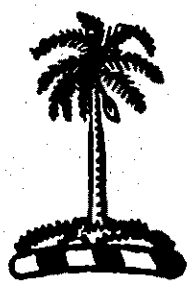
URBAN TRANSPORT STUDY
IN
GREATER METROPOLITAN AREAS
OF
GEORGE TOWN, BUTTERWORTH AND BUKIT MERTAJAM
MALAYSIA

PUBLIC TRANSPORT STUDY

TECHNICAL REPORT - 14



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PREFACE

Generally the definition for 'Public Transport' is understood as the following:

" Public transport is taken to mean modes available for public use rather than any distinction based on ownership"
----Planning for Public Transport by Peter R. White.----

According to the definition, there are many kinds of public transport in the study area such as bus, ferry, taxi, trishaw, railway and air and sea transport.

Among these transport modes, airway and searoute have little functions from the viewpoint of urban transport in the study area, and have a more important role in intra-national and inter-national levels. The main purpose of this study is to study urban transport in a metropolitan area, thus the major subjects are intended to be bus, ferry, taxi, trishaw and railway.

Regarding the ferry service, a technical report is prepared and a detailed description is given in that report.

Therefore, in this report the following items are treated in separate parts.

Part 1. Bus
Part 2. Taxi
Part 3. Trishaw
Part 4. Railway
Part 5. Bas Kilang
Part 6. Bas Sekolah

Among the above, Part 5 & 6, Bas Kilang and Bas Sekolah, should not be included in the public transport in the strict sense of the word. This is because, these services are provided only for limited personel who have some contract made for the provision of these services

Nevertheless, these roles are very similar to the bus service, they influence bus service to a great extent and the co-relationship between the two should not be neglected.
Therefore those two parts are contained in this report.

In this report mainly the existing conditions of each transport mode are mentioned for the purpose of realizing the present situation. A clear understanding is necessary from various aspects for planning. Detailed explanations are made in each part according to the results of analysis of every source of data obtained.

At the beginning of the report, the overall features of each public transport may be estimated as follows:

Estimated Number of Traffic Volume Travelled by Each Mode

(per day)

	No. of Vehicles	No. of Vehicle Trips	No. of Passengers
Bus	410	-	256,000
Taxi*	470	3,400	6,500
Trishaw*	2,400	13,000	26,000
Bas Kilang*	320	2,600	65,000
Bas Sekolah	190	2,900	44,000
Railway	-	-	3,500**
Ferry	11	460	81,800***

* Penang State

** Butterworth & Bukit Mertajam

*** Including drivers.

Part 1 BUS

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LIST OF TABLES AND FIGURES

1. INTRODUCTION

The 'bus' is a public conveyance that travels along a fixed route and takes up and sets down passengers at fixed points (bus stops) *.

Generally the bus is the most effective public transport by land in particular in intermediate sized cities such as those with a population below one million.

In the study area, the bus is one of the most important transport modes for the public in addition to the ferry.

In this report we describe bus services in order to introduce the present situation, to find out existing problems, and to give suggestions for demand forecasting and planning in the future.

Even though in the study area there are other bus services such as 'Bas Kilang' and 'Bas Sekolah', these are in somewhat different categories from public transport. And so, some description about them is made in other parts.

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* as defined by Oxford Advanced Learner's Dictionary of Current English.

2. SURVEYS AND COLLECTION OF DATA

To investigate present conditions of bus operation, various data were collected from bus companies, related administrative government bodies and bus patrons.

There is little data on bus transport authorized by the govornment such as statistical annual reports. Therefore we had to begin to gather basic data such as list of bus companies, bus routes and so on. It's necessary to integrate adequate raw data from time to time in order to make some improvement plans for the future.

At the same time several surveys wore carried out by the study team as mentioned hereafter. All results from data collected are described in Section 3 - Present Conditions.

2.1 Surveys

Three types of bus surveys were carried out for the purpose of clarifying detailed conditions of bus transport.

These surveys are as follows:

i) Bus Passenger Interview Survey
ii) Administering questionnaires to Bus Companies.
iii) Bus Travel-time Survey

i) Bus Passenger Interview Survey

This is one of the fundamental surveys for the public transport study, and the purpose is to obtain the characteristics of bus patrons; e.g. origin & destination, trip purpose, distance & means of transport taken to bus station and frequency of bus usage.

The passengers were interviewed with questionnaires at selected bus-stations. The selected bus-stations were 3 major bus terminals, 5 medium bus-stations and 6 minor bus-stations.

This interview survey was conducted during three peak hours (morning, noon and evening). Using random sampling, about 600 subjects were interviewed at the above six stations. The passengers interviewed were those who were about to board or alight from the buses.

As the detailed descriptions were made in Technical report - 05, reference should be made of it whenever needed.

ii) Administering questionnaires to Bus Companies.

This survey was conducted with cooperation of RIMV*. The study team drew up the questionnaire and RIMV sent them out and collected them from each bus company.

In Penang Island, there are 5 bus-operating organizations, the City Council Bus and 4 other private bus companies. In the study area in Province Wellesley, there are 12 private bus-companies including 2 companies which operate inter-regional express bus services.

* RIMV: Registration and Inspection of Motor Vehicles

The aim of the survey is to collect data on the bus service, such as;

i) Existing conditions of bus operations (e.g. its network, vehicles, facilities, etc.)
ii) Bus fares
iii) Present state of management of the bus companies
iv) Present problems faced by the bus companies
v) Future prospects and plans, and so on.

A sample questionnaire is attached in Appendices.

iii) Bus Travel-time Survey

This survey consists of 2 parts. The first part of this survey was conducted to determine the average travel-time taken by bus to travel along main bus routes and compare the time taken in peak and in off-peak hours. This survey was carried out according to the procedure in which a survey on board measured the time taken from the origin to the destination along the selected bus route twice in both peak and off-peak hours.

The second part of this survey was carried out to estimate the time taken by bus between each bus station and also to estimate its average running speed. The surveyor on board a bus along the selected bus route recorded the time at each bus stop. After this the distance between each stop was measured by the curvimeter and the running speed was calculated.

iv) Others

Besides the surveys above, a few surveys regarding to bus stop facilities and terminals were carried out. These results are summarized and given at the appropriate sections in each of our report.

3. PRESENT CONDITIONS

3.1 General

There are 5 bus organizations in Penang Island and 14 bus companies in Province Wellesley. These bus companies provide bus services to the general public and have 407 buses registered. In 1978 about 256 thousand passengers travelled by bus in the whole study area. This number seems to consists of approximately 20% of total person trip volume in the study area excluding on foot and by bicycle.

The bus services are divided into 3 categories from the viewpoint of the width of service area; these are intra-city, intra-regional and inter-regional service.

Since the study area is separated by the straits, there is no bus service connecting the island to the mainland.

Inter-regional bus service links the main cities in Peninsular Malaysia such as from Butterworth to Alor Star, Ipoh, Kuala Lumpur and etc. This inter-regional bus service is a cheaper means of transport for long distance travel compared to the railway and air-way.

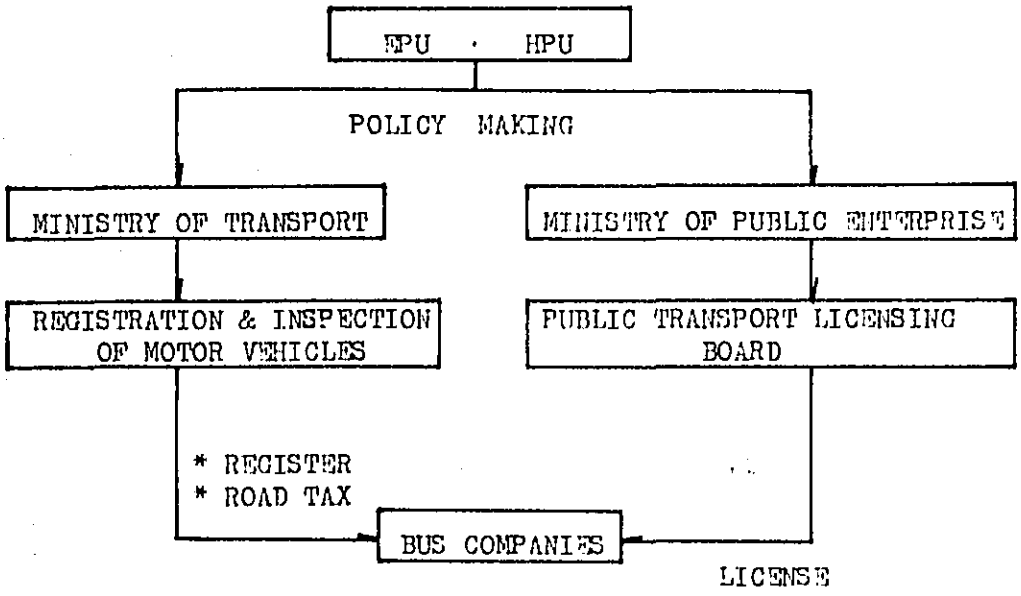
3.2 Enterprises

Bus companies are under the administration of two government offices; the RIMV, which is under the Ministry of Transport, and the Public Transport Licensing Board of the Ministry of Public Enterprise. The two ministries are controlled under EPU (Economic Planning Unit), HPU (Highway Planning Unit). The EPU and HPU are responsible for policy-making regarding public transport. Bus fares and routes are the concern of the Federal Government through the Public Transport Licensing Board in Kuala Lumpur.

All bus companies have to register their bus fleet ownership and their payment of road-tax in RIMV through an application.

The administrative structure mentioned above is shown in the following figure.

Fig.1.1 Administrative Structure of Bus Transport



The outline of each bus company is as follows.

The Municipal Council of George Town is the only government body in Malaysia which manages a bus service. This is called the City Council bus service, and is managed by the City Transport Department i.e. M.P.P.P. (Majlis Perbandaran Pulau Pinang).

Others excluding MARA are all private companies and the list of companies is shown in the following table.

Table 1.1 List of Bus Companies

	Name	Address of Office	No. of Employees	No. of buses
1.	City Council Bus *	Off Datuk Kramat Rd., Pulau Pinang	491	75
2.	Lim Teng Seng Bus Co. Sdn. Bhd.	Maxwell Rd., Penang	188	40
3.	Sri Negara Transport Service Co. Sdn. Bhd.	Beach St. Penang	52	8
4.	Penang Yellow Bus Co.**	Maxwell Rd., Penang	434	89
5.	Min Bus Co. Sdn. Bhd.	Penang Rd., Penang	159	29
6.	Central Province Transport Co. Sdn. Bhd.	Bagan Luar Rd., Butterworth	-	53
7.	United Traction Co. Sdn. Bhd.	-do-	155	46
8.	Bagan Town Bus Service Sdn. Bhd.	-do-	25	6
9.	Sam Lian Omnibus Co. Sdn. Bhd.	-do-	60	10
10.	Syarikat Pengangkutan Federal Bhd.	Jalan Kelab, Butterworth	30	9
11.	Syarikat Mangkalam Setia Bhd.	Jalan Danby, Bukit Mertajam	-	7
12.	Lean Hock Bus Co. Sdn. Bhd.	Straight St., Bukit Mertajam	52	9
13.	Kim Sen Omnibus Co. Sdn. Bhd.	Jalan Permatang Batu, Bukit Mertajam	64	13
14.	Hup Seng Bus Co. Sdn. Bhd.	Nibong Tebal, Province Wellesley	-	5
15.	Syarikat Bus Hup Hoe	-do-	-	2
16.	Lee Sin Hiang Co.	Simpang Empat, Province Wellesley	-	1
17.	Syarikat Pengangkutan Bekerjasama Seberang Perai Bhd.	Kepala batas, Province Wellesley	-	5
18.	MARA***	Kuala Lumpur	-	-
19.	Butterworth-Grik Express Sdn. Bhd.	T. Tualang, Kedah	-	-
20.	Ekspa (Butterworth - Taiping) Express	Taiping, Perak	-	-
21.	Ekban (Butterworth - Padang Besar) Express	Jalan Bagan Jermal, Butterworth	31	7

* Official name: Majlis Perbandaran, Pulau Pinang. Jabatan Pengangkutan Bandaraya

** Official name: Syarikat Bus Kuning Pulau Pinang Bhd.

*** : Majlis Amanah Rakyat

5 bus companies are franchised in Penang Island; 6 of them have their bases at Butterworth and 3 of them have their head offices in Bukit Mertajam.

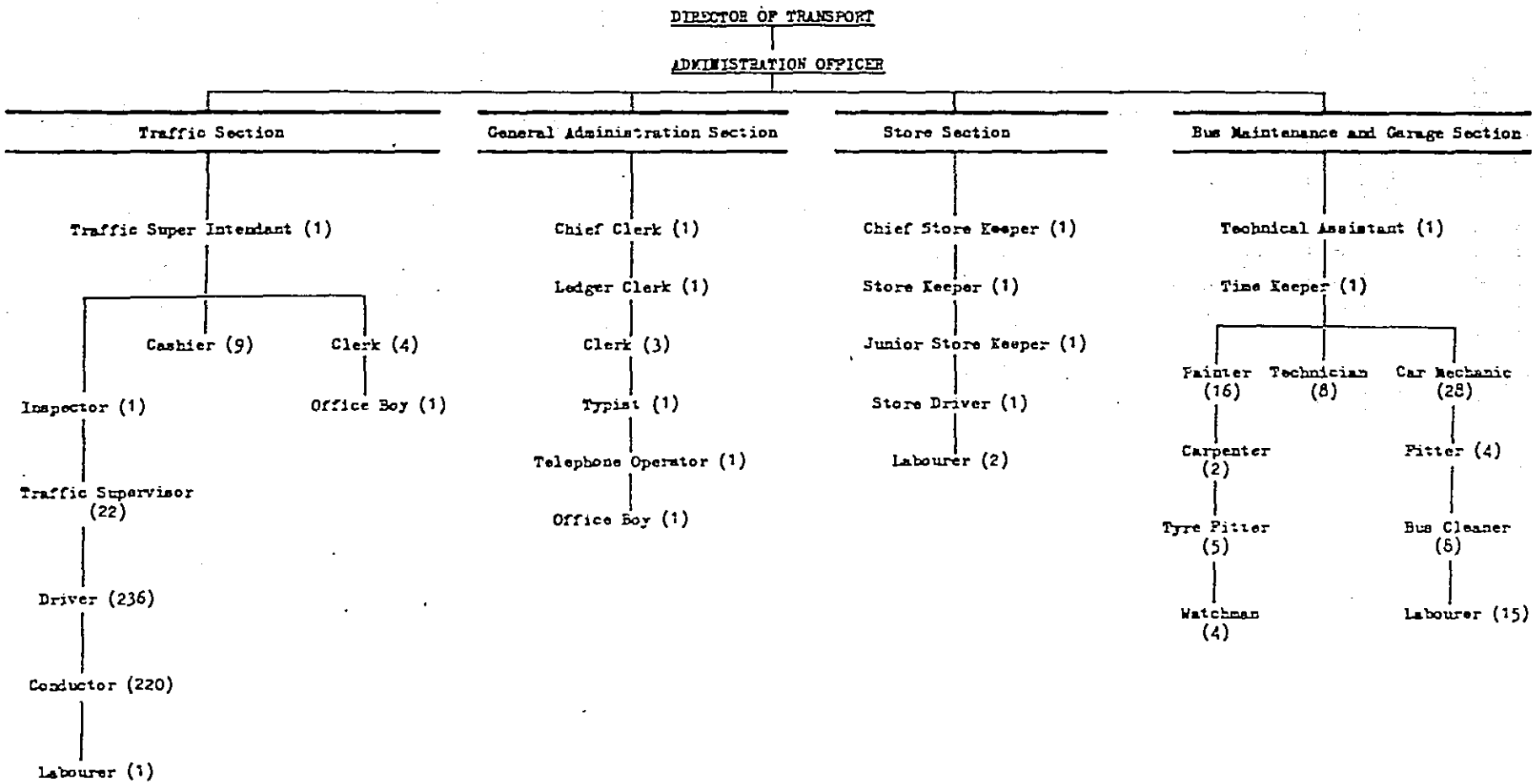
In Province Wellesley there are many small companies which have less than 50 employees and less than 10 bus fleets. The organization chart of City Council Bus is shown at the end of this section as a reference.

Table 1.2 Total Number of Employees.

Name of Bus Companies	Total Employees			Share(%) in 1978
	1976	1977	1978	
City Council Bus	500	494	491	37
Penang Yellow Bus	430	427	434	33
Hin Bus	162	166	159	12
Lim Seng Seng Bus	203	198	188	14
Sri Negara Bus	49	45	52	4
Sub-Total	1344	1330	1324	100
Central Province Wellesley Bus	-	-	-	-
Lean Hock Bus	48	52	52	12
Sam Lean Omnibus	55	60	60	14
Bagan Town Bus	25	25	25	6
Federal Transport Bus	24	30	30	7
Min Sen Bus	82	85	84	19
United Traction Bus	137	147	155	35
Ebban Bus	19	28	31	7
Sub-total	490	427	437	100

Note: Central Province Wellesley Bus Company failed to reply to our enquiry.

Table 1.3 ORGANISATION CHART OF TRANSPORT DEPARTMENT, M.P.P.P.



3.3 Routes

1) Network

Bus routes provided by these companies are shown in the following table and figures.

Table: 1.4 Bus Routes.

