo Flows in Domestic Shipping Involving Palembang

A comprehensive division of forecasted commodity flows through the port of Palembang is important to the design of port facilities as the size of vessels operating in each sector of domestic shipping is vastly different. This obviously affects the wharfage that must be provided. It is also useful in clarifying actual cargo flows over general cargo facilities. Volumes of oil, coal, and fertilizers included in any port's statistics tend to overstate the congestion at general

cargo facilities.

Tables II-5.3.1-1, 5.3.1-2 and 5.3.1-3 give the estimated volumes of traffic loaded and unloaded in each sector of domestic shipping forecasted until the year two thousand. The bulk of this forecast is a straight forward interpretation of the economic forecast in Volume I. Of major importance is the division of cargo between the RLS and specialized shipping. This splitting of the market is important for fertilizer, cement, petrochemical products and timber.

Fertilizer was assumed to be 5% in RLS vessels and 5% in special purpose vessels. The ten percent RLS share corresponds to the final commercial distribution of bagged products.

The prediction of timber flows is difficult. On one hand timber and timber products are cheaply shipped in large consignments on dedicated vessels. On the other hand most domestic timber shipments will be consigned to Java. Currently RLS trade routes between Java and Palembang are not balanced with most cargo outbound from Java. Additional timber cargo could be handled at very small additional cost. For this reason it was thought that the RLS would be able to acquire sufficient timber cargoes to fill inbound vessels. This will not occur, of course, unless the RLS grants a special discount for timber. The current RLS rate will not be competitive at all with barges or other dedicated shipping. Tables II-5.3.1-4 and II-5.3.1-5 summarize predicted cargoes to go via the RLS service.

The estimation of local traffic in the tables is based on its function as a distribution system for commercial goods. As such, it will grow much more slowly than the other sectors which will be driven by the

Table II-5.3.1-1

Domestic Cargo Discharged at Palembang by Sector

Forecast 1974 - 2000

(excludes trade with Singapore)

	1974	1980	1985	1990	1995	2000
1) Oil	2418	2150	1880	1610	1340	1080
2) RLS	82	133	212	357	445	649
3) Non RLS*						
Interisland	45	89	153	165	286	395
4) Local	65	93	117	150	184	224
5) Sailing	13	14	14	14	12	10
Total	2623	2479	2376	2296	2267	2358

Units (1000 tons)

*Largely salt, sugar and rice

Table II-5.3.1-2

Domestic Cargo Loaded at Palembang

Including Timber Products/Excluding Sawn Timber

	1974	1980	1985	1990	1995	2000
RLS (excluding Singapore)	53	201	331	436	531	697
Local	26	35	44.5	53.2	58.1	50.2
Oil	4208	4164	3747	3376	3037	2138
Local Oil	58	63	51	52	49	34
Local Coal	28	37.4	46.8	56.4	61.2	61.2
Major Coal	0	132	703	913	1008	758
Fertilizer	135	612	1151	1412	1752	2072
Cement	0	163	327	446	511	787
Non RLS*	0	40	453	847	1329	2000
	4449	5443	6851	7592	8336	8599

*Consisting mostly of timber products measured by weight

Units 1000 tons

Table II-5.3.1-3

Timber Loaded at Palembang by Sector

	1974	1980	1985	1990	1995	2000
RLS Timber	12	66	108	152	152	195
Special Timber	0	37	114	291	619	1110
Sailing Timber	14	15	16	17	18	20
Total Timber	26	118	238	460	789	1325

Units 1000 M^3

Table II-5.3.1-4

RLS Cargo to be Loaded at Palembang

Forecast 1974 - 2000

	1974	1980	1985	1990	1995	2000
General Cargo (1000 Tons)	25.9	43.3	65.0	98.1	143.2	207
Fertilizer* (1000 Tons)	8.9	37.0	71	92	115	142
Timber Products (1000 Tons)	1.8	51.0	84.0	118.0	119.4	151
Oil Products (1000 Tons)	4.2	4.2	3.7	3.4	3.0	2.1
Sawn Timber (1000 M^3)	12.0	66.0	108.0	152.0	151.0	195

*5% of Pusri's output assumed to be shipped by RLS
**.1% of product output assumed to go by RLS

Table II-5.3.1-5

Cargo to be Unloaded by RLS at Palembang

Forecast 1974 - 2000

(excludes trade with Singapore)

	1974	1980	1985	1990	1995	2000
Total domestic cargo unloaded at Palembang excluding oil and petrochemicals (1000 tons)	136	215	311	521	637	900
Expected RLS market share (%)	60 %	62 %	64 %	66 %	68 %	70 %
Expected RLS Domestic cargo excluding oil & petrochemicals (1000 tons)	82	133	199	343	433	630
Petrochemicals (1000 tons)	0	0	44	70	120	190
Expected RLS market share (%)	0	0	0.3	0.2	0.1	0.1
Expected RLS petrochemicals cargoes (1000 tons)	0	0	13	14	12	19
Total RLS cargo unloaded at Palembang (1000 tons)	82	133	212	357	445	649

industrial expansion of Indonesia.

5.3.1.1 Interisland Shipping - Organization and Current Traffic

Interisland shipping in Indonesia is largely handled using the Regular Liner Service (RLS). The services offered by this enterprise are similar to those offered by liner services operating in international trade. Negotiable bills of lading are issued, warehousing and stevedoring can be arranged by the shipping company. A published tariff exists and is now in the process of revision.

Currently forty four companies operate vessels in the RLS system. The largest operator is P. T. Pelni, a government owned corporation. It operates 57 vessels totalling 83,919 deadweight tons. The next largest operator is P. T. Sriwijaya Raya Lines with 14 vessels totalling 19,138 deadweight tons. A total of 303 vessels, with about 290,000 DWT, not operate in the system.

Table II-5.3.1-6 gives the size distribution of steel vessels operating in the RLS. Shipping within this system operates on a family of 26 trunk routes, 17 feeder routes and 15 routes serving Singapore.

Figure II-5.3.1-1 gives all the RLS trade routes which now serve Palembang. The RLS market share of all cargo landed and loaded at Palembang in 1974 is calculated in Table II-5.3.1-7. Table II-5.3.1-8 gives distances and annual cargo volume (1974) of all RLS routes serving Palembang. Tables II-5.3.1-8 to II-5.3.1-14 give the statistics concerning cargo flows on these routes in 1974.

While the cargo loaded and discharged at Palem-

Table II-5.3.1-6

Sizes of RLS Vessels 1974

Size	Number	Percentage
Less than 500 DWT	79	28
501 - 875	85	30
876 - 1250	49	18
1251 - 2000	45	16
2001 - 3000	23	8
Total	281	100

Source: Maritime Research Council

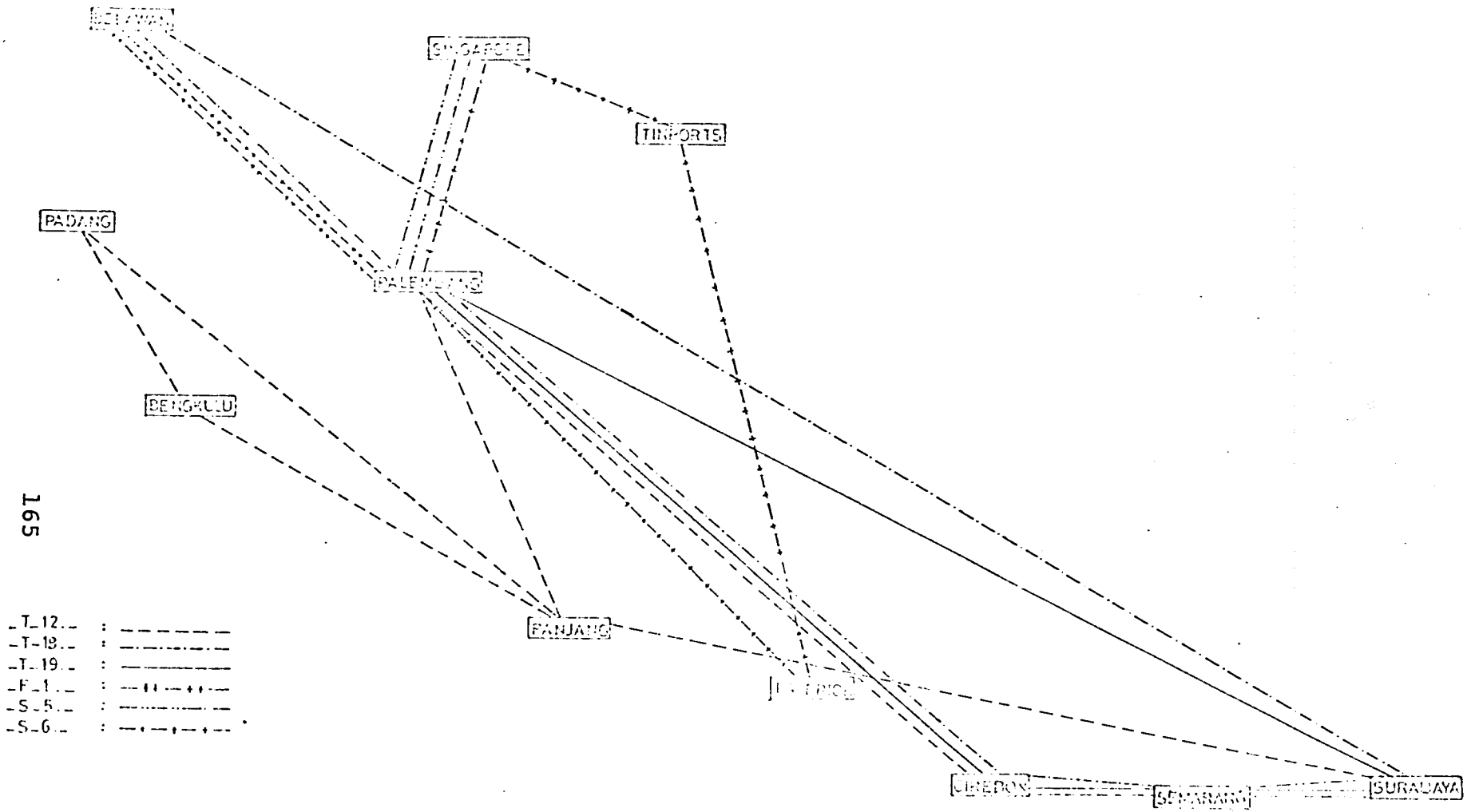


FIGURE : II-5.3.1-1

RLS ROUTES SERVING PALEMBANG

SOURCE : B.P.P TRAFFIC DIVISION

Table II-5.3.1-7

Market Share of RLS

	Total* Loaded At Palembang	Loaded On RLS Tonnage	RLS Market Share	Total* Unloaded at Palembang	Unloaded From RLS Tonnage	RLS Market Share
Interisland	100,208	53,460	26%	136,000	82,962	60%
Singapore	159,900	116,211	73%	78,000	22,738	29%
	260,108	169,671	99%	214,000	105,700	89%

*Excluding Pertamina cargoes of crude oil or products

Source: RLS Statistics and EGF Commodity Forecast

Table II-5.3.1-8

RLS Routes Involving Palembang

TRUNK ROUTES

T - 12	Distance miles
Surabaya	478
Panjang	293
Bengkulu	218
Padang	492
Panjang	442
Palembang	430
Ceribon	110
Semarang	189
Surabaya	
	2652
76,000 tons/year	

T-18	Distance miles
Surabaya	1,113
Belawan	634
Palembang	430
Ceribon	110
Semarang	110
Surabaya	189
	2496
75,000 tons/year	

T - 19	Distance miles
Surabaya	295
Cattle Ports	914
Palembang	430
Ceribon	110
Semarang	189
Surabaya	
	1938
41,000 tons/year	

FEEDER ROUTES

F - 1	Distance miles
Belawan	634
Palembang	634
Belawan	
	1268
8,000 tons/year	

SINGAPORE ROUTES

S - 5	Distance miles
Singapore	298
Palembang	298
Singapore	
	596
101,000 tons/year	

S - 6	Distance miles
Tg. Priok	345
Palembang	298
Singapore	348
Tin Ports	220
Tg. Priok	
	1211
67,000 tons/year	

Source : Directorate Sea Communications

Table II-5.3.1-9

Cargo Flows on RLS Trunk Route T-12

All figures Long Tons

1974

From \ To	Panjang	Beng-kulu	Padang	Panjang	Palembang	Cirebon	Semarang	Surabaya	Total loaded
Surabaya	0	497	15217	0	18766	268	123	-	19,654
Panjang	-	0	6	-	0	0	0	0	6
Bengkulu	0	-	0	0	0	0	0	0	0
Padang	0	0	-	6643	26638	0	0	723	34,004
Panjang	-	0	0	-	0	0	1327	0	1,327
Palembang	0	0	142	0	-	6250	8521	3792	18,705
Cirebon	0	0	0	0	0	-	0	144	144
Semarang	1327	0	0	0	203	0	-	0	1,530
Surabaya									
Total unloaded	1327	497	15365	6643	45607	6518	9971	4659	75,370

