THE GOVERNMENT OF MALAYSIA
THE STATE OF SARAWAK

MIRI-BINTULU

REGIONAL PLANNING STUDY

SUPPORTING REPORT

No. 7

TRANSPORT

—1974—

HUNTING TECHNICAL
SERVICES LTD. LONDON

HOFF AND OVERGAARD
COPENHAGEN

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C O N T E N T S

CONVERSIONS

Linear Measures:

1 inch	=	25.4 millimetres
	=	2.54 centimetres
1 foot (12 inches)	=	0.3048 metre
1 yard (3 feet)	=	0.9144 metre
1 chain (22 yards)	=	20.117 metres
1 mile (1 760 yards)	=	1.609 kilometres

Square Measures:

1 square inch	=	6.45 square centimetres
1 square foot	=	9.29 square decimetres
1 square yard	=	0.836 square metre
1 acre (4 840 sq. yards)	=	0.405 hectare
1 square mile (640 acres)	=	259.00 hectares

Weights:

1 ounce (16 drams)	=	28.350 grammes
1 pound (16 ounces)	=	0.454 kilogram
1 kilogram	=	1.65 katis
1 cwt (122 pounds)	=	50.8 kilograms
1 ton (20 cwt)	=	16.8 piculs

Measure of Capacity:

1 pint	=	0.568 litre
1 quart (2 pints)	=	1.137 litres
1 gallon (4 quarts)	=	4.546 litres

CHAPTER 1

INTRODUCTION

1.1 GENERAL

This Report describes the investigations, evaluations and recommendations made by the Consultants on transport development within the Study Area. It has been developed from Chapter 7 of the Perspective Plan and the following papers - Water Transport in and to/from the Study Area; Sample Surveys of Road and Water Transport in the Study Area; Road Administration and Construction in Sarawak; Airport Development in the Study Area; An Evaluation of Settlement Patterns; and Memoranda on - Port Development; Maximum Vehicle Weights and Dimensions; and Road Costs.

Transport development has been related to general regional development and a comprehensive planning concept covering all aspects of transport development has been applied. In this Report the term 'transport industry' is defined as all establishments and organisations, whether public or private, specialising in carrying out transport of goods and passengers; it thus includes lorry and bus establishments, shipping enterprises and airlines.

1.2 THE ROLE OF TRANSPORT IN ECONOMIC ACTIVITY

Transport is an essential feature of an economy characterised by specialised production and exchange of goods and is indispensable to economic and social development. The provision and efficiency of transport services will usually be important determinants of the pace and locational pattern of development. Transport activity often accounts for 10 to 15 per cent of the Gross Domestic Product (GDP) in developed countries. In developing countries the contribution varies considerably from country to country since the variables, determining the cost and volumes, are fewer and individually more important. Commensurate with the role in production, transport absorbs a significant part of total investments. A study comprising 23 countries (Sectoral Paper on Transport World Bank, 1972) shows that with income levels above US$200 per capita per year, Transport and Communications were allocated between 13 and 36 per cent (average 19 per cent) of the Gross Fixed Investments in the period 1945 to 1965. The total role of transport in the national economy is even greater than these figures indicate as many transport activities and investments are included under other items than transport in the national accounts.

Investigations in developed countries indicate that the demand

for transport in the long run is highly elastric depending on transport price, time and quality. Transport costs are generally not a significant portion of the final price of most highly manufactured goods, the demand for transport is consequently fairly insensitive to its price. Such demand, however, is often highly sensitive to transport time, regularity and other quality features, all of which influence the choice of mode for these products. The situation is quite different for transport of low value agricultural, mineral and forestry products which often make up the larger proportion of the transport demand in developing countries.

Demand for passenger transport is in general highly sensitive to its price and the level of personal incomes. With an increasing level of incomes passengers' sensitivity to changes in transport time and quality will increase.

1.3 PLANNING TRANSPORT DEVELOPMENT

The important interaction between transport and social and economic development, and the high benefits and costs involved in improved transport emphasise the need for comprehensive and long range transport planning, such planning includes the establishment of comprehensive principles and guidelines for transport development, the methods and tools for transport management, and a system to ensure that policies and plans are implemented.

Since transport demand is derived from primary activities in other sectors of production, its effective planning implies adequate assessment of activities and targets in these other sectors and their translation into estimates of wanted transport services and assumed traffic volumes on routes and through terminals. This requires a system approach and forecasts over rather long periods of time since investments in transport infrastructure have long economic lives. The system approach in transport planning implies that all modes and aspects of transport are considered and co-ordinated in the basic layout for the future transport system. The plans for building transport infrastructure (roads, ports, airports) should be co-ordinated with each other and with plans for the transport industry. Where, as in Malaysia, the transport industry is largely operated by the private sector, the Government should guide and control the transport industry so that it will act according to established policies and aims. Such guidance could be by direct regulation of for instance, the number, character and field of operation of transport establishments, and it could be pricing and taxes.

Planning of transport development can only to a limited degree be confined to a region which in turn is a part of a country. The policies, the basic framework of the future transport system and the guidelines for establishment of an efficient

transport industry have to be designed for the country (or State) as a whole. Some of the considerations and recommendations put forward on transport development in this Plan, therefore apply to the whole State of Sarawak.

CHAPTER 2

PRESENT TRANSPORT SYSTEM AND DEMANDS

2.1 GENERAL

The internal transport in the Study Area was until recently mainly based on the rivers, which still play an important part. They provide a rigid, slow and often expensive transport system. The influence area of such a system is limited to the banks of the navigable rivers, and often, where they exist at all, connections are long and difficult between the separate river systems.

The building of the road network in Miri District has already improved the transport situation for the affected areas of the District, which have experienced a rapid growth of road transport. Also, the recently completed Miri-Bintulu road has connected a number of previously separated areas and has thus tied the Study Area more closely together.

Travelling between the Study Area and other Divisions of Sarawak, other states and other countries is mainly by air. A road is planned between Bintulu, Sibu and Kuching but not yet completed; the road between Kuala Baram and Brunei is motorable except after heavy rains.

The Study Area mostly receives it supplies from Sibu, Kuching, Peninsular Malaysia (through Port Klang) and Singapore, where goods from foreign countries are also trans-shipped. Agricultural export products are mainly sent to Kuching, Sibu and Singapore for further processing and export to the consumer countries. Export of timber and oil products are generally moved directly to the foreign countries for consumption or further processing. Figure 2.1 shows the present transport infrastructure.

2.2 ROADS AND ROAD TRANSPORT

2.2.1 Roads

In 1972 there were some 267 miles of roads in the Fourth Division maintained by PWD. In addition there were a few miles of roads and tracks maintained by the District Council and by local farmers. The roads in the Fourth Division comprise about 22 per cent of all PWD roads in Sarawak.

The Road Development Programme (Table 2.1) is planned to increase the road network in Fourth Division corresponding to a cost of $19.7 mn from 1973 to 1975. About 27 per cent of the Road Development expenditure 1971-75 for Sarawak is all-

TABLE 2.1 ROADS AND ROAD CONSTRUCTION

A. PRESENT ROAD NETWORK 1972

Area	Mileage by surface type			
	Bitumen	Stone/gravel	Earth	Total
Sarawak (maintained by PWD)	260	895	57	1 212
Fourth Division (maintained by PWD)	29	217	21	267

B. ROAD DEVELOPMENT PROGRAMME 1971 TO 1975 ($'000)
(ACCORDING TO THE REVISED SECOND MALAYSIA PLAN, 1973)

	Item	By years					Total 1971 to 1975
		1971	1972	1973	1974	1975	
		Actual		Estimates			
Sarawak	Trunk roads	5 291	5 356	6 444	11 272	11 353	39 716
	Feeder roads	1 995	1 705	2 703	4 112	3 186	13 701
	Road surfacing and improvement	9 246	9 250	12 443	13 281	5 991	50 211
	Urban roads	2 815	2 784	1 880	5 050	3 750	16 279
	Total	19 347	19 095	23 470	33 715	24 280	119 907
Fourth Division	Trunk roads	2 237	2 362	2 200	6 700	6 700	20 199
	Feeder roads	987	177	434	1 070	650	3 318
	Road surfacing and improvement	113	22	22	1 013	1 500	2 670
	Urban roads	149	350	250	500	700	1 949
	Total	3 486	2 911	2 906	9 283	9 550	28 136

C. ROAD MAINTENANCE EXPENDITURE

Year	Sarawak			Fourth Division			
	Mileage of roads maintained	Expenditure $'000	$ per mile	Mileage of roads maintained	Total $'000	Percentage of total in Sarawak	$ per mile
1971	1 112	5 570	4 550	232	837	15	3 610
1972	1 199	6 000	5 000	262	981	16.4	3 740

ocated to Fourth Division. Road construction and maintenance are quite expensive in Fourth Division as most road building materials have to be hauled over long distances. Chippings and bitumen have to be imported from First Division and from foreign countries respectively.

Table 2.2 shows the present road standards applied by PWD and some construction cost estimates. PWD roads in general have a quite high and costly alignment standard because they are built to allow further improvements following expected increasing traffic volumes.

However, it is the Consultants' opinion that access roads in villages and small towns and to individual farms and the like,

FIGURE 2·1

TRANSPORT INFRASTRUCTURE AND ESTIMATED AVERAGE ANNUAL DAILY ROAD TRAFFIC 1972

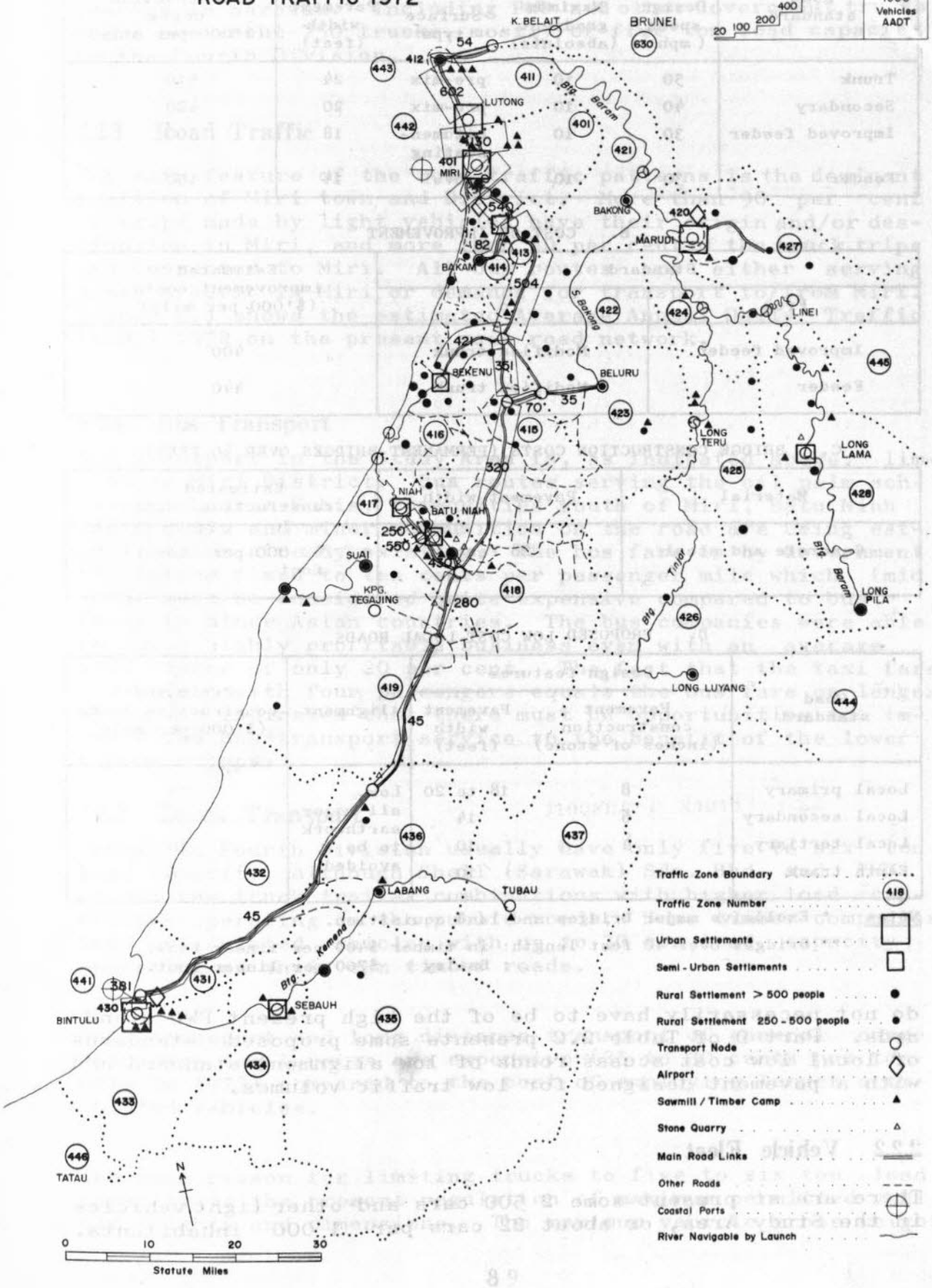


TABLE 2.2 ROAD DESIGN STANDARDS AND COSTS

A. PWD DESIGNED ROADS - STANDARD FEATURES AND ESTIMATED COSTS

Road standard	Design features				Estimated* construction costs ($'000 per mile)
	Design speed (mph)	Maximum gradient (absolute)	Surface type	Pavement width (feet)	
Trunk	50	10	pre-mix	24	510
Secondary	40	10	pre-mix	20	420
Improved feeder	30	10	bitumen-seating	18	300
Feeder	30	10	gravel	14	150

B. COST OF IMPROVEMENT

Standard		Estimated improvement costs ($'000 per mile)
From	To	
Improved feeder	Modified trunk	400
Feeder	Modified trunk	440

C. BRIDGE CONSTRUCTION COSTS (PERMANENT BRIDGES OVER 40 FEET)

Material	Pavement width	Estimated construction costs
Concrete and steel	28 feet	$2 000 per linear foot

D. PROPOSED LOW COST LOCAL ROADS

Road standard	Design features		Alignment	Estimated** construction costs ($'000 per mile)
	Pavement construction (inches of stone)	Pavement width (feet)		
Local primary	8	18 to 20	Low, all major earthwork to be avoided	75
Local secondary	6	14		35
Local tertiary	4	10		20
Earth track	-	10		6

Notes * Exclusive major bridges and land aquisition.

** Bridges over 40 feet length: in timber $400 per linear foot;
: Bailey $700 per linear foot.

do not necessarily have to be of the high present PWD standards. Part D of Table 2.2 presents some proposed standards of local low cost access roads of low alignment standard and with a pavement designed for low traffic volumes.

2.2.2 Vehicle Fleet

There are at present some 2 500 cars and other light vehicles in the Study Area, or about 22 cars per 1 000 inhabitants.

The car density is significantly higher than in Sarawak as a whole, for which it amounts to about 16 cars per 1 000 inhabitants. There are, on the other hand, only 25 buses in the Fourth Division equivalent to a bus density of only half the average in Sarawak. Including PWD and other Government trucks there are about 750 trucks, mostly of five ton load capacity in the Fourth Division.

2.2.3 Road Traffic

The main feature of the road traffic patterns is the dominant position of Miri town and District. More than 90 per cent of trips made by light vehicles have their origin and/or destination in Miri, and more than 60 per cent of the truck trips are connected to Miri. All bus routes are either serving urban traffic in Miri or demands for transport to/from Miri. Figure 2.1 shows the estimated Average Annual Daily Traffic (AADT) 1972 on the present main road network.

2.2.4 Bus Transport

Bus transport in the Study Area is, as indicated above, limited to Miri District. Bus routes serving the oil palm schemes at Lambir-Subis, communities south of Miri, Batu Niah and Bintulu and minor communities on the road are being established or already existing. The bus fare is by Government regulation fixed to ten cents per passenger mile which (mid 1972) must be considered quite expensive compared to bus fares in other Asian countries. The bus companies were able to run a highly profitable business even with an average load factor of only 20 per cent. The fact that the taxi fare per person with four passengers equals the bus fare on longer distances indicates that there must be opportunities to improve the bus transport service to the benefit of the lower income groups.

2.2.5 Truck Transport

Trucks in Fourth Division usually have only five to six ton load capacity, although Shell (Sarawak) Sdn. Bhd. and PWD have a few truck trailer combinations with higher load capacities operating on the public roads. Some timber companies have articulated vehicles with up to 30 ton load capacity operating on their own timber roads.

Bulk transport and long distance transport of general cargo with five ton lorries are expensive (25 to 30 cents per ton mile in 1973) compared to the cost of employing larger articulated vehicles.

The main reason for limiting trucks to five to six ton load capacity is the present regulation of maximum permitted vehicle weights and dimensions. The maximum vehicle gross weight

in the Fourth and Fifth Divisions is at present limited to 12 tons, the maximum bridges are designed to accommodate vehicles with 8/12 ton axle loads on single/tandem axles and a gross weight of up to 30 tons on four axles. The limiting factor for a higher load capacity are the numerous temporary bridges, mostly of the Bailey-bridge type. Another major obstacle for future development of an efficient road transport appears to be the present Government policy of preference for truck companies based on one truck and one owner/driver.

In Table 2.3 an estimate is presented of the present road traffic and transport.

TABLE 2.3 MOTOR VEHICLES AND ROAD TRAFFIC IN THE STUDY AREA

A. MOTOR VEHICLES AND ROAD TRAFFIC 1970-71

Vehicle type	Number of vehicles	Vehicles per thousand inhabitants	Estimated average annual mileage	Road traffic in million vehicle miles
Cars	2 560	22.3	5 000	12.8
Buses	25	0.18	30 600	0.8
Trucks	750	6.52	20 000	15.0

B. ROAD TRANSPORT 1970-71

Vehicle type	Road traffic in million vehicle miles	Average load persons/passengers	Total road transport	Road transport per capita
			Passenger miles	
Cars	12.8	4	51.2	445
Buses	0.8	7.5	6.0	52
		Tons	Ton miles	
Trucks	15.0	2.5	37.5	326

C. ROAD TRANSPORT EXPENDITURE 1970-71

Vehicle type	Estimated average cost (price) per transport work unit (passenger miles)	Transport expenditures	
		Total $ mn	Per capita per year $
Cars	10 cents	5.12	44.5
Buses	10 cents	0.60	5.2

2.3 PORTS AND SHIPPING

2.3.1 Ports

Ports in the Fourth Division are under the authority of the Marine Department whose main duties, however, are pilotage

services, vessel safety, navigational aids and registration of vessels. There are no effective port authorities managing the ports and port services in the Division.

There are a number of small ports and landings, whose wharves are located alongside the rivers because coastal waters are too shallow and without natural sites for ports. The river ports are only accessible to vessels of shallow draught because of the shallow sand bars outside all the rivers. Larger vessels must use open, off-shore anchorages one to three miles off the coast.

The main river ports in the Fourth Division are Miri (Miri River), Bintulu (Kemena River), Marudi and Kuala Baram (Baram River). Wharves in Miri have a total length of 574 feet and a least depth alongside of two to seven feet. The Miri River port is only accessible for coastal vessels with a maximum of six to seven feet draught. The wharves in Bintulu, Marudi and Kuala Baram have a total length of 72 to 138 feet, and both the Kemena and Baram river bars allow vessels with up to eight feet draught to pass at high tides. The main features of the present river ports are presented in Table 2.4.

The wharves are generally in a poor state of repair. Cargo handling is done by stevedoring companies or wharf labour unions which largely employ labour intensive and expensive cargo handling methods. Cargo handling rates are usually in the range of $8 to $10 per ton for bulk cargo and up to $30 to $40 per ton general cargo in crates and boxes. A summary of port and handling charges is presented in part B of Table 2.4.