Bus Company	Route No.	Origin	Destination	Operating Distance km	Operating Distance m
y Council Bus	1	Ayer Itam	Jetty	9.4	(5.85)
	2	Bagan Jermal	"	7.4	(4.00)
	3	Jelutong	"	6.4	(4.00)
	4	Yeap Chor Ee Road	"	9.7	(6.00)
	5	"	"	9.4	(5.85)
	6	"	"	9.7	(6.00)
	7	Waterfall Garden	"	8.1	(5.02)
	8	Ayer Itam	Penang Hill	1.9	(1.20)
	9	Yeap Chor Ed Rd.	Jetty	9.3	(5.75)
	10	Kg. Melayu	"	9.7	(6.02)
	11	Aquarium	"	9.7	(6.00)
	12	Jelutong	Ayer Itam	6.1	(3.80)
	13	"	Bagan Jermal	9.8	(6.12)
i Seng Seng		Prangin Rd.	Ayer Itam	7.2	(4.50)
		Jetty	"	9.5	(5.88)
. Negara	136	Jetty	Bagan Jermal		( )
	136A	"	Bt. Lada		( )
ang Yellow Bus	66	Jetty/Weld Quay	Balik Pulau	35.1	(21.84)
	67	Jalan Maxwell	Gertak Sanggul	28.1	(17.43)
	68	"	Batu Maung	26.4	(16.38)
	69	"	"	28.7	(17.85)
	70	"	Telok Kumbar	22.7	(14.12)
	71	"	Balik Pulau	32.4	(20.16)
	72	"	Jelutong	5.2	(3.26)
	73	Balik Pulau	Pulau Betong	11.2	(6.9E)
	74	"	"	11.2	(6.98)
	75	"	Pantai Acheh	10.8	(6.72)
	76	"	Telok Bahang	19.6	(12.18)

	77	Jalan Maxwell	Custom Village, Aquarium & Brown Garden	10.8	(6.72)
	78	"	Sungai Ara	14.6	(9.06)
	79	"	Ayer Itam via Relau	25.7	(15.96)
		Ayer Itam.	Paya Terubong		
Bus	93	Prangin Bus stand	Telok Bahang	22.5	(14.0)
	93A	"	Tanjong Bungah	10.2	(6.35)
	94	"	"	11.8	(7.35)
tral Province lesley	51	Bukit Mertajam	Lunas	16.1	(10.00)
	52	Butterworth	Padang Serai	31.8	(19.75)
	53	"	Bukit Mertajam	16.1	(10.0)
	54	"	Penanti	14.1	(8.75)
	55	"	Tasek Glugor	24.1	(15.0)
	56	Bukit Mertajam	Prai	10.5	(6.5)
	57	Butterworth	Kepala Batas	24.1	(15.0)
	58	"	Permatang Binjai	17.7	(11.0)
	59	Tasek Glugor	Bukit Mertajam	22.1	(13.75)
	60	Butterworth	"	13.3	(8.25)
	60B	"	Permatang Pauh	11.3	(7.00)
	61	Penanti	Pengkalan Tambang	6.0	(3.75)
	62	Butterworth	Prai	5.8	(3.60)
	506	"	Kulim	27.4	(17.00)
	586	"	Baling	86.9	(54.0)
ted Traotion	84	Butterworth (Mitchell Pier)	Kuala Muda	25.0	(15.54)
	86	"	Teluk Air Tawar	22.8	(14.18)
	517	"	Sg. Petani	23.8	(14.79)
	518	Bukit Mertajam	"	29.7	(18.45)
	516	Butterworth	Alor Star		( )
an Town	141	Butterworth	Titi Timbol	7.2	(4.5)
	142	"	St. Mark's School	6.4	(4.0)
Lian	513	Butterworth	Parit Buntar	44.1	(27.4)
eral	230	Butterworth	Sg. Puyu	10.3	(6.4)
	232	"	Pokok Sena	19.6	(12.2)

ia		Bukit Mertajam	Kg. Baru		( )
		"	Kulim	14.1	(8.75)
		"	Bukit Mertajam		( )
n Hock	106	Bukit Mertajam	Sg. Lembu	15.7	(9.75)
	107	"	Kulim	14.1	(8.75)
Sen	96	Simpang Ampat	Balai Dam	7.6	(4.7)
	97	Bukit Mertajam	Nibong Tebal	30.6	(19.0)
	98	Nibong Tebal	Sg. Bakap	10.6	(6.6)
	99	Bukit Mertajam	Kuala Juru	15.3	(9.5)
Seng*	111	Nibong Tebal	Parit Buntar	6.4	(4.0)
	112	"	Sungei Kechil Ilir	10.0	(6.2)
Hoe*	116	Nibong Tebal	Sg. Bakau	12.2	(7.6)
	117	"	Sg. Udang	11.7	(7.25)

* Outside the study area

In Penang Island, 5 bus companies provide services for different areas as follows:-

i) City Council buses serve the whole city area of George Town with thirteen routes.

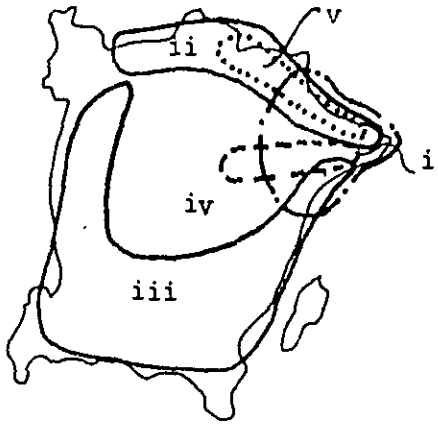
ii) Hin buses serve the north.

iii) Yellow buses serve the south and west of the island.

iv) Lim Seng Seng buses serve only between the central area of George Town and Ayer Itam.

v) Sri Negara buses serve the northern area of George Town.

Fig. 1.2 Bus Service Coverage in George Town.



Most of the route form radial routes towards the center of George Town, with some exception of the City Council and Yellow bus.

These bus routes in the city area are shown in detail in Fig. 1.3 and 1.4.

PETA
BANDARAYA GEORGE TOWN, PULAU PINANG

SEKIL : 5 INCI PADA 1 BATU

BUS - NETWORK

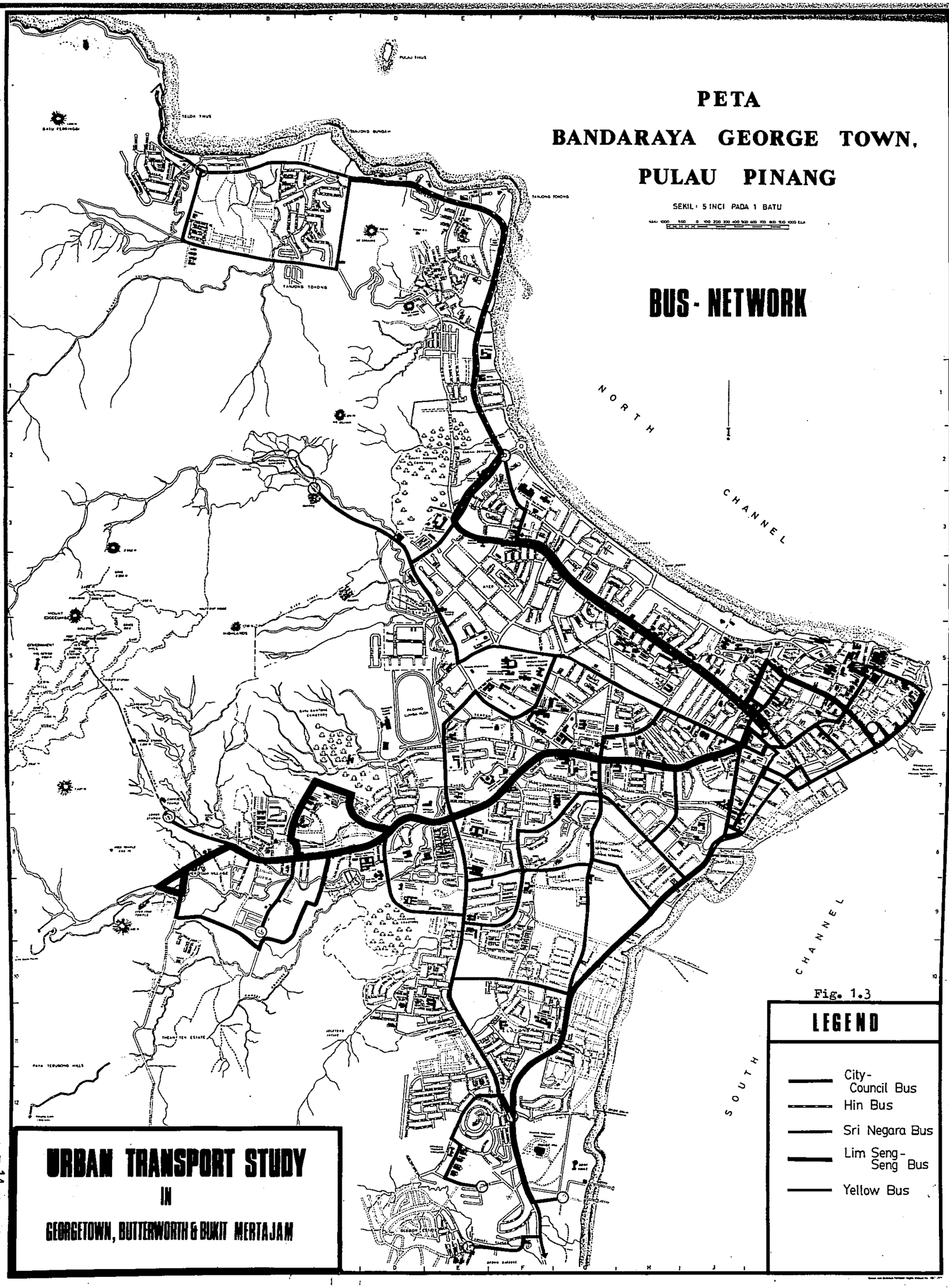


Fig. 1.3

LEGEND

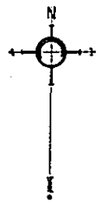
- City-Council Bus
- Hin Bus
- Sri Negara Bus
- Lim Seng-Seng Bus
- Yellow Bus

URBAN TRANSPORT STUDY
IN
GEORGETOWN, BUTTERWORTH & BUKIT MERTAJAM

PETA
BANDARAYA GEORGE TOWN, PULAU PINANG

SEKIL : 5 INCI PADA 1 BATU

BUS-ROUTE MAP



NORTH CHANNEL

CHANNEL

Fig. 1.4 LEGEND

	BUS NO.	DESTINATION
———	1	AIR ITAM
·····	2	BAGAN JERMAL
———	3	JELUTONG
———	4	PERAK ROAD
———	5	GREEN LANE through AIR ITAM
———	6	PATANI ROAD
———	7	WATERFALL
———	8	PENANG HILL
———	9	GREEN LANE through HAMILTON ROAD
———	10	KAMPUNG MELAYU
———	11	AKUARIUM
— — —	12	JELUTONG / AIR ITAM
———	13	JELUTONG / BAGAN JERMAL

URBAN TRANSPORT STUDY
IN
GEORGETOWN, BUTTERWORTH & BUKIT MERTAJAM

In Province Wellesley United Traction buses provide services to the north from Butterworth and Bukit Mertajam. Central Province Wellesley buses have a very wide service in the central area, and Lean Hock and Bagan Town buses also serve this area. In southern area Sam Lian and Min Sen buses provide some routes from Butterworth and Bukit Mertajam towards Simpang Ampat.

Most bus routes have their origin/destination at Butterworth or Bukit Mertajam.

While, in this area there are also inter-regional bus services such as Butterworth to Padang Besar, Butterworth to Taiping and Ipoh, and Butterworth to Kuala Lumpur.

Fig. 1.5 shows the bus routes in Province Wellesley. Also shown are the bus routes of 3 bus companies covering mainly the fringe areas in Penang Island.

SEMENANJUNG MALAYSIA

PULAU PINANG

1:63,360

Skil 1 Batu Scinci

BUS - NETWORK

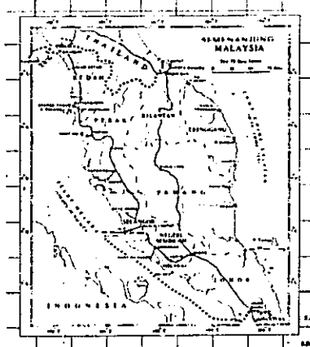
LEGEND Fig. 1.5

Min Sen	Lean Hock
Hup Seng	United Traction
Sam Lian	Mara
Syarikat Rangkaian Setia	
Bagan Town	Hin
Federal	Sri Negara
Hup Hoo	Yellow
Central Province Wellesley	

URBAN TRANSPORT STUDY

IN

GEORGETOWN, BUTTERWORTH & BUKIT MERTAJAM



JENIS A
TIPE
CETAKAN PERTAMA
EDITION

2) Network Coverage

(i) George Town area

There are altogether over 20 bus routes operating throughout the city area. These bus networks cover almost all main roads which form the skeleton of major road pattern.

Three north-bound routes of different companies, such as City Council Bus, Hin Bus and Sri Negara Bus pass through Burma Road. Six City Council Bus routes and Lim Seng Seng Bus routes overlap along Dato Keramat and Ayer Itam Roads. Also six south-bound bus routes overlap along Green Lane. And eight south-bound bus routes run through Jelutong Road.

Besides, along almost all the other main roads there are dense bus services, in the city area. The bus service level has been upgraded in terms of the density of route network. This is because, all the bus-stops are located within the distance of 250 m from each other, and the total area within 250m radius from these bus-stops covers 80% of the city area. This means 80% of the city area is accessible to the bus-stop within a 4 min. walk.

(ii) Other areas in Penang Island

In the northern areas of Penang Island viz., Telok Bahang, Batu Feringgi, Tg. Bunga, bus services are provided by the Hin Bus. The southern and western areas, such as, Bayan Lepas, Gertak Sanggul, Balik Pulau, Bt. Genting and Kg. Pantai Acheh, are served by the Yellow Bus.

Bus routes cover main roads in rural areas. Supposing the bus service area is 500 m along the bus routes, 90% of residents in the southern area and 70% of residents in the western area can make use of the bus service.

(iii) Province Wellesley

In the central and northern area, in and around Butterworth and Bukit Mertajam, almost all main roads along developed areas located are covered by bus routes. Therefore, on the assumption that bus service area is within 500 m along the bus routes, main developed areas are included in the service area but kampong

areas are not.

In the southern part of Province Wellesley, there are only a few bus routes along the main roads such as Federal Route 1, and so most small villages located apart from these main roads cannot enjoy adequate bus service. Therefore, the level of bus service to these parts is abruptly reduced compared to other areas which are mentioned above. Many villages are excluded within the 500 m distance along the bus routes. In future there would be a need to extend the bus route toward those areas.

Fig. 1.6 and Fig. 1.7 shows the bus-stop location and coverage and bus-route coverage respectively.

PETA
BANDARAYA GEORGE TOWN.
PULAU PINANG

SEKIL : 5 INCI PADA 1 BATU

N

NORTH CHANNEL

SOUTH CHANNEL

Bagan Jermal terminal

Waterfall terminal

Victoria Street main terminal

Penang Hill terminal

Ayer Itam terminal

Kg Melayu terminal

Green Lane terminal

Calthrope terminal

Fig. 1.6

URBAN TRANSPORT STUDY
IN
GEORGETOWN, BUTTERWORTH & BUKIT MERTAJAM

LEGEND

bus-stop

bus terminal

within 250 m from bus-stop

BUS-STOP LOCATION & COVERAGE

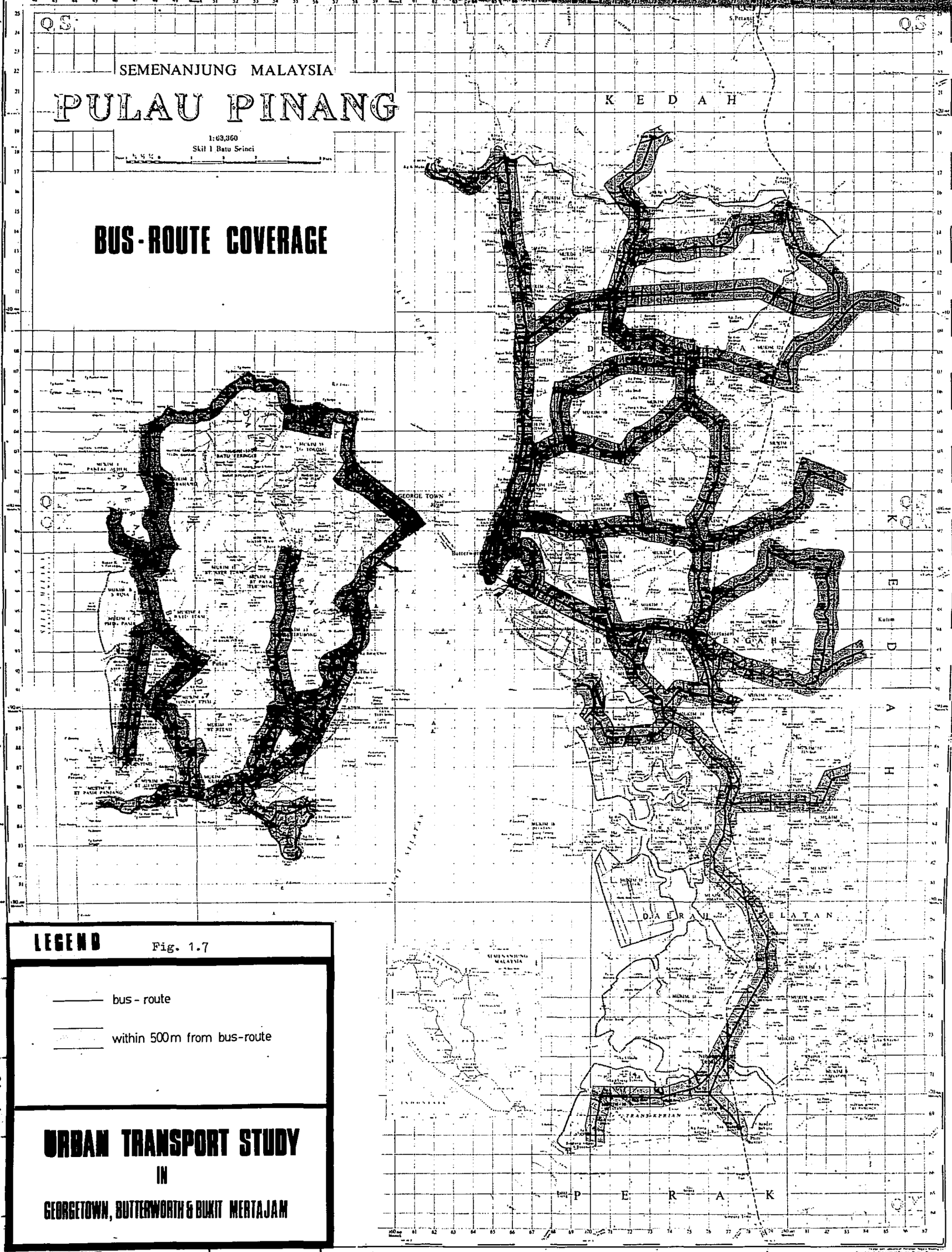
PENGARAH KEJURUTERAAN
MAJLIS PERBANDARAN PULAU PINANG
1977

SEMENANJUNG MALAYSIA

PULAU PINANG

1:63,360
Skil 1 Batu Seinci

BUS-ROUTE COVERAGE



LEGEND Fig. 1.7

bus - route

within 500m from bus-route

URBAN TRANSPORT STUDY
IN
GEORGETOWN, BUTTERWORTH & BUKIT MERTAJAM

3.4 Operation Schedule and Frequency

1) Bus Operation Period

The operation period for all buses which serve in George Town area is 19 running hours daily from 5.15 am. or 6.00 am. to 12.30 am. or 1.00 am. One of the reasons why the bus service starts so early in the morning is because of schools' and factories' morning shift.