Minimum Number Yearly Sailings: 8

Based on: RLS - Fleet Planning & Operation - June 1975

Table II-5.3.1-10

Cargo Flows on RLS Trunk Route T-18

All figures Long Tons

1974

From \ To	Belawan	Palembang	Cirebon	Semarang	Surabaya	Total loaded
Surabaya	28,090	18,766	268	123	--	47,247
Belawan	--	4,804	570	86	2,047	7,507
Palembang	486	--	6,250	8,525	3,792	19,053
Cirebon	0	0	--	0	144	144
Semarang	0	203	0	-	0	203
Surabaya						
Total unloaded	28,576	23,773	7,088	8,734	5,983	74,153

Minimum Yearly Number Sailings: 13

Based on: RLS - Fleet Planning and Implementation - June 1975

Table II-5.3.1-11

Cargo Flows on RLS Route T-19
All figures Long Tons
1974

From \ To	Cattle Ports	Palembang	Cirebon	Semarang	Surabaya	Total loaded
Surabaya	1299	10766	268	66	--	12,409
Cattle Ports	--	0	0	0	88	88
Palembang	0	--	3525	4807	2042	10,374
Cirebon	0	0	--	0	144	144
Semarang	0	144	0	--	0	144
Surabaya	0				-	
Total unloaded	1299	10910	3793	4873	2274	23,159

Minimum Yearly Sailings: 13

Based on: RLS - Fleet Planning and Implementation - June 1975

Table II-5.3.1-12

Cargo Flows on RLS Feeder Route F-1

All figures Long Tons

1974

From \ To	Palembang	Belawan	Total loaded
Palembang	--	5,328	5,328
Belawan	2672	--	2,672
Palembang			
Total unloaded	2672	5,328	8,000

Minimum Yearly Number of Sailings: 20

Based on: RLS - Fleet Planning and Implementation - June 1975

Table II-5.3.1-13

Cargo Flows on RLS Singapore Route S-5

All figures Long Tons

1974

From \ To	Palembang	Singapore	Total loaded
Palembang	-	91,009	91,009
Singapore	17,738	-	17,738
Palembang			
Total unloaded	17,738	91,009	108,741

Minimum Yearly Number of Sailings: 25

Based on: RLS - Fleet Planning and Implementation - June 1975

Table II-5.3.1-14

Cargo Flows on RLS Singapore Route S-6

All figures Long Tons

1974

From \ To	Palembang	Singapore	Tin Ports	Tanjung Priok	Total loaded
Tanjung Priok	5,369	2,108	2,902	--	10,379
Palembang	--	25,202	65	6,038	31,305
Singapore	5,000	--	1,821	27,827	34,648
Tin Ports	77		--	2,741	2,818
Tanjung Priok				--	
Total unloaded	10,446	27,310	4,788	36,606	79,150

Minimum Yearly Number of Sailings: 14

Based on: RLS - Fleet Planning and Implementation - June 1975

bang is fairly balanced for the trade routes as a whole, cargo moving in one direction predominates. As a result, utilization of tonnage is not high. Table II-5.3.1-15 gives an estimate of the load factor for a 2500 ton ship operating on Route T-18. The calculation assumes that the vessel is loaded to her marks (i.e., books a full cargo) at Surabaya. If this does not occur, the utilization will be correspondingly less.

5.3.1.2 Cost of Interisland Shipping

The estimated annual operating costs of Indonesian flag shipping operating in the RLS service is shown in Figure II-5.3.1-2. These costs are based on vessels with an average of ten years. The medium age of Indonesian flag vessels is 16 years, so current actual maintenance costs will be more, but financial costs less. An interest rate of 10% was assumed. While this estimate is current practice in Indonesia, it is likely that most operating companies pay far in excess of this figure.

For comparison, the annual costs of a 3500 ton vessel operating in the Carribbean have been included. The vessel is 20 years old, so financial costs are relatively small. The first mortgage on the American managed ship carries an interest rate of 13%.

Table II-5.3.1-16 gives the costs of operating nine different ships on trade Route T-18. The costs of transport is not uniformly decreasing with size for the following reasons:

1) Tug boats are not compulsory to berth vessels smaller than 1,500 DWT.
2) As vessel size increases so does the number of hatches.

Table II-5.3.1-15

Booked Cargo and Utilization of 2000 Ton Vessel on RLS Route T-18

PORT	Cargo loaded (tons)	Cargo discharged (tons)	Cargo on board (tons)	Miles to next Port	Ton miles from leg
Surabaya	2000	253	2020	1113	2,248,260
Belawan	318	1210	1128	634	715,152
Palembang	807	1007	926	430	398,180
Ceribon	6	300	632	110	69,520
Semarang	9	370	271	189	51,219
	3140	3140		2476	3,482,331

Assuming 2500 ton ships used about 2200 tons is available for cargo.

Maximum utilization = $\frac{3,482,331}{2,200 \times 2,476}$ = 64%

Note: Approximate number of trips annually will be 24
More than one vessel is required to maintain this frequency of service.

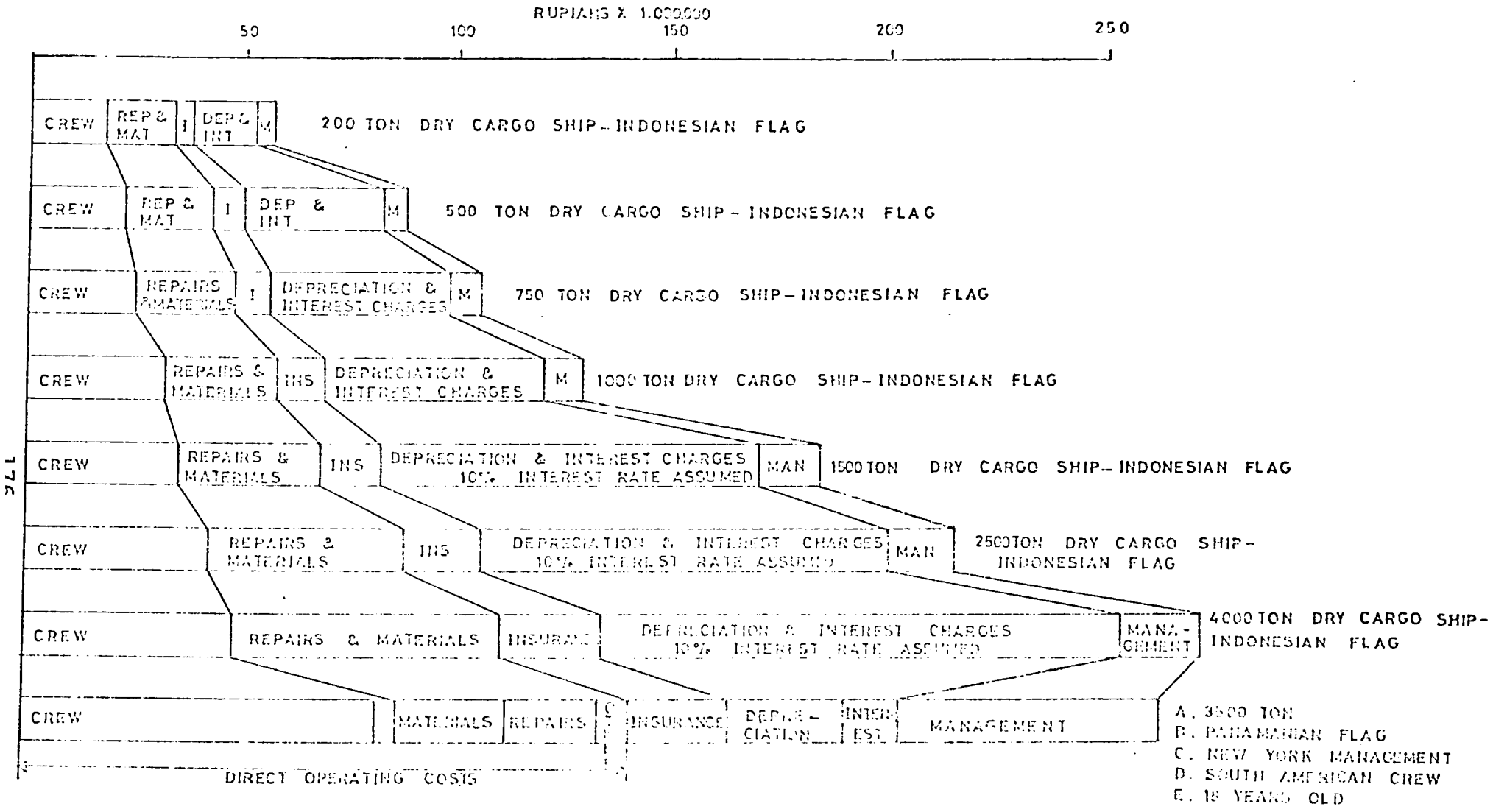


FIGURE : II-5.3.1-2

ANNUAL OPERATING COSTS INDONESIAN DRY CARGO VESSELS

SOURCE : P.T. [illegible]

TABLE II-5.3.1-16

COSTS OF OPERATING VESSELS ON RLS ROUTE T-18

SHIP SIZE	ESTIMATED WAITING DAYS PER TRIP (A)	CARGO ONBOARD SAILING SURABAYA *	TOTAL CARGO LOADED *	CARGO HANDLING RATE **	CARGO HANDLING TIME/DAYS (B)	SPEED ***	SEATIME (C) ****	TOTAL TRIP TIME	NO. TRIPS PER YEAR	COST OF STEVE-DORING IN & OUT	ESTIMATED PORT CHARGES ***	SEA FUEL ***	ANNUAL COST OF VESSEL PER TRIP ****	TOTAL COST OF TRIP *****	NUMBER TON/MILES LOADED	COST/ TON	COST/ TON-MILE
200	2	180	282	202	2.79	8.5	12.14	16.93	20.3	1,748	599	670	6,924	9,941	311,700	35.2	.032
500	3	450	706	202	6.99	9.0	11.46	21.47	16.1	4,377	1096	1090	13,410	19,973	779,250	28.2	.026
750	3	675	1059	202	10.45	9.5	10.85	24.30	14.1	6,565	1681	1535	18,580	28,361	1,168,875	26.78	.024
1000	3	900	1412	202	14.00	10.0	10.3	27.30	12.6	8,754	2287	2662	25,478	39,181	1,558,500	27.75	.025
1500	3	1350	2118	268	19.31	10.75	9.6	31.91	10.8	13,131	3736	3321	37,072	57,260	2,337,750	27.035	.024
2000	3	1800	2824	268	21.07	11.25	9.17	33.24	10.3	17,508	4266	3686	45,645	71,105	3,117,000	25.18	.023
2500	3	2250	3570	327	21.83	11.75	8.78	33.61	10.2	22,134	4608	4003	52,311	83,056	3,896,250	23.26	.021
3000	3	2700	4236	327	25.91	12.0	8.60	37.51	9.2	26,263	5812	4893	63,365	100,333	4,675,500	23.68	.021
4000	3	3600	5648	327	29.19	12.5	8.25	40.44	8.5	35,017	7566	6930	80,260	129,773	6,234,000	22.97	.021

Total Sailing Distance - 2476 miles

*Tons
**Tons/day
***Knots
****Days
*****$US/trip

As each additional hatch is less productive than the previous, the days spend handling cargo do not rise in a uniform fashion. This, in turn, affects the rate at which annual vessel costs can be billed to the voyage.

3) Because over 75% of the larger ships' time is spent in port handling cargo, much of the advantage of larger tonnage is lost.

Because of the nature of route T-18 with many port stops, the cost of transport is not strongly sensitive to ship size. It is clear however tonnage smaller than 750 tons should not be operated on the route. It is also clear that the least cost transport results from the larger vessels. However, considering the greater flexibility of the 2500 ton vessel, in practice, this vessel will be the best. This, incidently, is the size of shipping currently operating on the route.