The main off-shore anchorage is one to three miles outside Miri (Miri roads); cargo to and from Miri to, or from the Miri roads is carried by 30 to 80 ton lighters at a cost of $10 per ton. Outside Lutong there are off-shore loading berths for oil; outside Kuala Baram and other places along the coast timber carriers anchor to pick up logs for export.

23.2 River Transport

Transport on the rivers is usually undertaken by launches in the lower and more navigable parts and by longboats with outboard engines in the upper and less navigable parts. There are scheduled services at only a few main connections. The river and coastal transport is a free trade without any Government regulation. Launches and bigger longboats are in general operated by local traders and co-operatives mostly to serve their own transport demands. Table 2.5 shows some of the main characteristics of the more important river transport routes.

Transport rates by launches in mid 1973 were 15 to 40 cents per ton mile and eight cents per passenger mile. Recently

TABLE 2.4 CHARACTERISTIC FEATURES OF PORTS IN FOURTH DIVISION

A. TECHNICAL FEATURE OF THE PORTS

Town centre	Wharves		Least depth (feet)	Notes
	General	Length (feet)		
Miri	Coastal	200	2.2	Originally 7 feet draught+
	Custom	174	2	Originally 4 feet draught+
	Immigration	200	7	
Bintulu	Custom	138	4	Under re-construction
Kuala Baram	Custom	90	9	
Marudi	Custom	72	20	

B. PORT AND HANDLING CHARGES

Port	Terminal operations		On vessel account		On shippers account		Total
			Wharfage	Stevedore	Cargo handling	Lighterage	
			Dollars per ton				
Miri	At wharf from hatch to store		Neglig.		10		10
	Via Miri roads liner to store		Neglig.	2.5	10	10	22.50
Marudi	From hatch to store		Neglig.		6 to 8		6 to 8
Bintulu	From hatch to store		Neglig.		8 to 10		8 to 10
Other river ports Fourth Division	From hatch to store				5 to 6		5 to 6
Kuching[1]	Rice, sugar, salt	Through godown	1.50	3.15	4.50		9.15
		Direct from hook	1.50	3.15	2.50		7.15
	General cargo	Through godown	1.50	4.50	6		12
		Direct from hook	1.50	4.50	4		10
	Bona fide trans-shipment				10		

Notes + Depth reduced due to lack of maintenance dredging, lost cargo and debris.

(1) The Kuching Port Authority (Tariff) Regulations, 1970.

(2) Port dues, berthing fees and other charges are considered to be negligible on a per-ton basis.

daily express-boat services between Kuala Baram and Marudi, and a second daily service between Marudi and Long Lama have been opened. The express-boats have a seat capacity of about 60, and charges are 12 to 15 cents per passenger mile.

Transport by longboat is expensive - costs are generally in the range of 50 cents to one dollar per ton mile. In 1973 about 70 per cent of the cost of operating a longboat was gasoline costs.

TABLE 2.5 RIVER TRANSPORTS - ROUTES AND RATES

Route		Distance (statute miles)	Vessel type (GRT)	Freight rates			Passenger fares	
From	To			Commodity group samples	Per ton	Per ton mile	Per passenger	Per passenger mile
					Dollars			
Kuala Baram	Marudi	65	Launch (<50)	General cargo	12	0.19	5	0.08
			Express boat				8 to 10	0.12 to 0.15
Kuala Baram	Long Lama	132	Launch (<50)	Rubber	17	0.13	10	0.08
				Fertiliser	20	0.15		
				Rice	31	0.23		
Kuala Baram	Batu Gading	130	Lighters	Stone**	10	0.08		
Marudi	Long Lama	67	Launch (<50)	General cargo	10	0.15	5	0.075
					15	0.22		
Marudi	Long Linei	(4-6 hours)	Launch (<50)				3	
Marudi	Long Teru	46 (5-7 hours)	Launch (<50)	Padi, sugar	8.4	0.18	3	0.07
				Rubber, pepper	13.4	0.29		
				Petrol	15	0.33		
Marudi	Long Luyang	112 (2 days)	Longboat (2)				10	0.09
							5*	(0.04)
Marudi	Long San	150 (2 days)	Longboat (3)	Rice, sugar	168	1.1	10 down	
				Rubber	50	0.33	15 up	
				Fertiliser**	115	0.77		
			Launch	Animal feed**	85	0.57		
Bintulu	Tatau	37 (5 hours)	Launch (12)	General cargo	10	0.27	7	0.19
Bintulu	Sebauh	18	Launch	Sugar (general cargo)	10	0.55	1	0.06
Bintulu	Labang	40	Launch	Sugar (general cargo)	15	0.38		
Bintulu	Tubau	64	Launch	Sugar (general cargo)	20	0.31	3	0.05

Notes * Members of the co-operative which owns the boat.
** Government contract rates.

TABLE 2.6 CHARACTERISTICS OF MAIN COASTAL ROUTES

Route		Distance in statute miles	Service calls per month	Freight rates		
From	To			Commodity type	Dollars	
					Per ton	Per ton mile
Marudi	Kuching	427	2 launches, 4 calls	General cargo	28	0.065
				Rubber, timber	25	0.06
Marudi	Kuala Baram	65 by river	5 launches (Marudi to Kuala Baram)			
Kuala Baram	Miri	15 by road	1 lorry (Miri to Kuala Baram) daily	General cargo	18	0.225
Miri	Kuching	349	24 calls (Baram Shipping, Miri Shipping, Shin Hin Co.)	General cargo	17 to 25	0.05 to 0.07
				Agric. products		
				Sawn timber	21	0.06
				Stone	17 to 18	0.05
				PWD goods*	16	0.045
Sebuyau	Miri	320	Tug, lighter	Stone, gravel*	13.25	0.04
Miri	Sibu	286	Coasters		No information	
Bintulu	Kuching	253	12 calls (Sim Swee Joo Shipping, Miri Shipping, Ching Ming Co.)	General cargo	17	0.07
				Rubber	20	0.08
				damar, stone	17	0.07
Bintulu	Sibu	184	6 launches in weekly service	General cargo	12	0.065
				Textiles, drinks	14	0.075
Tatau	Sibu	185	Launches	General cargo	20 to 25	0.11 to 0.13
Sebuyau	Bintulu	236	Tug, lighter	Stone*	11.25	0.047
Miri	Kota Kinabalu	210	Coaster (200 tons)	Sawn timber**	35	0.17
Miri	Niah	50	Launch (30 tons)	General cargo	25	0.50
Miri	Suai	89	Launch	General cargo	30	0.34

Notes * PWD contract prices.
** From wharf to wharf.

2.3.3 Coastal Regional and Overseas Shipping

The main coastal routes are between Miri and Kuching and Sibu, between Bintulu and Kuching and Sibu, and between Marudi and Kuching. These routes are mainly served by coasters of 40 to 200 ton load capacity. The predominant freight charges are in the range of five to seven cents per ton statute mile. Transport of stone from Kuching and Sebuyau to the Study Area is partly carried by coasters but mainly by lighters and tug-boats. A summary of the main coastal routes and their salient features is presented in Table 2.6.

There are regular regional shipping routes connecting Miri and Marudi to Peninsular Malaysia (Port Klang) and Singapore. Two shipping companies are operating on routes which include calls at Port Klang, Singapore, Miri Roads, Muara (Brunei), Labuan and other Sabah ports. Vessels employed on these routes are mostly old 1 500 to 3 000 ton vessels which are of too deep a draught to pass the Miri or Baram bars. They anchor at Miri Roads where they are served by lighters. Cargo to and from Marudi is trans-shipped in Labuan. The connection between Marudi and Labuan is served by a 150 ton steel coaster which makes a round trip every two weeks.

In addition to the regional shipping routes described above, a small shipping company runs a fortnightly direct service between Miri wharves and Singapore. The company employs two shallow-draught coasters of 350 to 450 ton load capacity which can pass the Miri bar at high tides. With these shallow-draught vessels the costly lighterage services and the stevedoring at Miri Roads are avoided. The total freight charges however are about the same for all these companies; the savings in lighterage and stevedoring at Miri Roads compensates for the higher operating costs of the small coasters compared to the bigger 1 500 to 3 000 ton vessels.

When there is enough cargo, vessels sailing between Kuching, Sibu and Japan call at Miri Roads. Approximately once a month liners to Europe call to pick up about 1 000 tons of sawn timber.

In both the Tariff of Rates for Regional Shipping and Overseas Shipping the transport rates are specified by commodity types. The tariffs discriminate heavily against cargo of higher value. The ad valorem principle that is the assumed ability to pay, appears to be just as important a factor in the pricing policy as the real cost of handling and shipping. Table 2.7 shows summaries of the present tariff of rates for some regional shipping routes and Tables 2.8, 2.9 and 2.10 summaries of freight tariffs for some overseas shipping routes by conference lines. Table 2.11 shows an estimate of exports and imports of cargo to the Study Area by coastal, regional and overseas shipping.

TABLE 2.7 SUMMARY OF PRESENT REGIONAL SHIPPING FREIGHT TARIFFS

A. SARAWAK, BRUNEI AND SABAH/SINGAPORE

Commodity	Miri/Labuan		Kuching/Sibu		Bandar Seri Begawan		Kota Kinabalu	
	M*	W*	M	W	M	W	M	W
	Malaysian dollars							
Ad valorem (on value)	1%		1%		1%		1%	
Animal feed		26		26		26		28.50
Beans		29		26		28.50		31
Beer (and stout)	35.50	40	30.50		29.50	32.50	37.50	42
Beverages	33.50	35	27	30	30.50	34	33.50	37
Boards (fibreboard etc.)	31.50	35	27	30	30.50	34	33.50	37
Cattle, buffaloes each	85		49.50		83.50		90.50	
Cement - bags		25		26		25		27
Deep freeze cargo	97.50	108.50	78	87	97.50	108.50	105	117
Fertiliser - harmless		26		29		25		28.50
Empty bottles	23.50	26	21.50	24	23.50	26	25.50	28.50
Coffee seeds and beans		45.50		34		44.50	43.50	48.50
Flour (wheat, sago etc.)		25		26				27
Freezer cargo	79	88	62.50	69.50	78	87	85	94.50
General cargo	39.50	44	35.50	40	39	43.50	42.50	47.50
Machinery	43.50	48.50	37	41.50	42.50	47.50	47	52
Rice, bran		25		26		25		27
Sawn timber	30.50		30.50		29.50		32.50	
Prefab timber	23.50		18.50		22.50		25.50	
Weed killer	39.50	44	35.50	40	39	43.50	42.50	47.50
Lime - hydrated		29		26		28.50		31
Palm kernels - dry		(20.50)						
Rubber bales		(25.50)		19				
Pepper - bags (1 620)		(35)		24				
Bitumen		32		21		31.50		35
Commercial vehicles	23.50		18.50		22.50		25.50	
Semi-dangerous cargo	65.50	73	53.50	60	64	71	69.50	77.50
Dangerous cargo	97.50	108.50	71	79.50	97.50	108.50	105	117
Fruit and vegetables	41	45.50	35.50	40	40	44.50	43.50	48.50
Illipenuts				30				
Corrugated iron	30.50	34	30.50	34	29.50	32.50	32.50	36
Plywood	30.50	34	30.50	34	29.50	32.50	32.50	36
Oil drums	35.50	40	30.50	34	34.50	38.50	37.50	42

Freight is quoted in M$ as: W = per metric ton;
M = per cubic meter.

B. SARAWAK, BRUNEI AND SABAH/PORT KLANG**

Commodity	Rate basis	Miri/Labuan*	Kuching/Sibu	Bandar Seri Begawan	Kota Kinabalu
		Malaysian dollars			
Animal feed	W	33.25	30	34.50	34.50
Iron bars	W	36	35	37.50	37.50
Beans	W/M	35	37	36.50	36.25
Beer, stout	W/M	48	44.50	50.50	50
Beverages	M	46	43	48.50	48
Bitumen	W	42	38	44	44
Boards (fibreboard etc.)	W/M	43	41.50	45	45
Bottles, empty	W/M	35	37	36.50	36.25
Commercial vehicles	M	35	30	36.50	36.25
Cement	W	33.25	30	34.50	34.50
Coconut oil - drums	W	48	37	50.50	50
Coffee seeds and beans	W/M	53	44.50	56	55.50
Dangerous cargo	W/M	104	96	110	109
Deep freeze cargo	W/M	104	110	110	109
Fertiliser - harmless	W	33.25	33	34.50	34.50
Flour (wheat, sago etc.)	W	33.25	33	34.50	34.50
Freezer cargo	W/M	87.25	84	92	91.75
Dried fruit, vegetables	W/M	53	48	56	55.50
General cargo, NOS	W/M	52	48	55	54.50
Cattle, buffaloes					
Corrugated iron	W/M	39	40	41	41
Hydrated lime	W	36	37	37.50	37.50
Machinery	W/M	53	49	56	55.50
Lubricating oil - drums	W	43	44.50	45	45
Plywood	W/M	42	44.50	44	44
Rice, maize	W	33.25	37	34.50	34.50
Sawn timber	M	42		44	44
Framework, prefab timber	M	35	30	36.50	36.25
Weed killer	W/M	52	48	55	54.50
Semi-dangerous cargo	W/M		72		
Pepper - bags	W	(58)	39		
Sago - bags	W		33		
Tapioca	W		33		
Rubber		(38)			
Illipenuts	W		40		

Freight is quoted in M$ as: W = per long ton;
M = per 40 cubic feet.

Notes * The rates include stevedoring at Miri roads, lighterage fee of M$10 per ton is charged additionally.

** The rates on these given in Tariff of Rates except for rates given in brackets which are estimates given by shipping agents. The rates do not include port charges for shipper or consignee's account which have to be added to give the total shipping costs.

TABLE 2.8 SUMMARY OF PRESENT OVERSEAS SHIPPING FREIGHT TARIFFS SABAH AND SARAWAK TO EUROPE[1]

Commodities	Sarawak				Sabah	
	A coaster		Direct loading		Direct loading	
	W	M	W	M	W	M
	Malaysian dollars					
Antimony ingots		285				
Canes - loose or in bundles	229		220		220	
Cocoa beans - bags	228		205		199	
Copra - bags/bulk					108	
Cocoa wash - bags					171	
Coffee beans - bags					235	
Core stock panels						120
Cylinder - empty metal gas	113	101	96	85	96	85
Gum, damar or copal - bags	262		252		252	
- cases		226		198		198
Gutta percha - cases		231				
Illipenuts - bags	224					
Illipenut oil - drums		216		189		
Jelutong - cases		207		189		
Oil - coconut - drums	127		113		113	
- palm - bulk					102	
- palm - drums					112	
Ore - antimony	126		118			
Palm kernels - bags and bulk					158	
Pepper - bags	297		263		263	
Pepper dust or sweepings - bags	245		207			
Rattans - bundles	327		318		318	
Rubber - sheet - cases or bales		129		117		117
- crepe - cases or bales		119		106		106
Palletised dry natural rubber		129		117		117
Sago flour - bags	131		111		111	
Sand - glass			95			
Tapioca, pearl (seed and medium) - bags	194					
Teak mosaic panels		152				
Timber - sawn[6]		165		150		150
Timber - plywood veneer (net)		115		115		115
- dowels (not teak) - bundles	140	127	120	109		
- moulded shutters slate - packed				126		
- mouldings (not teak) - packed		127		109		
Wooden broom handles - bundles		134		114		
Unenumerated cargo, packages value up to US$:- 2 465 per ton	270		267		267	
2 300 per cubic metre		243		240		240
3 120 per ton	303		300		300	
2 000 per cubic metre		271		269		269
3 570 per ton	367		364		364	
3 200 per cubic metre		329		327		327
3 570 per ton	408		405		405	
3 200 per cubic metre		366		363		363

Notes

(1) The freight rate basis is:-

W = per metric ton gross;
M = per cubic metre.

When alternatives are quoted the rate giving the highest amount of freight will always be charged. Contractor and cash rebate amounts to about 10 per cent.

(2) The freight rates are converted from US$ by using the exchange rate of US$1 = M$2.315, adjusted according to the FEFC currency adjustment factor (CAF) of +25.5 per cent and the Suez surcharge of +7.5 per cent (July, 1973).

(3) Europe base ports: Amsterdam, Antwerp, Avonmmouth, Bremen, Genoa, Glasgow, Hamburg, Havre, Hull, Liverpool, London, Marseilles, Naples, Port Said, Rotterdam. To other European ports, ports in Africa, South America, Central America and the Middle East there are additional charges.

(4) Direct loading in Sarawak applies only to Tanjong Mani. Loaded ex-coastal applies when cargo is forwarded by coastal services for trans-shipment at Singapore or elsewhere at ocean carriers option.

(5) Freight allowances are given for pre-palletised cargo and cargo in unit loads (which confirm with some single weight and dimensional standards) in the following way:-

- for freight paid on measurement the height is reduced by six inches and the freight charged on the adjusted cube of the unit load less M$1.57 per cubic metre;
- for freight paid on weight the freight will be charged on the gross weight less the weight of the pallets, less an allowance of M$2.88 per metric ton;
- for ad valorem freight the freight will be charged on the value of the cargo less an allowance of M$1.57 per cubic metre on the measurement of the cargo only.

(6) For sawn timber in bundles from Miri and and Tanjong Mani the following allowances is given:-

a) a discount of about M$6.97 per gross cubic metre on bundles with one fair end and size within certain limits;

b) a discount of about M$8.28 per gross cubic metre on bundles which comply with a more strict unit size than (a).

TABLE 2.9 SUMMARY OF PRESENT OVERSEAS SHIPPING FREIGHT TARIFFS - SARAWAK TO HONGKONG AND JAPAN[2]

Commodity	Per quantity[1]	Hongkong M$	Japan M$	Commodity	Per quantity[1]	Hongkong M$	Japan M$
Ad valorem		3.5%	4%	Ad valorem		3.5%	4%
Antimony ore	W	58	65	Gums (including damar and jelutong)	W/M	67	104
Beans (cocoa, coffee, soya)	W	62	89	Illipenuts	W	113	146
Birds' nests	M	78	115	Motor cars (uncrated)	each	460	530
Bottles - empty	M	42		Motor cars (crated)	each	656	782
Bottles - returned empties (aerated water bottles only)	M	27		Nutmeg	W	106	159
Castor seeds	W	62	89	Palm kernels	W		78
Charcoal	W		54	Pepper	W/M	89	102
Coconuts	each	0.10		Plywood	50 cubic feet	42	66
Coconut oil	M	33	77	Prawns - dried	W/M	67	104
Coconut husks	M	33	56	Rattan	W	105	143
Copra	W		58	Ramin dowl work	50 cubic feet	45	70
Corestocks veneer	50 cubic feet	42	60	Rubber (per 1 000 kg)	W	46	64
Cutch	W/M	58	84	Sago flour	W	38	48
Cylinders	W	62		Sawn mouldings	50 cubic feet	52	78
Dangerous cargo:				Sawn timber	50 cubic feet	44	65
- semi-hazardous	W/M	100	149	Scrap iron	W	52	89
- hazardous	W/M	134	198	Used rubber tyres	M	44	
Fireclay	W		56	Frozen prawns	M	150	190
General cargo NOS	W/M	67	99	Frozen fish	M	135	170
Ginger	W/M		66	Minimum B/L	per set	24	38
				Parcel receipt	per set	14	24

NOS = Not otherwise specified.

Additional charges: (a) Heavy lifts: Additional charge is made to general cargo rate on the same weight in measurement basis as under:-

Tons	M$/net/ton	M$/40 cubic feet
1 - 2	7	4
2 - 5	9	7
5 - 8	23	18
8 - 10	26	20
10 - 15	38	33

(b) Long length: Items over 30 feet, plus 20 per cent except when heavy lift surcharge applies.
(c) Rubber: Rubber to Moji (Japan) subject to surcharge of M$9 per ton.