In Province Wellesley, most of the bus companies stop their operations a little earlier compared to the urban buses in George Town, and after 11.30 pm., almost all bus services are stopped. Thus, a worker who lives in the rural area far from the city needs other transport modes such as the factory bus service.

And now, all the bus companies have the opinion that there is no necessity to extend the existing operation hours of their bus services.

2) Frequency

The frequency of bus services is quite different by each route; for example, the most frequent route is serviced 180 times in each direction, that is, 5 to 7 minutes interval per hour while the least frequent route has only 1 trip per day.

The detailed list is shown in the following tables. And the frequency along each route section is illustrated in Fig. 1.8 and 1.9.

Table 1.5 Bus Routes and Frequency (Penang Island)

Company	Route Number	Origin	Destination	Distance Mile	Distance Kilometers	Minutes	Fare ¢	1st. Departure	Last Departure	Frequency Per Day (Double Trip)
CITY COUNCIL	1	JETTY	– AIR ITAM BUS TERMINAL	5.85			35	6.00 A.M.	12.05 A.M.	180
"	2	JETTY	– BAGAN JERNAL BUS TERMINAL	4.60			25	6.10 A.M.	12.05 A.M.	135
"	3	JETTY	– JELUTONG BUS TERMINAL	4			25	6.00 A.M.	12.05 A.M.	180
"	4	JETTY	– GREEN LANE BUS TERMINAL	6			35	6.00 A.M.	12.05 A.M.	120
"	5	JETTY	– GREEN LANE BUS TERMINAL	5.85			35	7.00 A.M.	9.00 P.M.	19
"	6	JETTY	– GREEN LANE BUS TERMINAL	6			35	6.00 A.M.	12.05 P.M.	77
"	7	JETTY	– WATERFALL GARDEN	5.02			30	6.00 A.M.	9.30 P.M.	30
"	8	AIR ITAM	– PENANG HILL	1.20			15	6.30 A.M.	9.45 P.M.	60
"	9	JETTY	– GREEN LANE BUS TERMINAL	5.75			35	6.08 A.M.	12.05 A.M.	74
"	10	JETTY	– KAMPUNG MELAYU	6.02			35	6.00 A.M.	12.05 A.M.	98
"	11	JETTY	– AKUARIUM	6			35	6.55 A.M.	11.50 P.M.	17
"	12	JELUTONG BUS TERMINAL	– AIR ITAM BUS TERMINAL	3.50			25	6.00 A.M.	9.40 P.M.	47
"	13	JELUTONG BUS TERMINAL	– BAGAN JERNAL BUS TERMINAL	6.12			35	6.00 A.M.	9.30 P.M.	31
SRI NEGARA	1	JETTY	– BAGAN JERNAL ROUND ABOUT			10–12				82
"	2	JETTY	– MT. ERSKINE BUKIT LADA			60				16
HIN BUS CO.	93	PRANGIN STAND TERMINAL	– TELOK BAHANG TERMINAL	14						97
"	93A	PRANGIN STAND TERMINAL	– TANJONG BUNGAH TERMINAL	6.35						97
"	94	PRANGIN STAND TERMINAL	– TANJONG BUNGAH TERMINAL	6.35						47
"	94A	PRANGIN STAND TERMINAL	– TANJONG BUNGAH TERMINAL	6.35						33

PENANG YELLOW BUS CO. BHD.	66	JETTY	– BALIK PULAU	21.84			66
"	67	JLN. MAXWELL	– GERTAK SANGGUL	17.43			23
"	68	JLN. MAXWELL	– BATU MAUNG	16.38			49
"	69	JLN. MAXWELL	– BATU MAUNG	17.85			49
"	70	JLN. MAXWELL	– TELUK KUMBAR	14.12			1
"	71	JLN. MAXWELL	– BALIK PULAU	20.16			1
"	72	JLN. MAXWELL	– JELUTONG	3.26			88
"	73	BALIK PULAU	– PULAU BETONG	6.98			9
"	74	BALIK PULAU	– PULAU BETONG	6.95			9
"	75	BALIK PULAU	– PULAU ACHEH	6.72			31
"	76	BALIK PULAU	– TELUK BAHANG	12.18			5
"	77	JLN. MAXWELL	– CUSTOM VILLAGE, AQUARIUM, BROWN GARDEN	6.72			47
"	78	JLN. MAXWELL	– SUNSET ALA	9.06			24
"	79	JLN. MAXWELL	– AIR ITAM VIA RELAU	15.96			24
"	79	AIR ITAM	– PAYA TERUBONG				34
LIM SENG SENG	1	MAXWELL ROAD	– AIR ITAM	4.5	6.00 A.M.	12.15 A.M.	

Table 1.6 Bus Routes and Frecuency

(Province Wellesely)

Company	Route Number	Origin	Destination	Distance Mile	Distance Kilometers	Minutes	Fare s	1st. Departure	Last Departure	Frequency Per Day (Double Trip)
LEAH HOCK BUS CO. SDN. BHD.	106	B. KERTAJAM	- SUNGEI LEMBU	9½		30	50	6.30 A.M.	6.50 P.M.	6
"	107	B. KERTAJAM	- KULIM	8½		25	45	6.45 A.M.	11.20 P.M.	48
SAN LIAN OMNIBUS CO. SDN. BHD.	513	BUTTERWORTH	- PARIT BUNTAR	27		75	140	6.30 A.M.	10.30 P.M.	48
CENTRAL PROVINCE WELLESLEY TRANSPORT CO. SDN. BHD.	51	B. KERTAJAM	- LUNAS	10		30		6.00 A.M.	11.40 P.M.	41
"	52	BUTTERWORTH	- PADANG SEPAI	19½		60		6.00 A.M.	9.30 P.M.	37
"	53	B. KERTAJAM	- BUTTERWORTH	10		35		6.00 A.M.	12.25 A.M.	106
"	54	BUTTERWORTH	- PENANTI	8½		30	50	6.15 A.M.	10.45 P.M.	11
"	55	BUTTERWORTH	- TASEK GLUGOR	15		46		6.00 A.M.	7.30 P.M.	4
"	56	B. KERTAJAM	- PRAI	6½		20	35	6.00 A.M.	9.30 P.M.	16
"	57	BUTTERWORTH	- KEPALA BATAS	15		45	80	6.00 A.M.	7.30 P.M.	5
"	58	BUTTERWORTH	- PMTG. BERJAI	11		35	60	7.50 A.M.	6.00 P.M.	4
"	59	TASEK GLUGOR	- LUNAS (VIA SIM-PANG TAI TEONG)	6.1		18		6.30 A.M.	12.00 P.M.	2
"	59	TASEK GLUGOR	- LUNAS (VIA PADANG MENORA)	7½		23		7.20 A.M.	6.00 P.M.	3
"	59	B. KERTAJAM	- TASEK GLUGOR	13½		45		9.15 A.M.	5.00 P.M.	4
"	60	B. KERTAJAM	- BUTTERWORTH (VIA PRAI JLN. PARU)	6½		25		6.00 A.M.	12.25 A.M.	107
"	60A	BUTTERWORTH	- PMTG. PAUH (VIA JLN. DATO HUSSEIN ONN)	7		21	40	6.30 A.M.	9.50 P.M.	8
"	61	PENANTI	- PENGKALAN TAMBANG	3½		12	25	7.15 A.M.	7.15 P.M.	8
"	62	BUTTERWORTH	- PRAI	3.6		11	25	6.00 A.M.	12.00 A.M.	26
"	506	KULIM	- KEPERMAN PIER	17		45	90	7.00 A.M.	6.45 P.M.	24
"	556	BUTTERWORTH	- BALING	54		105	275	7.00 A.M.	7.00 P.M.	12
BAGAN TOWN BUS SERVICE SDN. BHD.	141	BUTTERWORTH	- SITI TINAOL	4½		22	25	6.10 A.M.	11.50 P.M.	45
"	142	BUTTERWORTH	- ST. MARK SECONDARY SCHOOL	4		22	25	6.15 A.M.	12.00 P.M.	45

KIN SEN OMNIBUS CO. SDN. BHD.	97	B. KERTAJAM	– NIBONG TEBAL	19	50	100	6.15 A.M.	9.20 P.M.	56
"	99	B. KERTAJAM	– KUALA JURU	95	30	55	6.00 A.M.	7.20 P.M.	24
"	96	SUNG. ENFAT	– BALAI DAN	47	20	30	6.15 A.M.	6.10 P.M.	14
"	99	NIBONG TEBAL	– SUNGEI BAKAP	6.5	25	40	6.20 A.M.	7.00 P.M.	12
THE UNITED TRACTION CO.	84	MITCHELL PIER	– KUALA MUDA						25
"	86	MITCHELL PIER	– TELOK AIR TAWAR, KEPALA BATAS						29
"	517	MITCHELL PIER	– SUNGEI PETANI						25
"	518	B. KERTAJAM	– SUNGEI PETANI						29
"	516	MITCHELL PIER	– ALOR STAR						38
FEDERAL TRACTION	230	BUTTERWORTH	– SUNGEI PUYU	6					80
"	232	BUTTERWORTH	– POKOK SENA						20
SYK. RANGKAIAN SETIA BHD.		B. KERTAJAM	– KULIM						
"		B. KERTAJAM	– BUKIT MINYAK						
"		B. KERTAJAM	– KG. BARU						
SYK. EBBAN	1	BUTTERWORTH	– KANGAR/P.B.	112					6
"	2	KANGAR/P.B.	– BUTTERWORTH	112					7
"	3	KANGAR	– KUALA LUMPUR						1

Fig. 1.8

Number of Bus Trips per day (Both directions)

(In George Town)

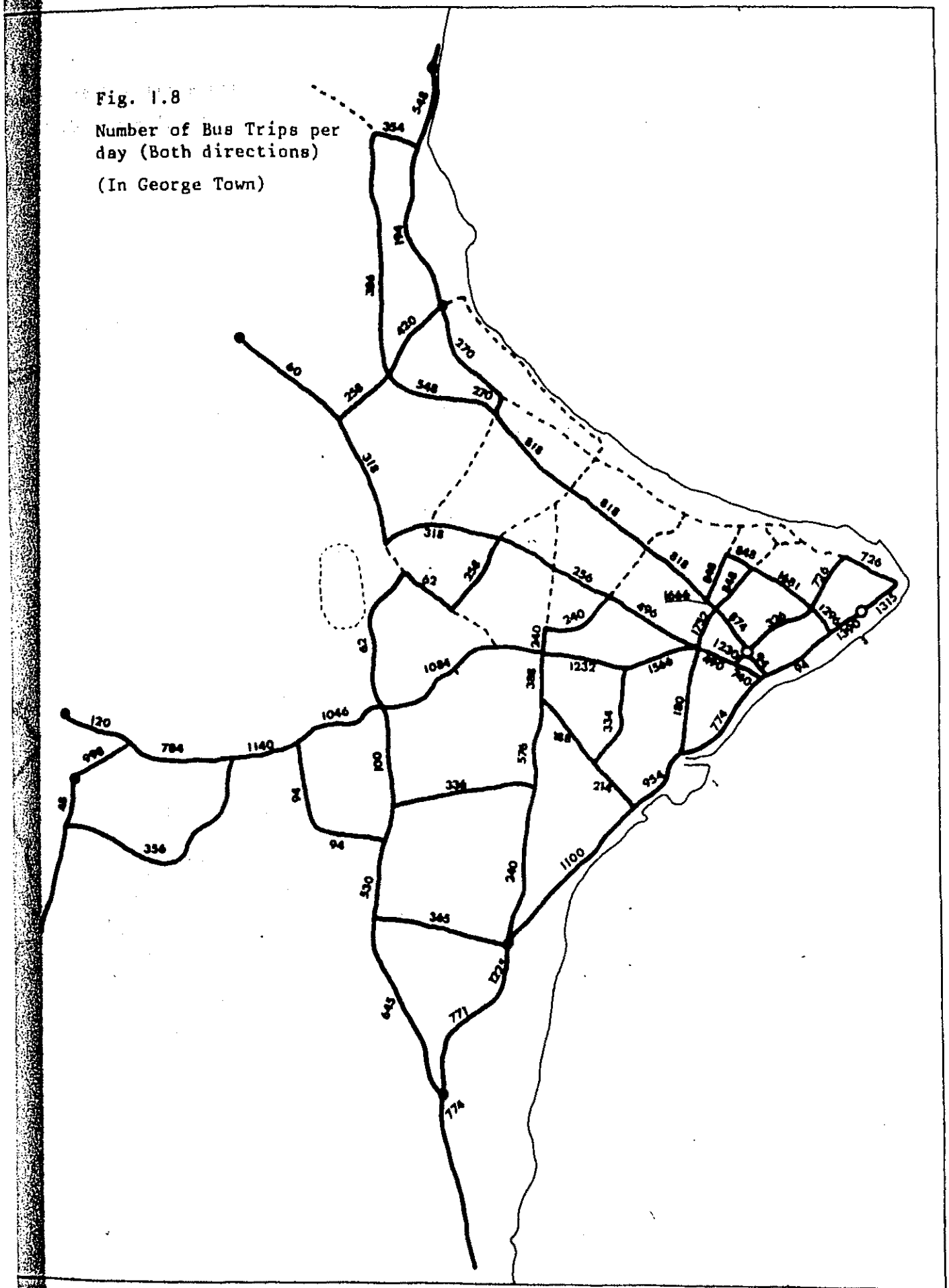
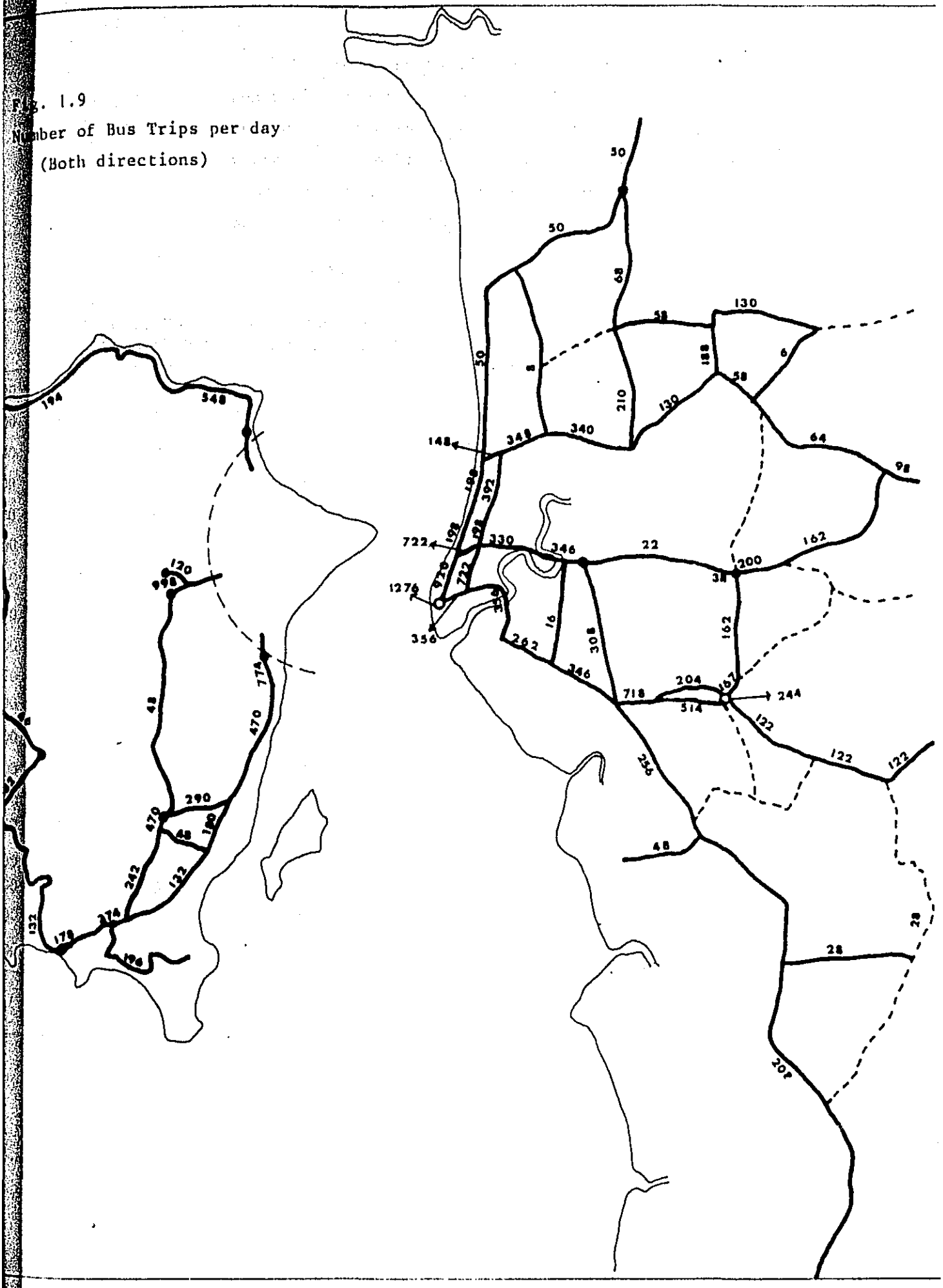


Fig. 1.9
Number of Bus Trips per day
(Both directions)



The frequency by Time zone is almost constant by each route as shown in Table 1.7. Although the demand for bus service fluctuates hourly in accordance with people's activities, it's not rational that the scheduled frequency is almost constant. It's necessary to improve frequency in order to cope with the fluctuation in demand.