Table II-5.3.1-24 gives the cost of operating ships on RLS route 3-5 (Palembang-Singapore-Palembang). The principal cargo is outbound rubber and coffee. The trade route is very short and as a result, ships larger than 2000 tons are at a large disadvantage. While vessels of 200 tons seem competitive, the number of trips of such vessels required to transport Palembang's exports is about 500 per year in 1974. This many arrivals and departures will create congestion at both ends that will raise costs well above those indicated in Table II-5.3.1-24 Such small ships will not carry any of this cargo. This is true to a smaller extent of the 500 ton ship. It is felt that the dominant vessel of this route will be 750 to 1500 tons, averaging say 1000 tons. Current tonnage operating on RLS routes is shown in Table II-5.3.1-17

Table II-5.3.1-17

Vessels Operating on Domestic RLS Routes Calling at Palembang

Ship	DWT M tons	GRT (Register tons)	Year Built	Length (Meters)	Beam (Meters)	Draft (Meters)	Speed Kts	SHP
T - 12								
Geibi Maru	1620		1965					
Sandra Maria	1395		1953					
Gn. Dempo	1650		1951					
T - 18								
Yashima Maru	2113	1295	1962	69.1	11.0			
Kangean	2522		1958					
Pisang Elang	2687		1957	76.00	14.00	5.34	10	1800
T - 19								
Bintang Samudra VII	1254	1086	1960	59.0	10.50	4.40	10	960
Daya Indra	740		1949					
Bahagia II	1200	861	1951	61.4	9.9	5.0	9.5	300
Bintang Samudra VIII	1254	1086	1960	65.8	10.5	4.4	10	960
Daya Kurnia	1260		1950					
Frigo	550							
F - 1								
Pantai Labu	246	787	1925	52.3	9.42	4.55	9.0	480
Sumatra Jaya	176	511	1947	38.1	7.03			

Table II-5.3.1-17

Vessels Operating on Domestic RLS Routes Calling at Palembang

(contd)

Ship	DWT M tons	GRT (Register tons)	Year built	Length (meters)	Beam (meters)	Draft (meters)	Speed Kts	SHP
S - 5								
Bintang Samudra I	584	779	1961	53.5	9.8	1.55	10	600
Bintang Samudra II	667	663	1956	51.9	8.25			725
Bintang Samudra III	1230	1123	1956	62.2	10.50	4.34		1330
Bintang Samudra VI	650	406	1956	42.7	7.60	3.30	7	300
Panahan	618	546	1953	51.1	9.1			
Landu	575	522	1953	51.0	9.00	3.3	9	480
Bahagia I	470	396	1950	46.6	7.90	2.70	9.5	300
S - 6								
Bintang Samudra IV	770	659	1936	53.8	9.4	3.6		640
Bintang Samudra V	670	495	1939	50.2	8.4	3.8		300
Darpo V	450	519	1961	43.1	8.3			
Darpo IV	450	524	1945	43.1	8.3			
Musi River	800	405	1949	52.02	9.2			
Nila Samudra I	610	610	1974	49.31	8.51			

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These costs are strongly affected by a number of factors. The principal one, of course, is the utilization of the vessels themselves. If too many vessels sail on a route, costs rise extremely quickly. When over-tonnaging exists, it is cheaper to lay up the excess vessels than to sail with very small amounts of cargo or to slow steam. As crew costs are low in Indonesia, little is gained by removing the crew and lay up is in effect accomplished by increasing the waiting days of the vessel. Waiting time figures used to estimate these costs reflect the current depressed state of the shipping market.

Were the demand for shipping to increase, a reduction in the waiting time would be relatively easy to accomplish.

A second point is that efficient vessels operating on this route spend only 13% of their time at sea. This means that the ships cargo handling gear is used almost continuously and the engine seldom. It is clear that a tug barge transport system would raise the use of expensive propulsion machinery to acceptable levels. A tug barge system is ideally adapted to this route and would be extremely competitive. As there are only two terminal points, eight 500 ton barges and two tugs could carry all cargo now going to Singapore from Palembang today. The cost of this service would be about $15 a ton including stevedoring.

Currently there is some barge tonnage operating in the trade principally carrying plywood and timber.

The advantage of barges on other routes is smaller because of the large number of ports involved. This creates problems with keeping track of the barges, shippers asking to leave cargo in barges in lieu of a warehouse, etc. In addition barges are not as well adapted to

carrying general cargo which predominates on other RLS routes.

5.3.1.3 RLS Pricing Policy

The tariff of the RLS is based on a square root formula of linked distances adjusted for a few factors such as the stowage factors of particular cargoes. Table II-5.3.1-19 gives the commodity classification of all commodities shipped on the RLS. After first determining the proper commodity group and classification, the freight rate is then taken directly from the tariff. Table II-5.3.1-20 shows the tariff to all domestic ports connected to palembang by the RLS. To obtain the freight, the tariff rate is multiplied by the gross weight. For domestic shipments stevedoring is for the account of the cargo and is not included in the tariff.

Table II-5.3.1-21 gives the tariff of routes connecting Singapore and Palembang. As cargo on this route is shipped liner terms, stevedoring in and out of the ship (only) is included. The freight rate in this trade is the product of the tariff rate times weight or volume (m^3) whichever is greater.

The tariff of the RLS is different from most liner tariffs in that it tries to assign rates on the basis of the cost of carriage. In international liner trades "what the traffic will bear" is the rule that determines rates charged. In Indonesia rubber and wood go on the RLS for the same rate. However, for the Java-New York rate agreement, the base rate for wood is $\$57/m^3$ and rubber $\$74/m^3$. The lower rate for timber results from factors as lower demand for timber and competition from tramp shipping.

Table II-5.3.1-19

RLS Commodity Classification and Conversion From Weight to Revenue Ton

No.	Commodity	Classification
1.	Livestock	-
2.	Meat	2.5
3.	Fish	1.0
4.	Rice	0.8
5.	Wheat Flour	0.8
6.	Sugar	0.8
7.	Maize	0.8
8.	Coffee, Tea spices	1.2
9.	Tobacco	1.0
10.	Animal Foods	1.875
11.	Other grain	1.5
12.	Copra	1.2
13.	Palm and Cooking oil	1.0
14.	Margerine Butter, etc.	1.875
15.	Fertilizer	0.8
16.	Other chemicals	1.5
17.	Rubber, rubber goods	1.5
18.	Wood, Wood products	1.5
19.	Paper & Paper products	1.0
20.	Hides & leather products	1.5
21.	Textiles	1.875
22.	Salt	1.0
23.	Cement	0.8
24.	Other nometalic minerals	1.875
25.	Gold, Silver etc.	-
26.	Iron & steel	1.5
27.	Base metal products	1.5
28.	Machinery	4.5
29.	Miscellaneous (paint luggage soap mates, etc.)	1.875
30	Asphalt	1.2
31	Others	1.1

Table II-5.3.1-20

RLS Tariff for Routes T-12, T-18, T-19 and F-1

Rupiahs per Weight Ton

Commodity Classification	Ceribon	Surabaya	Belawan	Jambi	Semarang	Kalianget
0.8	2,968	3,536	3,504	2,288	3,216	3,664
1.0	3,710	4,420	4,380	2,860	4,020	4,580
1.2	4,452	5,304	5,250	3,432	4,824	5,496
1.5	5,565	6,630	6,570	4,290	6,030	6,870
1.875	6,956.25	8,287.50	8,212.50	5,362.50	7,537.50	8,587.50
2.5	9,275	11,050	10,950	7,150	10,050	11,450
3.33	12,354.30	14,718.60	14,585.40	9,523.80	13,386.60	15,251.40
4.5	16,695	19,890	19,710	12,870	18,090	20,610

Notes: 1. Excludes stevedoring

2. Rice, Sugar and Flour plus 10%

Source: P. T. Putra Samudra

Table II-5.3.1-21

RLS Tariff for Singapore Routes S-5 and S-6

Singapore dollars per weight ton or M^3

No.	Commodity	Palembang-Singapore	Singapore-Palembang
1.	Iron		S $ 30.33
2.	Cement		S $ 30.33
3.	Tin flat		S $ 30.33
4.	Machinery		S $ 38.45
5.	Rice, Sugar & Flour	S $ 38.45	S $ 38.45
6.	Sawn timber	S $ 38.45	
7.	General Cargo	S $ 38.45	S $ 38.45
8.			S $ 44.53
9.	Coffee	S $ 38.45	
10.	Rubber	S $ 38.45	
11.	Tea	S $ 44.53	

The pricing policy of the RLS provides for more economic use of resources than "what the traffic will bear" and is surely in the interest of Indonesia as a whole. However, it does result in smaller revenues for ship operators.

A second feature of the domestic tariff is its failure to include stevedoring charges. Presently this is a wise policy as it frees the RLS from the necessity of collecting potentially large bills for storage, etc. It also encourages price adjustments to take place in ports. However, it is clear that if containerization comes to the interisland trades, this aspect of the tariff will be changed. First, in Indonesia, container loading and unloading will, for some time, be more expensive than conventional. Hence even if system costs are lower, shippers will be reluctant to ship in containers because of increased stevedoring costs. Second, as most of the interisland trade is in small lots, most consignments will have to be consolidated to fill whole containers. Shippers will not be willing to pay charges for this as the only benefit from consolidation goes to the carrying company.

5.3.1.4 Operating Results of RLS Services

Estimating the profits of operators on RLS routes is not an easy problem. Currently the demand for rubber is low and, no matter how high potential profits are, current profits are low. Secondly, the profit from ship operations depends strongly on the age of the ship. Financial costs almost always exceed maintenance costs, and providing a ship can be made to go reliably, the older ship will always be the cheapest. This is, of course, for ships of the same size. Secondly, fleet

operation can have large system costs not easily billed against a single voyage and appropriate steps must be taken to ensure that these are accurately accounted for.

Tables II-5.3.1-22 and II-5.3.1-23 give sample manifests and revenue calculations for a single voyage of a 700 ton vessel sailing on Route S-5. Also given in the tables is the average freight rate and percentage of the vessels deadweight used.

Table II-5.3.1-24 calculates the voyage operating results on Route S-5 for a range of ten year old vessels. Table II-5.3.1-25 gives the estimated annual results for this operation. Table II-5.3.1-26 gives the same information for 20 year old ships that are largely written off. The utilization of a vessel's deadweight and average freight rate were taken from the actual manifest and tariff in Tables II-5.3.1-22 and II-5.3.1-23.

It should be remembered that depreciation is not an expense that a business pays in cash. Actual changes in the cash position of a business occur when money is loaned to buy an asset, when it spends this money, and when it repays the loan and interest. With the exception of interest, these financial charges are not included in the profit and loss statement. However, they, of course, affect the business's ability to survive. Many profitable businesses have failed because their cash flows were insufficient to service their debt. Many businesses which continually "lose" money every year are in strong financial positions because of favorable cash flows.

To calculate a businesses cash flow, the depreciation is added to the annual profit yielding the annual cash flow. This is the money that is available to repay

Table II-5.3.1-22

Sample Manifest and Revenue of Vessel Operating on RLS Route S-5

Palembang - Singapore

Consignment	Commodity	Weight (tons)	Volume (M^3)	Freight rate (S$/$M^3$ or ton)	Total freight (S$/consignment)
1.	Rubber Indonesian Standard	110	165	38.45	6344
2.	Rubber Indonesian Standard	43	69	38.45	2653
3.	Rubber Indonesian Standard	54	86	38.45	3306
4.	Rubber Crumb Rubber SIE 50	54	61	38.45	2345
5.	Rubber Crumb Rubber SIE 50	54	61	38.45	2345
6.	Rubber Crumb Rubber SIE 50	54	61	38.45	2345
7.	Rubber Crumb Rubber	54	61	38.45	2345
8.	Rubber No. 3 thin Brown Crepe	101	126	38.45	4844
9.	Rubber No. 3 thin Brown Crepe	51	70	38.45	2691
10.	General Cargo	1	1	38.45	38
	Total	576	761		S$29,256

Average Tariff = S $ 29,256/576 = S $ 50.79/ton

Average Tariff = US $ 20.31/ton

Cargo = 86% of deadweight

Table II-5.3.1-23

Sample Manifest and Revenue of Vessels Operating on RLS Route S-5

Singapore - Palembang

Consignment	Commodity	Weight (tons)	Volume (M^3)	Freight Rate (S$ / ton)	Total Freight (S $/consignment)
1	Rubber machinery parts	0.1		38.45	38
2	Coriander seeds	6.5		38.45	249
3	Fire hydrants	5.0		38.45	192
4	Methanol (drums)	23.6		38.45	907
5	Garlic	10.5		38.45	403
6	Trisodium Phosphate	18.0		38.45	692
7	Empty steel cylinders	5.0		38.45	192
8	Machine parts	1.0		38.45	39
9	Dried garlic	5.0		38.45	192
10	Lube Oil	69.0		38.45	2653
11	Lube Oil	166.0		38.45	6382
	Total	309.7			S$ 11939

Average Tariff = S $ 38.45/ton

Average Tariff = US$ 15.38/ton

Cargo = 309.7/667 = 46% of deadweight

Table II-5.3.1-24

Estimated Voyage Profit and Loss from Operations on RLS Route S-5

I VOYAGE TIMES

Vessel Dwt.	Cargo on board sailing (tons) *	Total cargo loaded during trip (tons) *	Cargo handling rate (tons/day)	Cargo handling time (days)	Vessel speed (Kts)	Sea time (days)	Estimated waiting time (days) **	Total voyage time (days)	Number trips annually
200	170	265	200	2.6	8.5	2.9	2.0	7.5	46
500	430	660	200	6.5	9.0	2.8	2.0	11.3	31.4
750	645	990	200	9.8	9.5	2.6	2.0	14.4	24.0
1000	860	1320	270	9.7	10.0	2.5	3.0	15.2	22.7
1500	1290	1980	270	14.7	10.75	2.3	3.0	20.0	17.3
2000	1720	2640	270	19.7	11.25	2.2	3.0	24.9	13.9
2500	2150	3300	325	20.1	11.75	2.1	4.0	26.2	13.2
3000	2580	3960	325	24.1	12.00	2.1	4.0	30.2	11.4
4000	3440	5280	390	27.4	12.75	2.0	4.0	33.4	10.3