Notes (1) Rates per weight - W: per long ton;
per measurement - M: per 40 cubic feet.

(2) The rates to Japan apply to Osaka, Kobe, Nagoya and Yokohama. Delivery at Hongkong is overside to consignee's craft. The rebates for large (bulk) shipments amount to about 10 per cent.

TABLE 2.10 SUMMARY OF PRESENT OVERSEAS SHIPPING FREIGHT TARIFFS SABAH, SARAWAK AND BRUNEI TO UNITED STATES

Commodity	Basis[1]	Sarawak		Sabah/Brunei	
		Group A[2]	Group B[2]	Group A[2]	Group B[2]
		Malaysian dollars			
Ad valorem, NOS	W/M or Ad val.	327 4%	350 4%	387 4%	410 4%
Cargo, NOS[4,7]		360	385	363	387
Cargo, NOS[8]				387	410
Clover - bags	50 cubic feet	774			
Corestock	M		158		158
Cutch - bags and cases	W/50 cubic feet	193	153		153
Damar - batu - cases	50 cubic feet		230		
Damar - batu - bags	50 cubic feet		250		264
Dowels - wooden bundled	50 cubic feet	175	176	178	180
Gutta percha - cases/bags	50 cubic feet		370		
Jelutong - cases[4]	50 cubic feet		257		
Pepper - bags	W	382	382		
Plywood - veneer, crates	50 cubic feet	194	194	194	196
Frozen prawns	50 cubic feet	503	503	503	504
Rattan - cane furniture	W/M	189	189	186	189
Rubber - bales/cases	50 cubic feet	203	222	203	222
Sago flour - bags	W	188	167		
Timber - sawn and machine processed, laminated	50 cubic feet	175	176	175[10]	176[10]
Timber - sawn in bundles one end flush	50 cubic feet	163	165		
Timber - sawn in bundles both ends flush	50 cubic feet	153	155		
Timber - logs[2]	50 cubic feet	221	222	229	210
Abaca fibre and waste - bales[11]	W			287	294
Abaca fibre and waste - bales[8]	W			233	235
Automobiles - unboxed	50 cubic feet			360	362
Cassia	W			646	648
Cocoa beans - bags	W			501	502
Mace - bags	W			850	
Nutmeg - bags	W			494	
Oil palm - bulk[9]	W			120	125
Oil palm - packed	50 cubic feet				256
Pottery	W/M			215	218
Rattan - bundles	W			561	562
Timber flooring[5]	50 cubic feet				251
Blocks[6]	50 cubic feet				274

NOS = Not otherwise specified.

Notes
(1) Except as otherwise provided rates apply per 2 240 pounds (long ton) or 50 cubic feet whichever produces the greater revenue. M = per 40 cubic feet.
(2) Group A: ports at the Pacific Coast (California);
Group B: ports at the Atlantic Coast (New York Baltimore).
(3) Freight rates converted from US$ by using the exchange rate US$1 = M$2.315. The rates have been adjusted according to the Far Eastern Freight Conference Currency Adjustment Factor (CAF) 25.5 per cent.
(4) For the ports of Kuching, Sibu, Sarikei and Binatang only.
(5) Rate applies at loading port of Brunei only.
(6) Rate applies at loading port of Kuala Belait only.
(7) Rate applies at North Borneo ports, except Limbang, Weston, Kuala Belait, Marudi.
(8) Rate applies at loading ports of Limbang, Weston, Kuala Belait, Marudi.
(9) Rate applies at loading port of Kunuh only, and is inclusive of clearing expenses before loading and after discharge.
(10) Timber sawn: a reduction of M$8 per 50 cubic feet will be allowed on timber sawn, strapped in bundles; the maximum length of a bundle shall be 30 feet, one end of each bundle shall be stacked flush.
(11) Rate applies at loading port of Tawau only.

TABLE 2.11 ESTIMATED SHIPPING TO/FROM THE STUDY AREA AND INTERNAL WATER TRANSPORT

A. EXPORTS AND IMPORTS OF THE STUDY AREA BY SHIPPING 1970[1,5]

Region	Origin destination[4]	Import (tons)			Export (tons)[1]		
		General cargo	Gasoline, diesel oil	Sand, stone	General cargo[2]	Sawn timber	Round timber
MIRI	A	21 000	1 500		9 500		
	B	29 100	1 400		1 600		
	C	1 400			200	6 500	
	D	4 900			500	7 200	800 000
	Total	56 400	2 900		11 800	13 700	800 000
MARUDI	A	5 000	350		1 600		
	B	1 900	200		800		
	C				2 600	900	2 650
	D	150			5 750		9 100
	Total	7 050	550		10 750	900	11 750
BINTULU	A	10 000	650		17 000		
	B		400				
	C					3 600	
	D						183 700
	Total	10 000	1 050		17 000	3 600	183 700
STUDY AREA	A	36 000	2 500	30 000[3]	28 100		
	B	31 000	2 000		2 400		
	C	1 400			2 800	11 000	2 650
	D	5 050			5 750	7 200	992 800
	Total	73 450	4 500	30 000[3]	39 050	18 200	995 450

B. ESTIMATES OF INTERNAL WATER TRANSPORT IN THE STUDY AREA 1972[6]

Commodity group	Goods transported (tons)		Total
	Between Planning Units and Sub-units	Inside Planning Units (local)	
Building and construction materials	20 000		20 000
Mineral oil products	20 000	2 000	22 000
Other cargo (general cargo)	60 000	10 000	70 000
Total	100 000	12 000	112 000
Forestry products	-	-	700 000

Notes
(1) Excluding export of oil products.
(2) Includes agricultural products.
(3) Estimated.
(4) A = First, Second, Third Divisions of Sarawak;
B = Peninsular Malaysia, Singapore, Thailand;
C = Sabah, Brunei;
D = Other foreign countries.
(5) Based on Custom statistics and one week origin-destination survey.
(6) Estimates mainly based on a two-day origin-destination survey in July, 1972.

TABLE 2.12 AIR TRAFFIC AND TRANSPORT, 1970 TO 1973

A. AIR TRAFFIC SERVICE (OCTOBER, 1973)

Airport	Number of scheduled flights per day to					Total number of flights[1]	Aircraft type
	Miri	Sibu	Kuching	Brunei	Kota Kinabalu		
Miri		5	5	2	4	10	F27
Bintulu	2	2	2	1	1	4	F27
Marudi[2]	11						BN2

B. PASSENGERS CARRIED 1970

From / To	To and from airport						Total
	Miri	Sibu	Kuching[1]	Brunei[1]	Kota Kinabalu[1]	Other	
Miri		14 073	6 719	4 056	2 417	10 395	37 630
Bintulu	4 849	5 161	1 009	347	406	8	11 780
Marudi	2 091	-	-	-	-	518	2 609
Total	6 940	19 204	7 728	4 403	2 823	10 921	52 019

C. MAIL AND CARGO CARRIED 1970 (TONS)

From / To	To and from airport						Total
	Miri	Sibu	Kuching[3]	Brunei[3]	Kota Kinabalu[3]	Other	
Miri		102	119	20	20	8	269
Bintulu	8	135	46	32	1	0	222
Marudi	10					61	71
Total	18	237	165	52	21	69	562

Notes (1) Is not necessarily the same as the total number of flights to other destination as two or more destinations can be served by one flight.

(2) Per week.

(3) Includes passengers and cargo in transit at these international airports.

2.4 AIRPORTS AND AIR TRANSPORT

2.4.1 Airports

There are at present three airports in the Study Area, at Miri, Bintulu and Marudi. Miri and Bintulu airports were completed in 1968 to their present standard with bituminous runways designed to serve aircraft of the Fokker F27 type and weight. The airport at Marudi can only take smaller aircraft such as the BN2 presently used by Malaysian Airlines System (MAS).

The airport at Bintulu is located near the town. This is quite convenient at present but rather inconvenient for the future development needs of the town and the airport. The airport at Marudi is also located near the town, but Miri airport is about five miles from the town.

2.4.2 Air Traffic and Transport

Miri and Bintulu airports (1973) are served by six and two daily flights respectively, connecting these towns with each other and with Sibu, Kuching, Brunei and Sabah. Marudi is connected with Miri by daily flights by the small seven seater BN2, which also serves Bario and other small settlements in the interior.

Passenger transport by air between the Study Area and the rest of Sarawak, other states in Malaysia and foreign countries amounted in 1970 to 74 000 passengers. Air travel between the three airports in the Study Area amounted to about 14 000 passenger trips. Mail and cargo to and from the Study Area amounted to about 400 tons, internal air cargo and mail was around 20 tons. Details of air traffic and transport are presented in Table 2.12.

CHAPTER 3

FUTURE TRANSPORT DEMANDS

3.1 INTRODUCTION

It has been widely observed that the development of transport demand is closely related to:-

(a) economic and population growth;
(b) improvements in the transport system.

Transport demands have in general been observed to grow a little faster than overall economic growth. A projected growth of the Gross Regional Product of seven to eight per cent per annum can , according to general experience, be expected to lead to average annual growth rates of about eight to ten per cent for goods transport and ten to 12 per cent for passenger transport.

In the following sections estimates of the future transport demands up to 1990 are presented. The estimates have been based on:-

- present transport demands as presented in Chapter 2;
- envisaged population and economic growth;
- envisaged development of the future transport system;
- development trends experienced in other countries.

Exports and imports of mineral oil, oil products and gas have been considered to be outside the scope of this Study. Air-service for the interior of Fourth Division has also been excluded, on the grounds that they are a highly specialised problem which should be the subject of a separate study.

3.2 FUTURE IMPORTS AND EXPORTS OF THE STUDY AREA

Transport between the Study Area and other parts of Sarawak, other states in Malaysia and foreign countries, is at present primarily by coastal and ocean-going vessels. Some cargo and mail is carried by air, the total volume of which in 1970 accounted for less than 0.1 per cent of the total external transport. It is expected that coastal and ocean-going vessels also in the future will continue to carry the bulk of the external goods transport. Some coastal transport will be diverted to trucks, especially over distances below 200 miles. Air transport is expected to grow in importance but will probably count in volume for less than 0.5 per cent of the total external goods transport.

3.2.1 Shipping (and Lorry Transport)

About 30 000 tons of stone and sand and 73 000 tons of other cargo were brought by ships into the Study Area in 1970. Roughly 75 per cent of the goods were landed in Miri, the rest mainly at Bintulu and Marudi. About 50 per cent of the goods were supplied by dealers in First, Second and Third Divisions of Sarawak, the remainder came mainly from Singapore, Peninsular Malaysia and Thailand. The estimated total import of general cargo amounted to about 0.53 tons per capita, which appears reasonable in relation to the comparable foreign import to the whole of Sarawak of 0.37 tons per capita.

Export of an estimated one million tons of timber products as logs to Japan was mainly cleared through the Miri Customs. Another 50 000 tons of export cargo was mainly shipped from Miri and Bintulu through other Divisions of Sarawak. Details of the estimated total volumes of imports and exports are shown in Table 2.11 (page 19).

Estimates of the future volumes of imports and exports of the Study Area have been made for four commodity groups. Two alternative estimates of 1990 volumes and average growth rates are presented in Table 3.1. These alternative estimates relate to two Situations discussed in the Perspective Plan, submitted in March 1973. The first assumed an overall annual population growth rate of four per cent and the second a growth rate of five per cent. The import of agricultural inputs (fertilisers, animal feedstuff etc.) is estimated to increase by more than ten fold by 1990 and the import of cereals to have doubled. The export of those agricultural products, which are handled as dry cargo, is estimated to reach about 140 000 tons and the export of palm oil by tankers to reach more than 300 000 tons by 1990.

The import of stone from the First and Second Divisions of Sarawak is estimated to follow the general economic growth; the present and possibly new quarries in the Study Area can probably supply the lower quality stones.

The forestry output (including output from areas outside the Study Area) which could be shipped through Bintulu in the Study Area, will reach 60 to 70 mn cubic feet by 1990, (FAO, 1972). Assuming an increased local processing of the timber, by 1990 more than 50 per cent would be exported as sawn timber, 20 per cent as manufactured products and less than 30 per cent as logs. The volume of import cargo, such as consumer and producer goods, and the export of general cargo are assumed to increase at an average rate of seven to nine per cent per annum. The total imports and exports demanding shipping and lorry transport would, according to the estimates made above, be about 60 to 100 per cent higher by 1990 than the 1970 volumes. The transport volumes which require port facilities are however, expected to increase by 10 to 11 times because manufactured timber products demanding port handling would be the main type of export commodity. Logs are far less demanding because they can be floated to ships waiting at open anchorages.

TABLE 3.1 ESTIMATED FUTURE (1990) IMPORTS AND EXPORTS OF THE STUDY AREA BY SHIPPING AND LORRY TRANSPORT

A. ESTIMATED IMPORT AND EXPORT VOLUMES (THOUSAND TONS)

	Commodity group	1970 volumes	Estimated 1990 volumes	
			Situation I	Situation II
Import	Input to agriculture (fertiliser etc.)	7.4	85	85
	Cereals (rice, wheat, oats etc.)	5	10	12
	Stone, sand	30	120	150
	Other cargo (consumers and producers goods)	61	240	330
	Total	103.4	455	577
	Agricultural products, dry cargo	8	140	140
	Agricultural products, liquid cargo	-	316	316
	Forestry products: logs	996	350	400
	sawn timber	18	300	350
	industrial products	-	100	120
	Other cargo	30	120	170
	Total	1 052	1 326	1 496
Grand total	Volumes	1 155.4	1 781	2 073
	Average growth rates per cent per annum	-	2.2%	3.0%
Total, excluding logs (port requiring volumes)	Volumes	159.4	1 431	1 673
	Average growth rates per cent per annum	-	12%	12.5%

B. ESTIMATED TRANSPORT PATTERN VOLUMES (THOUSAND TONS) (1)

Year	Transport pattern by origin-destination					Total
	Commodities	Sarawak	Countries bordering South China Sea	Other countries		
				Via transit	Direct	
1970	General cargo	64	38	11	-	113
	Sand, stone	30	-	-	-	30
	Sawn timber	-	11	-	7	18
	Total	94	49	11	7	161
1990 (Situation) II	General cargo	237	220	150	130	737
	Sand, stone	150	-	-	-	150
	Palm oil	-	-	-	316	316
	Sawn timber	-	50	negl.	300	350
	Manufactured timber products	-	20	negl.	100	120
	Total	387	290	150	846	1 673

Note (1) Excluding logs.

A forecast of future shipping trading and transport patterns can be no more than very approximate. However, some assumptions are now made in order to assess future shipping and port requirements.

The major portion of agricultural export products can be assumed to be destined for countries outside the South China Sea area. The same is also likely be true for logs and about 90 per cent of the sawn timber and manufactured wood

products. The supply to the Study Area of inputs for agriculture (fertiliser, equipment etc.) and of cereals will probably be nearly equally divided between the rest of Sarawak, Peninsular Malaysia, countries in the South China Sea area and other more distant countries. Of the general cargo imported by Sarawak in 1970 about half the volume came from Peninsular Malaysia and countries around the South China Sea, and half from more distant countries. It is assumed that this is valid for the Study Area today and that it will be equally valid in 1990. Export of general cargo would most probably have destinations in Kuching, Sibu and Peninsular Malaysia.

The main export commodities such as palm oil and forestry products, and most other bulk export commodities such as rubber and palm kernels will probably be transported by liners and chartered vessels calling at the most convenient deep water port, for shipment to distant destinations. But other exports to and imports from distant countries are likely to be in such small quantities on each link and so separated in time that direct shipping to a deep water port in the Study Area could not be expected. Direct shipping may account for around 30 per cent of the volumes, the rest will probably be trans-shipped at major ports in Peninsular Malaysia or in Singapore.

The trade between the Study Area and Peninsular Malaysia and other countries around the South China Sea will probably be shipped directly for most of the volumes if reasonable port facilities are available in the Study Area. The assumed future trade and transport patterns are presented in Table 3.1, Part B. It can be assumed that a part of the transport between the Study Area and the rest of Sarawak will be diverted to truck transport, especially transport between the Bintulu Area and Sibu.

3.2.2 Air Transport

Airlines throughout the world are now finding that transport of cargo and mail is showing higher growth rates than passenger transport. It could well be that air transport of mail and cargo to and from the Study Area will grow at average annual rates of up to 15 to 17 per cent.

3.3 INTERNAL GOODS TRANSPORT

The goods transport within the Study Area is, as described in Chapter 2, partly carried out by lorries and partly by coastal and river craft. It can be assumed, however, that with the envisaged development of an extensive road network and an efficient road transport industry, most internal transport in the future will be carried out by lorries. It is assumed that the only significant water transport will be long dis-

tance transport of stone and other low value bulk commodities. It has proved difficult, using the available data, to make an accurate estimate of the future lorry transport. The following considerations help to give an indication of the order of magnitude. In Section 3.2 the future imports and exports for the Study Area were estimated at 1.8 to 2.1 million tons by 1990 (see Table 3.1). It can be assumed that most of this cargo will be transported by lorry. The estimated export of 300 000 tons palm oil (see Table 3.1) is the result of the processing of some 1.5 million tons of oil palm fruit. In addition there would be goods produced and consumed in the Study Area. The total amount of goods marketed in and exported from the Study Area by 1990 can be estimated at four to four-and-a-half million tons.

Surveys carried out in developed countries indicate that the amount of goods transported is often about double the amount of goods marketed and exported. The reasons are that some cargo is registered as being transported twice or more; stone, sand and earth from construction works are not counted as marketed goods, neither are garbage and other waste. If the goods volumes transported are taken as being about eight to nine million tons and the average transport distances as being 20 miles, the total yearly internal goods transport by lorry would amount to some 160 to 180 million ton miles by 1990. If the average lorry load capacity is assumed to be eight tons, the average load factor to be 50 per cent; and the average annual mileage for lorries to be 30 000 miles, the lorry fleet would be 1 300 to 1 500 units by 1990.

3.4 EXTERNAL PASSENGER TRANSPORT

At present passenger transport between the Study Area and the rest of Sarawak, other states in Malaysia and other countries, is mostly by aircraft. Passenger transport by coastal and ocean-going vessels is insignificant, bus transport between Miri and Kuala Belait (Brunei) is, for convenience, counted as internal transport.

Passenger transport by air between the Study Area and the rest of Sarawak, Peninsular Malaysia and other countries amounted to about 74 000 passengers in 1970. The increase over the last ten years has been exceptional with average annual growth rates of 22 per cent for Bintulu and 36 per cent for Miri. This decade, however, has also been a period for the establishment of modern aviation in the Study Area and of years of high economic activity.

The Malaysia Airport Study (ACRES/SWR Consortium, 1972) estimated that the annual traffic on Bintulu and Miri airports would reach 170 000 and one million passengers respecitvely by 1990. The report, which has been made available to the Consultants, does not give any specific details on the forecast methodology, but it appears that trend extra-

polations have played a major role. The forecasts of the Airport Study must therefore be modified in the light of the development envisaged in the Plan now presented.