Table 1.7 Frequency by Time Zones

	Route No. 53 B'worth-B.M.	Route No. 60 B'worth-B.M.	Route No. 52 B'worth-Padang Serai	Route No. 62 B'worth-Prai	Route No. 51 B.M.-Lunas
0700	7	7	3	2	4
0800	6	6	2	2	3
0900	6	6	3	1	3
1000	6	6	2	2	3
1100	6	6	3	1	3
1200	6	6	2	2	3
1300	6	6	2	1	3
1400	6	6	3	1	3
1500	6	6	2	1	3
1600	6	6	3	2	3
1700	6	6	2	1	3
1800	6	6	2	2	3
1900	6	6	3	1	3
2000	6	6	2	2	3
2100	6	6	2	1	3
2200	6	5	1	1	2
2300	5	2	-	1	2
2400	3	3	-	2	1
2500	1	1	-	-	-
	106	102	37	36	51

These frequencies above are scheduled by each company.

Usually, the bus service does not follow strictly the scheduled time-table, because of various reasons such as break-down of buses, traffic congestion along bus routes, etc.

There is one sample data showing the irregularity of bus operations.

Table 1.8

Scheduled and Actual Bus Density by Routes

Route	Scheduled		Real Operating*		Shortage/Excess		Ratio	
	No. of Buses	Trips	No. of Buses	Trips	Buses	Trips	Buses	Trips
1	19	550	13	327	-6	-223	68	59
2	6	198	6	212	0	+ 14	100	107
3	12	338	12	289	0	- 49	100	86
4	8	186	6	186	-2	0	75	100
5	1	31	1	31	0	0	100	100
6	4	129	4	97	0	- 32	100	75
7	2	55	3	90	+1	+ 35	150	145
8	1	100	1	46	0	- 54	100	46
9	6	129	7	177	+1	+ 48	117	139
10	5	127	6	153	+1	+ 26	120	120
11	1	31	1	33	0	+ 2	100	106
12	2	45	2	74	0	+ 29	100	164
13	2	30	4	96	+2	+ 66	200	320
LSS	28	1,036	28	896**	0	-140	100	86
SN	7	210	7	170**	0	- 40	100	81
Total	104	3,225	101	2,867	-3	-318	97	89

CC : City Council

LSS : Lim Seng Seng

SN : Sri Negara

* : 20th Oct. 1976, Wednesday

** : rough estimation from annual trips

Source : A Study of the Utilization of Bus Transport in George Town. (1978)

The reduction rate of trips is below 50% on the City Council bus route No. 8, while the increase reaches over 300% on route No. 13.

The reason why there are many differences between scheduled and actual numbers, lies mainly in their operation system. That is, sometimes operators decide by themselves whether to reduce services because of the lack of demand on their routes.

3.5 Bus Fleet

In Penang Island, the scheduled bus companies have a bus fleet of 241 buses while in Province Wellesley they have 166 buses. The total number of buses in the study area is 407.

The increase in the number of buses is not significant; for example, in the City Council Bus its annual growth rate is 2.8% from 1971 to 1978, and in Penang Yellow Bus the maximum number is 99 buses in 1975. Recently the number is decreasing.

In Penang Island, the Yellow Bus Company has the bigger number of buses, contributing to 37% of the total bus fleet on the island. This is followed closely by the City Council Bus service which contributes 31%, the Lim Seng Seng Bus Company 17%, the Hin Bus Company 12% and the Sri Negara Bus Company 3%.

In Province Wellesley, two big companies, the Central Province Wellesley Bus Company and the United Traction Bus Company make up about 60% of the total bus fleet. Other bus companies occupy less that 8% each. The ownership of buses is given in Table 1.9.

Regarding the age of buses in the bus fleet of Penang Island, more that half of them are 5 - 10 years old. About 25% is 5 - 6 years old, 26% is 7 - 10 years old, about 20% are 1 - 2 years and 3 - 4 years, and 8% is over 11 years old.

These buses are all large-size buses and are divided into two types. One is cross-seat type, and the other is standee type. The passenger capacity for the former type is '40 - 47 seats plus 10 - 15 standings', while that for the latter is '83 standings plus 24 seats'.

In the study area the standee type buses are not so popular and this is one of the reasons why the capacity of bus transport is limited. Also buses equipped with air-conditioners are few.

Table 1.10 shows the number of buses by age.

Table 1.9 Number of Buses by Companies

Company	Number of Buses							
	1971	1972	1973	1974	1975	1976	1977	1978
City Council	60	60	60	60	65	65	70	70
Lim Seng Seng	13	13	24	24	29	29	39	40
Sri Negara	-	-	-	7	7	8	8	8
Penang Yellow	47	52	74	93	99	81	81	89
Hin	21	21	25	26	26	29	30	29
Central Province	-	-	-	-	-	-	-	53
United Traction	-	-	-	-	-	-	-	46
Bagan Town	4	4	4	4	4	4	4	6
Sam Lian	7	7	7	8	9	10	10	10
Federal	3	3	3	4	5	5	6	9
Setia	-	-	-	-	-	-	-	7
Lean Hock	8	8	8	7	8	8	9	9
Min Sen	9	9	9	9	10	10	11	13
Total	172	177	214	242	262	249	268	385

Table 1.10 Number of Buses by Age

Company \ Age	1-2	3-4	5-6	7-10	11-	Total
City Council	8	14	9	34	10	75
Lim Seng Seng	10	5	12	9	4	40
Sri Negara	-	5	3	-	-	8
Penang Yellow	20	19	32	15	3	89
Hin	12	4	5	5	3	29
Sub-Total	(20.7) 50	(19.5) 47	(25.3) 61	(26.2) 63	(8.3) 20	(100) 241
United Traction	10	9	10	10	7	46
Bagan Town	2	4	-	-	-	6
Sam Lean	4	2	2	1	1	10
Lean Hock	5	1	1	2	-	9
Min Sen	2	4	1	1	5	13
Sub-Total	(27.4) 23	(23.8) 20	(16.7) 14	(16.7) 14	(15.4) 13	(100) 84
Total	(22.5) 73	(20.6) 67	(23.1) 75	(23.7) 77	(10.1) 33	(100) 325

* Collected Data Only.

3.6 Number of Passengers

1) Total

The trend of bus passengers in Penang Island shows an increase up to 1976 at an annual rate of 5.1%, but from 1977 there has been a decrease instead. Whereas in Province Wellesley the total number of passengers has continued to increase up to 1978.

The number of passengers were 64.4 million in Penang Island and 28.4 million in Province Wellesley (in 1978) respectively as can be seen in Table 1.11 and Fig. 1.10.

Table 1.11

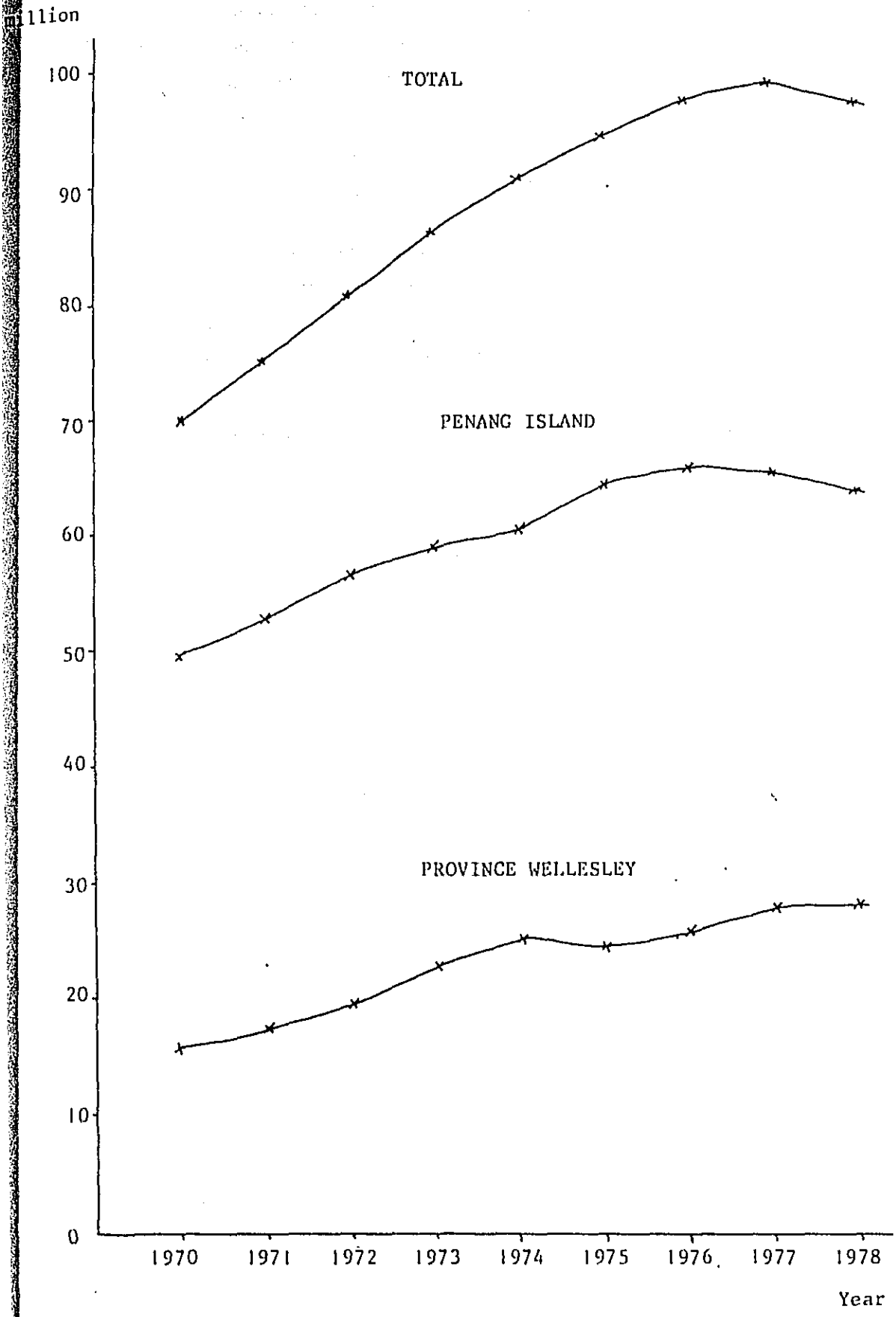
Trend of Bus Passengers*

(thousand)

Year	Penang Island	Province Wellesley*	Total	Index No.
1970	49,302	15,940	65,242	100
1971	52,776	17,557	70,333	108
1972	56,880	19,194	76,074	117
1973	50,644	23,070	81,714	125
1974	60,490	25,663	86,153	132
1975	64,743	24,995	89,738	138
1976	66,391	26,367	92,758	142
1977	66,331	28,275	94,606	145
1978	64,364	28,432	92,796	142

* Collected Data only (not whole data)

Fig. 1.10 Trend of Bus Passengers



As can be understood in the following table, in every major company total number of passengers has decreased from 1976, or 77. Especially in Penang Island the total number of passengers of the City Council Bus has begun to decrease from 1973, at an annual rate of 1.8%. In Province Wellesley almost all companies have had an increase in passengers except for the biggest company - Central Province - which comprises a share of over 40%.

Although there are large fluctuations from the mean volume of the total number of bus passengers per day such that it is more than 20% over the average day's volume, still the average daily passenger volume in Penang Island is 182 thousand and 176 thousand in 1977 and 1978 respectively. While in Province Wellesley 77 thousand in 1977 and 78 thousand in 1978 travelled by bus, in addition to which 2,000 passengers may be added as the passengers of other companies data of which were not available. Therefore, 0.34 - 0.35 times per person in Penang and 0.18 times per person in Province Wellesley, use the bus every day.

In the whole of Penang State, the average number of daily bus passengers is about 256 thousand, excluding the passengers of long distance express buses.

Table 1.12 Trend of Bus Passengers

(thousand)

Company \ Year	1970	1971	1972	1973	1974	1975	1976	1977	1978	Composition Rate % 1977	Composition Rate % 1978	Annual Growth Rate % 1970–75	Annual Growth Rate % 1973–78
1. City Council Bus	21,832	23,273	25,286	25,147	24,727	24,905	25,267	25,064	22,655	37.8	35.2	2.7	-2.1
2. Lim Seng Seng Bus	7,451	8,641	9,589	10,700	11,500	10,000	10,650	11,800	13,500	17.8	21.0	6.1	4.8
3. Sri Negara Bus	1,252**	1,438**	1,651**	1,895**	2,176	2,440	2,876	3,445	3,532	5.2	5.5	14.3	13.3
4. Penang Yellow Bus	13,186**	13,787**	14,415**	15,072**	15,759	20,921	20,671	19,331	18,695	29.1	29.0	9.7	4.4
5. Bin Bus	5,581	5,637	5,939	5,830	6,328	6,477	6,927	6,671	5,982	10.1	9.3	3.0	0.5
Sub-total	(49,302)	(52,776)	(56,880)	(58,644)	60,490	64,743	66,391	66,331	64,364	100	100	5.6	1.9
6. Central Province	6,854***	7,549***	8,253***	9,920***	11,035***	10,748***	11,338***	12,473	11,852	44.1	41.7	9.4	3.6
7. United Traction*	3,347***	3,687***	3,871	4,635	5,040	5,108	5,428	5,694	6,312	20.1	22.2	8.8	6.4
8. Bagan Town	1,895	2,009	2,147	2,659	2,906	2,633	2,684	2,703	2,764	9.6	9.7	6.8	0.8
9. Sam Lian	550	562	639	879	962	969	1,048	1,181	1,275	4.2	4.5	12.0	7.7
10. Federal	616	771	861	925	1,017	1,021	1,120	1,202	1,415**	4.3	5.0	10.6	8.9
11. Lean Hock	1,333	1,524	1,648	1,867	2,110	1,979	1,998	2,066	2,060	7.3	7.2	8.2	2.0
12. Min Sen*	1,345	1,455	1,775	2,185	2,593	2,537	2,751	2,956	2,754	10.5	9.7	13.5	4.7
Sub-total	(15,940)	(17,557)	(19,194)	(23,070)	(25,663)	(24,995)	(26,367)	28,275	(28,432)	100	100	9.4	4.3
Total	(65,242)	(70,333)	(76,074)	(81,714)	(86,153)	(89,738)	(92,758)	94,606	(92,796)	–	–	6.6	2.6
:: Ebban (Express)	–	–	–	–	–	43	67	71	89	–	–	–	27.4****

Note: There are other 5 small companies in Province Wellesley whose data are not available.

* Including other passengers except ordinary buses.

** Estimate from the trend.

*** Estimated by the compositions in 1977 & 78.

**** 1975 – 78

Table 1.13 The Number of Passengers by each Company

(person/day)

	1977	1978	per scheduled trip (one way) (1978)
City Council	68,720	62,070	29.0
Lim Seng Seng	32,330	36,990	-
Sri Negara	9,440	9,680	49.4
Penang Yellow	52,960	51,220	55.7
Hin	18,280	16,390	29.9
Penang Island Total	181,730	176,350	-
Central Province	34,170	32,470	39.3
United Traction	15,600	17,290	59.2
Bagan Town	7,410	7,570	42.1
Sam Lian	3,240	3,490	36.4
Federal Traction	3,290	3,880	19.4
Lean Hock	5,660	5,640	52.2
Min Sen	8,100	7,550	35.6
Others*	2,000	2,000	-
Province Wellesley Total	79,470	79,890	-
Total**	261,200	256,240	-

* Estimated by the study team

** Excluding passengers of Ebban (530 in 1977, 670 in 1978)

2) Each route

The data regarding the number of passengers by each route are insufficient to analyse each characteristic of routes, though some examples can be shown. Among City Council bus routes in 1978, the largest number of passengers was that of Route 1 (Jetty to Ayer Itam), with a total of 4,515,000 passengers, followed by Route 3 (Jetty to Jelutong) with 3,514,000 passengers and the third, the only route with an increase in the number of passengers is Route 10 (Jetty to Kg. Melayu) with 3,219,000 passengers.

Each route above has very frequent services such as 180 return trips per day for Route 1 and 3 and 98 return trips for Route 10. And 34.4 passengers per trip are carried along Route 1, 26.7 passengers along Route 3, and 45.0 passengers along Route 10. (Refer to Table 1.14).