*86% of Deadweight loaded on outbound passage from Palembang

*46% of Deadweight loaded on inbound passage to Palembang

**Based on E. G. Frankel Estimates

Table II-5.3.1-24

Estimated Voyage Profit and Loss from Operations on RLS Route S-5
(contd)

II VOYAGE COSTS

Vessel Dwt.	Stevedoring in & out ($/voyage) *	Port fuel & charges ($/voyage)**	Sea Fuel ($/voyage)***	Prorated annual cost ($/voyage) ****	Total operating cost ($/voyage)	Cost per ton of cargo ($/ ton)
200	1640	240	160	2390	4420	16.70
500	4090	530	270	6870	11760	17.80
750	6140	970	350	10940	18390	18.60
1000	8180	1460	650	14177	24467	18.50
1500	12280	2280	795	23210	38560	19.40
2000	16368	3657	880	32808	53717	20.30
2500	20460	4530	960	40544	66487	30.90
3000	24550	6290	1190	51074	83108	20.90
4000	32740	10375	1680	66233	111024	21.02

*Based on UNA and Singapore Stevedoring Tariff.
**Based on Port of Palembang and Port of Singapore Tariffs.
***Bunner Prises used - High Speed Fuel Rp 25,300 per ton
Medium Diesel Fuel Rp 21,900 per ton
Marine Fuel Oil Rp 21,900 per ton
****Share of annual costs given in Figure II-5.3.1.2.

Table II-5.3.1-24

Estimated Voyage Profit and Loss From Operations on RLS Route S-5

(contd)

III VOYAGE REVENUE & PROFIT

Vessel DWT	Cargo loaded for Singapore *	Average Rev./M ton **	Outbound revenue ***	Cargo loaded for Palembang *	Average Rev./M.ton ***	Inbound revenue ***	Total revenue ***	Total cost ***	Voyage profit (loss) **
200	170	20.30	3490	95	15.38	1415	4910	4420	490
500	430	20.30	8730	230	15.38	3540	12270	11764	510
750	645	20.30	13100	345	15.38	5310	18405	18390	10
1000	860	20.30	17470	460	15.38	7070	24540	24467	73
1500	1290	20.30	26200	690	15.38	10610	36810	38560	(1748)
2000	1720	20.30	34930	920	15.38	14150	49080	53717	(4635)
2500	2150	20.30	43670	1150	15.38	17690	61350	66487	(5135)
3000	2580	20.30	52400	1380	15.38	21225	73620	83108	(9460)
4000	3440	20.30	69870	1840	15.38	28299	98165	111024	(12860)

* Tons
** US $/ton
*** US $

Note: Freight rate calculated from tariff and manifest.

Table II-5.3.1-25

Estimated Annual Operating Results for Vessels Operating on RLS Route S-5

Excludes Taxes and Overhead
10 Year Old Tonnage

Vessel Size	Voyage Profit (LOSS) ($/voyage)	Number voyages Annually	Annual Profit (LOSS) ($/year)	Annual Depreciation ($/year)	Annual Cash Flow ($/year)	Value Vessel $	Years to recover Investment
200	490	46	22,540	23,540	46,080	235,000	5
500	510	31.3	15,960	49,500	65,460	495,000	7.6
750	10	23.9	240	67,720	67,960	677,100	10.0
1000	73	22.7	1,660	83,250	84,910	832,524	10.0
1500	(1750)	17.3	(30,153)	110,193	80,040	1,102,000	14.0
2000	(4635)	13.9	(64,240)	130,339	66,100	1,303,398	20.0
2500	(5135)	13.2	(69,882)	150,000	80,180	1,500,000	19.0
3000	(9460)	11.4	(108,010)	163,800	55,790	1,638,349	29.0
4000	(12860)	10.3	(133,447)	193,600	61,100	1,936,900	31.0

Table II-5.3.1-26

Financial Operating Results 20 Year Old Vessel RLS Route S-5

All figures US$ per year

I ANNUAL COST - 20 YEAR OLD SHIPS

Vessel size	Annual operating costs 10 year old Vessel	Financial charges 10 year old vessel	Insurance charges 10 year old vessel	Financial charges 20 year old vessel	Insurance charges 20 year old vessel	Extra maintenance 20 year old vessel	Annual operating costs 20 year old vessel
200	109,710	36,630	7,326	10,575	2,930	2,098	81,357
500	215,780	73,993	15,407	22,281	6,162	2,654	157,477
750	261,965	101,148	21,071	52,739	8,428	2,893	203,806
1000	322,085	124,507	25,905	37,462	10,362	3,386	222,833
1500	400,355	164,783	34,289	49,536	13,716	4,069	268,604
2000	454,718	194,824	40,558	58,651	16,223	4,600	298,810
2500	533,559	224,348	46,675	67,500	18,670	5,388	354,094
3000	582,956	244,943	50,981	73,500	20,392	6,000	386,924
4000	682,199	289,685	60,272	87,000	24,108	7,376	450,726

Table II-5.3.1-26

Financial Operating Results 20 Year Old Vessel RLS Route S-5
(contd)

II VOYAGE COSTS

Vessel size	# trips annually *	Cost of stevedoring in & out **	Estimated port charges includes port fuel **	Sea Fuel **	Prorated annual operating cost **	Total operating cost **	Cost per *** ton of cargo
200	43.7	1,636	237	160	1,861	3,898	14.75
500	29.8	4,092	534	266	5,284	10,176	15.42
750	22.7	6,138	965	353	8,978	16,434	16,60
1000	17.8	8,184	1,455	645	12,518	22,802	17.27
1500	16.4	12,276	2,279	795	16,376	31,728	16.02
2000	13.2	16,368	3,657	884	22,637	43,546	16.49
2500	12.5	20,460	4,526	957	28,326	54,269	16.44
3000	10.8	24,552	6,288	1,194	35,826	67,860	17.13
4000	9.8	32,736	10,375	1,680	45,992	90,783	17.19

*Includes adjustment for increased time required for vessel repairs.

** $/voyage

*** $/ton

Table II-5.3.1-26

Financial Operating Results 20 Year Old Vessel RLS Route S-5
(contd)

III VOYAGE REVENUES & PROFITS

Vessel size	Total voyage revenue *	Total voyage cost **	Voyage profit (loss) **	Annual profit ***	Depreciation ***	Cash flow ***	Value of vessel £	Years to recover investment
200	4,907	3,898	1,009	44,093	7,050	51,143	35,250	.6
500	12,207	10,176	2,301	68,569	14,854	83,423	74,271	.9
750	18,405	16,434	1,971	44,741	20,301	65,042	101,577	1.5
1000	24,540	22,802	1,738	30,936	24,975	55,911	124,878	2.3
1500	36,811	31,728	5,083	83,361	33,058	116,419	165,291	1.4
2000	49,082	43,546	5,536	73,075	39,101	112,176	195,509	1.7
2500	61,353	54,269	7,084	88,550	45,000	133,550	225,000	1.6
3000	73,623	67,860	5,763	62,240	49,000	111,240	245,000	2.2
4000	98,165	90,783	7,382	72,343	59,000	131,343	290,000	2.2

*Voyage revenue taken from 10 year old vessel calculation.

** $/voyage

*** $/year

financial obligations. The cash flow from vessel operations is given also in Tables II-5.3.1-25 and II-5.3.1-26. This is compared to the value of the vessel by assuming its entire value to be obtained via a loan. The last column is the amount of time required to repay the loan assuming all cash flows are used for this purpose. The interest is accounted for previously in the profit and loss calculation.

To estimate the financial position of businesses operating shipping on route S-5, adjustments must be made for the ability of the company to collect its receivables, interest it must pay for its working capital, any invisible costs or revenues, etc. These factors are important and must be accurately accounted for before the whole picture is clear.

In any case concerning the Singapore route, it is clear that an operation with old ships has an advantage over one with newer vessels. Current freight rates are really only adequate to support the existing vessels sailing on the route. The average age of vessels operating on Singapore routes is 23 years. When new tonnage is used on the route, the freight required will go up substantially. It must be noted that 23 years is close to the maximum length of time a ship can be used. For a ship much older than 23 years, when a break downs do occur, they can be lengthly. While operating costs do not rise much, revenues can fall abruptly. The second thing is that for 10 year old tonnage, it will be difficult to successfully operate any newer vessel over 750 tons on route S-5. When older tonnage is used almost any size vessel is economically competitive. It is thought, however, that any vessel over 2000 tons would be difficult

because the decreased frequency of sailing may require the construction of additional warehousing for rubber exports.

While voyage profits and loses were not calculated for other RLS routes, the least expensive ship will be larger than on the Singapore run because of the longer sailing distances.

5.3.1.5 Berth Forecast for RLS Shipping

Table II-5.3.1-27 gives the forecast volumes of cargo imported into Palembang via the RLS trunk and feeder routes.

The basic assumption behind this is that while the sizes of vessels will grow somewhat, the average cargo shipped to Palembang will go up much more rapidly as cargo shipments between Java and Sumatra increase. Trade route T-12 (between Palembang and Padang) will become much less important as Palembang becomes an exporter rather than importer of cement. It is thought that on trunk routes, the vessel size will grow to around 2500 tons from its current average of 1300 tons.

The forecast of cargo carried to Singapore on RLS routes is more difficult. Were LASH to be introduced, it would be very successful in the trade.

Forecast rubber and coffee exports are shown in Table II-5.3.1-28 together with the expected cargo carried by liner shipping arriving here to drop off general cargo in Table II-5.3.1-29.

Table II-5.3.1-30 gives the forecast number of RLS visits (including foreign flag vessels operating on the same routes).

Table II-5.3.1-27

Forecast Berth Requirement at Palembang

by RLS (Domestic Routes)

Year	Cargo Unloaded at Palembang by RLS Service (tons)	Expected Cargo Ship destined for Palembang (tons)	Expected Annual Number of RLS Arrivals
1974	82,000	650	126
1980	133,000	850	156
1985	212,000	1,050	201
1990	357,000	1,250	285
1995	445,000	1,450	306
2000	649,000	1,625	399

Table II-5.3.1-28

Forecast Direct Export of Rubber and Coffee from Palembang

Year	Forecast Total Exports of Coffee & Rubber (tons annually)	Cargo Loaded on Liners Calling at Palembang to Unload (tons annually)	Cargo Available for RLS, LASH or Additional Liner Calls
1974	188	59	128
1980	261	65	196
1985	339	109	230
1990	445	167	278
1995	556	366	190
2000	697	531	166

units 1000 tons

Table II-5.3.1-29

Forecast Number of RLS Sailings to Singapore

(Includes Singapore Flag Ships)

Year	Average Size of Each Cargo Loaded at Palembang (tons/vessel)	Total Annual Cargo carried by RLS (tons/year)	Number RLS Sailings
1974	750	128,000	170
1980	750	196,000	261
1985	750	195,000	260
1990	750	236,000	314
1995	750	161,000	214
2000	750	141,000	188

Table II-5.3.1-30

Berth Requirements for RLS Shipping

Year	Trunk and Feeder Routes (Number Sailings Annually)	Singapore Routes (Number Sailings Annually)	Total Number RLS Ship Visits
1974	126	170	296
1980	156	261	417
1985	201	260	461
1990	285	314	599
1995	306	214	520
2000	399	188	587

5.3.2 Local Shipping

The local shipping using the port of Palembang serves two markets. First, it is a primary distribution system for consumer goods and light industrial products. All of this trade is between Jakarta and Palembang. It also serves as a feeder distribution system to small ports in the vicinity not directly served from Jakarta or Surabaya. In both trades major cargoes are beverages, empty bottles, steel products, soap, etc. The feeder system also carries large volumes of coconut oil in drums and, of course, empty drums as backhaul cargo. The tonnage operating to Jakarta is steel vessels of about 150 deadweight tons. The ships have been kept in very good condition. Vessels operating on the feeder routes are usually of wood construction. The average size is about 30 tons deadweight. While some of these vessels are in good shape, the bulk of this fleet has not received adequate maintenance. Figure II-5.3.2-1 shows the local trade routes which call at Palembang.

The estimated costs of shipping operating on the route to Jakarta are shown in Table II-5.3.2-1. Because of the short trade route, small vessels are very competitive. The optimum ship size on this route is about 500 deadweight tons. Currently no ships operating on this run are larger than 200 tons.