Both Bintulu and Miri are expected to develop into major urban centres with an extensive road network providing good connections between the cities and their influence areas. On this basis and on that of the Plan's target population (Situation I of the Perspective Plan) and economic growth it is estimated that the external air traffic in 1990 will be about 300 000 to 500 000 passengers on Bintulu airport and about 750 000 to 1 000 000 passengers on Miri airport (see Table 3.2). These volumes correspond to average annual growth rates in external traffic of 16 to 20 per cent for Bintulu airport and 13 to 15 per cent for Miri airport. The development of an extensive and high standard main road

TABLE 3.2 ESTIMATED AIR TRANSPORT DEVELOPMENT IN AND TO/FROM THE STUDY AREA (1)

A. PASSENGER TRANSPORT

Year	Airport	Estimated population basis (thousands)	Traffic inside Study Area (thousand passengers)	Traffic to/from Study Area		
				Average number of passengers per capita	Total (thousand passengers)	Average growth rate (Per cent per annum)
1970	Marudi	21	4.3	-	-	-
	Miri	65 + 21	14.2	0.7	59.4	-
	Bintulu	30	9.9	0.5	14.3	-
1990 Situation I	Marudi	-	-	-	-	-
	Miri	180	15	4	750	13.5
	Bintulu	70	15	4	300	16.0
1990 Situation II	Marudi	(40)	-	-	-	-
	Miri	200	20	5	1 000	15
	Bintulu	100	20	5	500	20

B. MAIL AND CARGO

Year	Airport	Estimated population basis (thousands)	Transport inside Study Area (tons)	Transport to/from Study Area		
				Tons per thousand people	Total (tons)	Average growth rate (per cent per annum)
1970	Marudi	21	11.8	-	-	-
	Miri	65 + 21	22.3	3.9	332	-
	Bintulu	30	10.5	2.4	70.8	-
1990 Situation I	Marudi	(35)	-	-	-	-
	Miri	180	insignif.	25	4 500	14
	Bintulu	70	insignif.	25	1 800	17
1990 Situation II	Marudi	(40)	-	-	-	-
	Miri	200	insignif.	30	6 000	16
	Bintulu	100	insignif.	30	3 000	20

Note (1) Excluding traffic to/from the interior of the Third, Fourth and Fifth Divisions.

network with good connections to Sibu, Kuching and Brunei, will probably divert some of the external passenger transport to cars and buses. No estimate of the amount of this traffic or its probable impact on the air transport on certain connections for example Bintulu-Sibu, has been made.

3.5 INTERNAL PASSENGER TRANSPORT

3.5.1 Car Transport

Experience from other countries indicates a strong relationship between car ownership and GNP per capita. This relationship is illustrated in Figure 3.1 for a number of countries in 1962. It also shows the same relationship for Malaysia and Sarawak 1965 to 1970. It has also been observed that the demand for individual car ownership increases over the years as people become more and more car-minded.

In the projections of future car ownership in the Study Area it has been assumed that the problem of environmental pollution by cars will have been improved by 1990, so that at least in sparsely populated Sarawak, there will be no need to seriously curb the expansion of motor car use. It has been further assumed that taxes and other restrictions on car use will not significantly affect the increase of car ownership in Sarawak compared to other countries. On these bases it is expected that there will be about 60 to 65 cars per thousand inhabitants in the Study Area by 1990. This indicates that the car fleet will grow at an average annual rate of nine to 11 per cent. Car traffic and transport are estimated to grow at about ten to 12 per cent per annum reflecting an expected average increase in the use of each car. Further details on these estimates are presented in Table 3.3. Any possible effects of the recent general awareness of an energy shortage and of the corresponding, significant increases in petrol prices have not been taken into account.

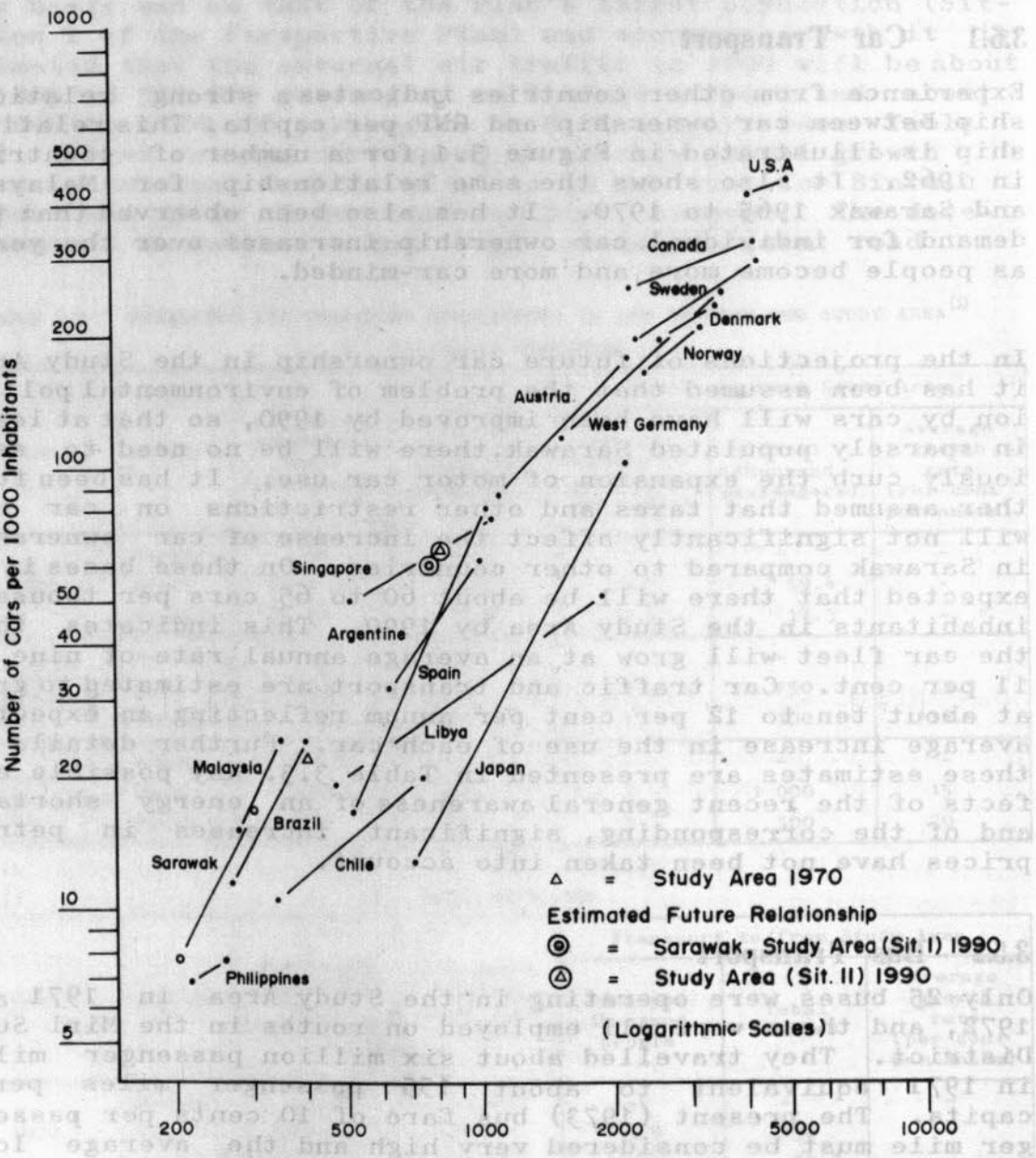
3.5.2 Bus Transport

Only 25 buses were operating in the Study Area in 1971 and 1972, and these were all employed on routes in the Miri Sub-District. They travelled about six million passenger miles in 1971 equivalent to about 155 passenger miles per capita. The present (1973) bus fare of 10 cents per passenger mile must be considered very high and the average load factor of 20 per cent to be too low compared to bus transport in most other countries. In general it is assumed that the future potential bus transport users will prefer a cheaper bus service at the expense of a reduced service frequency.

Assuming an average fare in the future of five cents per passenger mile and a reasonable service standard, it is estimated that the future bus transport could reach an annual amount

FIGURE 3.1

RELATION BETWEEN CAR DENSITY AND LEVEL OF ECONOMIC DEVELOPMENT 1963 - 1971



Notes: 1) The following exchange rates have been used : 1965-70 — US$1 = M$3.1
1971 — US$1 = M$2.9
1990 — US$1 = M$2.8

2) Source: United Nations Yearbook 1972

TABLE 3.3 ESTIMATED DEVELOPMENT OF CAR TRANSPORT

A. DEVELOPMENT OF CAR OWNERSHIP

Year	Area	GNP/GRP per capita[1] (dollars)	Cars per thousand population	Population (thousands)	Number of cars
1965	Sarawak	620	7.8	840	6 552
1966	Peninsular Malaysia	920	17.4	8 720	151 776
1970	Sarawak	907	16.4	975	16 000
	Study Area	1 280	22.3	115	2 560
1990	Sarawak	2 185[2]	60	1 700	100 000
	Study Area: Situation I	2 095	60	250	15 000
	Situation II	2 265	65	300	20 000

B. DEVELOPMENT OF CAR TRAFFIC AND TRANSPORT IN THE STUDY AREA

Year	Car traffic development				Car transport development		
	Car fleet (thousands)	Average annual mileage (thousands)	Total vehicle miles (millions)	Average growth rate (per cent per annum)	Average number of persons per car	Total passenger miles (millions)	Average growth rate (per cent per annum)
1970	2.56	5	12.8	-	4	51	
1990							
Situation I	15	6	90	10	4	36.0	10
Situation II	20	6	120	12	4	48.0	12

Notes (1) GNP/GRP in dollars per capita = Gross National/Regional Product in Malaysian dollars per capita.
(2) Assumed GNP/GRP in dollars per capita.

of some 500 passenger miles per capita by 1990. The pre-requisite for this development is the construction of an extensive road network as presented in Section 4.2 and the development of an efficient bus transport service as discussed in the same section.

Estimated future bus transport requirements indicate, when compared to the present situation in Miri Sub-District, that the demand for bus transport in passenger miles per capita would grow at an average annual rate of six per cent despite the growth in private car ownership. Private expenditures on bus transport would, however, only grow at half that rate due to the expected decrease in bus fares. Further details on the estimates made are presented in Table 3.4.

TABLE 3.4 ESTIMATED DEVELOPMENT OF BUS TRANSPORT IN THE STUDY AREA

A. RELATION BETWEEN BUS FLEET AND POPULATION

Year	Area	Population (thousands)	Number of buses	Number of buses per thousand population
1966	Peninsular Malaysia	8 720	3 491	0.4
1971	Sarawak	1 000	342	0.34
	Fourth Division	140	25	0.18
	Miri Sub-District	37	25	0.68
1990	Study Area, Situation I	250	200	0.8
	Study Area, Situation II	300	250	0.8

B. DEVELOPMENT OF BUS TRANSPORT IN THE STUDY AREA

Year	Growth in GRP[1] in capita (per cent per annum)	Passenger miles per capita		Total passenger miles	
		Passenger miles	Average growth rate (per cent per annum)	Passenger miles	Average growth rate (per cent per annum)
1971		(155)[2]		5.75	
1990, Situation I	2.8	500	6[3]	125	16
1990, Situation II	3.2	500	6[3]	150	18

C. ESTIMATED REQUIRED BUS FLEET 1990

Year	Total passenger miles (millions)	Average passenger miles per bus mile	Average annual mileage of buses	Total number of buses required
1971	5.75	7.5	30 600	25
1990, Situation I	125	15	40 000	200
1990, Situation II	150	15	40 000	250

Notes (1) GRP - Gross Regional Product.
(2) In Miri Sub-District.
(3) Compared to Miri Sub-District.

CHAPTER 4

FUTURE TRANSPORT SYSTEM

4.1 FRAMEWORK OF FUTURE TRANSPORT SYSTEM, 1990

The future transport system should first provide accessibility to all development areas and give opportunities for convenient transport and travel within and to/from the Study Area. It should secondly provide cheap and convenient transport services in accordance with the volumes and characteristics of the transport demands. It is envisaged that the future transport system in 1990 will include the following main features:-

- an extensive road network as the backbone of the internal part of the transport system;
- a deep water port at Bintulu (Tanjong Kidurong), modern coastal ports at Miri and Marudi; and perhaps coastal port facilities at Kuala Baram;
- modern airports able to serve medium size jet aircraft at Miri and Bintulu;
- an efficient transport industry.

The main features of the envisaged transport infrastructure are presented in Figure 4.1. The following sections show a perspective for development of the major modes of transport.

4.2 ROADS AND ROAD TRANSPORT

4.2.1 Road Network and Costs

The proposals for the future main road network are presented in Tables 4.1, 4.2 and 4.3. The new road network in the Study Area should include the following:-

- construction of 48 miles of new trunk roads during the Action Programme period 1975 to 1980 at the cost of $13.5 mn;
- construction of 264 miles of other public roads outside the urban areas, of which 124 miles should be completed in the Action Programme period. Total costs of the 264 miles are estimated at $43 mn;
- construction of 76 miles of new urban roads during the Action Programme period at a cost of $6.9 mn. Another $15 mn are estimated to be required for road construction during the period 1981 to 1990;
- improvement and surfacing of nearly 130 miles of trunk roads and secondary roads and improvements of 11 bridges in the Action Programme period at a total cost of $33 mn. Road improvements, surfacing and bridges required during the years 1981 to 1990 have been estimated to cost about

FIGURE 4.1

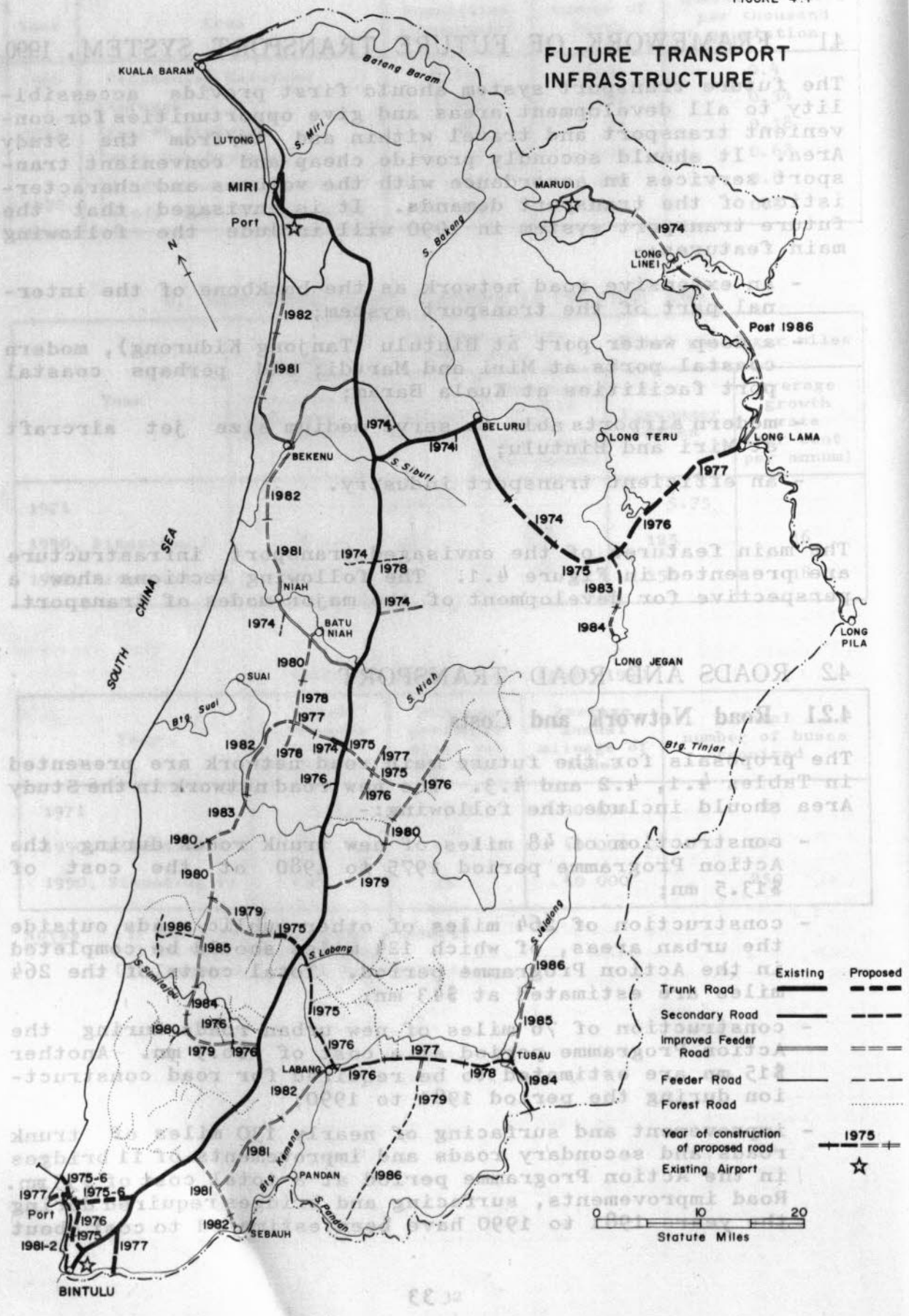

FUTURE TRANSPORT INFRASTRUCTURE
KUALA BARAM
Batang Baram
LUTONG
S. Miri
MIRI
Port
MARUDI
S. Bekeng
LONG LINEI
Post 1986
BELURU
LONG TERU
LONG LAMA
BEKENU
S. Sibuti
LONG PILA
LONG JEGAN
NIAH
BATU NIAH
SUAI
S. Niah
Big Suai
Big Tinjar
S. Lobang
S. Jalalong
S. Simiarau
LABANG
TUBAU
PANDAN
Big Kemena
S. Pandan
SEBAUH
BINTULU
SOUTH CHINA SEA
N
Existing
Proposed
Trunk Road
Secondary Road
Improved Feeder Road
Feeder Road
Forest Road
Year of construction of proposed road
1975
Existing Airport
0
10
20
Statute Miles

TABLE 4.1 ROAD CONSTRUCTION AND IMPROVEMENTS 1975 TO 1980

Item	1975		1976		1977		1978		1979		1980		Total 1975 to 1980	
	Miles	Costs $'000	Miles	Costs $'000	Miles	Costs $'000	Miles	Costs $'000	Miles	Costs $'000	Miles	Costs $'000	Miles	Costs $'000
Construction														
Trunk roads	20.0	5 755	15.1	4 577	12.5	3 240							47.6	13 572
Secondary roads	8.0	1 600	8.0	1 600	8.0	1 600	4.8	960					28.8	5 760
Improved feeder roads	20.6	2 710	11.3	1 695	5.5	830	6.1	910	20.4	3 060	14.0	2 100	77.9	11 305
Feeder roads			4.1	492			2.7	324	6.5	780	4.1	492	17.4	2 088
Urban roads	8.4	617	9.1	921	17.1	1 432	19.2	1 887	12.7	1 074	9.9	990	76.4	6 921
Sub-total	57.0	10 682	47.6	9 285	43.1	7 102	32.8	4 081	39.6	4 914	28.0	3 582	248.1	39 646
Improvements and surfacing														
Trunk roads	10.5	2 500	30.5	7 000	26.0	6 000	18.0	4 160	17.0	4 000	17.0	4 000	119.5	27 660
Secondary roads	2.3	500	2.3	500			3.0	1 500	3.0	1 500			10.6	4 000
Bridges		250		700		500		250						1 700
Sub-total	12.8	3 250	32.8	8 200	26.0	6 500	21.0	5 910	20.0	5 500	17.0	4 000	130.1	33 360
Total	69.8	13 932	80.4	17 485	69.1	13 602	53.8	9 991	59.6	10 414	45.0	7 582	378.2	73 006

TABLE 4.2 URBAN ROADS PLANNED FOR CONSTRUCTION BETWEEN 1974 AND 1980

Town	1974	1975		1976		1977		1978		1979		1980	
	Miles	Miles	Costs $'000	Miles	Costs $'000	Miles	Costs $'000	Miles	Costs $'000	Miles	Costs $'000	Miles	Costs $'000
Ladang Tiga, Subis I+II	6.3												
Ladang Empat		2.0	40										
Mera-a		2.2	44										
Igang				3.3	200	3.3	200	3.3	190				
Galasah						2.5	150						
Sebanah						3.6	254						
Lamaus								4.2	267				
Ensabang										4.2	267		
Telabit												1.4	188
Timong				0.4	8								
Miri*		3.3	500	3.3	500	3.3	500	3.3	500	3.3	500	3.3	500
Bintulu**				1.2	180	1.2	180	1.2	180	1.2	180	1.2	180
Long Lama								4.1	615	1.4	29	1.5	29
Batu Niah		0.9	33	0.9	33	0.9	33	1.0	33	1.0	33	1.0	33
Marudi						1.3	40	1.3	40	1.3	40	1.1	35
Beluru								0.3	25	0.3	25	0.4	25
Bekenu								0.5	37				
Labang						1.0	75						
Total	6.3	8.4	617	9.1	921	17.1	1 432	19.2	1 887	12.7	1 074	9.9	990

Notes * Mileage estimated on basis of cost figures taken from the Sarawak Mid-Term Review of the Second Malaysia Plan.
** Excludes trunk roads in the Tanjong Kidurong area north of Bintulu.