Table 1.14 Number of Passengers by Routes

(Penang Island)

Company	Route Number	Origin	– Destination	Distance Mile	Number of trips	1977	1978	Number of Passengers (x1000) 1977/day	1978/day	1978/trip
CITY COUNCIL	1	JETTY	– AIR ITAM BUS TERMINAL	5.85	360	5,114,797	4,514,872	14,013	12,370	34
"	2	JETTY	– BAGAN JERMAL BUS TERMINAL	4.40	270	2,772,295	2,555,709	7,595	7,001	20
"	3	JETTY	– JELUTONG BUS TERMINAL	4	360	4,152,002	3,514,166	11,375	9,628	27
"	4	JETTY	– GREEN LANE BUS TERMINAL	6	240	2,830,355	2,638,810	7,754	7,230	30
"	5	JETTY	– GREEN LANE BUS TERMINAL	5.85	38	545,059	498,393	1,493	1,365	36
"	6	JETTY	– GREEN LANE BUS TERMINAL	6	154	1,545,513	1,406,096	4,234	3,852	25
"	7	JETTY	– WATERFALL TESTT	5.82	60	958,035	679,397	2,625	1,861	31
"	8	AIR ITAM	– PENANG HILL	1.20	120	477,394	391,907	1,308	1,074	9
"	9	JETTY	– GREEN LANE BUS TERMINAL	5.75	148	2,230,603	1,909,378	6,111	5,232	35
"	10	JETTY	– KAMPUNG MELAYU	6.02	196	2,941,298	3,210,479	8,058	8,796	45
"	11	JETTY	– [illegible]	6	34	231,894	226,946	635	621	18
"	12	JELUTONG BUS TERMINAL	– AIR ITAM BUS TERMINAL	3.80	94	617,505	499,138	1,692	1,368	15
"	13	JELUTONG BUS TERMINAL	– BAGAN JERMAL BUS TERMINAL	6.12	62	667,366	579,843	1,828	1,589	26
SRI NEGARA	1	JETTY	– BAGAN JERMAL PULAU AMAN		164	(3,445,476)	(3,532,260)	(9,440)	(9,677)	(49)
"	2	JETTY	– KG. ESSENE PULAU LADA		32					
HIN BUS CO.	93	PRANGIN STAND TERMINAL	– TANJONG BUNGAH TERMINAL	14	194	(6,671,328)	(6,981,816)	(18,278)	(16,389)	(30)
"	93A	PRANGIN STAND TERMINAL	– TANJONG BUNGAH TERMINAL	6.35	194					
"	94	PRANGIN STAND TERMINAL	– TANJONG BUNGAH TERMINAL	6.35	94					
"	94A	PRANGIN STAND TERMINAL	– TANJONG BUNGAH TERMINAL	6.35	66					

PENANG YELLOW BUS CO. BHD.	66	JETTY	– BALIK PULAU	21.84	132					
"	67	JLN. MAXWELL	– DERTAN SENTOSA	17.43	46					
"	68	JLN. MAXWELL	– BATU MAUNG	16.38	96					
"	69	JLN. MAXWELL	– BATU MAUNG	17.85	98	(19,331,061)	(18,316,518)	(52,962)	(50,182)	(55)
"	70	JLN. MAXWELL	– TELUK KUMBAR	14.12	1					
"	71	JLN. MAXWELL	– BALIK PULAU	20.16	1					
"	72	JLN. MAXWELL	– JELUTONG	3.26	172					
"	73	BALIK PULAU	– PULAU BETONG	6.98	18					
"	74	BALIK PULAU	– PULAU BETONG	6.98	18					
"	75	BALIK PULAU	– PULAU ACHEH	6.72	62					
"	76	BALIK PULAU	– TELUK BAHANG	12.18	10					
"	77	JLN. MAXWELL	– CUSTOM VILLAGE, AQUARIUM, BROWN GARDEN	6.72	94					
"	78	JLN. MAXWELL	– SUNGEI AJA	9.36	48					
"	79	JLN. MAXWELL	– AIR ITAM VIA BELAU	15.96	48					
"	79	AIR ITAM	– PAYA TERUBONG		68					
LIM SENG SENG	1	MAXWELL ROAD	– AIR ITAM	4.5						

Table 1.15 Number of Passengers by Routes

(Province Wellesley)

Company	Route Number	Origin	– Destination	Distance Kile	Number of trips	Number of Passengers (x1000) 1977	1978	1977/day	1978/day	1978/trip
LEAN HOCK BUS CO. SDN. BHD.	106	B. MERTAJAM	– SUNGEI LEMBU	9½	12	96,986	97,090	266	266	22
"	107	B. MERTAJAM	– KULIM	6½	96	1,968,569	1,963,090	5,393	5,379	56
SAT LIAN OMNIBUS CO. SDN. BHD.	513	BUTTERWORTH	– PARIT BUNTAR	27	96	1,180,564	1,274,789	3,234	3,493	36
CENTRAL PROVINCE WELLESLEY TRANSPORT CO. SDN. BHD.	51	B. MERTAJAM	– LUNAS	10	82					
"	52	BUTTERWORTH	– PADANG SERAI	19½	74					
"	53	B. MERTAJAM	– BUTTERWORTH	10	212					
"	54	BUTTERWORTH	– PENANTI	8½	22					
"	55	BUTTERWORTH	– TASEK GLUGOR	15	8					
"	56	B. MERTAJAM	– PRAI	6½	32					
"	57	BUTTERWORTH	– KEPALA BATAS	15	10					
"	58	BUTTERWORTH	– PMTG. BINJAI	11	8	(12,473,306)	(11,852,239)	(34,173)	(32,472)	(39)
"	59	TASEK GLUGOR	– LUNAS (VIA SIA-PANG TAI TEONG)	6.1	4					
"	59	TASEK GLUGOR	– LUNAS (VIA PADANG MENORA)	7½	6					
"	59	B. MERTAJAM	– TASEK GLUGOR	13½	8					
"	60	B. MERTAJAM	– BUTTERWORTH (VIA PRAI JLN. BARU)	8½	204					
"	60B	BUTTERWORTH	– PMTG. PAUH (VIA JLN. DATO HUSSEIN ONN)	7	16					
"	61	PENANTI	– PENGKALAN TAMBANG	3½	16					
"	62	BUTTERWORTH	– PRAI	3.6	52					
"	506	KULIM	– MITCHELL PIER	17	48					
"	586	BUTTERWORTH	– BALING	54	24					
BADAN TOUT BUS SERVICE SDN. BHD.	141	BUTTERWORTH	– TITI TINGGI	43	90	1,386,324	1,357,324	3,799	3,719	41
"	142	BUTTERWORTH	– JTK. [illegible] SEMOR	4	90	1,316,672	1,406,996	3,607	3,855	43

KIM SEN OMNIBUS CO. SDN. BHD.	97	B. MERTAJAM	– NIBONG TEBAL	19	112	1,997,589	1,848,200	5,473	5,064	45
"	99	B. MERTAJAM	– KUALA JURU	95	46	398,183	398,577	1,091	1,092	23
"	96	SUPG. EMPAT	– BALAI DAN	47	28	192,808	178,977	528	490	18
"	98	NIBONG TEBAL	– SUNGEI BAKAP	6.6	24	140,700	139,234	385	381	16
THE UNITED TRACTION CO.	84	MITCHELL PIER	– KUALA MUDA		50	1,026,633	1,087,530	2,813	2,980	60
"	86	MITCHELL PIER	– TELOK AIR TAWAR, KEPALA BATAS		58	1,105,227	1,675,121	3,028	4,589	79
"	517	MITCHELL PIER	– SUNGEI PETANI		50	893,463	919,203	2,448	2,518	50
"	518	B. MERTAJAM	– SUNGEI PETANI		58	992,578	1,255,740	2,719	3,440	59
"	516	MITCHELL PIER	– ALOR STAR		76	607,026	617,048	1,663	1,691	22
FEDERAL TRACTION	230	BUTTERWORTH	– SUNGEI PUTU	6	160	(1,201,780)	(1,297,922)	(3,293)	(3,556)	(18)
"	232	BUTTERWORTH	– POKOK SENA		40					
SYK. RANGKAIAN SETIA BHD.		B. MERTAJAM	– KULIM							
"		B. MERTAJAM	– BUKIT MINYAK							
"		B. MERTAJAM	– EG. BARU							
SYK. EKBAN	1	BUTTERWORTH	– KANGAR/P.B.	112	13	33,481	42,505	92	116	9
"	2	KANGAR/P.B.	– BUTTERWORTH	112	14	37,239	46,640	102	128	9
"	3	KANGAR	– KUALA LUMPUR		2					

3) Fluctuation

There is insufficient data on hourly, weekly and monthly flow that detailed analyses are unable to be done.

However, some sample data are obtained from bus companies, and a brief description is written below.

Hourly Fluctuation

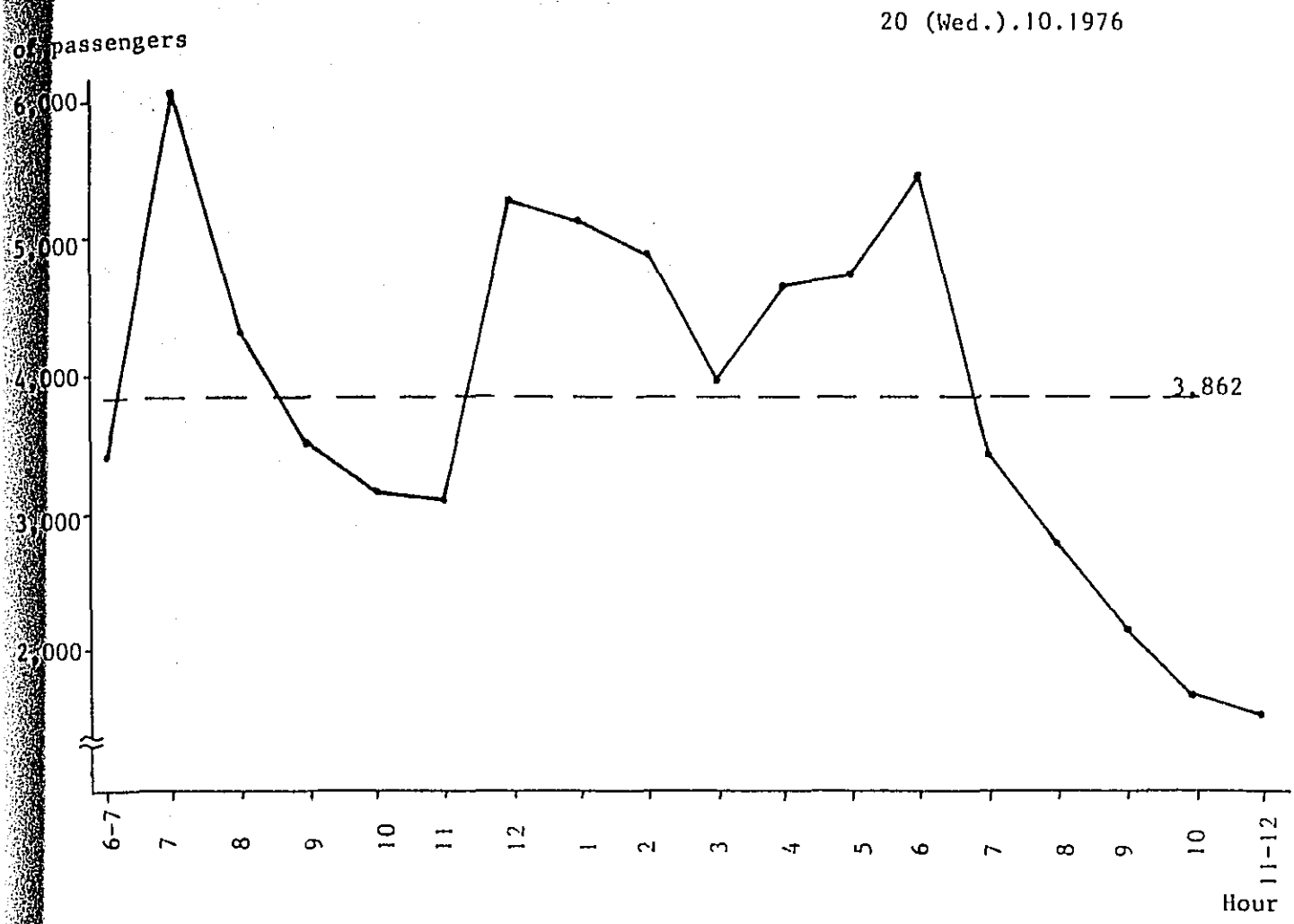
The data obtained from City Council is that of October, 1976. Although this is not up to date and is data for only a day (20th, Wednesday), this is still the only data regarding hourly fluctuation in bus passenger demand.

According to the data, the hourly flow pattern of bus passengers has three peaks in a day. One is in the morning, 7.00 to 8.00, and two are in the afternoon. 12.00 to 1.00 and 6.00 to 7.00. The highest peak is from 7.00 to 8.00, the volume is 1.5 times of average and 8.7% of the whole day's volume. This is because of the trips for the purpose of commuting and going to school.

The two peaks in the afternoon are not so high compared to the highest peak; these are trips the purpose of which is returning home and going shopping and other social intercourse.

The hourly fluctuation of City Council Bus Passengers are shown in Fig. 1.11

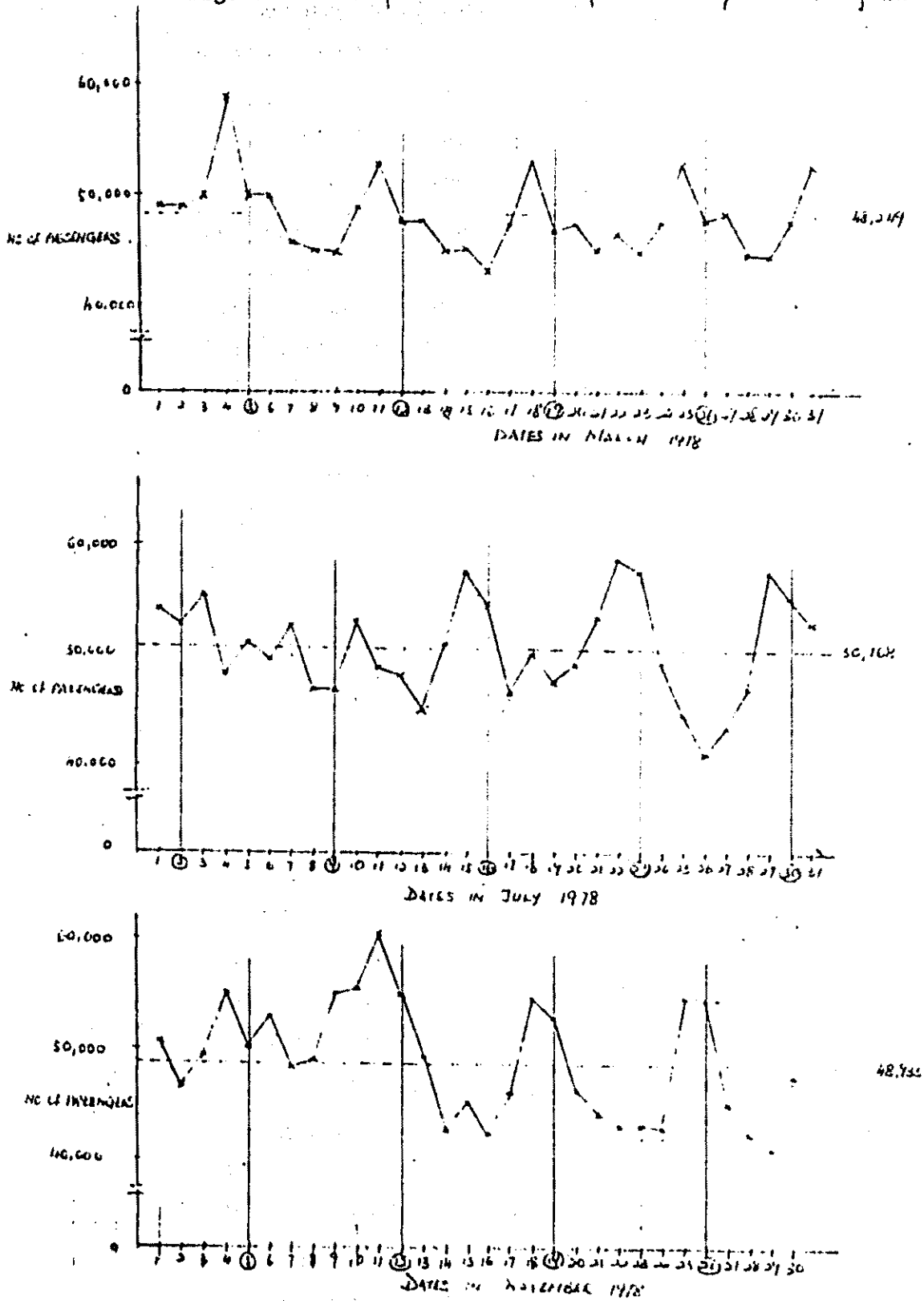
Fig. 1.11 Hourly Fluctuation of City Council Bus Passengers



Weekly Fluctuation

The data from one company in Penang Island indicates various fluctuating patterns weekly. According to these, the peak demands in a week appear on Saturday, and on Thursday or Wednesday a fall in demand occurs. The peak volumes often reach 25% more than the average daily volume. See Fig. 1.12.

Fig. 1.12 A Sample Fluctuation of Bus Passenger (Penang Transport Co.)



3.7 Running Conditions

Running conditions are discussed according to the three categories below.

* Condition of roads along bus routes
* Loading conditions
* Running speed.

1) Condition of roads along bus routes.

In the study area there are bus services almost along all main roads, as mentioned before. Most roads in this area has only one lane in each direction, a width of less than 40 feet (12 metres) and parking is allowed on road-sides. Besides there are neither bus priority lanes nor exclusive lanes.

Therefore the condition of roads must be relatively inconvenient for buses.

(i) Width of carriage-way

In George Town the condition of bus routes are summarized as follows in terms of their width.

Ayer Itam Road and Dato Keramat Road which are the main bus routes, are 12 metres wide but the width of the section from Magazine roundabout to Jalan Perak is greatly reduced by roadside parking.

Ayer Itam Road, from the intersection with Jalan Perak to that with Jalan Padang Tembak, is a two-lane dual carriage-way.

Green Lane and Jalan Scotland are 9 metres wide. There no parking vehicles on these roadsides and so the whole carriage-way of these roads is used only for traffic flow.

The width of Jalan Jelutong varies; from the intersection at Bridge Street to Lorong Perak is 9 metres, from Lorong Perak to Jalan Batu Lanchang is 12 metres, and the section from Green Lane to Lorong Batu Lanchang is 9 metres.

Jalan Perak from Jalan Jelutong to Jalan Sungai Pinang is 10 metres wide except one short section; e.g. one section from Sungai Pinang to Jalan Burma is about 8-10 metres.