The reasons for this involve the inadequacy of wholesaling and classification of the route as a local rather than interisland route. The classification of the route as local technically limits the maximum size ship to 500 m^3 or about 200 DWT. RLS operators receive financial help to acquire new capacity from P.T. PANN and local operators do not. As a result, the operators

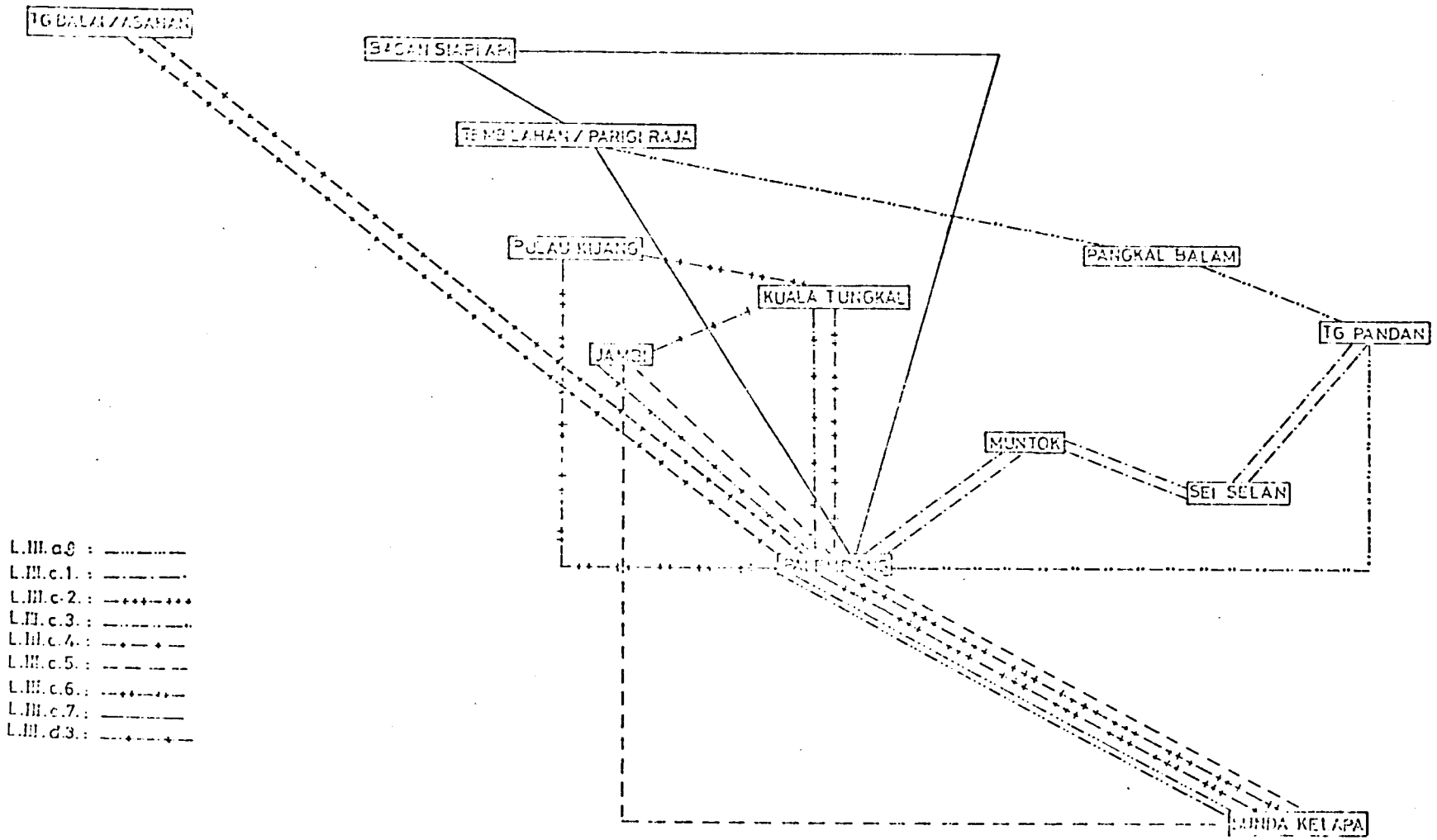


FIGURE : II-5.3.2-1

LOCAL ROUTES SERVING PALEMBANG

SOURCE: D.P.P TRAFFIC DIVISION

Table II-5.3.2-1

Cost of Operating Selected Vessels on Local Route LIII C-8

Jakarta - Palembang - Jakarta

DWT.	Total estimated waiting days/trip	Cargo loaded at Jakarta (tons)	Total cargo loaded during trip (tons)	Cargo handling rate tons/trip	Cargo handling time (days)	Speed (Kts)	Sea time (days)	Trip time (days)	# Trips annually
200	2	180	324	202	3.2	8.5	3.4	8.6	40
500	2	450	810	202	8.0	9.0	3.2	13.2	27.2
750	2	675	1215	202	12.0	9.5	3.0	17.0	20.3
1000	2	900	1620	202	16.04	10.0	2.9	20.9	16.5

DWT.	Cost stevedoring ($/voyage)	Estimated Port charges ($/voyage)	Sea fuel ($/voyage)	Prorated annual cost vessel ($/voyage)	Total cost/trip ($/voyage)	Cost per ton mile ($/ton mile)	Cost per ton with stevedoring ($/ton)	Cost per ton excluding stevedoring ($/ton)
200	2008	202	187	3513	5910	0.052	18.24	12.043
500	5022	644	304	7937	13907	0.049	17.16	10.96
750	7533	1056	424	12905	21918	0.052	18.04	11.84
1000	10044	1526	749	19455	31774	0.056	19.61	13.41

of local shipping have access to smaller amounts of capital and pay higher interest rates. This tends to push operators to the use of smaller ships with higher operating costs, but smaller capital requirements.

5.3.2.1 Pricing Policy of Local Shipping and Operating Results

The structure of the tariff charged by operators of local shipping to Jakarta is similar to the RLS domestic tariff. The same commodity classification system is used. The tariff does not include stevedoring. Table II-5.3.2-2 gives the complete tariff as of January 1975. All charges are based on weight tons.

Table II-5.3.2-3 gives an actual manifest and calculation of actual revenue for a 150 DWT vessel operating on the route.

Table II-5.3.2-4 gives the estimated voyage profits resulting from operations on this route. The percentage of a vessels deadweight loaded and average freight rate for the inbound leg were based on Table II-5.3.2-3. For the return trip to Jakarta, an estimate was made based on observations at the pier. Departing vessels were not as heavily laden as inbound. Outbound cargoes were primarily empty bottles, scrap iron, and wood products. It is clear again that the 500 ton ship is the most profitable operating on the route.

5.3.2.2 Forecast of Berthing Requirements for Local Shipping

The most profitable ship to operate on the local route to Jakarta is determined only in part by the owner's ability to book cargo. Presently, the maximum sized vessel that can be used on the route is 500 m^3 GRT

Table II-5.3.2-2

Tariff of Local Shipping Between Jakarta and Palembang

Item No.	Description	1975 Tariff Jakarta - Palembang Rp/Metricton	1975 Tariff Jakarta - Palembang $/Metricton
1	Livestock	--	--
2	Meat	--	--
3	Fish	3,350	8.13
4	Rice	4,02o + 10%	10.73
5	Wheat & Flour	2,600 + 10%	6.94
6	Sugar	2,600 + 10%	6.94
7	Maize	2,600 + 10%	6.94
8	Coffee, tea & spices	5,025	12.19
9	Tobaccc	3,350	8.13
10	Animal Foods	6,281	15.25
11	Other Grain	5,025	12.19
12	Copra	5,025	12.19
13	Palm & Cooking oil	3,350	8.13
14	Margarine & Butter	6,281	15.25
15	Fertilizer	2,600	6.94
16	Other Chemicals	5,025	12.19
17	Rubber, Rubber Goods	5,025	12.19
18	Wood & Wood Products	5,025	12.19
19	Paper & Paper Products	3,350	8.13
20	Hide & Leather Products	5,025	12.19
21	Textiles	6,281	15.25
22	Salt	3,350	8.13
23	Cement	2,600	6.94
24	Other Non-metallic Minerlas	2,600	6.94
25	Gold, Silver, Etc.	Advalorem	

Table II-5.3.2-2

Tariff of Local Shipping Between Jakarta and Palembang
(contd)

Item No.	Description	1975 Tariff Jakarta - Palembang Rp/Metricton	1975 Tariff Jakarta - Palembang $/Metricton
26	Iron & Steel	5,025	12.19
27	Base Metal Products	5,025	12.19
28	Machinery	15,075	36.59
29	General Cargo (luggage, soap etc.)	6,281	15.25
30	Asphalt	4,020	9.75

Table II-5.3.2-3

Sample Manifest for Trip Between Jakarta-Palembang

Consignment	Weight (kilos)	Freight Rate ($/metricton)	Revenue ($)
1. Washing soap	40,950	15.25	624.48
2. Condensed milk	45,000	15.25	686.25
3. Dried Spaghetti	36,050	15.25	549.76
4. Iron bars	3,900	12.19	47.54
5. Tooth paste	4,300	15.25	65.58
6. Condensed milk	16,000	15.25	244.00
7. Toilet soap	1,150	15.25	17.54
Total cargo	147,000		2,235.15

Average Freight Rate = $ 15.20/weight ton

All monetary figures in US$

Table II-5.3.2-4

Estimated Profit and Loss from Ship Operations on Route LIII C-8

DWT	Inbound cargo from Jakarta (Tons)	Inbound Average Freight Rate ($/ton)	Inbound Revenue ($/voyage)	Outbound cargo to Jakarta (Tons)	Outbound Average Freight Rate ($/ton)	Outbound Revenue ($/voyage)	Voyage Costs ($/voyage)	Voyage Profit (Loss) ($/voyage)
200	180	15.20	2,736	160	13.50	2,160	3,902	992
500	450	15.20	6,840	400	13.50	5,400	8,885	3,355
750	675	15.20	10,260	600	13.50	8,100	14,385	3,975
1000	900	15.20	13,680	800	13.50	10,800	21,730	2,750

DWT	# Trips	Voyage Profit Per Trip ($/voyage)	Annual Voyage Profit ($/year)	Annual Deprec-iation	Annual Cash Flow	Vessel Value	Years to Recover Investment
200	40	992	39,600	23,540	63,140	235,000	3.7
500	27.2	3,355	91,256	49,500	140,756	495,000	3.5
750	20.3	3,975	80,693	67,720	148,413	677,000	4.5
1000	16.5	2,750	45,375	83,250	128,625	832,000	6.5

Figures exclude commissions to freight forwarders, office expenses, inability to collect receivables, etc.

or about 250 DWT. For vessels larger than this, the route must be an interisland route.

It is thought that the average size of tonnage operating on this route will grow gradually to around 350 DWT. These vessels will be almost entirely dedicated to general cargo although scrap iron will continue to be a significant back haul cargo. Projections of general cargo carried by local shipping and estimations of numbers of ship arrivals are given in Table II-5.3.2-5. Sufficient capacity exists to carry projected back haul cargoes.

The forecast of cargo and ship arrivals for "feeder" local vessels is shown in Table II-5.3.3-6. As cargo is primarily vegetable oils, the traffic in coconut oil is the primary base of the estimate.

5.3.3 Special Shipping

While the RLS and local shipping are vital to the support of Palembang as a community, special shipping is important as a support of Palembang's industrial base. As the bulk of the forecast expansion of exports is in raw and semi finished industrial commodities, the most important changes in shipping patterns will take place in the special shipping sector of the industry.

The five important bulk commodities at Palembang are:

1) Petroleum (both crude and product)
2) Timber
3) Fertilizer
4) Cement
5) Coal

Both petroleum and fertilizer are shipped in tonnage operated by vertically integrated companies -

Table II-5.3.2-5

Forecast Arrivals of Local Shipping Traffic with Jakarta

Year	Expected Average Ship Size	Local General Cargo Arriving Palembang	Number of calls
1974	100	36,000	360
1980	175	55,000	314
1985	250	73,000	292
1990	285	93,000	326
1995	310	115,000	370
2000	350	143,000	408

Table II-5.3.2-6

Feeder Local Service Sailings

Year	Ship Size Dwt	Cargo To Be Carried (tons/year)	Number of Annually
1974	30	26,200	873
1980	36	38,700	1,075
1985	42	50,800	1,209
1990	48	57,500	1,197
1995	54	69,000	1,277
2000	60	81,000	1,350

Pertamina and Pursi respectively. As such, transportation for these commodities is carefully planned and largely centered around private docks and wharfage. These commodities will affect the port principally in the congestion that the dedicated tonnage creates while waiting at anchor to go to the private dock facilities.

A second aspect of the problem is that at least in tanker shipping, tremendous economies of scale are possible. If volumes of oil in and out of Pertamina, it is possible that savings in charter hire of tankers would justify additional dredging of the Musi River.