TABLE 4.3 ROAD PROJECTS - MILEAGES AND INVESTMENT COSTS YEAR BY YEAR

Detail	Total mileage	Total costs $'000	74		75		76		77		78		79		80		81		82		83		84		85		86	
			Miles	Costs $'000	Miles	Costs $'000	Miles	Costs $'000	Miles	Costs $'000	Miles	Costs $'000	Miles	Costs $'000	Miles	Costs $'000	Miles	Costs $'000	Miles	Costs $'000	Miles	Costs $'000	Miles	Costs $'000	Miles	Costs $'000	Miles	Costs $'000
Construction trunk roads																												
Beluru-Long Lama	31.0	7 750	7.0	1 750	8.0	2 000	8.0	2 000	8.0	2 000																		
Bintulu-Tanjong Kidurong	10.0	4 000			4.5	1 800	5.0	2 000	0.5	200																		
Miri-Bintulu Road - Igang	0.8	200	0.8	200																								
Miri-Bintulu Road - Timong	4.0	1 040			4.0	1 040																						
LNG Road	0.9	270			0.5	135	0.4	135																				
Miri-Bintulu Road - Bintulu/ Tanjong Kidurong	4.7	1 222			3.0	780	1.7	442																				
Miri-Bintulu Road - Batang Kemena	4.0	1 040							4.0	1 040																		
Secondary roads																												
Labang Road	11.5	2 300			8.0	1 600	3.5	700																				
Labang-Tubau	17.3	3 460					4.5	900	8.0	1 600	4.8	960																
Bintulu Coast	12.9	2 580															8.0	1 600	4.9	980								
Tubau-River Anyi	6.6	990																					6.6	990				
Improved feeder roads																												
Igang - Forest Boundary	2.0	300	2.0	300																								
Igang-Sebanah	6.9	1 035			3.9	585	3.0	450																				
Kabatu	13.3	1 995			9.0	1 350	4.3	645																				
Lambir-Subis	14.2	1 425	6.5	650	7.7	775																						
Miri-Bintulu Road - Sigrak	4.0	600					4.0	600																				
Labang-Tubau Road - Beseduan	2.0	300											2.0	300														
Lamaus	2.2	330							2.2	330																		
Igang forest boundary - Ensabang	7.4	1 110							3.3	500	4.1	610																
Sigrak-Takau	4.0	600											4.0	600														
Telabit	2.0	300									2.0	300																
Miri-Bintulu Road - Paroh	10.0	1 500											8.0	1 200	2.0	300												
Timong-Nyal	14.4	2 160											6.4	960	8.0	1 200												
Takau-Perihas	11.2	1 680																					3.2	480	8.0	1 200		
Ensabang-Batu Niah	4.0	600													4.0	600												
Kabatu-Paroh	3.0	450																					3.0	450				
Niah-Bekenu	17.3	2 595															8.0	1 200	9.3	1 395								
Bakam	12.0	1 800															8.0	1 200	4.0	600								
Telabit-Nyal	15.0	2 250																	8.0	1 200	7.0	1 050						
Miri-Bintulu Road - Sebauh	9.0	1 350															8.0	1 200	1.0	150								
Sebauh-Labang	16.2	2 430															8.0	1 200	8.2	1 230								
Long Jegan	11.0	1 650																			8.0	1 200	3.0	450				
Marudi-Long Linei	7.0	1 050	7.0	1 050																					8.0	1 200	4.0	600
Jelalong	12.0	1 800																										
Feeder roads																												
Mera-a	1.8	216	1.8	216																								
Sepupok	1.8	216	1.8	216																								
Karabungan	2.5	300	2.5	300																								
Miri-Bintulu Road - Galasah	1.3	156							1.3	156																		
Sigrak Service Centre - Sigrak Village	2.8	336							2.8	336																		
Sungai Klad	2.7	324									2.7	324																
Azang Village	2.1	252													2.1	252												
Kawang	2.0	240													2.0	240												
Perihas-Semba	6.6	792																									6.6	792
Beseduan-Lebus	6.5	780											6.5	780													7.0	840
Lebus-Sungai Pandan	7.0	840																										
Urban roads																												
Total	76.4	6 921			8.4	617	9.1	921	17.1	1 432	19.2	1 867	12.7	1 074	9.9	990												
Total construction	404.4	65 535	29.4	4 682	57.0	10 682	47.6	9 285	43.1	7 102	32.8	4 081	39.6	4 914	28.0	3 582	32.0	6 400	30.5	5 555	15.0	2 250	15.8	2 370	16.0	2 400	17.6	2 232
Improvements and surfacing																												
Trunk roads																												
Miri-Bintulu Road - Improvement and surfacing	129.0	(12 500 (18 200	17.0	(3 500 (500	10.5	(2 000 (500	25.0	(4 000 (2 000	21.0	(3 000 (2 000	17.0	4 000	17.0	4 000	17.0	4 000	5.0	1 200										
Beluru Road (1)	12.0	2 160					5.5	1 000	5.5	1 000	1.0	160																
Secondary roads																												
Miri-Lutong (1)	7.0	1 500	2.4	500	2.3	500	2.3	500																				
Kuala Baram-Brunei (5)	6.0	3 000									3.0	1 500	3.0	1 500														
Bridges																												
Lutong-Kuala Baram (2)		200						200																				
Miri-Bintulu Road (9)		1 500				250		500		500		250																
Total improvements and Surfacing	154.5	39 060	19.4	4 500	12.8	3 250	32.8	8 200	26.5	6 500	21.0	5 910	20.0	5 500	17.0	4 000	5.0	1 200										
Grand total	558.9	99 882	48.8	9 182	69.8	13 932	80.4	17 485	69.6	13 602	53.8	9 991	59.6	10 414	45.0	7 582	37.0	6 000	30.5	4 575	15.0	2 250	15.8	2 370	16.0	2 400	17.6	2 232

$5 mn per year.

It is further assumed that the Bintulu-Sibu road will be completed before 1990, which would require an additional $30 mn. The main policy consideration behind the proposals is to provide all towns and potential development areas with suitable road access.

It is assumed that an agreement would be made between the Government of Sarawak and Brunei to provide a high standard link between Miri and Kuala Belait. It is also assumed that it will be technically feasible, although difficult and costly, to provide a direct road between Miri and Marudi via Kampong Bakong with a ferry across the Baram River. The distance to Miri would then be only 40 miles compared to 150 miles via Long Lama.

A direct road from Miri to Marudi would obviate the need for an airport at Marudi and would provide Marudi with a far better and cheaper transport connection than would be otherwise possible.

Approximate estimates have been prepared which indicate that the benefits of a direct road link between Miri and Marudi would make the road a feasible project if it could be built for $6 mn in addition to the cost of the section of road planned between Miri and Bakong.

It is recommended that a full feasibility study of the alternatives be carried out by PWD.

The effective influence area of a road is only 0.3 to two miles in agricultural and forestry development areas. A network of local access roads will therefore be required to provide the necessary road access to the larger agricultural and forestry development blocks. Some of the chosen development areas contain both a forest potential and an agricultural potential. Careful planning and co-ordination of the forestry access roads to suit the later agricultural needs could result in considerable economies by avoiding duplication of access roads. It is therefore proposed that all plans for access roads should be agreed by a joint committee with representatives from the forestry, agricultural and general land use planning agencies. It is further proposed that an inventory be made of the existing timber roads in areas suitable for agriculture, to assess the value of maintaining and improving them as agricultural access roads.

4.2.2 Road Standards

Generally the road standards presently employed by the Public Works Department (PWD) are considered suitable for the future main road network. But the design of roads and bridges ought

to be linked to specific 'design vehicles' which then could be used as a norm for the generally permitted vehicle dimensions.

Because of economies of scale road transport costs will decrease with increasing vehicle axle loads and by augmenting the number of axles (for example by use of trailers). The vehicle volume load capacity can be raised by increasing the vehicle width, height and length. Increased vehicle axle loads and dimensions would, however, require stronger pavements and bridges and improved road alignment, and thus increase road costs. Experiences from other countries, however, have shown that for each level of transport demand there are corresponding standards which bring to a minimum the combined road transport costs and road building costs. In general optimum standards of axle loads and dimensions increase with increasing transport demand. The principles of these basic relationships are presented in Figure 4.2.

The present road standards, employed by PWD, can in general accommodate maximum axle loads of 8/13 tons on single/tandem axles and tractor-semitrailers with gross weight of up to 30 tons. The present practice of using temporary bridges, however, limits the lorry size to five to six tons as a consequence of which transport costs per ton mile might be up to five cents higher than by using tractor-semitrailers with 20 tons load capacity. If only half the estimated lorry transport in 1972 could have obtained, on average, half of the estimated benefit of five cents per ton mile, the total annual saving in lorry transport costs would have amounted to about $500 000 or some 15 per cent of the total road development expenditure in the Study Area in 1972. As the real issue is the tempo of the construction programme for new permanent bridges, the above considerations indicate that this programme should be accelerated and should be given priority. They also indicate that it might be feasible to construct even temporary bridges according to the same design standards as the permanent bridges.

The Consultants' Plan envisages that the Bintulu Area in particular will undergo rapid development with a considerable timber industry and a deep water port to facilitate efficient export of timber products, palm oil and other products. The export products which, within a five to ten year period are expected to amount to 0.5 to one million tons per year, will mostly be brought to the port by lorries.

Road development programmes therefore should aim to increase the road and bridge design standards for the Bintulu areas road network, which will carry heavy traffic, so that the roads could accommodate axle loads of 10/16 tons on single/tandem axles. The increase of the axle load from 8/13 to 10/16 tons is estimated to yield an average benefit of one cent per ton mile when tractor-semitrailers are employed. The cost of increasing the road bearing capacity could amount to some $8 000 to $15 000 per mile, and assuming the

present bridge design standards employed by PWD can accommodate tractor-semitrailers with 10/16 tons loads without revision. Thus it will be feasible to improve and design the road network for 10/16 ton axle load if the annual transport volume of bulk cargo is above 100 000 to 150 000 tons.

The most commonly permitted maximum vehicle width in developed countries is 2.5 metres (eight feet two inches). This vehicle width allows for convenient transport of eight by eight feet containers and of most standard pallets. However, an increase in the vehicle width from 7.5 feet to eight feet two inches will further make it possible to increase the permissible height from 10.5 feet to about 13 feet and still provide for better vehicle stability. This increase in width is advocated.

For goods weighing an average of one ton per 100 cubic feet and less, the vehicle load capacity in cubic feet is as important as the load capacity in tons. A tractor-semitrailer carrying cargo weighing one ton per 100 cubic feet would have to be about 40 to 45 feet long to accommodate a load of 20 tons. The most common container now in use is 20 feet long. A tractor-semitrailer combination having an overall length of about 51 feet to be able to carry two of these containers at the same time.

Another aspect to be considered in determining vehicle length is the bridge bearing capacity. A five-axled tractor-semitrailer with a gross weight of 30 tons should have an overall length of about 50 feet to comply with the present applied bridge design standards.

A main source of accidents is the mixing of slow moving and motorised traffic. It is therefore suggested that roads in urban areas, and perhaps some other places, where traffic makes it desirable are provided with separate lanes or paths for pedestrians and cyclists. These sidelanes or paths, which ought to have the same surface type as the main road to attract the pedestrians and cyclists, would significantly increase the capacity of the main road for the motorised traffic.

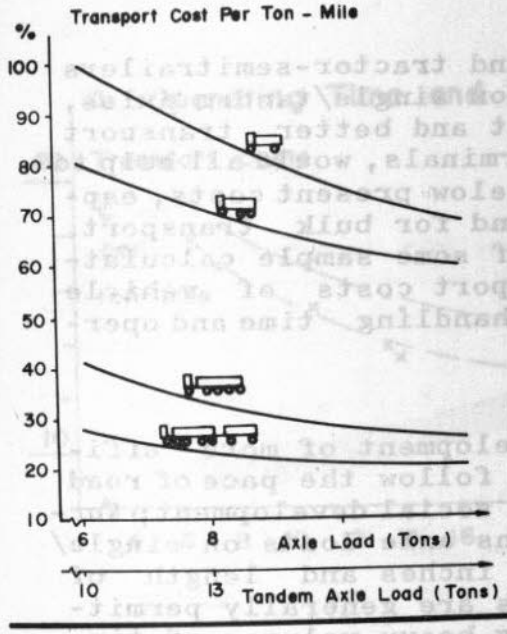
4.2.3 Road Construction Capacities

At present the PWD in Sarawak has 14 road construction units (MRCUs), four of which are allocated to the Fourth Division: three for road construction and one for road improvements and surfacing. If the capacity of one unit is assumed to be about $1.5 mn (1973 value) of road works per year, the envisaged public road development in the period 1973 to 1990 would require the full time employment of an average of eight to nine construction units. An important aspect of the road construction programme is the need for major portions of the network to be constructed before specific forestry or agricult-

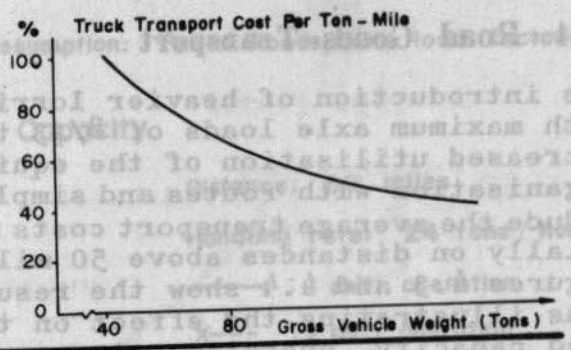
FIGURE 4.2

PRINCIPAL RELATIONS BETWEEN VEHICLE WEIGHTS AND DIMENSIONS, TRUCK TRANSPORT COSTS – AND ROAD CONSTRUCTION & MAINTENANCE COSTS

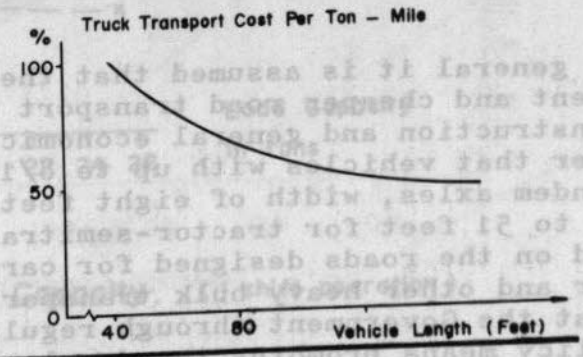
(a) TRANSPORT COST PER TON – MILE FOR DIFFERENT TYPES OF VEHICLES AND AXLE LOADS



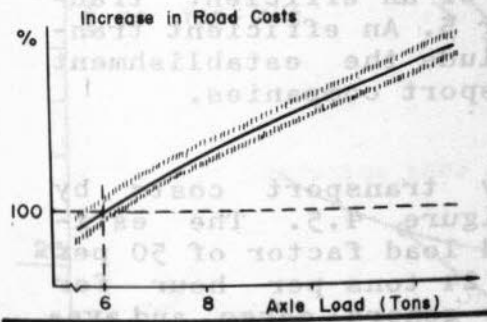
(b) RELATION BETWEEN GROSS VEHICLE WEIGHT AND TRANSPORT COST



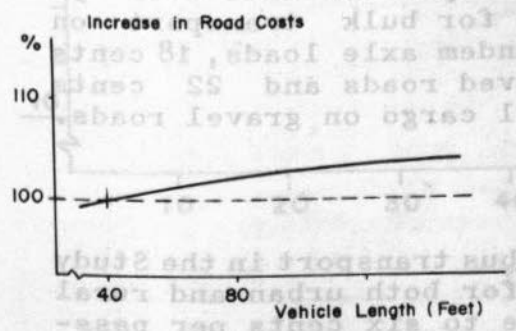
(c) RELATION BETWEEN VEHICLE LENGTHS AND TRANSPORT COST



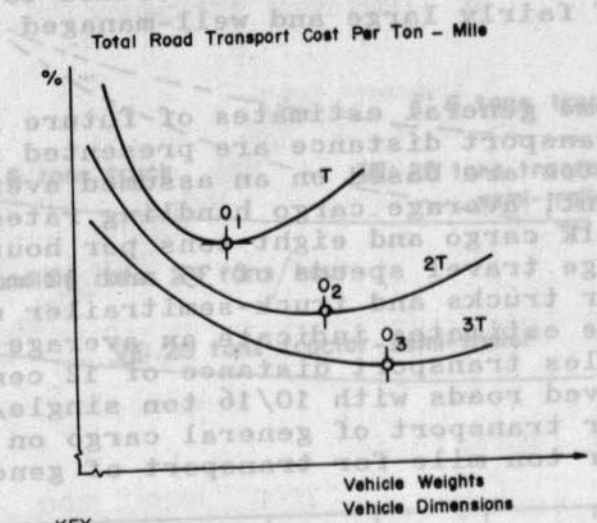
(d) RELATION BETWEEN ROAD COSTS AND MAXIMUM PERMITTED AXLE LOAD



(e) RELATION BETWEEN ROAD COSTS AND MAXIMUM PERMITTED VEHICLE LENGTH



(f) PRINCIPAL RELATION BETWEEN OPTIMUM VEHICLE WEIGHTS AND DIMENSIONS AND TRUCK – TRAFFIC VOLUME



KEY

Total Road Transport Cost = Road Costs + Truck Transport Costs
T = Traffic Volume in no. of Trucks or Goods Volume in tons
O = Optimum Vehicle Axle Load, Gross Vehicle Weight or Vehicle Length i.e. when the Sum of Road Cost and Truck Transport Costs is a Minumum

ural projects can start. To attain the optimal timing of road construction could well put too much strain on the capacities of the PWD and the State budgets. It is therefore suggested that foreign financing (for example through IBRD, IDA or ADB) and contractors' assistance are considered for financing and constructing part of the necessary road development.

4.2.4 Road Goods Transport

The introduction of heavier lorries and tractor-semitrailers with maximum axle loads of 8/13 tons on single/tandem axles, increased utilisation of the equipment and better transport organisation with routes and simple terminals, would all help to reduce the average transport costs far below present costs, especially on distances above 50 miles and for bulk transport. Figures 4.3 and 4.4 show the result of some sample calculations illustrating the effect on transport costs of vehicle load capacity, operating time, cargo handling time and operating efficiency.

In general it is assumed that the development of more efficient and cheaper road transport will follow the pace of road construction and general economic and social development; further that vehicles with up to 8/13 tons axle loads on single/tandem axles, width of eight feet two inches and length of up to 51 feet for tractor-semitrailers are generally permitted on the roads designed for carrying heavy volumes of timber and other heavy bulk transport. Finally it is assumed that the Government through regulations and other transport policy means promotes the development of an efficient transport industry as discussed in Chapter 5. An efficient transport industry is here assumed to include the establishment of fairly large and well-managed transport companies.