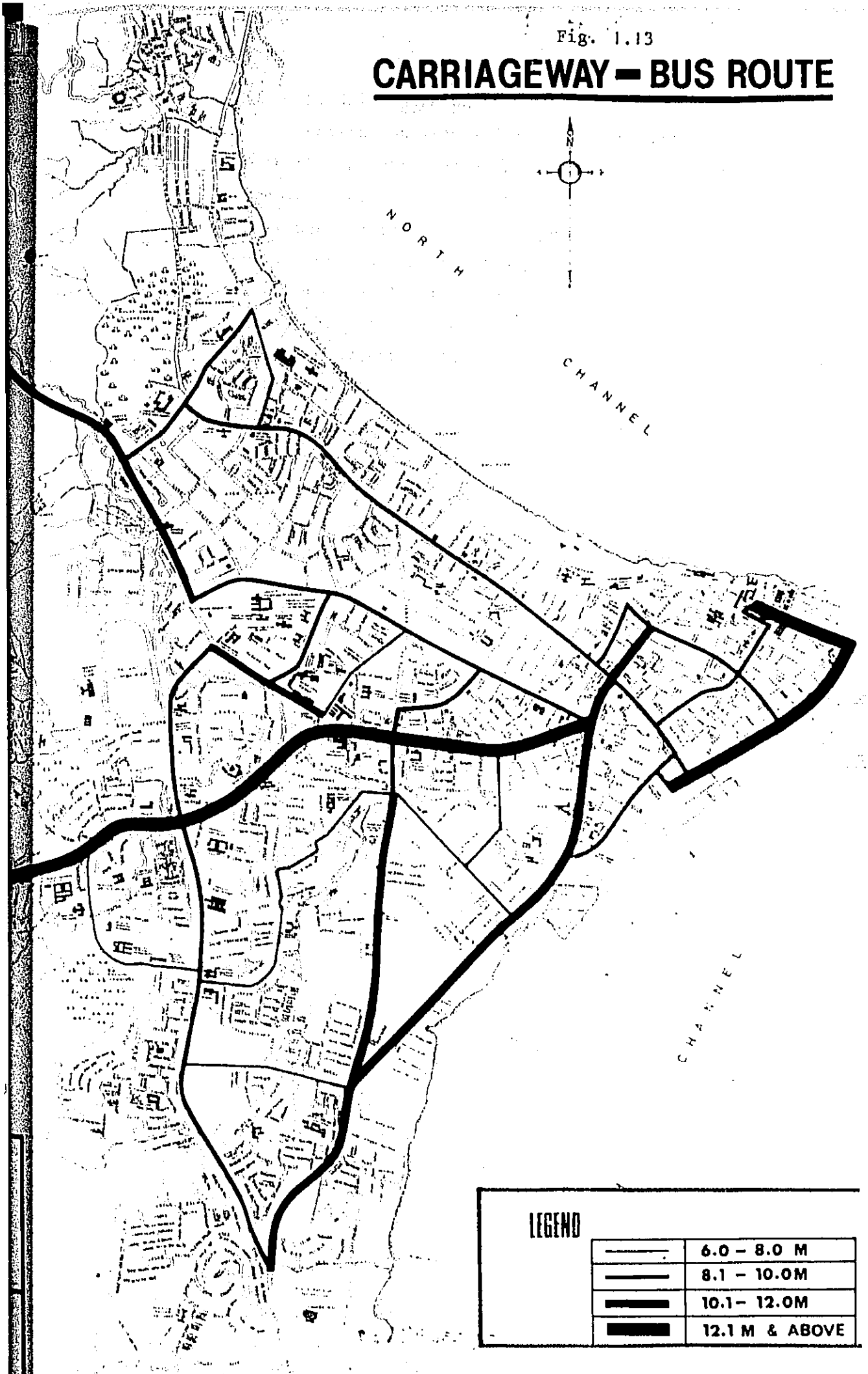
Jalan Burma is about 9 metres wide. The right of way of this road is 22 metres and roadside parking does not disturb the traffic flow because vehicles park on the road shoulder.

Jalan Macalister is about 9 metres wide. Bridge Street is about 9 metres wide. The width of the carriage-way of this street is slightly reduced due to roadside parking and also because of its usage by pedestrians.

The following figure illustrates the width of bus routes.

Fig. 1.13

CARRIAGEWAY – BUS ROUTE



(ii) Roadside parking

Roadside parking is allowed along almost all bus routes with the exception of Jalan Jelutong. Although parking is regulated along one side at some sections, vehicles parked near bus stations often obstruct buses to turn-in and turn-out. Buses which cannot approach bus stations completely block the regular traffic flow.

(iii) Traffic volume along bus routes

The traffic volume along bus routes is shown in the table.

Table I.16 TRAFFIC VOLUME AND ROAD CAPACITY

Name of Roads	1979 Traffic Volume	Capacity
Jalan Bagan Jermal	13000	15200
Jalan Burma	9000 - 17000	15200
Macalister Road	4000 - 9000	15700
Jelutong Road	15000 - 17000	14700
Green Lane	15000 - 17000	15300
Jalan Perak	8000 - 13000	15600
Jalan Dato Keramat	16000	15000 - 45000
Ayer Itam Road	18000 - 24000	15000 - 45000

Along some roads present traffic volume is already over the capacity, and so the running condition for bus is very much influenced by congestion of roads.

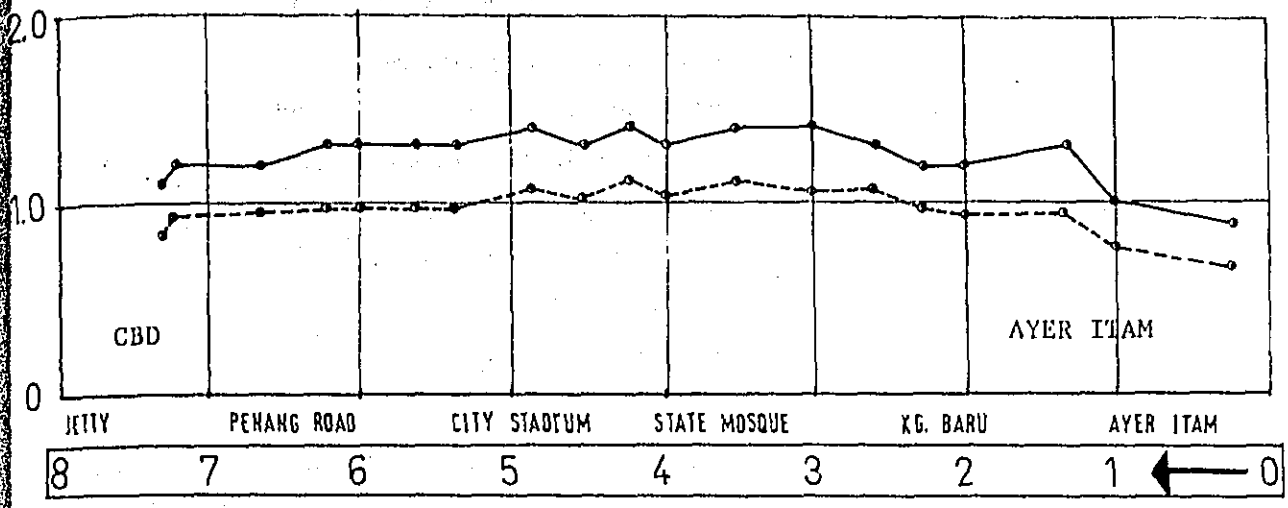
2) Loading Conditions

From the results of the bus company survey, the fact is obtained that there is maximum loading along main direction of almost all routes during peak hours. While during off-peak hours, the City Council bus and the Yellow bus are 40% loaded, Hin bus is 30% loaded and Lim Seng Seng bus is 50% loaded.

For example, one result from the survey shows the variation of load factor along the route during peak hours, as follows:

Fig. 1.14

LOAD FACTOR (Ayer Itam to Jetty)



DISTANCE IN KM.

Survey Time : Morning Peak Hour
(7.30 at Ayer Itam)
(Thurs. 15 Nov. 1979)
From Ayer Itam to Dewan Sri Pinang

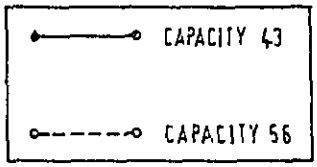
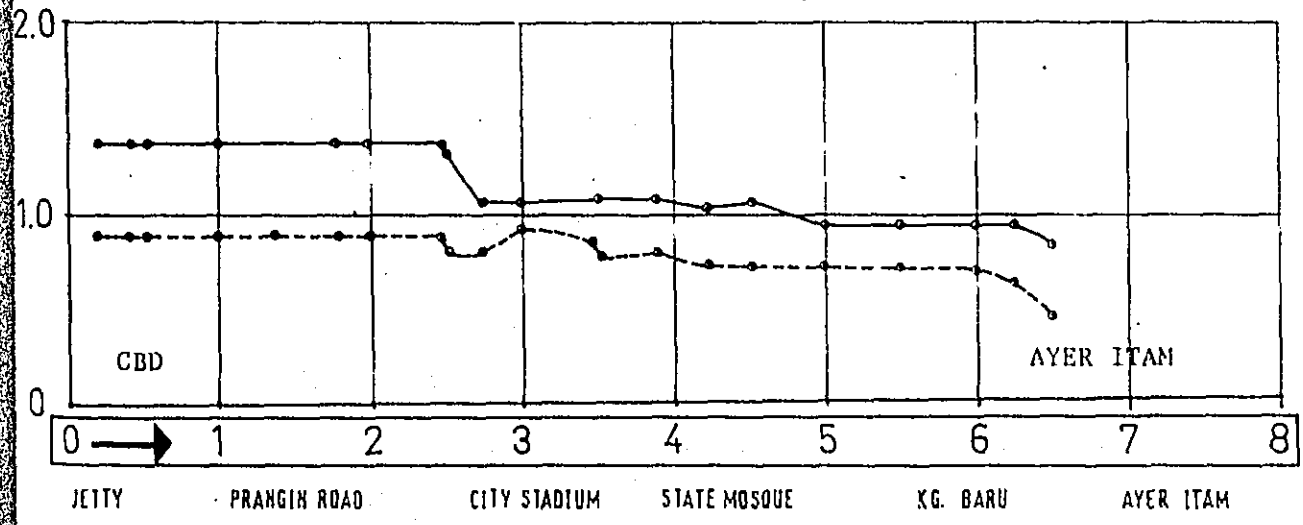


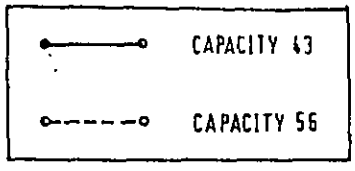
Fig. 1.15

LOAD FACTOR (Jetty to Ayer Itam)



DISTANCE IN KM.

Survey Time: Evening Peak Hour
(5.00-5.30, Wed. 14 Nov. 79)
From Magazine Roundabout to Ayer Itam



3) Running Speed

Comparing the time taken during peak hours and off-peak hours, the Jetty to Ayer Itam route through Penang Road, Jalan Dato Keramat and Ayer Itam Road is very different from the rest. The time taken along this route during peak hours is about 1.5 times more than that taken during off-peak hours.

Table 1.17

TIME TAKEN DURING PEAK/OFF PEAK HOURS.

(Minutes)

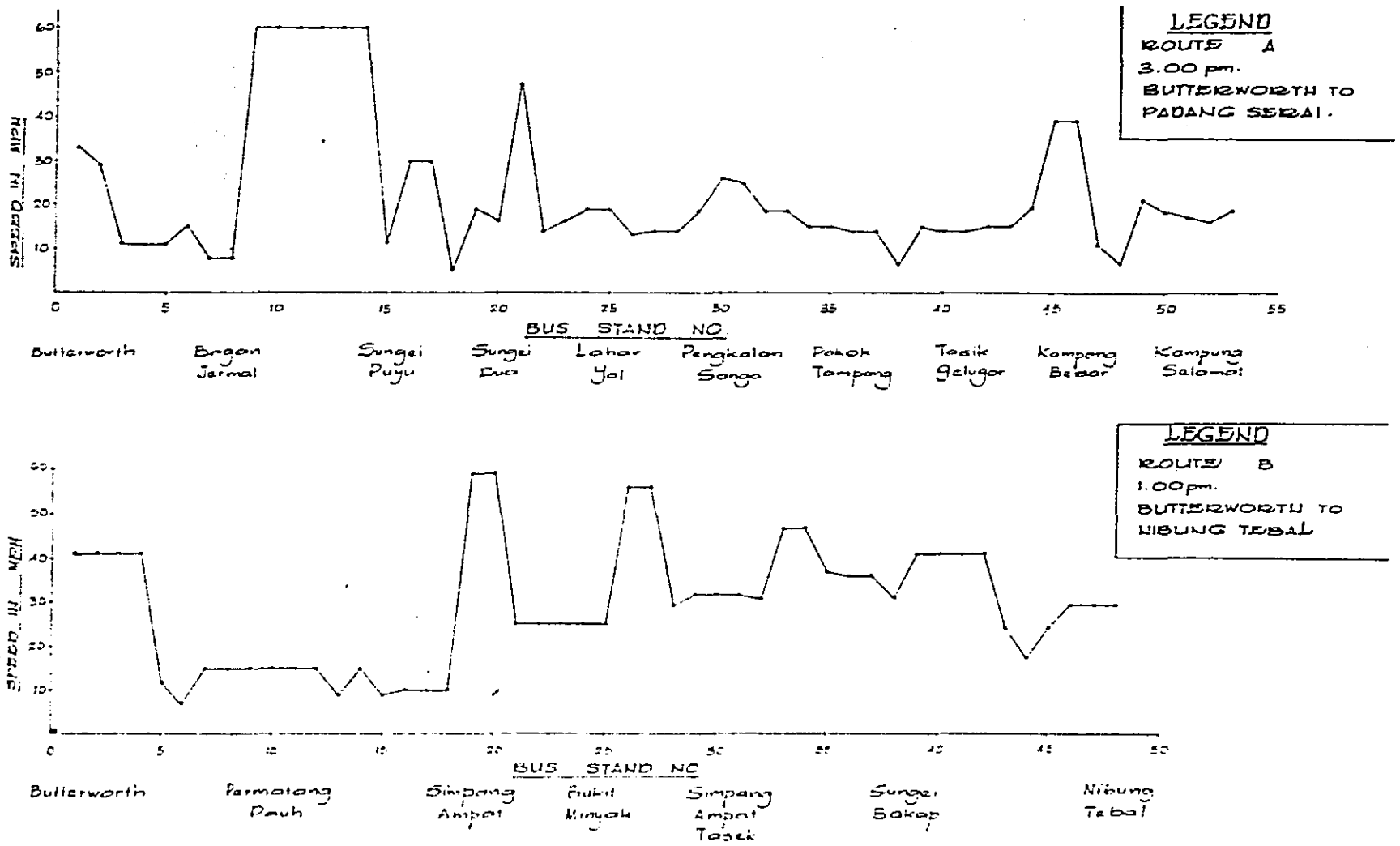
Origin	Destination	Peak (A)	Off-Peak (B)	A/B
Jetty	Ayer Itam	38.0	25.0	1.52
		34.5	24.0	1.44
Jetty	Jelutong	28.0	22.5	1.24
		24.5	21.5	1.14
Prangin Rd.	Tg. Bungah	27.5	26.5	1.04
		27.0	25.0	1.10
Butterworth	Bkt. Mertajam	45.5	32.0	1.42
		38.5	30.0	1.28
Butterworth	Bkt. Mertajam	43.0	33.5	1.28
		41.5	33.5	1.24
Butterworth	Kepala Batas	32.5	27.0	1.20
		33.5	25.0	1.34

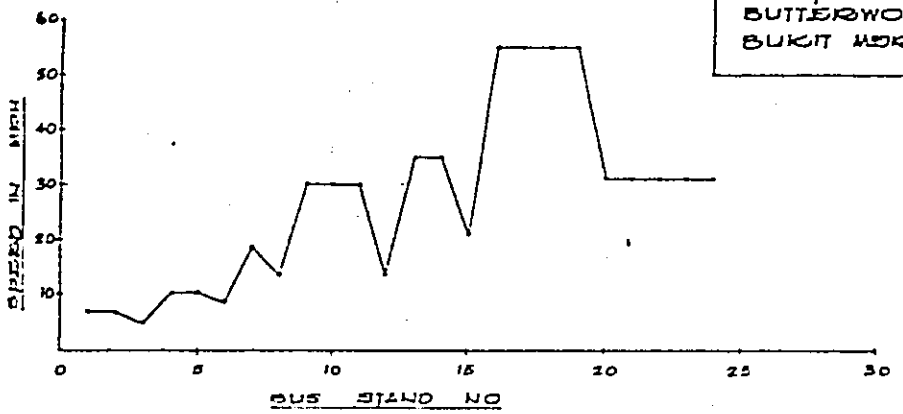
Excluding the sample of Prangin Rd. - Tg. Bungah, in peak-hours it takes over 20% longer than that in off-peak hours along other bus routes. These delays are mainly caused by two routes; one is the decrease of running speed due to the increase in traffic volume, and the other is time taken for boarding and alighting of many passengers.;

Sometimes in peak hours buses by-pass some bus-stops because they are fully loaded and so the latter reason may be incorrect.

Some results of running surveys are summarized in the following figures.

Fig. 1.16 Running Speed

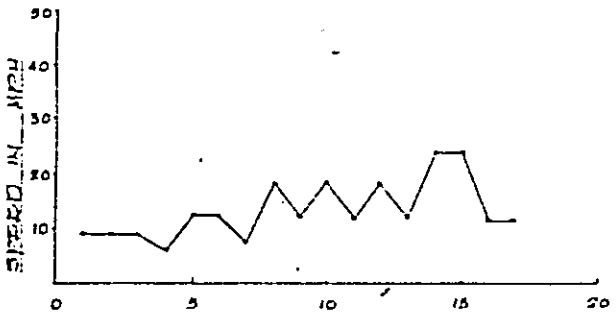




Butterworth Bagan Dalam Prai Simpang Ampat Permatang Rawa Bukit Mertajam

LEGEND

ROUTE C
5:00 pm.
BUTTERWORTH TO BUKIT MERTAJAM.