5.3.3.1 Petroleum Shipments

Currently Pertamina imports crude oil in tankers from producing fields in the vicinity and exports products in barges and parcel tankers. Table II-5.3.3-1 gives the numbers of tankers calling at Pertamina's facilities since 1970.

The costs of operating crude oil carrying tankers are shown in Figure II-5.3.3-1.

The cost of parcel tankers is very difficult to estimate without specific detailed information about a ship. However, a parcel tanker operation might cost 1 1/2 to two times as much per ton as a crude.

The cargo size of crude unloaded at Pertamina should gradually rise, in part to take advantage of economies of scale and in part to minimize congestion at the berths resulting from increased numbers of small product carriers. Currently a light loaded 25,000 ton tanker can bring in about 13,000 tons of cargo, and a 15,000 tonner about 9,000 tons. This poor utilization of capacity is caused, of course, by the 8 meter maximum

Table II-5.3.3-1

Tankers Calling at Pertamina

Year	Number of Vessels	Indonesian Flag		Foreign Flag		Average DWT	
		Unload	Load	Unload	Load	Unload	Load
1970	1,413	25	110	632	646	6.2	5.4
1971	1,118	12	118	471	517	6.3	5.3
1972	1,068	16	247	289	516	5.4	4.4
1973	1,857	8	598	423	828	7.2	3.7
1974	1,866	10	610	419	827	6.6	3.1

Source : BPP Annual Report.

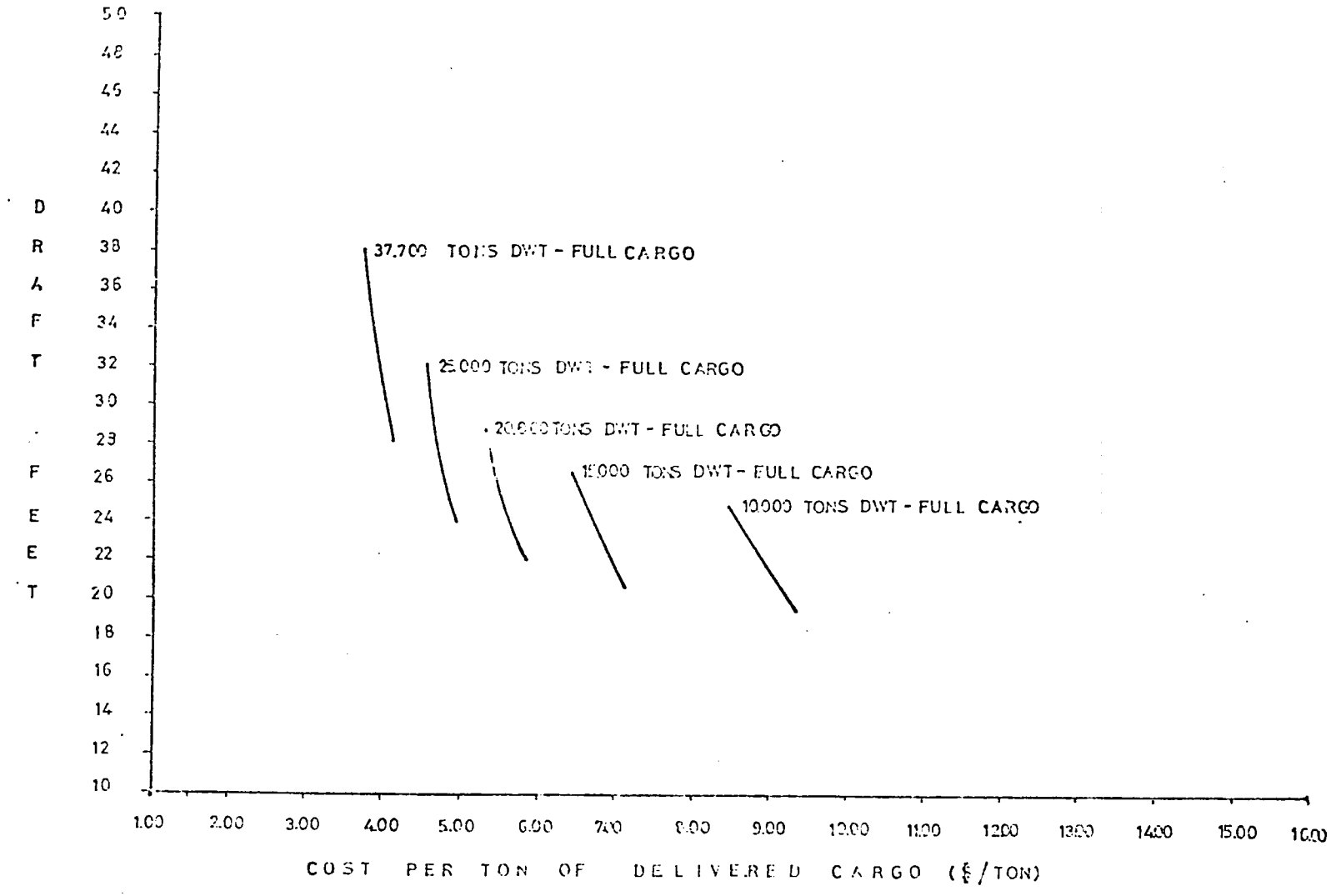


FIGURE:II-5.3.3.1

COST OPERATION - CRUDE CARRYING TANKERS - NORMAL TO SHALLOW DRAFT DESIGNS LIBERIAN FLAG EUROPEAN CREW - 1500 MILE (ONE WAY) ROUTE

draft of vessels using the Musi.

There are a number of steps which could be taken to improve the situation. The most obvious is the use of shallow draft tankers more fully loaded. To aid in this discussion, the principal variable in Figure II-5.3.3-1 is the tanker's summer draft. This is viewed as being an unlikely occurrence. Tanker shipping of this size is currently in reasonably plentiful supply and for at least five years it will be cheaper to light load large vessels than build special shallow draft vessels.

One possibility for a reduction in cost would be the conversion of the larger tankers to segregated ballast, thus simplifying their operation on a short route and reducing the fuel bill substantially by reducing the amount of tank cleaning. This would allow the unused volume of light loaded tankers to be put to some useful purpose. The economies of this depend almost exclusively on the details of the cargo piping system of any tanker being considered.

In any case it is forecast that the average size of crude oil shipments to Pertamina will increase. Product carriers are expected to decrease in size. The expected increase in production will, of necessity, go in smaller ships. The forecast imports of naptha could go in large vessels provided adequate shore tank capacity is available. Table II-5.3.3-2 summarizes the forecast ship arrivals due to oil and petrochemical.

5.3.3.2 Fertilizer

Fertilizer is to be one of the fastest expanding exports on the Musi River. At present, bulk exports of fertilizer are carried in small coal carriers equipped

Table II-5.3.3-2

Forecast Ship Calls at Palembang for Petroleum Products

	IMPORTS			EXPORTS			
	Domestic	Foreign		Domestic	Foreign		
Year	Crude imports	Naptha imports	Product imports	Product exports	Petro chemicals	Crude exports	Total # ship calls
1974	402	0	31	1395	0	38	1866
1980	358	0	45	1395	0	42	1835
1985	268	30	47	1250	144	42	1781
1990	201	51	67	1126	225	42	1712
1995	148	86	79	1013	345	42	1713
2000	108	141	115	708	525	42	1639

Units - ship arrivals annually.

with grab unloading equipment. Pusri has recently placed an order for three self-unloading urea carriers. These vessels of 7000 DWT will be the mainstay of the distribution system for fertilizer. As this size bulk carrier is close to the largest that can get up the Musi River, fully laden, it is expected that future additions to the fertilizer fleet will be of this size range. Table II-5.3.3-3 summarizes projections for fertilizer traffic.

5.3.3.3 Cement

The future of traffic in cement is extremely important to the design of additional port facilities at Palembang. Currently about 62,000 tons of cement are imported into the port annually. About 72% of this cement comes to Palembang from Padang in vessels ranging from 1500 tons DWT to 4000 tons. This import cement is the largest single commodity going over Boom Baru. During November, 1975 one third of the wharfage space was exclusively used for unloading this cement. As it is difficult to arrange sufficient trucking and lighterage to remove the cement from the pier as it is unloaded, large amounts are stored in the warehouses at Boom Baru.

Currently it is planned to construct a cement plant at Baturaja. Much of the cement will be exported through the port of Palembang completely reversing the existing trade pattern. The existing railroad will be used to supply clinker in bulk to a grinding and bagging plant located near Kertapati on the Musi River. Thus, the activity surrounding cement transport will no longer move over Boom Baru.

Table II-5.3.3-3

Forecast Ship Calls at Palembang for Fertilizer

Year	Ship Size (tons Dwt)	Cargo Volume tons/year	Number of Calls/year
1974	3000	135,000	45
1980	7000	612,000	87
1985	7000	1,151,000	164
1990	7000	1,412,000	201
1995	7000	1,752,000	250
2000	7000	2,072,000	296

The forecast of cement exports is vast with over three quarters of a million tons in the year 2000. With such a quantity, efficiency in its transport is extremely important. The carriage of cement is one area that vast improvements in efficiency are possible.

The tonnage presently carrying cement to Palembang is mostly old shelter deck ships of small size. They were on the whole designed to carry cargoes twice as bulky as cement. The unsuitability of these ships effects the efficiency of the whole operation. Port, pilot and other charges are higher because of larger gross tonnage per deadweight ton of ship capacity. Cargo handling is less efficient as each draft of cargo must be moved vertically the additional height of the tween deck space. Winches and their controls are old and generally in poor condition. This makes it difficult for the stevedores to control the winches well. Because of this damage to cement bags, trucks and lighters are not rare.

Each bag is individually handled twice if loaded directly onto a truck or lighter. Up to five handlings are required if the cement is stored in the warehouse. This multiple individual handling ruptures about four percent of the cement bags. In addition, it causes an enormous amount of needless work. To unload a 3500 ton consignment, about 21,000 trips with hand trucks are required to move the cement into the warehouse. The spilled cement in the ships' holds must be cleaned, further increasing the vessels' port time.

The first step in improving this situation is clearly palletizing the cement at the factory. This will eliminate the handling of individual bags. It will

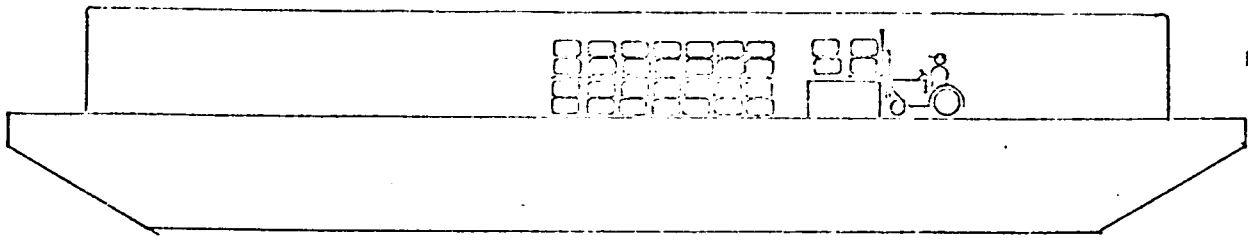
allow forklifts to handle the cement on the deck increasing the cargo handling rate and quartering the number of men required to unload a vessel.

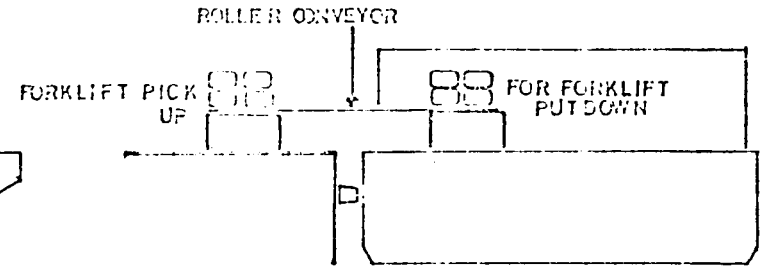
The second will be to obtain tonnage with wider hatches and appropriate volumetric capacity.

The third step is to ensure that ports at either end of the trip have adequate numbers of forklifts to handle the pallets.

Cement is an ideal commodity to carry in a barge as long as suitable facilities exist for unloading. The types of mobile cranes available in most Indonesian ports are not well suited to unloading cement from large barges. This means that unless a simple self-container cargo handling system is devised, barge carrying palletized cement would have to be extensively outfitted with cranes generating capacity, etc. Such a system would not be competitive with old ships. It seems possible to devise an adequate system. Figure II-5.3.3-2 shows a very rough design of such a self-loading barge. It is a regular flat top barge with a large enclosure to protect the cement from the elements as cargo is handled aboard the barge with a forklift. To unload the barge, the forklift puts a cement pallet on a roller conveyor. It is then rolled across to the dock where it is picked up by a second forklift and put on a truck or in a warehouse. The problems to be solved before this scheme would be workable are:

1) damage to the conveyor by forklift trucks
2) control of the pallet on the conveyor to make sure it doesn't fall off
3) design of the barge and cargo handling system so it is impossible to achieve lists and trims





Length = 35 meters

Beam = 9.15 meters

Draft = 3 meters excluding enclosure

Deadweight = 500 tons

Cost about US$ 170,000 (excluding forklifts)

FIGURE II-5.3.3-2

500 TON CLIENT BARGE

during unloading that make further work impossible.