Some general estimates of future lorry transport costs by transport distance are presented in Figure 4.5. The estimates are based on an assumed averaged load factor of 50 per cent, average cargo handling rates of 24 tons per hour for bulk cargo and eight tons per hour for general cargo, and average travel speeds of 35 and 32 miles per hour on paved roads for trucks and truck-semitrailer combinations respectively. The estimates indicate an average cost per ton mile over 50 miles transport distance of 12 cents for bulk transport on paved roads with 10/16 ton single/tandem axle loads, 18 cents for transport of general cargo on paved roads and 22 cents per ton mile for transport of general cargo on gravel roads.

4.2.5 Bus Transport

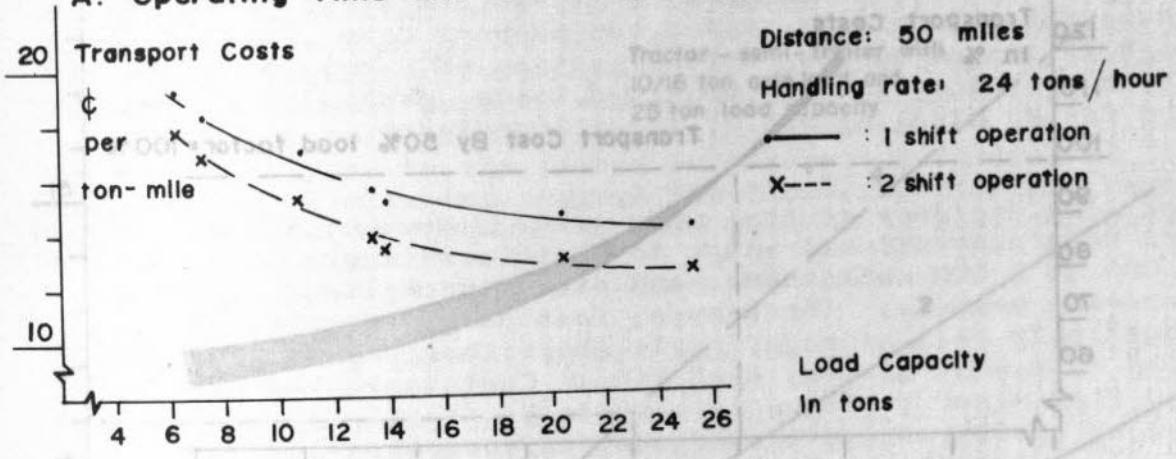
It is assumed that efficient future bus transport in the Study Area could provide adequate service for both urban and rural areas at an average fare of some five to six cents per passenger mile. This would imply that buses run at least 35 000

FIGURE 4·3

INFLUENCE OF VEHICLE LOAD CAPACITY, OPERATING TIME AND CARGO HANDLING RATE ON TRUCK TRANSPORT COSTS, SAMPLES

Assumption: Paved Roads, 50% load factor.

A. Operating Time and Load Capacity.



B. Handling Time and Load Capacity. (1 shift operation)

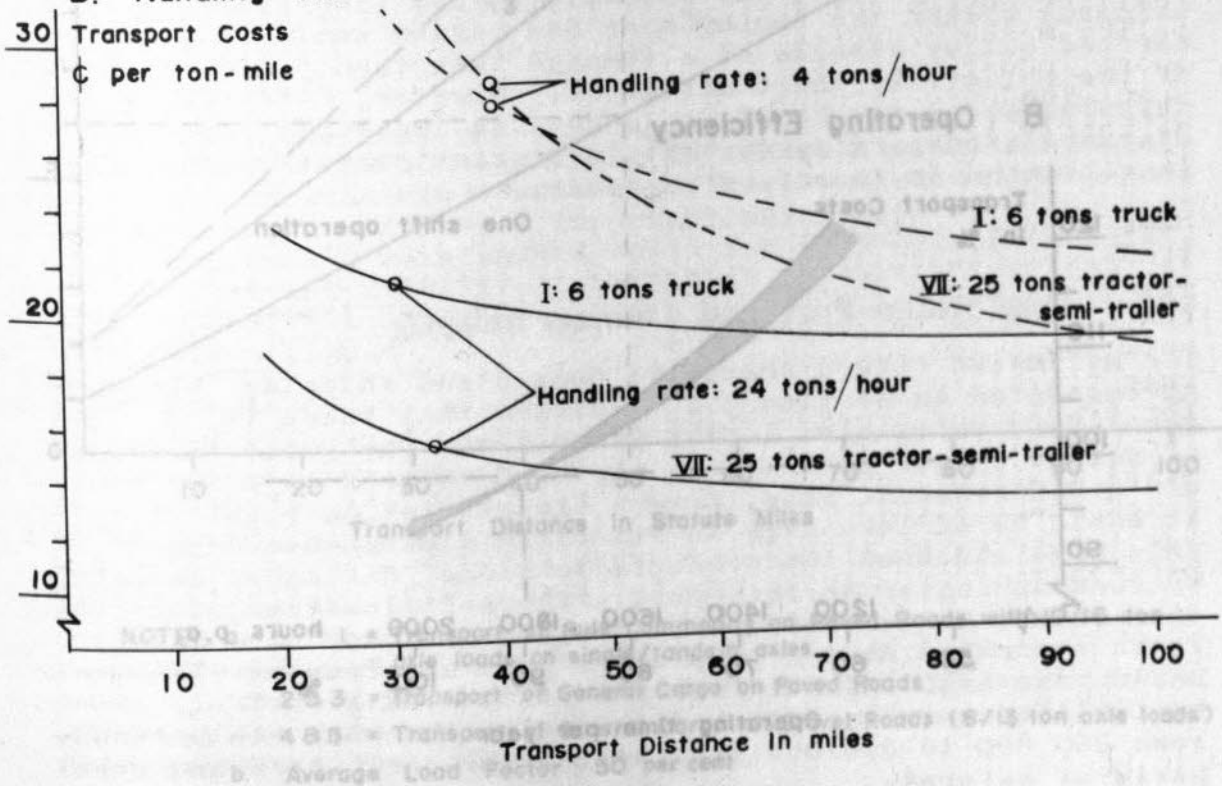


FIGURE 4·4

INFLUENCE OF LOAD FACTOR AND OPERATING EFFICIENCY ON AVERAGE TRANSPORT COSTS

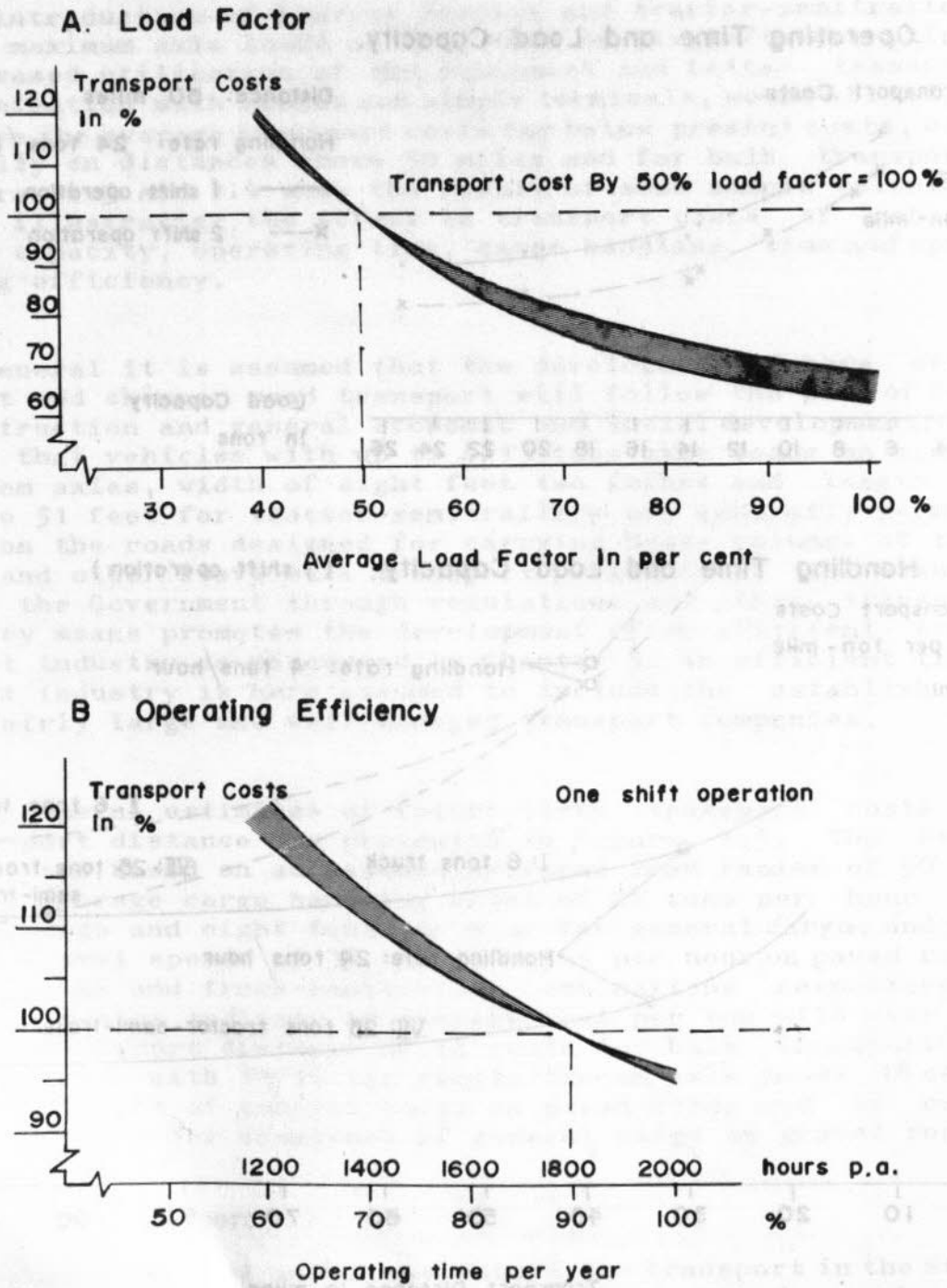
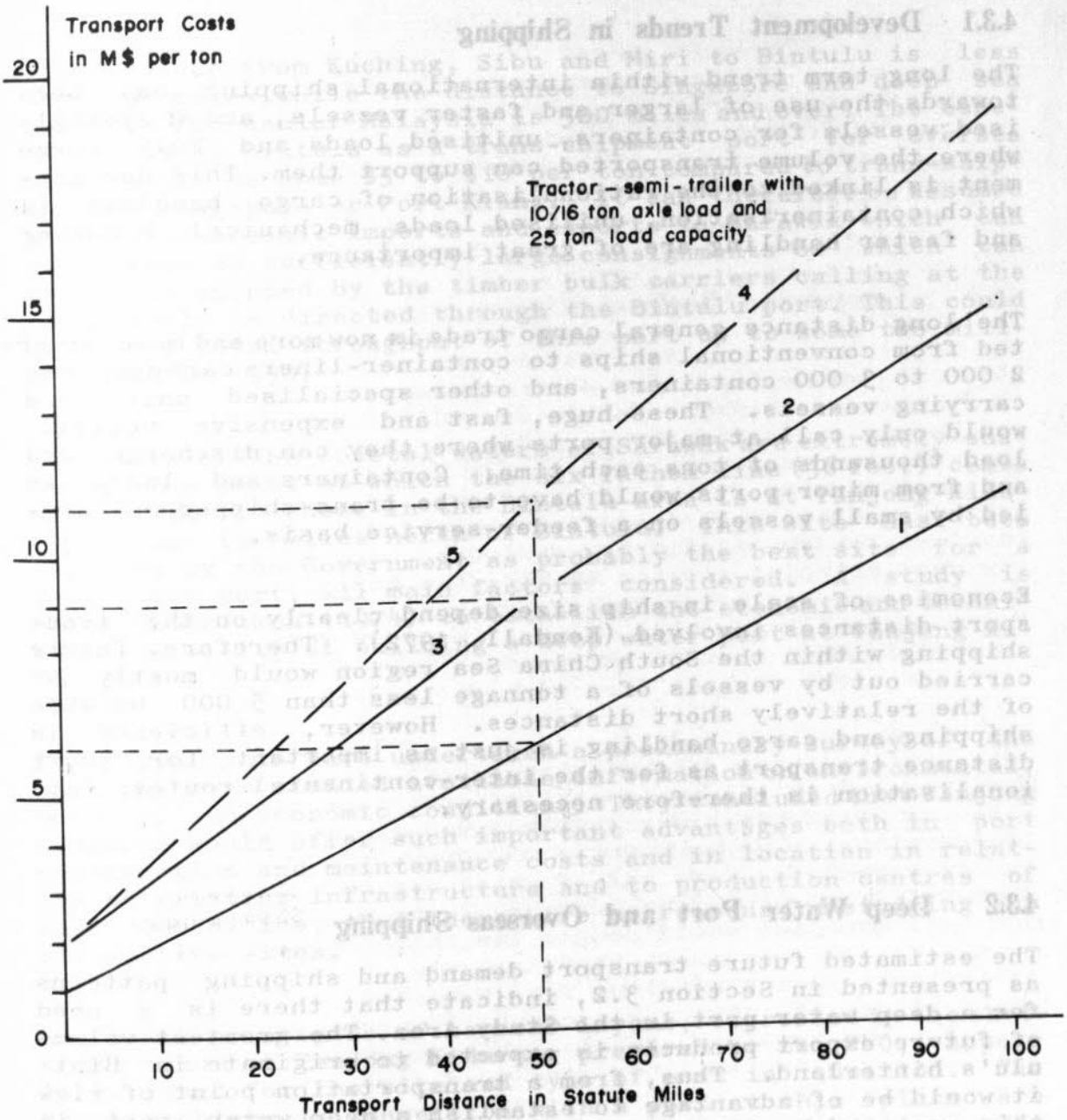


FIGURE 4.5

ESTIMATED FUTURE TRUCK TRANSPORT COSTS



NOTE: a. 1 = Transport of Bulk Commodity on Paved Roads with 10/16 ton axle loads on single/tandem axles

2 & 3 = Transport of General Cargo on Paved Roads

4 & 5 = Transport of General Cargo on Gravel Roads (8/13 ton axle loads)

b. Average Load Factor : 50 per cent

c. Terminal Costs are not included

to 40 000 miles a year with an average load factor of about 30 per cent. On rural routes with relatively few passengers the passenger and goods services could be combined and served by buses with a special load compartment.

4.3 PORTS AND SHIPPING

4.3.1 Development Trends in Shipping

The long term trend within international shipping has been towards the use of larger and faster vessels, and of specialised vessels for containers, unitised loads and bulk cargo where the volume transported can support them. This development is linked to the rationalisation of cargo handling in which containerisation, unitised loads, mechanical handling and faster handling are of great importance.

The long distance general cargo trade is nowmore and more diverted from conventional ships to container-liners carrying some 2 000 to 3 000 containers, and other specialised unit load carrying vessels. These huge, fast and expensive vessels would only call at major ports where they can discharge and load thousands of tons each time. Containers and loads to and from minor ports would have to be trans-shipped and carried by small vessels on a feeder-service basis.

Economies of scale in ship size depend clearly on the transport distances involved (Kendall, 1972). Therefore, future shipping within the South China Sea region would mostly be carried out by vessels of a tonnage less than 5 000 because of the relatively short distances. However, efficiency in shipping and cargo handling is just as important for short distance transport as for the inter-continental routes; rationalisation is therefore necessary.

4.3.2 Deep Water Port and Overseas Shipping

The estimated future transport demand and shipping patterns as presented in Section 3.2, indicate that there is a need for a deep water port in the Study Area. The greatest volume of future export products is expected to originate in Bintulu's hinterland. Thus, from a transportation point of view it would be of advantage to establish a deep water port in this area and haul the products for long distance shipping by road and water to this port. The best location, for reasons stated below would be at Tanjong Kidurong near Bintulu. It is estimated that a deep water port at Tanjong Kidurong would have a throughput from the Study Area alone of about one million tons in 1990. In addition the port would handle some 200 000 to 300 000 tons of general cargo to/from other parts of Sarawak.

It is, however, considered that shipping between Miri and Marudi on the one hand and the South China Sea region on the other could be more economically made directly by shallow draught vessels of some 1 000 to 1 500 tons dead weight than by trans-shipment at a deep water port near Bintulu. This, of course, assumes provision of suitable port facilities near Miri and Marudi.

The distance from Kuching, Sibu and Miri to Bintulu is less than 260 miles while the distance to Singapore and deep sea ports in Peninsular Malaysia is 500 miles and over. The benefit of using Bintulu as a trans-shipment port for oversea cargo would be some $5 to $10 per ton compared to trans-shipment at Singapore or Port Klang. It can therefore be assumed that trans-oceanic imports and exports to Sarawak which can be shipped in sufficiently large consignments or which can be easily shipped by the timber bulk carriers calling at the port, would be directed through the Bintulu port. This could bring the total throughput of this port up to some two million tons in 1990.

The whole of the coastal waters of Sarawak are extremely shallow. The point at which the six fathom line (36 feet) comes closest to the shore in the Bintulu area is at Tanjong Kidurong, some ten miles north of Bintulu. This site has been selected by the Government as probably the best site for a deep water port, all main factors considered. A study is being undertaken (1974) to establish the economic and technical feasibility of building a deep water port at Tanjong Kidurong.

The Consultants have undertaken a preliminary survey of the site and have studied available information on environmental, physical and economic conditions. They concluded that Tanjong Kidurong would offer such important advantages both in port construction and maintenance costs and in location in relation to existing infrastructure and to production centres of bulk commodities, that there were no reasons for studying any alternative sites.

The basic principles of harbour layout, expressed in the sketch for a port at Tanjong Kidurong prepared by the PWD, appear to be sound for the site and type of port in question. The major problems in connection with a port at this place are those of siltation and probably foundation conditions. The siltation in the port and its access channel would be less at Tanjong Kidurong than at any other site along the coast. Considerable siltation must, however, be anticipated. The study of these problems requires execution of extensive and advanced field investigations, especially during the north-east monsoon - the Landas - period.

With regard to foundation condition there is no reason to believe that better conditions would be found at any other

site considered within the region. Field investigations relating to wave and current conditions can possibly be kept to a very limited programme since the Sarawak Shell Company presently is carrying out such investigations close to the site using the most advanced technique available, that is using irregular waves directly reproduced from site records and measuring the effect on model ships moored in a harbour model.

A first stage of the deep water port consisting of one bulk berth and two general cargo berths for ocean vessels is likely to cost between $50 mn and $100 mn. The cost would depend heavily on the actual site conditions, in particular on the amount of initial dredging.