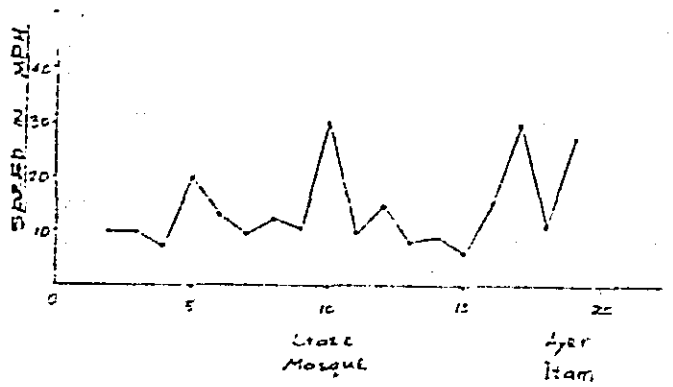
Bukit Mertajam Pekan Baru Cerok Tokun Machang Bubuk

LEGEND

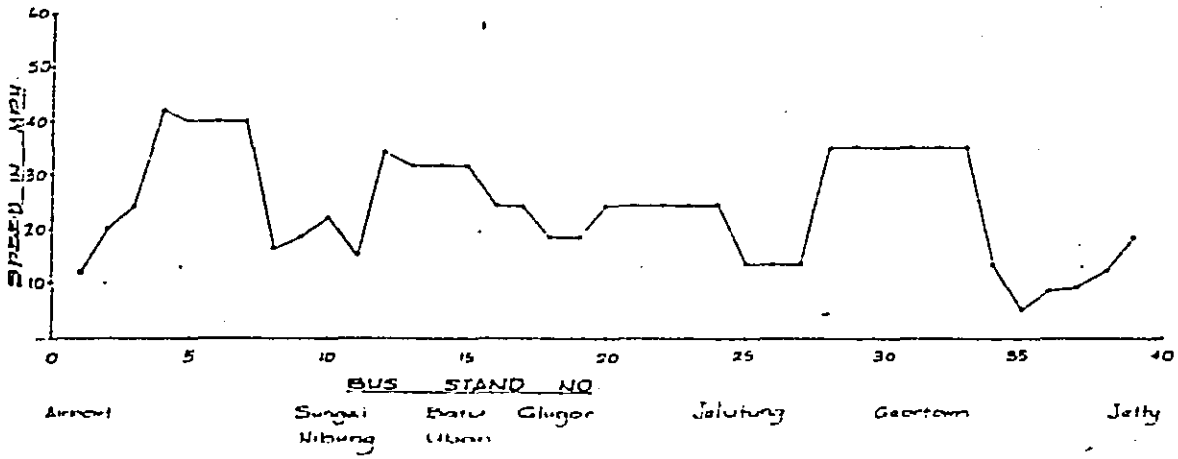
ROUTE D
5.00 – 6.00 pm.
BUKIT MERTAJAM TO MACHANG BUBUK

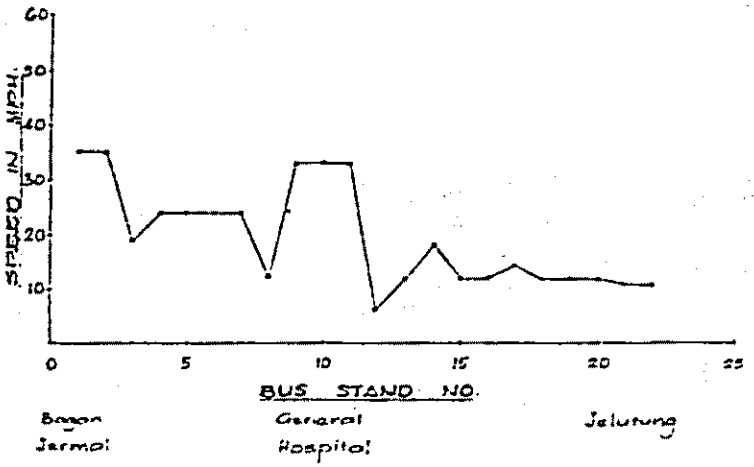
LEGEND
ROUTE ●

MAGAZINE CIRCUS
TO AYER ITAM



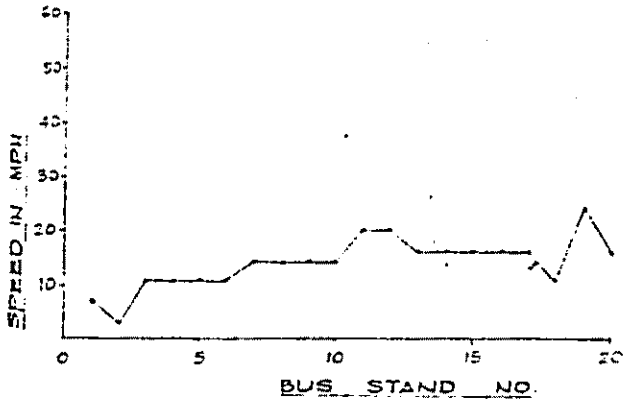
LEGEND
ROUTE D
1.00 pm.
AIRPORT TO
JETTY





LEGEND

ROUTE F
12.00 noon
BAGAN JERMAL TO JELUTUNG.



LEGEND

ROUTE G
1.00 p.m.
AYER ITAM TO JELUTUNG.

Travelling from Butterworth to Bukit Mertajam, the running speed increases gradually. In the town area of Butterworth, it is less than 10 m.p.h. Running speed before crossing the Prai River is slow due to the narrow carriage-way and the intersections, but ofter crossing the Prai River, the speed increase as it passes through Federal Route 1.

The average running speed along each route varies from 11 m.p.h. to 23 m.p.h. Along almost all the routes there are sections where the running speed is reduced due to narrow carriage-ways, roadside parkings and stopping at roundabouts. Generally speaking however, the average speed seems to be not too slow and there is no urgency to introduce some priority measures immediately.

In the case of the Yellow Bus route (Airport to Jetty), the running speed is lower in Sungai Nibong and Jelutong as shown in Fig.1.16. The running speed, especially when travelling through Jelutong via Jalan Jelutong and Bridge Street is greatly reduced.

During the evening peak hours along Jalan Dato Keramat and Jalan Ayer Itam, the running speed of the City Council buses starting from the Magazine Circus bus-stop to the Ayer Itam Bus Terminal fluctuates between 10 km/hr. and 50 km/hr. The reduced speed along these sections is due to the necessity to stop at intersections. Higher running speed along some sections is due to wider carriage-ways which provide enough space for all vehicles since there is no significant difference between the time taken by bus and that by car, viz, 11 minutes by bus and 9 minutes 50 seconds by car.

3.8 Bus transport Facilities

Bus transport facilities consist of the following items.

(a) Bus terminal facilities

(b) Bus-stop facilities

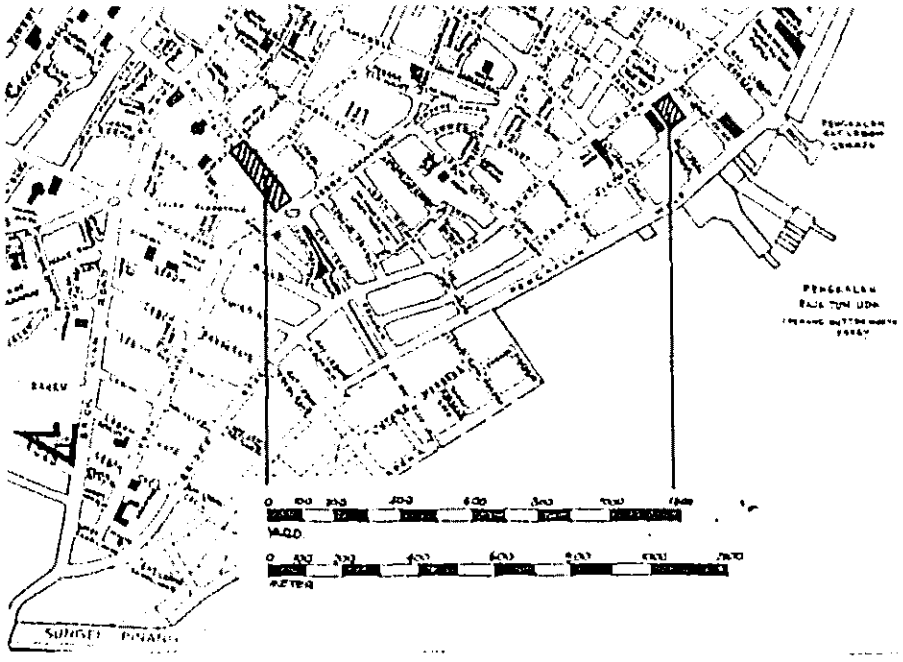
(c) Bus information facilities

1) Bus terminal facilities

In Penang Island, there are two main bus terminals in the C.B.D. of George Town, viz., the City Council Bus Terminal at the Jetty and the private bus company terminal at Prangin Road. Other minor bus terminals are located at the end of each bus route.

The two main bus terminals are shown in Fig. 1.17

Fig. 1.17 Existing Bus Terminals



The importance of these two bus terminals as public facilities is great because they are used by a vast number of commuters and shoppers.

Passengers from the ferry have to either walk to the City Council Bus Terminal or take the bus to the Prangin Road Terminal to get to their destinations by bus.

The existing location, about one kilometer apart from each other is not convenient for bus users because of the long distance that they are required to walk.

The City Council Bus Terminal which is located within a short distance from the ferry terminal is equipped with a a waiting room, a rest-room and lighting facilities. There is no information concerning the bus time-table, bus operating routes or maps; the only information provided is the destination of each route. However, the waiting room is too narrow to accomodate passengers, especially on rainy days. The space of the terminal houses about 20 buses.

The Prangin Road Bus Terminal cannot be called a bus terminal because of its inadequacies. It is not equipped with a waiting room, facilities for providing bus route information or lighting facilities. Consideration should be given to the marking of the boarding/alighting place and especially for the better utilization of space.

In Province Wellesley, Butterworth and Bukit Mertajam have main bus terminals.

The Butterworth Bus Terminal is the most developed in this area. This terminal is composed of two floors; the ground floor is for boarding/alighting, the first floor has staircases leading to specific bus berths. Besides, this first floor leads directly to the ferry terminal and railway station. The function of this terminal is well systematised, but for more effective utilization some facilities should be provided as follows:

* passenger waiting room
* information board showing the layout of the berths and each route:
* information service for bus, taxi, ferry and railway.

The Bukit Mertajam Bus Terminal should be more effectively utilised. It can be said that there is insufficient waiting room space especially at night and on rainy days.

2) Bus-stop facilities

Almost all bus-stops have small indicating plates on poles. There are too small to recognise especially at night and they should be changed to bigger ones. In rural areas, however, many bus-stops lack even this small sign.

There are no indications of bus-stop names, bus time-tables and fares at most bus-stops.

Some bus-stops on Green Lane, Ayer Itam Road or Federal Route No. 1 have bus bays. More consideration must be given to set bus bays on narrow roads so that there is no hindrance to smooth traffic flow. Some of the bus-stops are sheltered from the sun and rain, but these are not enough.

Regarding George Town area, a more detailed study was carried out. The summary is as follows:

There are many bus routes and over 250 bus-stops in George Town. These bus-stops may be classified into four (4) different types as shown in Fig. 1.18 .

Type A, A'

These are actually bus-stops on sections of pedestrian ways located on both side of the road. There is no special facility for bus-stops but only a small indicating board identifying each bus-stop, and also, there are no special bus-bays.

Type A bus-stops are those described above but they have shelters. Type A' is the same but they have no shelter.

Type B, B'

Type B and B' is the same as type A or A' but in type B and B', buses are provided space for stopping. Type B is provided with a shelter but type B' is not.

Type C, C'

Type C, C' is the most popular type of bus-stop. There is no pedestrian way, so that the shoulder of the road is used for bus-stops. In this type of bus-stops, there is no shelter provided. Type C' is the same as mentioned above but it has a shelter.

Type D, D'

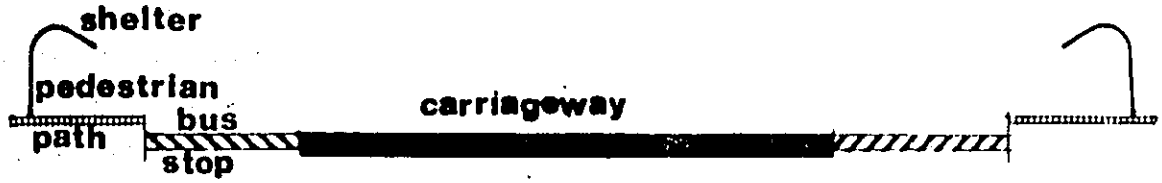
In this type, there is no pedestrian way, but there is additional space provided for buses to stop. Just as for type C & C', the shoulder of the road is used for the bus-stops. Type D mentioned above has shelter but type D' is not provided with shelter.

Fig. 1.18

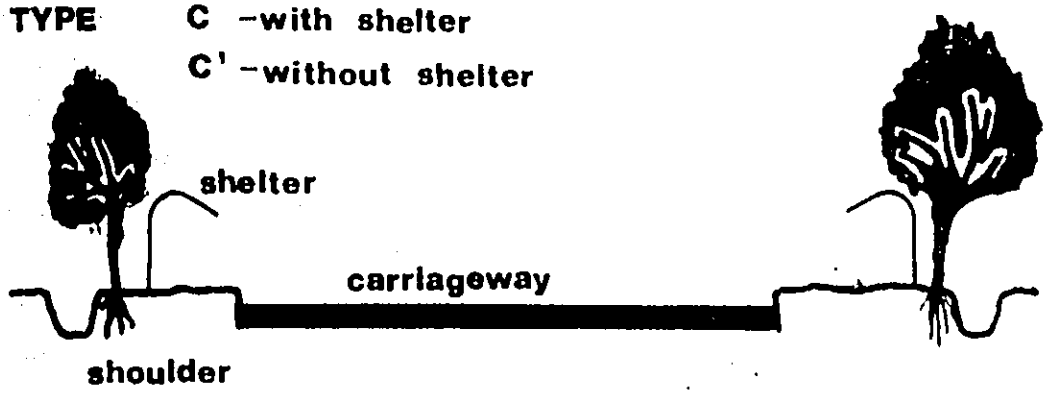
CONDITION OF EXISTING BUS STOP

TYPE A –with shelter
A' –without shelter

TYPE B –with shelter
B' –without shelter



TYPE C –with shelter
C' –without shelter



TYPE D –with shelter
D' –without shelter

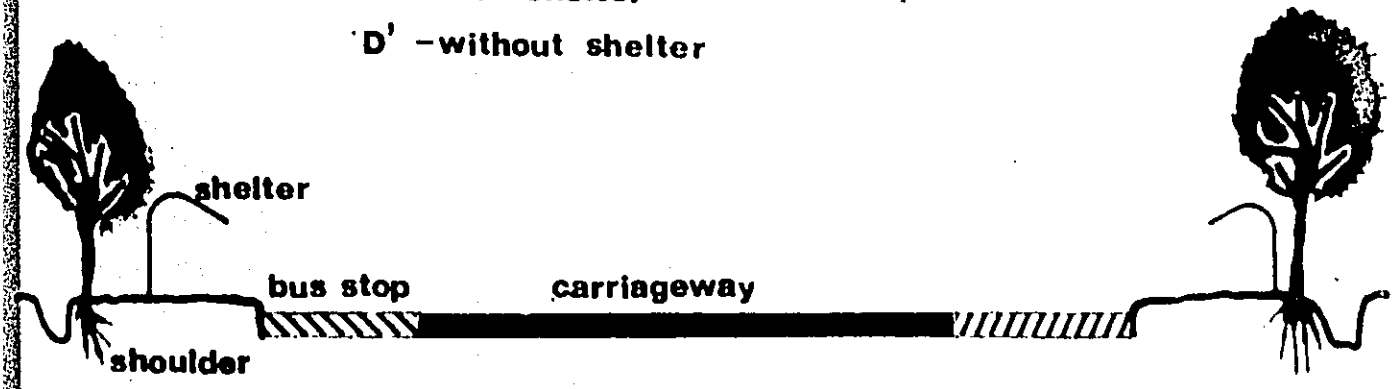


Table 1.18

No. of Bus-stops by Type and its Location

Name of Road	Existing type							
	A	A'	B	B'	C	C'	D	D'
PENANG ISLAND								
Green Lane			6	4		3		
Jalan Scotland	4							
Western road			2	5	3			
Jalan Residency						2		
Jalan Gottlieb						2		
Jalan Bagan Jermal		1				2		
Waterfall Road						5		
Lorong Batu Lancang					6			
Jalan Ayer Itam	2	1	15	3		1		
Kampong Baru						1		
Jalan Padang						4		
Boundary Road						6		
Jalan Kampong						7		
Hill Railway Road					4	2		
Jalan Balik Pulau						1		
Jalan Batu Lanchang					6	3		
Jalan Jelutong	7		2	1	1	8		
Jalan Perak	2	1			8	2		
Jalan Free School			1	2		1		
Jalan Counter Hall					5	5		
Jalan Macalister					12	6		
Jalan Kelawai			8					
Lorong Maktab					2			
Jalan Burmah						17		
Jalan Anson						4		
Jalan Dato Keramat	6	2						
Jalan Pantai						5		
Jalan Sungai Pinang						5		
Transfer Road					1			
Argyll Road					1			
Brick Kiln Road	4							
Calthrop Road						1		

Name of Road	Existing type							
	A	A'	B	B'	C	C'	D	D'
Penang Road		3						
Leboh Sandilands						1		
Leboh Mc Nair						2		
Leboh Carnavon						2		
Kampong Kolam						2		
Leboh Chulia		4		2				
Leboh Pitt						2		
Leboh Light	1	1		1		1		
Pengkalan Weld		1		1	2	3		
Gat Leboh Chulia					1			
Gat Leboh China					1			
Pesara King Edward					1			
Total	26	14	34	18	48	110	3	0
PROVINCE WELLESLEY								
Jalan Bagan Luar (Jalan Kuala Bekah)						10	11	12
Jalan Sungai Tembus					1	3		
Jalan Pasir Gebu						7		
Jalan Kampung Kuala						6		1
Jalan Permatang Tiga Ringgit							1	3
Jalan Sungai Dua						10		
Jalan Lahar Yoi						10		
Jalan Seberang To'Doi						3		
Jalan Tasek Gelugor						7		1
Jalan Kampong Selamat					1	11		
Jalan Bagan Tuan Kechil-Permatang Pauh					1	1	4	1
Jalan Permatang Pauh - Nibong Tebal	1	10	2			18	1	6
Jalan Bagan Dalam - Simpang Ampat						10		6
Jalan Simpang Ampat - Bukit Mertajam						7		1
Jalan Bukit Mertajam - Macang Bubok						17		
Total	1	10	2		3	120	23	25

Among these bus-stops in George Town 44% has shelter from the rain and sun and 22% has bus-bays on which buses can stop without hindering traffic flow along the road, but bus-stops that are equipped with both shelter and bus-bays are only a few (15% to the total).

As for bus-stops in Province Wellesley, 16% has shelter from the rain and sun and 27% has bus-bays. Also, 65% of bus-stops in this area belong to category C' which means they have no shelter nor bus-bays - a situation that needs to be remedied fast.

Therefore, considerable improvements are needed for the convenience of both car drivers and bus users.

3) Bus information facilities

At bus terminals or bus-stops, nobody knows the scheduled times of bus arrival/departures. So, most people wait at bus-stations for a very long time.

Every bus company has charge of different bus routes but terminals are not equipped with maps and other information of these bus routes.

3.9 Fare

Bus-fares are decided by the Federal Government through the Public Transport Licensing Board.

The fare system was changed in 1977 to the one in effect at present. Comparing with the former the up-ratio is approximately 20-25%.