The cost of such a barge is about $170,000 for 500 ton capacity.

Whether or not forecast export of cement actually goes in barges depends on many factors - among them charter rates for small ships, the repair of the Ampera Bridge and the destinations of the cement. If the cement stayed mostly within the confines of lower Sumatra going, say to Jambi or a similar port, a substantial portion of the traffic could be in barges. It is thought, however, at least until 1985, the bulk of this traffic will be in conventional ships. This idea is reflected for the forecast of ship calls in Table II-5.3.3-4.

5.3.3.4 Timber and Wood Products

Timber is a commodity that is more cheaply carried in barges than in ships. Its stowage factor is high and a very high percentage of a cargo is carried as deck cargo. Because of its large volume and irregular shape, it is awkward to load and discharge. On the other hand, it is fairly easily carried in flat top barges. The volumetric problem is solved simply by making a higher pile on the barge, and the cargo handling problem by the free access provided by the barges lack of sides.

It is evident that the barging system is far superior and should be able to achieve a very large market share of timber and wood product exports.

There are two competitors with the specialized shipping for sawn timber cargoes. The first is, of course, prahus (sailing ships) as timber carriage is

Table II-5.3.3-4

Forecast Ship Calls for Cement

Year	Consignment Size	Cargo Volume	Number of Calls
1974	--	--	--
1980	1,500	163,000	108
1985	2,000	327,000	163
1990	3,000	446,000	148
1995	3,000	511,000	170
2000	3,000	787,000	262

their main business. Currently they carry timber fairly efficiently and should be able to continue carrying their current volume for a long time. It seems unlikely that the cargo carried by the prahu fleet will expand unless the size of prahus increases.

One possible development would be the introduction of a vastly larger sailing vessel similar to the American lumber schooner. These vessels were used on the west coast between the states of Washington and California. Vessels of this type were built as large as 1000 DWT. Some vessels were fitted with as many as eight masts. The crew of these vessels was extremely small - only 11 men and the "fore and aft" rig could be handled by a single man at sea. These vessels remained competitive until 1922 in the United States. Even then competition from land transport and a decreasing volume of timber shipments were as responsible as any other factor for their demise. The construction cost of such a vessel might be the same as a similar sized motor vessel. The principal factor indicating that expansion in size of prahus is unlikely is shipyard capacity in Indonesia. The hull, while perhaps planked with wood, would be entirely framed with steel. The hull of these ships would have to be built in the same shipyards now involved in the construction of replacement vessels for the RLS. It is not thought that sufficient shipyard capacity will be available to build these vessels.

The second competitor for timber cargoes is the RLS. At present ships sailing on RLS routes calling on trade routes going to Surabaya are not fully loaded on their return trip.

It is thought that RLS shipping will be able to

fill this space with timber shipments. However, as the freight rate that can be obtained for this cargo is not high, it is not likely that RLS capacity will be expanded solely to book additional timber cargoes. Due to the type of cargo handling gear fitted on RLS ships, it is thought the principal products carried will be timber products such as plywood. Estimated timber volumes going on the RLS are shown in Table II-5.3.3-5.

Tables II-5.3.3-6 and 7 summarize the demand for timber shipments by special carrier together with an estimate of cargo carried by prahu.

The selection of the proper size barge to carry this export timber, is a complicated market research and optimization problem. It is thought that the recipients of this cargo will have adequate facilities to receive large consignments of cargo, so as a first estimate of barge size, 500 tons or 1500 m^3 was used. Table II-5.3.3-8 summarizes anticipated barge arrivals for wood shipments from Palembang.

5.3.3.5 Coal

At present only a small amount of coal is shipped from Palembang. Most of it is used to fire the tin smelter on Bangka Island. The barges carrying the coal to the smelter are loaded via a belt coal loader located at Kertapati. The anticipated redevelopment of the coal mines at Baturaja will cause a rapid increase in domestic coal exports through Palembang. The projected coal shipments are shown in Table II-5.3.3-9. It is thought that all of this coal will continue to go in barges and that they will increase in size. It is thought that in 1980 the average barge size will be 500 tons and that

Table II-5.3.3-5

Estimated Timber Cargoes Loaded by RLS

Year	Timber Products (1000 tons)	Sawn Timber (1000 M^3)
1974	1.8	12
1980	51.0	66
1985	84.0	108
1990	118.0	152
1995	119.0	152
2000	151.0	195

Table II-5.3.3-6

Estimated Shipments of Timber Products

Year	Forecast Timber Product Domestic Exports	RLS Share	Prahu Share	Total Market For Special Shipping
1974	3	1.8	--	1.2
1980	153.7	51.0	--	102.7
1985	245.6	84.0	--	161.6
1990	333.4	118.0	--	215.0
1995	575.9	119.0	--	456.0
2000	742.8	151.0	--	591.0

Figures in 1000 tons.

Table II-5.3.3-7

Estimated Shipments of Sawn Timber

Year	Forecast Sawn Timber Domestic Exports	RLS Share	Prahu Share	Total Market Share for Special Shippings
1974	26.4	12	14.4	0
1980	118	66	15.0	37
1985	238	108	16.0	114
1990	460	152	17.0	291
1995	789	152	18.0	619
2000	1325	195	20.0	1110

Figures in 1000 m^3

Table II-5.3.3-8

Forecast Barge Calls for Domestic Timber and Wood Product Exports

Year	Barges for Timber Products	Barges for Sawn Timber	Total Number Of Barge Calls
1974	--	--	--
1980	205	24	229
1985	322	76	398
1990	430	194	431
1995	912	412	1324
2000	1182	740	1922

Table II-5.3.3-9

Projected Barge Calls for Coal Exports

Year	Estimate Average Barge Size (tons)	Annual Coal Volume (tons)	Number of Calls
1974	300	29,000	92
1980	500	170,000	340
1985	750	750,000	1000
1990	1000	970,000	970
1995	1500	1,010,000	713
2000	1500	820,000	546

Table II-5.3.3-10

Projected Coal Shipments Via Port of Palembang

(000 Tons)

Year	Java	Bangka Island	Total
1974	1	28	29
1980	100	70	120
1985	680	70	750
1990	900	70	970
1995	970	100	1070
2000	720	100	820

the barges will grow to 1500 tons by 1995. The forecast for barge calls for export domestic coal is shown in Table II-5.3.3-10.

5.3.4 Peoples Shipping (Sailing Fleet)

A prahu is a sailing ship. In Indonesian waters two general types of prahus are used - the pinisi, a two masted, short, broad beamed, vessel usually over 200 m^3 GRT and the lambo, a single masted vessel with low freeboard, but with raised sides rooted over with timber. The optimum size of the lambo is about 150 m^3 GRT. While prahu shipping only carries about six percent of the cargo flowing through Palembang (excluding oil), it nevertheless serves a very important market. Table II 5.3.4-1 gives the available port statistics concerning sailing vessels using the port of Palembang. Before 1966 prahu shipping had a tremendous advantage over motorized shipping. At the time, the prahu's lack of dependence on foreign materials and spare parts, ability to sail without scarce bunners and gave it great success. Currently, conditions for modern shipping are favorable and prahu's shipping has a great competitive advantage. Currently, the principle market for prahus is in the timber trade.

In the general cargo trade one advantage offered by prahus is reduced cargo damage. Prahus are loaded item by item and as a result, have a better record of cargo damage then the local shipping loaded by slings. In addition, port facilities serving prahus are less congested then local facilities. The real factor indicating that sailing vessels will be declining in use is that local shipping has better access to capital and cargo booking. Because of the nature of the trade, the

Table II-5.3.4-1

Activity of Pelayaran Rakyat (Sailing Fleet)

Average Size	Year	Number of Vessels Using Port: Total	Unloading	Loading	Length Stay	Total Cargo 000's Tons	Tonnage* Handled per Vessel: Total	Unloading	Loading
	1966	899	--	--	--	35	39	--	--
	1967	645	--	--	--	20	31	--	--
	1968	854	--	--	--	22	25	--	--
	1969	798	--	--	--	22	27	--	--
	1970	538	--	--	--	19	35	--	--
	1971	481	--	--	--	17	36	--	--
115	1972	397	267	188	--	15	--	28	33
130	1973	440	374	232	12.1	25	--	35	51
192	1974/ 1975	432	299	357	11.7	27	--	38	45

Average size approximately 140 M3

*Assume .8 ton = 1 M3 of logs

most efficient arrangement is for their to be a single owner captain. When more than five vessels are owned by a single operation, it is difficult to keep track of the captain well enough to ensure their continued good faith. This fact puts a severe limit on the ability of the prahu fleet to expand to provide large scale transportation.

Because it is thought that large scale expansion of the prahu fleet is not really possible, it is unlikely that the existing port facilities for sailing vessels at Palembang will require expansion.

5.4 Summary Ship Arrival Forecast

Table II-5.4-1 gives a summary of all previous estimates made of ship arrivals. The basic conclusion is that 25 years from now the port of Palembang will be roughly three times busier than now. This is in terms of number of ships only. As there is a general increase in vessel size to accommodate the vast increase in cargo volume forecast, the complexity of the operation can be expected to increase far more than the tripled volume reflects on the surface. Because of this, it is vitally important that steps towards increased efficiency in the operation of the port begin immediately.

Care must be taken in using Table II-5.4-1 as the accuracy of any forecast of what will happen 25 years from now is open to question. In fact the statistics of ship arrivals at Palembang for 1974 are only thought accurate within ten percent. With this in mind, it is difficult to expect the long term forecast to be accurate within 30%.

Table II-5.4-1

Forecast of Ship Arrivals at Palembang

	1974	1980	1985	1990	1995	2000
Domestic						
Local - General Cargo	360/100	314/175	292/250	326/285	370/310	400/350
Local - Feeder	813/30	1075/36	1209/42	1197/48	1277/54	1350/60
Local - Coal	92 barge	340 barge	1000barge	970 barge	713 barge	546 barge
RLS - Domestic***	126/*	156/*	201/*	285/*	306/*	399/*
RLS - Singapore	170/750	261/750	260/750	314/750	214/750	188/750
Cement - Export	--	108/3000	163/4000	146/5000	170/5000	202/5000
Fertilizer	45/2500	87/7000	164/7000	201/7000	250/7000	296/7000
Timber	--	226/barge	398/barge	431/barge	1324/barge	-1922/barge
Interisland Oil	1797/**	1753/**	1518/**	1326/**	1161/**	816/**
Total Domestic	3403	4320	5058	5196	5785	6179
International						
Timber***(M^3)	133/3707	201/4350	257/5000	334/5650	401/6300	483/7000
Oil****	69	82	263	385	552	823
Liner	120	201	308	462	676	980
Total International	322	484	828	1132	1629	2286
GRAND TOTAL	3725	4804	5886	6328	7414	8465
Grand Total excluding Vessels under 500 GRT	2494	3564	4677	5131	6137	7115

* Cargo size increases but ship size to stay around 2000 ton
** 6000 ton vessel imports 4000 ton vessel export petroleum
*** Includes foreign flag cargo on this route
**** Mostly salt, rice and timber products

5.5 Marine Passenger Transport

5.5.1 Passenger Traffic

The river Musi, its tributaries and canals in the Palembang area carry substantial volume of passenger traffic. The principal forms of passenger travel within the port area include: 1) river ferries; 2) water taxis; 3) Bangka Island-Palembang ferry; 4) Haji pilgrim ships; 5) inland water transport and; 6) passenger travel on cargo vessels. Each source of passenger travel is briefly described below and estimates of future traffic volumes are prepared.