4.3.3 Coastal and Regional Shipping

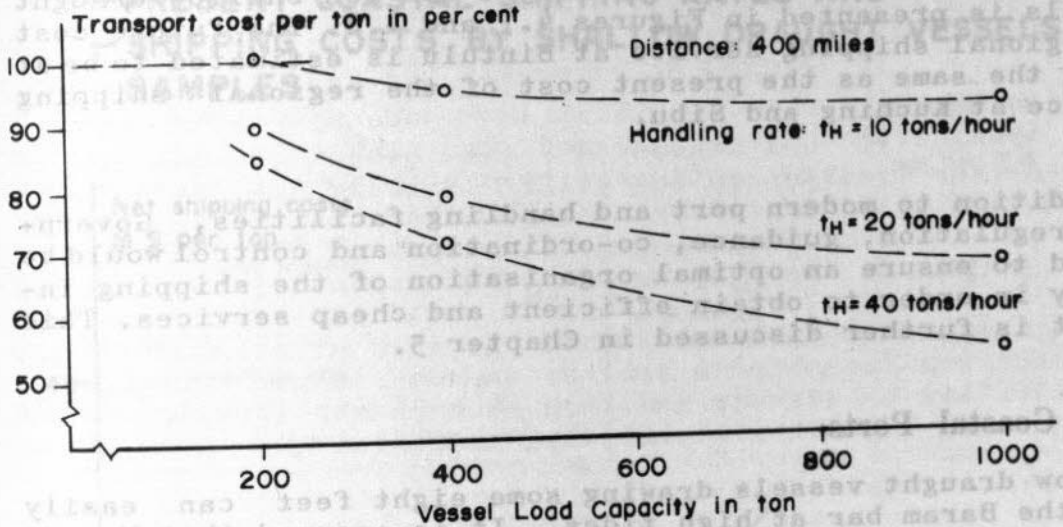
The provision of one deep water port at Bintulu will not satisfy all future needs for port development in the Study Area. It is assumed that the future demand for shipping from Miri and Marudi to destinations within the South China Sea could be made more economically directly than by trans-shipment at Tanjong Kidurong. It is further expected that a substantial part of the internal trade between the Divisions of Sarawak would most economically be carried by coastal shipping. A regional shipping service to Miri and Marudi and a coastal shipping service using shallow draught vessels of some 11 000 ton load capacity would, however, require that the entrance channel to Miri port be improved to provide for draughts of at least eight to nine feet at high tides.

Efficient shipping depends both on efficient port and handling services and on the employment of efficient vessels. Average shipping costs are also heavily influenced by the balance in trade volumes, fluctuations in transport demand and the demand for transport quality, all of which decide the average load factor (Figure 4.6). An increase in the vessel size from 200 to 1 000 tons would reduce the shipping costs by about 10 per cent if the cargo handling rate were ten tons per hour. An increase in the handling rate from ten to 40 tons per hour would reduce the shipping costs by 15 per cent for a 200 ton vessel. The combined effect, however, of increasing the vessel size from 200 to 1 000 tons load capacity and increasing the cargo handling rate from ten to 40 tons per hour could reduce the shipping costs by almost 50 per cent. Design of ships especially suited for national cargo handling, should take account of a blue print for a multi-purpose vessel with ability to handle containers, pallets and roll-on-roll-off vehicles. Such a blue print is presented by the South East Asian Regional Transport Survey (Little, 1972). It is further recommended that attention be paid to the ideas and views presented at the United Nations Seminar on Coastal Feeder and Ferry Services held in 1971 (United Nations, 1971).

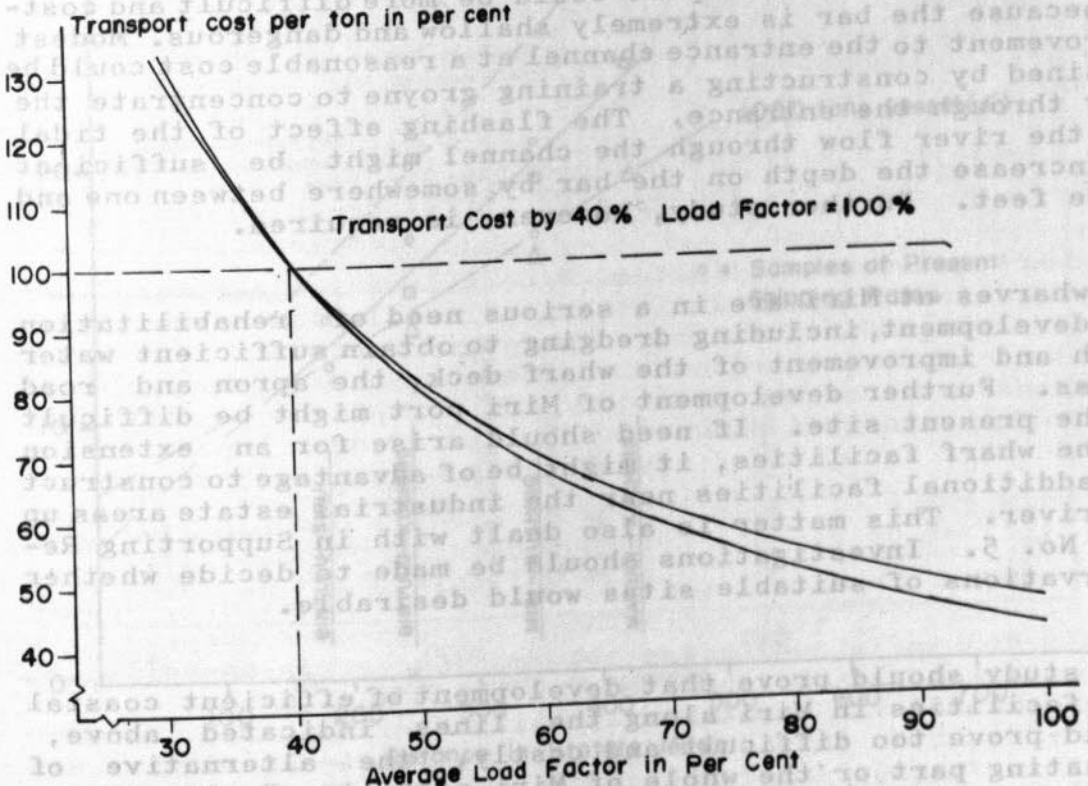
FIGURE 4.6

INFLUENCE OF VESSEL SIZE, HANDLING RATE AND AVERAGE LOAD FACTOR ON SHIPPING COSTS IN PER CENT

A. VESSEL SIZE AND HANDLING RATE



B. AVERAGE LOAD FACTOR



It is estimated that efficient regional and coastal shipping which includes the employment of 1 000 ton shallow draught vessels and efficient port services with cargo handling rates of at least 40 tons per hour, would be able to provide regional shipping service to Miri and Marudi and coastal shipping service at an average cost some 15 to 30 per cent below the present rates. A comparison between the present and the estimated future net shipping costs by 1 000 ton shallow draught vessels is presented in Figures 4.7 and 4.8. The future cost of regional shipping service at Bintulu is estimated to be at about the same as the present cost of the regional shipping service at Kuching and Sibu.

In addition to modern port and handling facilities, Government regulation, guidance, co-ordination and control would be needed to ensure an optimal organisation of the shipping industry in order to obtain efficient and cheap services. This aspect is further discussed in Chapter 5.

4.3.4 Coastal Ports

Shallow draught vessels drawing some eight feet can easily pass the Baram bar at high tides. It is assumed that Marudi port can easily be improved to take the 1 000 ton vessels and provide efficient port and handling services at fairly modest investments.

The improvement of Miri port could be more difficult and costly because the bar is extremely shallow and dangerous. Modest improvement to the entrance channel at a reasonable cost could be obtained by constructing a training groyne to concentrate the flow through the entrance. The flashing effect of the tidal and the river flow through the channel might be sufficient to increase the depth on the bar by somewhere between one and three feet. Further study, however, is required.

The wharves at Miri are in a serious need of rehabilitation and development, including dredging to obtain sufficient water depth and improvement of the wharf deck, the apron and road access. Further development of Miri port might be difficult at the present site. If need should arise for an extension of the wharf facilities, it might be of advantage to construct the additional facilities near the industrial estate areas up the river. This matter is also dealt with in Supporting Report No. 5. Investigations should be made to decide whether reservations of suitable sites would desirable.

If a study should prove that development of efficient coastal port facilities in Miri along the lines indicated above, should prove too difficult and costly, the alternative of relocating part or the whole of Miri port to Kuala Baram should be investigated. It has been recommended - and already been accepted by the Government - that a study of the

FIGURE 4.7

COMPARISON BETWEEN ESTIMATED;
– PRESENT COASTAL SHIPPING RATES AND
– SHIPPING COSTS BY SHALLOW DRAUGHT VESSELS SAMPLES

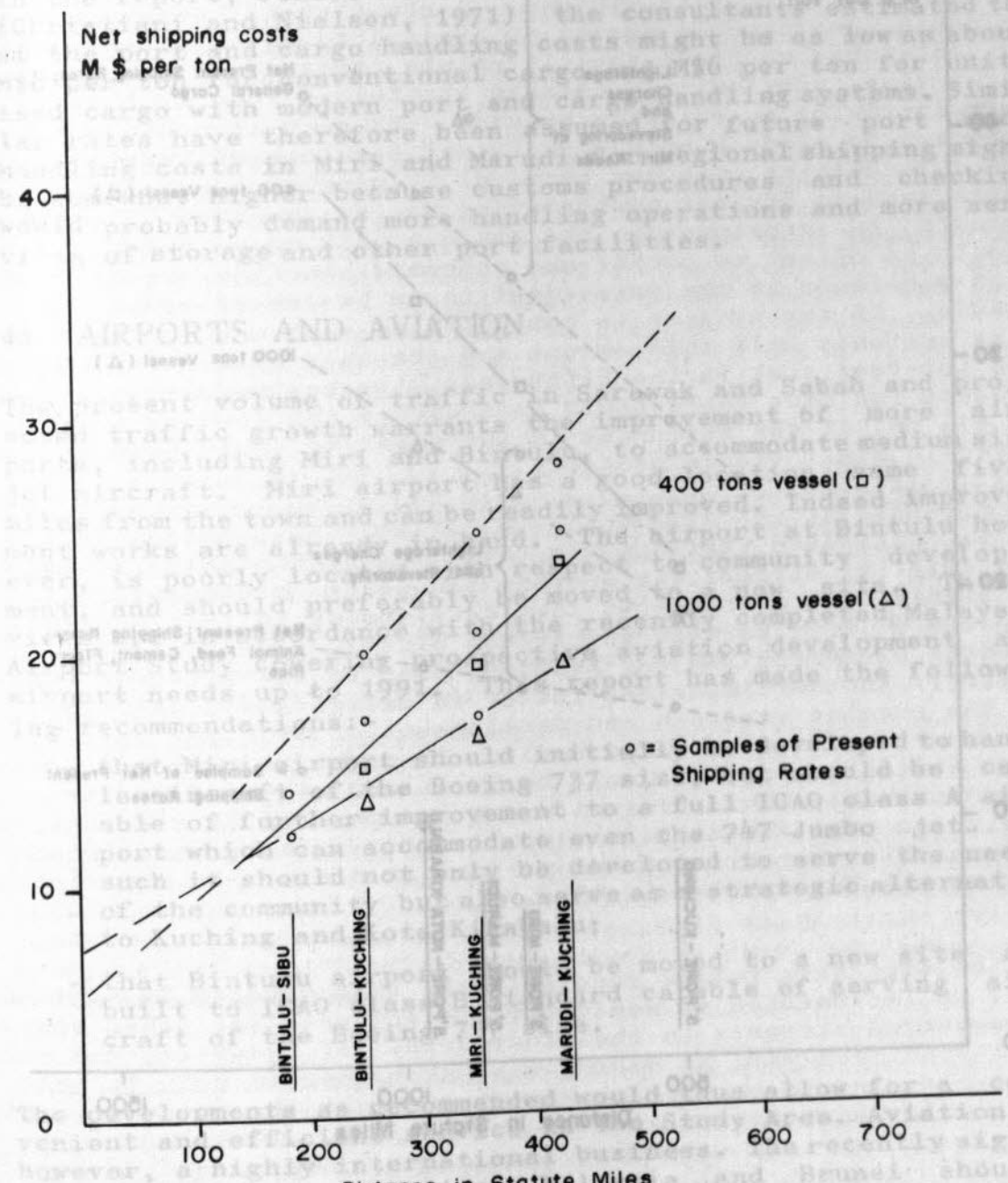
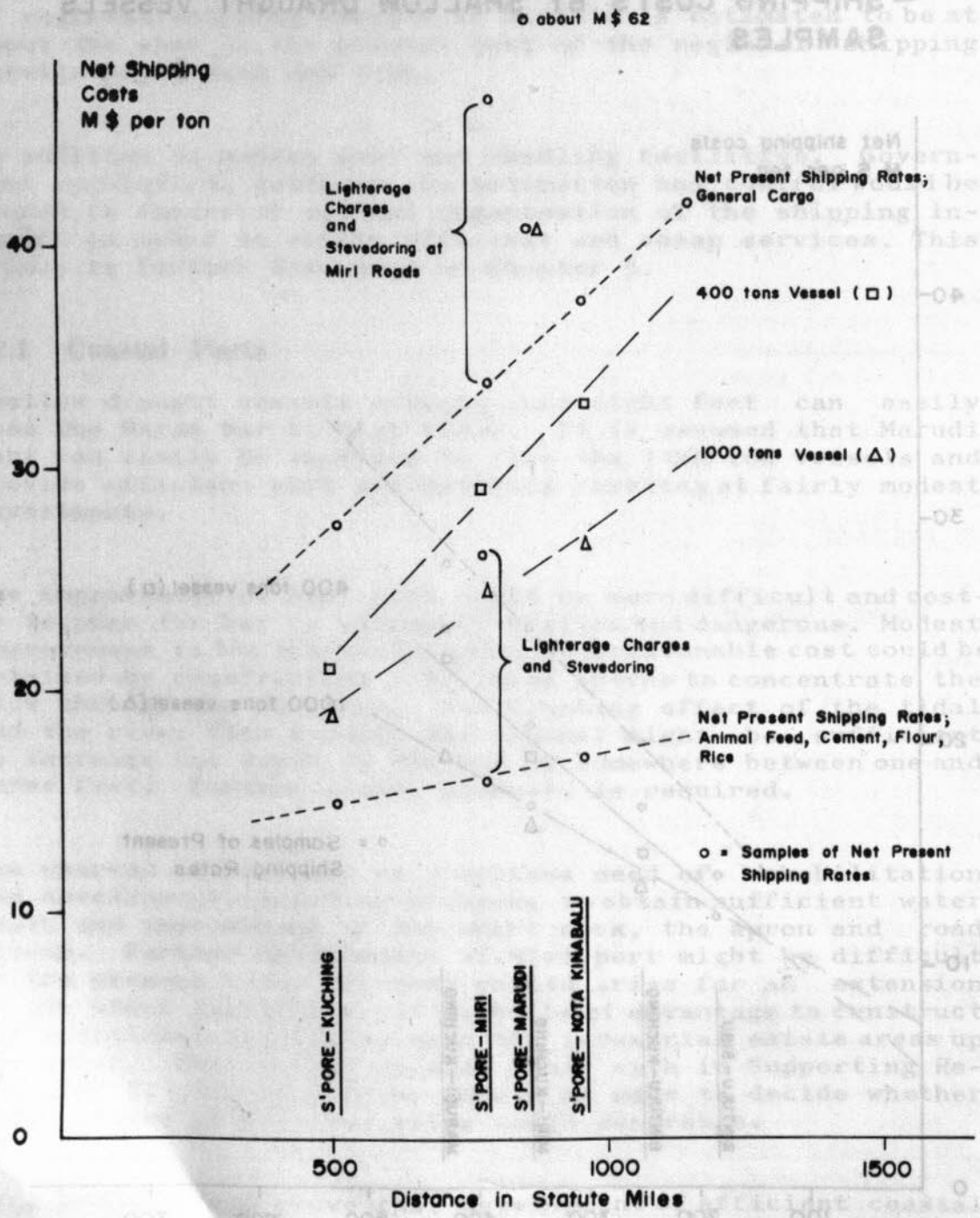


FIGURE 4.8

COMPARISON BETWEEN ESTIMATED;
– NET PRESENT REGIONAL SHIPPING RATES AND
– SHIPPING COSTS BY SHALLOW DRAUGHT VESSELS SAMPLES



port problems in Miri be added to the feasibility study of the deep water port at Bintulu.

The most urgent need in both Miri and Marudi is for a Port Authority to assess the problems, develop the facilities and run them as modern efficient coastal ports. It is strongly recommended that the State-wide Sarawak Port Authority is established as soon as possible with the authority and opportunity to operate and develop the ports in Miri and Marudi. This aspect is further discussed in Chapter 5.

In the report, Johore Port - Economic and Technical Study (Christiani and Nielsen, 1971), the consultants estimated that at the port and cargo handling costs might be as low as about M$8 per ton for conventional cargo and M$6 per ton for unitised cargo with modern port and cargo handling systems. Similar rates have therefore been assumed for future port and handling costs in Miri and Marudi for regional shipping might be somewhat higher because customs procedures and checking would probably demand more handling operations and more services of storage and other port facilities.

4.4 AIRPORTS AND AVIATION

The present volume of traffic in Sarawak and Sabah and projected traffic growth warrants the improvement of more airports, including Miri and Bintulu, to accommodate medium sized jet aircraft. Miri airport has a good location some five miles from the town and can be readily improved. Indeed improvement works are already in hand. The airport at Bintulu however, is poorly located with respect to community development, and should preferably be moved to a new site. These views are in accordance with the recently completed Malaysia Airport Study covering prospective aviation development and airport needs up to 1991. This report has made the following recommendations:-

- that Miri airport should initially be developed to handle aircraft of the Boeing 737 size, but should be capable of further improvement to a full ICAO class A airport which can accommodate even the 747 Jumbo jet. As such it should not only be developed to serve the needs of the community but also serve as a strategic alternative to Kuching and Kota Kinabalu;
- that Bintulu airport should be moved to a new site and built to ICAO class B standard capable of serving aircraft of the Boeing 737 size.

The developments as recommended would thus allow for a convenient and efficient service in the Study Area. Aviation is, however, a highly international business. The recently signed air traffic agreement between Malaysia and Brunei should, therefore, allow for the new international airport at Bandar Seri Begawan to serve as an emergency alternative for Kuching

and Kota Kinabalu at times when these airports are suddenly closed to air traffic; development of Miri airport to a full ICAO class A airport would thus be unnecessary.

It is understood that the improvement of Miri airport to an ICAO class B airport is included in the Second Malaysia Plan. The improvement which includes the widening and extension of the present runway is budgeted to cost $12 mn.

It is quite clear that Bintulu as a new emerging urban centre, will need a new airport. Investments in the existing airport should thus be kept at minimum. A new airport, however, requires a considerable amount of capital to be invested. It is therefore important that it should constructed at the right time, particularly because its future role is that of only improving an existing service. As such it could not be expected to produce such significant development benefits as the introduction of a new service. Timing of large improvements such as airport construction has an important economic impact. An investment in the range of $30 mn to $50 mn which should be offset by social and economic benefits of at least that magnitude if the investment is to be deemed sound and viable. If the project is completed in a year when the venefits are only half this amount and are only fully compensating the interest cost in the fifth year, the postponement of the project for five years could have earned the economy $8 mn to $14 mn, if the resources in the meantime could have employed in other viable projects.

It is considered that Bintulu could most profitably utilise the existing airport for another ten years. This would pose no significant obstacle to town development in that period because a large part of the future Bintulu town would be located closer to Tanjong Kidurong than to the existing town centre. Another important factor in design and construction is the ongoing research and development of STOL jet aircraft for short and medium range hauls. It might be that new and more suitable aircraft would be built and acquired by MAS which probably would present a new and perhaps less expensive design concept for Bintulu airport. It is recommended that a feasibility study of a new airport at Bintulu is undertaken during the Third Malaysia Plan.

If the extensive future road network, as envisaged in Section 4.2, is implemented it would obviate any need for other schedule-served airports in the Study Area. If, however, the direct road from Miri to Marudi via Bakong proves not to be feasible, an air service to Marudi of about the present standard would be necessary also in the future.