5.5.2 River Ferries

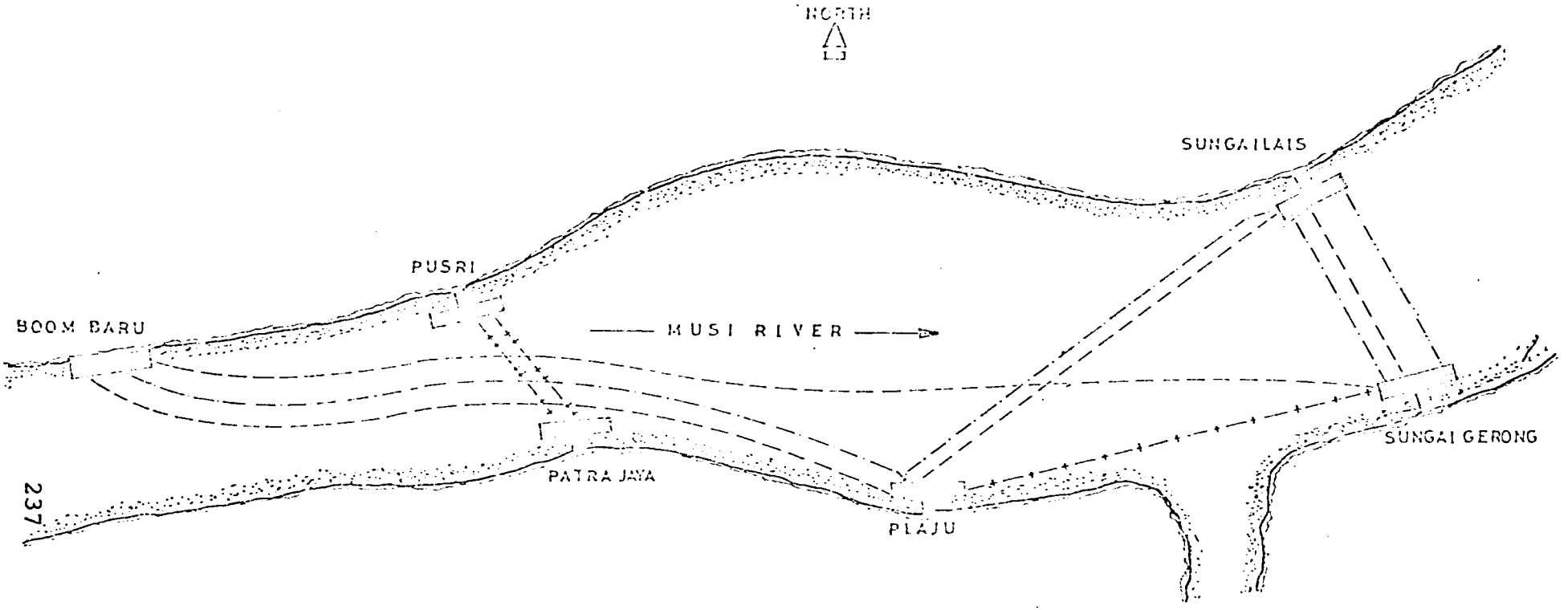
5.5.2.1 Present Situation

Five ferry routes are presently in operation connecting six ferry terminals in the port area. Three ferries, Sei Gerong - Sei Lais, Sei Gerong-Plaju and Pusri-Patrojaya, offer cross river service only. Two other ferry routes connect cross river ferry terminals with a ferry terminal in the Palembang Port area (Tangga Batu) as follows:

Route A: Sei Gerong - Palembang - Plaju - Sei Gerong

Route B: Sei Gerong - Sei Lais - Plaju - Palembang - Sei Gerong

Individual ferry routes are shown in Figure II-5.5-1. Additional information on river ferry traffic collected in a survey carried out as a part of this study is given in Table II-5.5-1. The table shows an average daily traffic volume of about 4,000 passengers and 57 daily ferry trips.



LEGEND :

- SUNGAI GERONG--BOOM BARU—PLAJU—SUNGAI LAIS
- SUNGAI GERONG—SUNGAI LAIS—PLAJU—BOOM BARU
- PLAJU—SUNGAI GERONG
- SUNGAI LAIS—SUNGAI GERONG
- PUSRI—PATRA JAYA—PUSRI

FIGURE : II-5.5-1

FERRY ROUTES & TERMINALS IN PALEMBANG

Table II-5.5-1

Passenger Ferries in Palembang

Terminal	Trips per Day	Average Passengers Per Trip	Daily Passengers	Ferries
Sei Lais	17	70	1,190	1
Plaju	9	80	720	1
Sei Gerong	19	60	1,140	2
Palembang	6	75	450	1
Pusri and Petrojaya	6	75	450	1
Total	57	70	3,950	6

5.5.2.2 Projections

The principal source of demand for river ferry service are employees of the Pusri fertilizer plant and the Sei Gerong and Plaju refineries. Commodity forecasts presented elsewhere in this study indicate a rapid growth of the former and a much slower rise of the other. The effect of these trends will be a relatively small growth for the principal ferry routes and a substantial expansion of the Pusri-Patrojaya ferry operation. The following estimates presented in Table II-5.5-2 reflect: (1) the expected level of activity in the above industrial establishments and (2) population trends for non-employee travel estimated at 20% of the total.

5.5.3 River Taxis

5.5.3.1 Present Situation

River taxis are small passenger boats, usually equipped with an outboard engine, which provide demand-responsive service in the Palembang port area. Most taxis provide local service only, but it is possible to engage them for out-of-town trips. The taxis congregate in several traffic generating centers along the riverfront including: (1) central market near the bridge; (2) railroad wharf; (3) Pusri fertilizer plant; (4) Sei Gerong refinery; (5) Plaju refinery and (6) Sei Lais ferry terminal.

No recorded information is available on this segment of passenger travel. To obtain it, the consultant carried out sample surveys at each location to determine traffic characteristics and volume estimates. This information is summarized in Table II-5.5-3.

Table II-5.5-2

Passenger Ferry Projections (Daily)

Year	Employees			Other Passengers	Total Passengers	Ferry Trips
	Pusri	Refineries	Total			
1975	350	2,800	3,150	800	3,950	57
1980	700	2,800	3,500	1,170	4,670	64
1985	850	3,080	3,930	1,690	5,620	77
1990	1,030	3,390	4,420	2,360	6,780	83
1995	1,260	3,720	4,980	3,230	8,710	100
2000	1,530	4,100	5,630	4,320	9,950	109

Table II-5.5-3

River Taxi Traffic in Palembang Port Area
(Average Daily Traffic)

Location	Number of Taxis	Taxi Trips	Passengers
Bridge	25	55	210
Kertapati	10	28	168
Pusri	2	4	12
Sei Gerong	4	13	86
Plaju	4	13	86
Sei Lais	7	18	120
Total	52	131	682

estimate of future traffic trends.* Adjusting the base year data for a probable underestimate and relating it to the expected growth in population, income and income elasticity of demand for passenger travel, following projections of river taxi can be expected. See Table II-5.5-4.

5.5.4 Bangka Island - Palembang Ferry

5.5.4.1 Present Situation

A regular scheduled ferry service is available between the port of Palembang and Mentok on Bangka Island. The service is operated three times weekly; the volume of passenger traffic on the ferry in recent years is shown in Table II-5.5-5.

5.5.4.2 Projections

Estimates of future passenger travel will depend on the population and income growth on the Bangka Island, for which the ferry provides a principal connection with Sumatra and Palembang. There are reasons to believe that the Bangka Island demographic and economic growth will approximate that in the Palembang port hinterland.** The passenger traffic projections reflecting expected trends are presented in Table II-5.5-6.

*Bangka's economy depends on the pepper cultivation and tin mining. Pepper cultivation has suffered recently from plant diseases, but measures are being taken to deal with this problem systematically. The tin refining capacity will be doubled in 1976 creating additional employment and income opportunities.

**Due to a limited size and duration of the survey, this information is illustrative only and probably understates actual traffic volumes since all river taxis on the river at a time of the survey were not counted.

Table II-5.5-4

River Taxi Traffic Projections

(Average Daily Traffic)

Year	Taxis	Taxi Trips	Taxi Passengers
1975	160	397	2,067
1980	235	580	3,030
1985	335	830	4,360
1990	470	1,160	6,100
1995	640	1,590	8,360
2000	860	2,130	11,190

Table II-5.5-5

Bangka Island - Palembang Ferry Passenger Traffic

Years	Passengers		
	Departing	Arriving	Total
1970	2,996	4,356	7,352
1971	2,513	4,908	7,421
1972	2,636	3,230	5,866
1973	4,383	3,218	7,601
1974	6,245	5,224	11,489
1975*	3,160	2,479	5,639

*January - August

Table II-5.5-6

Projections of Bangka Island - Palembang Ferry Passenger Traffic

Year	Passenger	Ferry Trips
1975	8,500	300
1980	12,500	440
1985	17,900	630
1990	25,000	880
1995	34,200	1,200
2000	45,700	1,600

5.5.5 Haji Pilgrim Traffic

5.5.5.1 Present Situation

Sumatra's predominantly Muslim population represents a large potential demand for pilgrim travel to the Islams' holy places in the Middle East. At present, low per capita incomes and high cost of such travel limit this demand. An additional constraint on the pilgrim travel by sea is the size and availability of passenger ships. The sea pilgrim travel has been in specially chartered vessels, among the largest to use the port of Palembang facilities. In recent years, one vessel has been chartered annually with an average of 500 pilgrims aboard, as shown in Table II-5.5-7.

5.5.5.2 Projections

The potential for pilgrim travel as shown in Table II-5.5-8 is substantial, but the effective demand for pilgrim travel by sea is limited by high cost and competition from the more economic air travel. The future pilgrim travel by sea may be also limited by the availability of passenger vessels. This study assumes, rather arbitrarily, no change in sea pilgrim travel during the period under review. Even this estimate may be on a high side if the Palembang airport is improved to handle larger jet aircraft, thus eliminating a need for Jakarta transfers. Table II-5.5-9 summarized expected pilgrim travel via the project port.

5.5.6 Inland Water Transport

5.5.6.1 Present Situation

Owner-operated and commercial passenger travel between Palembang and the many riverine towns and

Table II-5.5-7

Haji Pilgrim Travel Through Port of Palembang

Year	Passengers		Ships	
	Departing	Arriving	Departing	Arriving
1970	417	301	1	1
1971	600	419	1	1
1972	451	581	1	1
1973	452	448	1	1
1974	507	451	1	1
1975*	198	n.a.	1	n.a.

*Haj Season in November - December only departure shown

Table II-5.5-8

Moslem Pilgrims Departing to Mecca from Indonesia

Year	By Sea	By Air	Total
1971/72	19,778	2,312	22,090
1972/73	16,039	6,305	22,344
1973/74	16,391	28,191	44,582
1974/75	15,532	53,225	68,757

Source: Department of Religious Affairs

Table II-5.5-9

Projections for Pilgrim Travel Via Port of Palembang

Year	Pilgrims	Ship Visits
1974	958	2
1980	1,000	2
1985	1,000	2
1990	1,000	2
1995	1,000	2
2000	1,000	2

villages is an important, but little studied, element of river traffic in the port area. According to the Department of Inland Waterways, estimates shown in Table II-5.5-10 nearly 40,000 people arrived and left Palembang by inland water transport each month in 1975. Included in this total is the Bangka Island ferry traffic and out-of-town river taxi travel mentioned above. However, most travellers in this group are individuals coming to Palembang with products for sale, visiting friends, on business, etc. As a rule, these passengers and the boats they travel in do not use port-owned and operated facilities but anchor mid-stream or berth anywhere along the river front within the city of Palembang.

5.5.6.2 Projections

Inland waterways offer an extensive and inexpensive transport network within the project area. The swamp terrain covering much of the area indicates that river transport will remain the principal mode for passenger and cargo movements.* Table II-5.5-11 presents order-of-magnitude estimates of future passenger travel by river between Palembang and its tributary area. There is no basis for estimating passenger boat movements, but it should be noted that Keteks - the most popular passenger boats - carry 3-4 passengers on the average.

5.5.6.3 Passenger Travel on Cargo Vessels

According to official sources, passenger transport facilities are offered by foreign, interisland and sailing ships calling on the port of Palembang.

* Some diversion from river to road transport will occur if the proposed Palembang-Jambi and Palembang-Banyuasin road improvements are implemented.

Table II-5.5-10

Passenger Travel by River To/From Palembang in 1975

Month	Arriving	Departing	Total
February	13,677	16,620	30,297
March	15,255	19,258	34,513
April	14,659	17,140	31,799
May	19,321	21,464	40,785
June	18,013	17,826	35,839
July	34,455	21,705	56,160
August	16,777	23,007	39,784
Total	132,157	137,020	269,177
Average Monthly	18,880	19,574	38,454

Table II-5.5-11

Inland Water Passenger Movements at Palembang

Year	Passengers
1975	460,000
1980	675,000
1985	970,000
1990	1,350,000
1995	1,850,000
2000	2,470,000

Virtually all foreign travel is between Palembang and Singapore. Interisland travel includes passenger movements to/from North and West Sumatra ports. Local travel in sailing ships is reportedly limited to the Jambi-Palembang route. The negligible volume and erratic nature of this traffic shown in Table II-5.5-12 do not warrant a separate forecast.

Table II-5.5-12

Passenger Travel in Cargo Vessels

Year	Foreign	Interisland	Local	Total
1970	516	204	-	720
1971	99	2,314	-	2,413
1972	866	2,618	-	3,484
1973	391	30	-	421
1974	50	50	9	109
1975	n.a.	n.a.	n.a.	n.a.