CHAPTER 5

THE ROLE OF GOVERNMENT IN TRANSPORTATION

A transport system is highly complex because it encompasses several modes of transport which serve a large variety of transport needs. Transport affects almost all social and economic activities and its total cost may account for ten to 15 per cent of the GRP. Directly or indirectly nearly all transport activities are controlled or affected by Government decisions. The essence of a transport policy must, therefore, be to ensure that decisions and development within the transport sector are consistent with general development policies and aims.

The institutional problems of transport have in recent years been acknowledged as major obstacles to the development of efficient transport services in nearly all developing countries. This has been pointed out in a World Bank paper on the Transport Sector (World Bank, 1972). The problem has also been the subject of a United Nations Study (1972). In 1968 a comprehensive study was made on transport development in Malaysia (Nathan consulting group, 1968) in which transport policy was a major subject.

In the present Report only aspects of special importance to the development of an efficient transport system in the Study Area are discussed. The discussions are based on the assumption that the following aims would be important elements in the Government Transport Policy:-

- the transport system should achieve an efficiency in service and costs compatible with the transport demand and social priorities;
- the transport price should be based on the cost of providing the service.

The conclusion reached is that Government should increase its involvement in the transport sector and consequently strengthen the Government agencies concerned. It is further recommended that the Government should consider the desirability of carrying out immediately a comprehensive study of transport development in Sarawak.

Some of the recommendations made here are rather far reaching and would require fundamental changes in the present organisation of the transport industry with accompanying social effects. Government regulation of coastal and regional shipping trade with respect to types and number of vessels and operators, and control of rates would, for example, have a substantial impact on the present structure of the trade and

accordingly on the life of many persons. Changes, however, are bound to come as a consequence of the expansion and improvement of the road network. This will lead to a substitution of coastal shipping by lorry transport. Furthermore, the competitiveness of goods produced in Sarawak *vis a vis* products from other parts of the world will prescribe the strictest economy within the transport sector in order to minimise transport costs.

5.1 REGULATION OF ENTRY AND OPERATION

Regulation of entry into the transport business is usually considered a practical means of ensuring that only sufficiently skilled, responsible and financially sound operators are allowed to provide a transport service. Entry regulations also make it possible to restrict the number of companies involved so that each company is able to have a sufficiently large share of the trade to permit efficient operation of suitable equipment. This is especially important where the transport demand is rather small as it is, and will be for some time in the Study Area.

With a restricted number of licensed operators there should be a progressive lessening of restrictions on the quantity and capacity of equipment to allow the most efficient operators to expand their service and thus benefit the community. Unbalanced restrictions on equipment and on entry, however, could lead to a protected and inefficient transport industry which would be a burden on the community and an obstacle to social and economic development. The establishment and development of route services should be carefully planned to ensure that the service levels are in balance with the transport demand so that the service can be offered at a reasonable price.

It is considered that regulation of entry and operation is both feasible and desirable for coastal and river transport as well as for land transport and terminal operations. The system of regulations should, however, be flexible and dynamic to take advantage of technical innovations and developments within the transport sector.

5.2 TRANSPORT PRICING

In a modern efficient transport system, the fares and rates should usually be based on the cost of providing the service on a long term basis, for example two to five years. The practice of *ad valorem* pricing in shipping in the past assumed the ability to pay; the cost of providing the services was not the basic price-determinant. *Ad valorem* pricing is being more and more abandoned all over the world because it leads to distortions in economic and social development.

In a changing and fast developing transport system there should be some basic regulations and guidance on pricing to ensure that the transport industry develops and maintains a fair pricing policy and that the benefits of improvements are fairly shared between the industry and the community. Systems of price regulations are especially important on protected transport routes and where monopoly situations exist.

Transport pricing is also the most important quantitative factor in competition between transport modes. An overall pricing policy in which the transport price is based on the cost of providing the service would promote an optimum 'modal split' - that is distribution of different types of transport on different modes of transport. In this context transport pricing includes not only pricing of operator services but also pricing of services from Government controlled infrastructure such as roads and ports. The pricing policy must be fully co-ordinated with taxes and duties levied on transport equipment and operation. The pricing policy, and the transport taxes and fees, should also at least in principle, take into account inconveniences to society such as air pollution and noise.

5.3 TAXES AND FEES

Taxes and fees are levied on transport modes and operations, some as a price for public services rendered (roads, airfields etc.), others for fiscal reasons. The taxes and fees and their effect on the transport system should be carefully considered to ensure that the effect is in line with the aims of the transport policy and does not have any undesirable side effects. An often favoured policy is to evaluate service fees on the basis of cost-responsibility. The fees (or taxes) are levied on traffic and transport corresponding to the cost to the society of providing the services.

Public transport organisations offer services to the whole community but their wider service obligations often place them in a less favourable competitive position vis a vis private and individual transport. It is, therefore, often found desirable to favour public transport at the expense of individual and private transport. Annual licence fees in the Study Area on private cars are today generally less per seat than the licence fees on buses. The annual licence fee on a private car with an engine of 1 500 cc is $150 or about $30 per seat. The annual licence fee on buses is $60 per seat. It is recommended that these fees are reviewed with the aim of a change in the favour of buses.

Inland transport in Sarawak is mostly by longboats with gasoline powered outboard engines. This mode of transport will probably be the only one available in these areas for a long time. The transport of goods by longboats is extremely expensive and adds considerably to the cost of imported goods

as well as to the production costs of goods brought down river for sale. It would make a significant difference if the outboard engines in the upper river systems could be supplied with tax-free or tax-reduced gasoline. In case of no tax the gasoline bill would be halved and the total longboat transport costs could be cut by 30 to 40 per cent. One argument to support such a move would be that the current gasoline tax (or most of it) is levied as a means of letting motor vehicles pay for the public road services, of which the longboats make no use.

There are several means of providing tax-reduced gasoline to river transporters in the inner parts of Sarawak, and one suggested scheme is explained in Appendix I. Alternative means are the use of low octane gasoline at a tax-reduced cost, which cannot be used in motor vehicles, but only in specially developed boat engines; or the colouring of tax-reduced gasoline which when mixed with ordinary gasoline - even in small quantities, shows a distinct colour, so that control in its use can be exercised.

On distances of 100 to 250 miles there is and will in the future be keen competition between air and road transport for the passenger transport demand. The comfort, speed and cost of air transport would be compared to the same elements in the use of buses or private cars. In goods transport a similar competition can be expected between lorry transport and coastal shipping. The estimated future transport costs by the two alternative modes indicate that lorry transport in general will be the most economical mode on distances up to 150 to 200 miles, while coastal shipping can offer cheaper service over the longer distances (see Figure 5.1).

Lorry transport can usually offer door to door service at no extra cost while coastal shipping in most cases requires a feeder service by lorry between the ports and the shipper and consignees storage. Other factors in favour of lorry transport are less total transport time, simpler transport administration for the customer and fewer handling operations which might facilitate an easier and less expensive packing compared to the demands of coastal shipping.

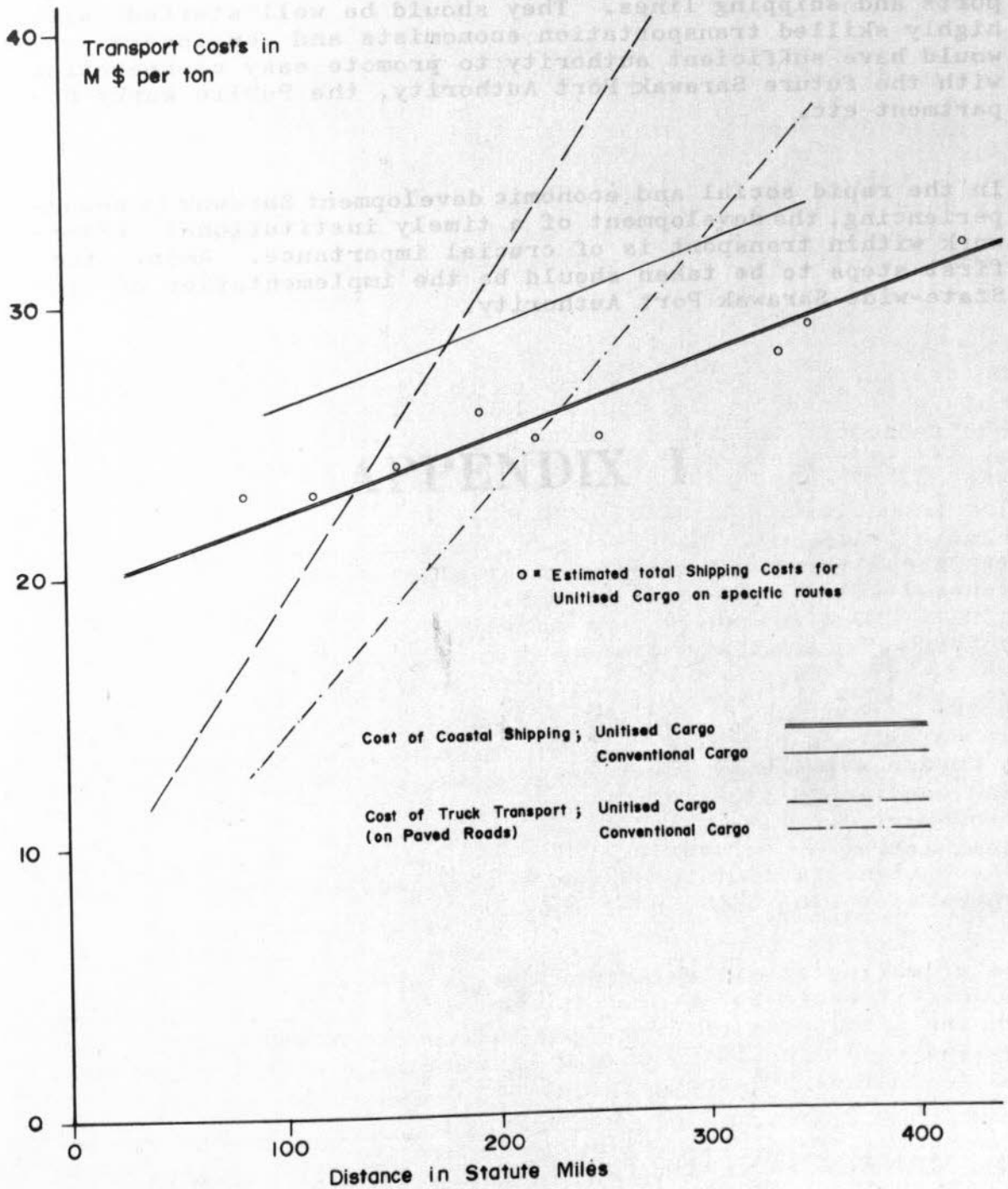
In promoting an optimal distribution of traffic by transport modes, it would be an advantage if the competition were based on the total cost of providing the services. Both airport taxes and road user taxes should, therefore, reflect the cost to the society of providing airports and roads.

5.4 MANAGEMENT OF TRANSPORT DEVELOPMENT

Control and guidance of transport development in accordance with the aims of overall regional development policy is a

FIGURE 5.1

COMPARISON BETWEEN ESTIMATED FUTURE
—COST OF COASTAL SHIPPING AND
—COST OF TRUCK TRANSPORT



difficult but highly rewarding task. It is recommended that the relevant authorities within the Sarawak Ministry of Communications and Works are strengthened and allocated the necessary power to facilitate efficient co-ordination of Government activities within the transport sector. The authorities should be capable of giving expert advice on operational as well as infrastructural matters, also to help and guide the traditional small businessman in land transport as well as large scale enterprises such as ports and shipping lines. They should be well staffed with highly skilled transportation economists and engineers who would have sufficient authority to promote easy co-operation with the future Sarawak Port Authority, the Public Works Department etc.

In the rapid social and economic development Sarawak is now experiencing, the development of a timely institutional framework within transport is of crucial importance. Among the first steps to be taken should be the implementation of the State-wide Sarawak Port Authority.

APPENDIX I

TAX REBATED FUEL

The concept of rebating tax on fuel, or part of it, for specified services is not new. A scheme was in operation in East Africa for many years applied mainly to use of fuel for agricultural machinery.

The scheme was enacted by legislation, and as such schemes must be open to abuse, included penalty clauses for misuse of the rebated fuel.

An outline of such a scheme applicable to river transport follows:-

1. The areas in which the scheme will be applicable should be designated.

2. The beneficiaries similarly, should be prescribed, in this case as 'Registered River Transport Operators'.

3. The type of river craft to which the scheme will apply and be limited, should be prescribed - e.g.

   - all outboard engines;
   - inboard engines of registered horse power, not exceeding .....

4. Finally, the amount of rebate should be prescribed by the type of fuel subject to rebate, the zone, if rebates are to vary; and the amount of rebate per gallon - e.g.

Fuel	Zone	Rebate per gallon
Petrol	1, 2 and 3	x cents
	4, 5 and 6	y cents
Petrol-oil mixture	4, 5 and 6	y cents

Subsequent variations in either zone or rebate would be gazetted.

5. Method

(a) Owners or operators of engined river transport craft coming within the purview of the scheme would be registered through application and approval by the local administrative officer or other designated Government official. It is recommended that an annual fee be charged for registration, not as a revenue earner - but for control.

Annexure I shows a form of application and registration.

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(b) Suppliers of approved fuels would be registered similarly - see Annexure II.

(c) The approved operator would be issued with a registration certificate - Annexure III. On production to the registered supplier he would be entitled to obtain a rebate certificate on purchase of the approved fuel - see Annexure IV.

(d) The rebate certificates would be surrendered periodically to the nearest sub-treasury or Treasury Office for payment against draw-back of Petroleum Tax - see Annexure V.

6. Security

(a) Inclusion of penalty clauses in the enabling Ordinance would be some deterrent to misuse of rebated fuel. Powers of inspection of suppliers' records should also be included - to be undertaken by administrative officers, and police say of the rank of Sergeant and above.

(b) On registration the operator would declare ownership of the engines used and estimated monthly fuel consumption. The authorising officer would determine the maximum amount of fuel purchasable in any one month. The registered supplier could be made responsible for recording individual purchases to ensure the maxima are not exceeded, but the main check would be in the paying office.

7. Affect on revenue

This could only be established after decision has been taken on the extent to which the scheme would be applied and the amount or amounts of rebate to be given. It would be reasonable to relate the rebate to the destination transport cost of the fuel, thereby equalising the consumer price throughout the Region or State.

A scheme in isolation in the Study Area may be an acceptable situation, but any rebate scheme of this nature should be considered State wise.

8. Administrative Note

Administratively, the scheme is not difficult of operation in that the consumer bears the responsibility of applying for the rebate and obtaining his fuel supplies from his registered supplier. He would of course be able to obtain as much un-rebated fuel as he wanted.

Government controls the rebate and Zone application, which may be amended or suspended at any time.

Consideration had been given to the use of colour additive fuel at a rebated price, but where this system has been used, far greater administrative problems have arisen, and checks by revenue officers from preparation of the fuel, to sale and consumption, would be required to prevent abuse.

9. Notes to Annexures

Annexure I: To be completed in duplicate. Original for registration and record; duplicate to be sent to the Registered Supplier.

Annexure II: Printed in book form - prenumbered. Original to registered supplier for display, duplicate for registration and record.

Annexure III: Printed in book form - prenumbered. Original issued to river transport operators in card cover, similar to a driving licence, duplicate for registration and record.

Annexure IV: Printed in book form - prenumbered. Books issued to registered suppliers who would surrender used books prior to issue of new certificates against signature. Original certificate to purchaser, duplicate for inspection (fixed) and subsequent return to issuing office.

Annexure V: To be completed in duplicate. Original to Paying Office, duplicate for applicant's retention.

(TITLE OF ORDINANCE)

Annexure I

Registered River Transport Operator

Registration Form

I [1] _____ of [2] _____ in the District of _____ hereby apply for registration under the [3] _____ as a river transport operator in the areas [4] _____ for the purpose of claiming the rebate specified in [3] _____ on fuels used in operation of the engines owned by me and described below in the carrying of passengers and goods for hire or reward in the areas so specified. I understand that the fuel on which rebate is claimed may be used only for the purpose prescribed and that it is an offence under [3] _____ to sell, utilise or otherwise dispose of the fuel so purchased.

Type and dimensions of boats _____ _____

Type, number and horse power of engines _____ _____

Total number of engines operated _____

Average monthly consumption of fuel estimated for the twelve months period _____ to _____

Petrol ____gallons Petrol-oil mixture ____gallons

Dated _____ at _____ Signature _____

Witness [5] _____

For official use

Application approved Registration No. _____ issued on _____ valid until _____

Approved purchase of fuel during the validity of this registration.

Petrol ____gallons per month
Petrol-oil mixture ____gallons per month

Registered Supplier: _____

Dated at
Dated _____ at _____

_____
Authorising Officer

---

1 Full Name
2 Longhouse or Village
3 Title of the Ordinance
4 Operating areas
5 Headman or Administrative Officer or other designated authorised officer

(TITLE OF ORDINANCE)

Annexure II

Registered Supplier

No. 0000

1 _____ of 2 _____

is appointed a registered supplier of petroleum products specified in 3 _____ and as such shall issue Rebate certificates for such purchases of petroleum products as are specified under 3 _____ to authorised registered river transport operators and to the maxima monthly amounts prescribed in the registration book held and produced by the operator at the time of purchase. It shall be unlawful for the registered supplier to supply knowingly such petroleum products subject to rebate for any purpose other than that prescribed in 3 _____ neither shall the registered supplier supply such petroleum products subject to rebate to any person not registered with him as a registered river transport operator.

This certificate of registration shall expire on _____

Dated _____ at _____

(Signed) Authorising Officer

Signature and chop of Registered Supplier:

---

1 Full Name
2 Address and District
3 Title of Ordinance

(TITLE OF ORDINANCE)

Annexure III

Registered River Transport Operator

No. 0000

1 _____ of 2 _____

3 _____ is hereby registered as a river transport operator for the purpose of carrying passengers and goods within the areas 4 _____ and is authorised to purchase not more than _____ gallons of _____ each month within the validity of this registration, on which rebate of tax may be claimed at the rate specified by Government Notice and from the registered supplier herein shown.

Registered Supplier: _____

_____

This registration expires on _____

_____

Authorising Officer

Dated _____ at _____

FEE $

Renewals, amendments and endorsements:

---

1 Full Name
2 Address
3 District
4 Area of operation

(TITLE OF ORDINANCE)

Annexure IV

Rebate Certificate

No. 0000

1 _____ registered river transport operator (No.) was today supplied with [2] _____ ( ) gallons of petrol grade ____*/petrol-oil mixture at a cost of $_____ against invoice No._____ dated _____

Dated_____ at _____ Registered Supplier (chop)

_____
Signature of
registered operator

* Delete as applicable

Note (or on reverse)
This rebate certificate supported by the registered supplier's invoices must be submitted to the nearest Treasury Office for payment, within x days of the date of issue, and should be accompanied by Claim form _____ The rebate payable shall be as gazetted by Government Notice.

---

1 Full Name
2 In words and figures

(TITLE OF ORDINANCE)

Annexure V

Rebate Claim Form

I [1] _____ of _____

registered river transport operator No. _____ hereby claim rebate on the petroleum products listed below purchased from [2] _____ for the period _____ to _____

The relevant Rebate certificates and supplier's Invoices are attached to this claim.

Approved monthly maximum _____ gallons.

Subject to claim _____ gallons.

Rebate Certificate No. and Date	Suppliers Invoice No. and Date	No. of gallons Petrol/Petrol-oil mixture
	Total	

Dated _____ at _____

_____
Claimant

For official use

Previous claim period _____

Claimed within current calendar month _____ gallons

Approved claim ____ gallons at _____ per gallon = $_____

_____
Authorising Officer

==========

1 Full Name of Claimant

2 . . . . . registered supplier

APPENDIX II

APPENDIX II

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