Bus fare system is as follows:

* For the first mile ..... 10 cents per passenger
* For each mile inexcess of the first mile ..... 5 cents.

Note:

Children under 5 years of age - FREE

A child 5 years old up to 14 years - HALF FARE calculated to the nearest denomination of 5 cents.

Fig. 1.19 Bus Fare System

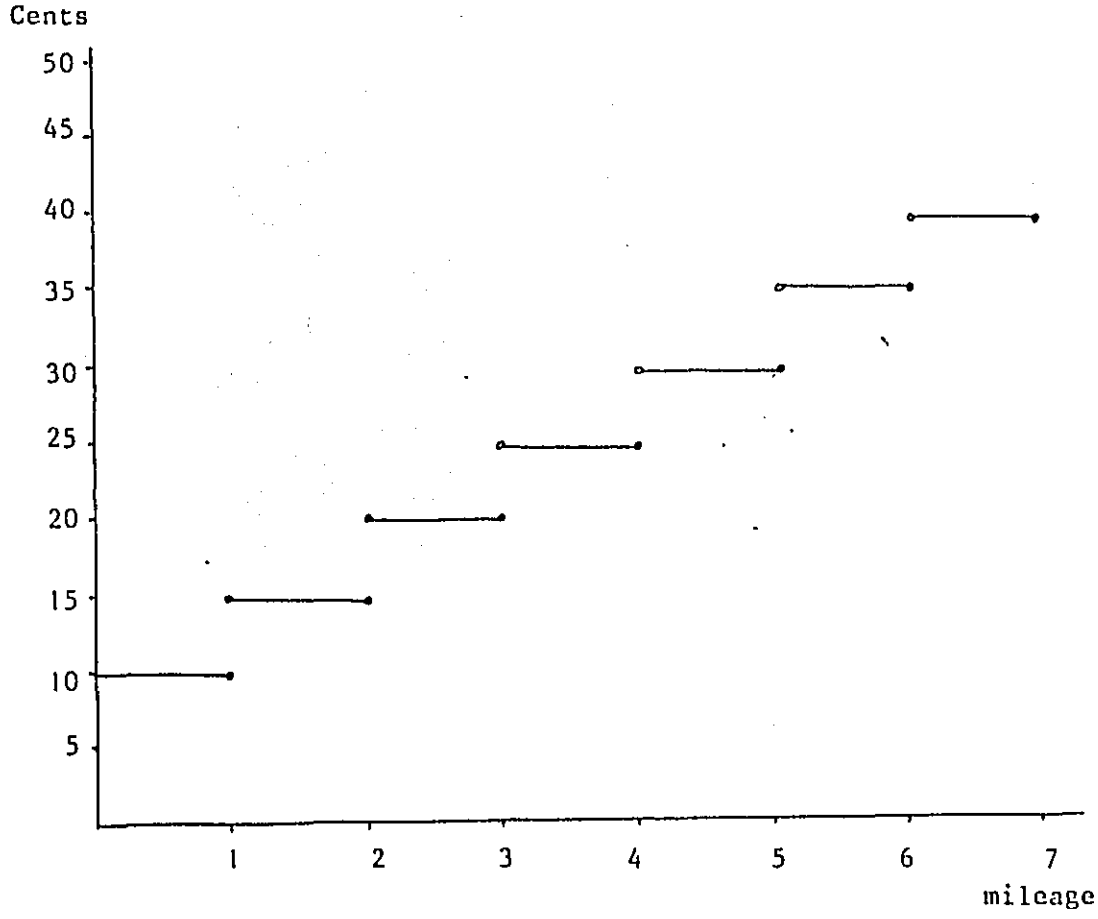
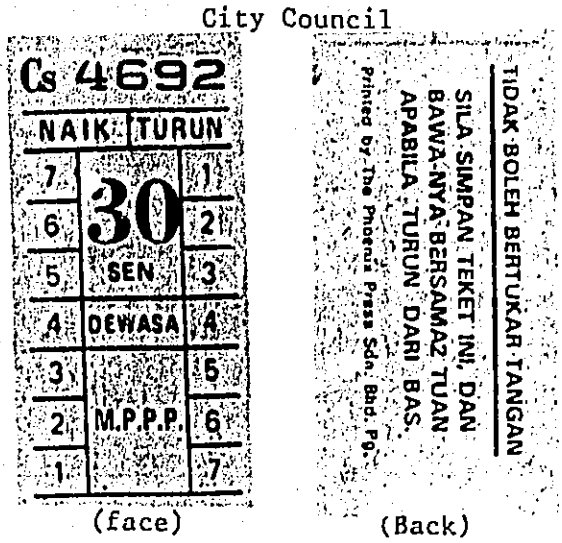


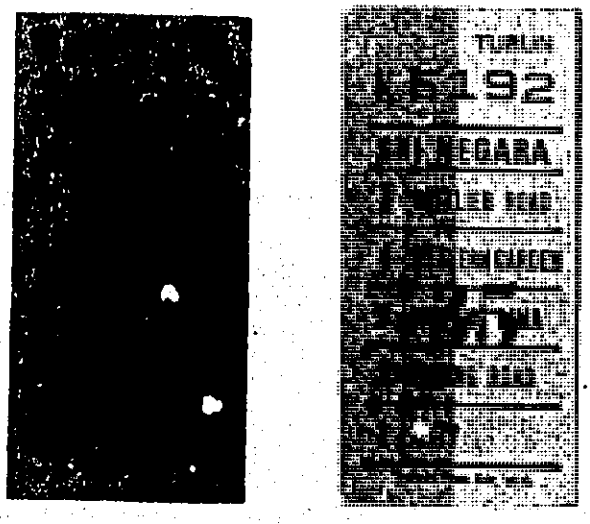
Fig. 1.20 Sample of Bus Tickets

City Council



(face) (Back)

Hin Bus Sri Negara



Some bus companies provide monthly concession tickets. This system varies in each company. A brief desciption of the system is given below.

Examples.

City Council Bus

Seasonal (monthly) concession tickets which restrict the passengers to travel only twice a day are available for sale at Adults $12/- and School Children $3/- a month. The monthly tickets entitle the purchaser to travel on any bus operated by the Majlis. A sample of this ticket is given in Fig. 1.21.

Central Province Bus

Monthly concession tickets may be issued to pupils of schools and Universities at the rate of $1/- per mile, per month, calculated on the mileage from picking up point to destination only.

Fig. 1.21 A Sample of Monthly Concession Ticket of the City Council Bus.

3.10 Financial Aspect

The data from 10 companies, 4 in Penang Island and 6 in Province Wellesley, are collected, and analysed from the Financial aspect.

The two big bus companies in Penang Island, City Council Bus Company and Penang Yellow Bus Company, ran into deficit in 1977 and 1978. The other companies, Hin Bus, Lim Seng Seng, Lean Hock, Sam Lean, Bagan Town, Min Sen, United Traction and Syarikat Ebban*, have shown a profit in their operation.

The outline of revenue and expenditure in 1978 is shown in the following table.

Table 1.19

Gross Revenue and Gross Expenditure, 1978

	Gross Revenue ($1000)	Gross Expenditure ($1000)	Profit ($1000)
Penang Island			
4 Companies	14675	18176	- 3501
Province Wellesley			
6 Companies	6961	4928	2033

In Penang Island, City Council and Penang Yellow Bus have 71% of the 4 companies' Gross Revenue, but their Gross Expenditure comes to 82% of the total 4 companies' expenditure. This shows that the expenditure of these two companies is much too high considering more detailed items, the following comments are made.

Bus operation cost account for over 97% of operating revenues in City Council Bus and over 93% in Yellow Bus.

The personnel expenditure accounts for over 70% of the total expenditure in case of City Council Bus, but only 17% in case of Penang Yellow Bus. The percentage of Hin Bus is 39% and Lim Seng Seng Bus Company 46%. The expenditure on personnel in City Council Bus is very high compared with the other private bus companies.

* Central Province Wellesley Transport Company is excluded here due to non-availability of information.

The personnel expenditure per employee of City Council Bus is 51% higher than that of the Yellow Bus, and Yellow Bus is 3% higher than Hin Bus.

The administrative expenditure of Yellow Bus is very high, it is 53% of the total expenditure. This rate in City Council Bus is 8.4%, 12% in Hin Bus and 14% in Lim Seng Seng Bus. Thus, of these two companies which show deficit, one is due to the high salaries and wages per employee and the other one is due to the high administrative expenditure.

The gross expenditure per employee in City Council Bus is 15% higher than the other private bus companies. Also, the number of employee per operating bus in City Council Bus is 34% more than that of the other private bus companies. It follows that City Council Bus has a possibility to improve their efficiency, since the number of employee per bus and the manpower cost per employee is higher than that of the other private bus companies.

The annual salaries and wages per driver varies from $1800 to $4,100. The highest wage is more than twice that of the lowest one. The average wages of a driver is about $3,200 per annum. The highest wages is offered by City Council Bus and the lowest one is offered by Federal Bus Company.

The conductor's annual wages vary between $1,100 and $3,600, the average wage is about $2,700. The wages of engineers and managers are very different between City Council and other bus companies. The wage of engineer in City Council is 6 times higher than the lowest one; the wages offered by City Council is almost twice that of the second highest wage. The highest wage of a manager is as much as ten times of that the lowest one and 3 times of the second highest one.

City Council offers the highest wages for all categories of its staff compared to other private bus companies. This is because it follows the salary scale of the government.

4 Passenger Characteristics

An interview was conducted at 14 bus stations; 3 major stations, 5 medium bus stations and 6 minor stations. About 600 passengers were interviewed about passenger's attributes, destination of the trip, purpose, means of transport & time taken to bus station, frequency of bus usage, and so on. Though the sample size is very few compared to the population (approximately 255 thousand per day), some typical characteristics may be understood by these results. Results are summarized as follows.

4.1 Sample Size

About 600 subjects were interviewed from the Survey Stations. A breakdown of the samples at each stations is shown in Table 1.20.

Table 1.20

Sample Interviewed

Survey Points	Samples Size	Time		Sex	
		Morning	Afternoon	Male	Female
A1 Ferry terminal at Butterworth	99	46	53	57	42
A2 Bus terminal at Maxwell Road	74	28	46	52	22
A3 Bus terminal at Bukit Mertajam	50	30	20	35	15
Sub-total	223 (37.5)	104	119	114	79
B1 City Council bus terminal	50	25	25	20	30
B2 Bus stand near Roman Catholic Church at Burmah Road	75	30	45	41	34
B3 Bus stand at Tanjung Tokong	27	12	15	12	15
B4 Bus stop at Air Itam	30	14	16	16	14
B5 Bus stop at Bagan Ajam	30	15	15	20	10
Sub-total	212 (35.7)	96	116	109	103
C1 Bus stop at Bayan Lepas Town	28	9	19	14	14
C2 Bus stop at Teluk Bahang Village	30	20	10	17	13
C3 Bus stop at Permatang Pauh	20	11	9	12	8
C4 Bus stand Kubang Semang	20	10	10	11	9
C5 Bus stop at New Development Area in Bukit Mertajam (Kampung Bharu)	30	19	11	17	13
C6 Bus stand at Balik Pulau	31	14	17	19	12
Sub-total	159 (26.8)	83	76	90	69
Total (%)	594 (100)	283 (47.6)	311 (52.4)	343 (57.7)	251 (42.3)

4.2 Attributes of Passengers

Sex of Passengers

As a whole, the number of male and female passengers is almost equal. Males make up 57% of the passengers. On the other hand, regarding the size of bus-stations, it has been found that at major bus-stations 64% are males and 36% females medium bus-stations have equal percentage of both sexes while at minor bus-stations there are 57% males and 43% females.

Car Ownership of Passengers

Almost all bus passengers do not own vehicles. This is shown in Table 1.21. Out of a total of about 600 passengers, only 28 passengers own vehicles (excluding motor-cycles) while 48 passengers own motor-cycles. Another 518 passengers do not own any motorized vehicles. Ownership of cars is about 5%, motor-cycles 8%, and 87% of the rest are forced to makes use of the bus services.

4.3 Trip Purpose

With reference to Table 1.22 the most frequent answer given to the question of trip purpose was "Going home" followed by "Going to Work".

At major bus terminals, one of the main functions of which is to distribute commuters to their destinations, 32.3% of those interviewed had their trip purpose as "going to work". On the other hand, at bus stations located within urban areas, the trip purpose of most of the passengers was "going home". It can be inferred, therefore, that in urban areas, bus passengers have more trip purpose, viz, they make use of the bus service for more purposive reasons than those at bus terminals.

Table 1.21

Car Ownership by Passengers

Station	Owner		
	Car	Motor-cycle	None
A1	4	8	87
A2	3	8	63
A3	1	0	49
Sub-total	8 (3.6)	16 (7.2)	199 (89.2)
B1	1	6	43
B2	9	7	59
B3	2	2	23
B4	1	2	27
B5	0	0	30
Sub-total	13 (6.1)	17 (8.1)	182 (85.5)
C1	1	2	25
C2	1	3	26
C3	0	0	20
C4	0	0	20
C5	4	4	22
C6	1	6	24
Sub-total	7 (4.4)	15 (9.4)	137 (86.2)
Total	28 (4.7)	48 (8.1)	518 (87.2)

Table 1.22 PURPOSE OF TRIPS

PURPOSE OF TRIPS / STATION	Going To Work	Going To School	Business Engagement	Going Home	Entertainment	Social Visit	To Religious Centre	Hospital/ Clinic	Shopping/ Marketing	Others
A1	43	5	2	20	7	6	0	2	4	10
A2	18	4	5	17	7	11	1	3	7	1
A3	11	9	0	9	3	3	0	1	8	6
Sub Total	72	18	7	46	17	20	1	6	19	17
RATIO %	32.3	8.0	3.1	20.6	7.6	9.0	0.4	2.7	8.5	7.6
B1	6	10	1	13	5	3	0	1	6	0
B2	21	6	3	16	4	12	2	0	9	2
B3	8	2	0	8	4	3	0	0	2	0
B4	3	7	2	4	3	2	0	2	3	4
B5	1	5	1	13	1	3	0	1	2	3
Sub Total	39	30	7	54	17	28	2	4	22	9
RATIO %	18.4	14.1	3.3	25.5	8.0	13.2	0.9	1.9	10.4	4.2

C1	2	3	2	5	3	7	1	0	1	4
C2	7	2	0	7	3	6	1	0	2	2
C3	3	0	0	11	4	0	0	0	2	0
C4	0	10	0	6	0	1	0	0	0	3
C5	6	12	1	5	0	3	0	0	0	3
C6	4	3	0	10	2	7	0	0	0	2
Sub Total	22	30	3	44	12	24	2	0	8	14
RATIO %	13.8	18.9	1.8	27.8	7.5	15.1	1.3	0	5.0	8.8
TOTAL	133	78	17	144	46	72	5	10	49	40
RATIO %	22.4	13.1	2.9	24.2	7.7	12.1	0.8	1.7	8.2	6.7

4.4 Catchment Area of Bus Stations

Interviews were conducted on the time-taken to bus stations in order to find out the radius of the catchment area of the bus stations.

It was found that there was a clear difference between the length of time-taken in rural areas and that of urban areas. In rural areas, 50% of the passengers take only 10 minutes to arrive at the nearest bus station whereas in urban areas, it takes them 15 minutes to arrive at the medium stations and the bus terminals.

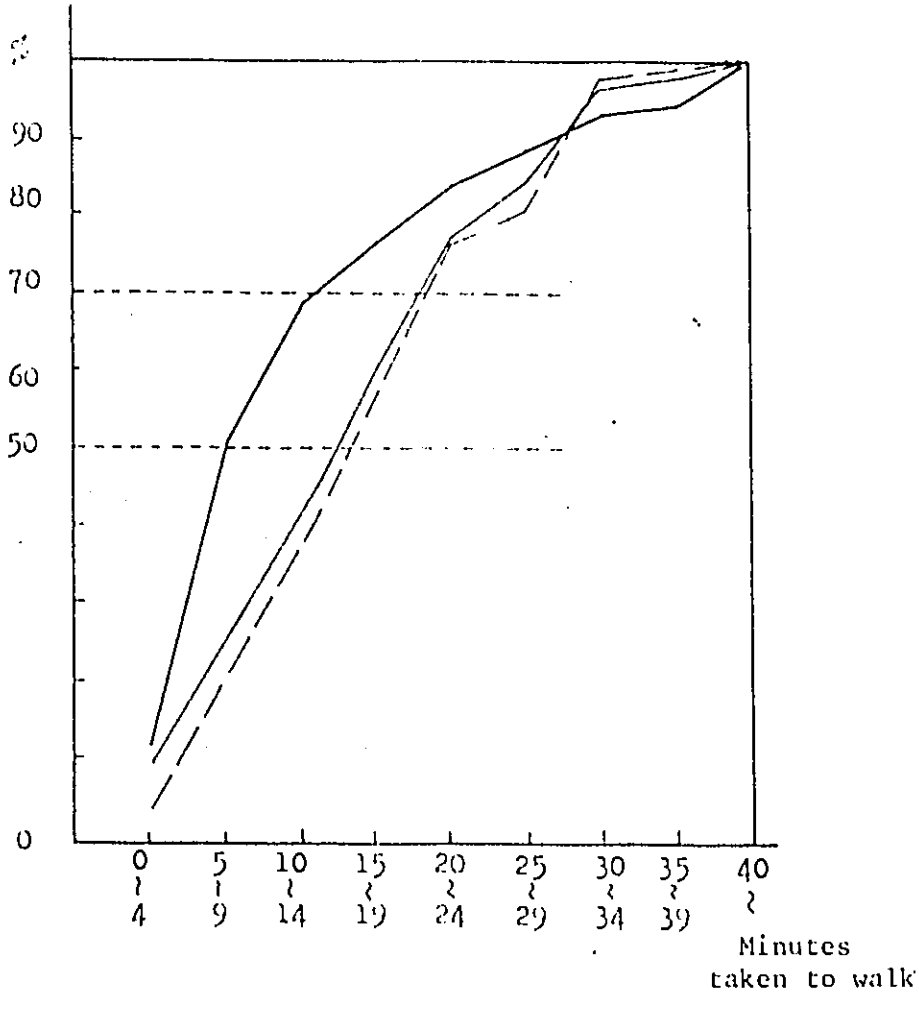
Fig. 1.22

Cumulative curve of access walk

- - - - - Major Bus Station

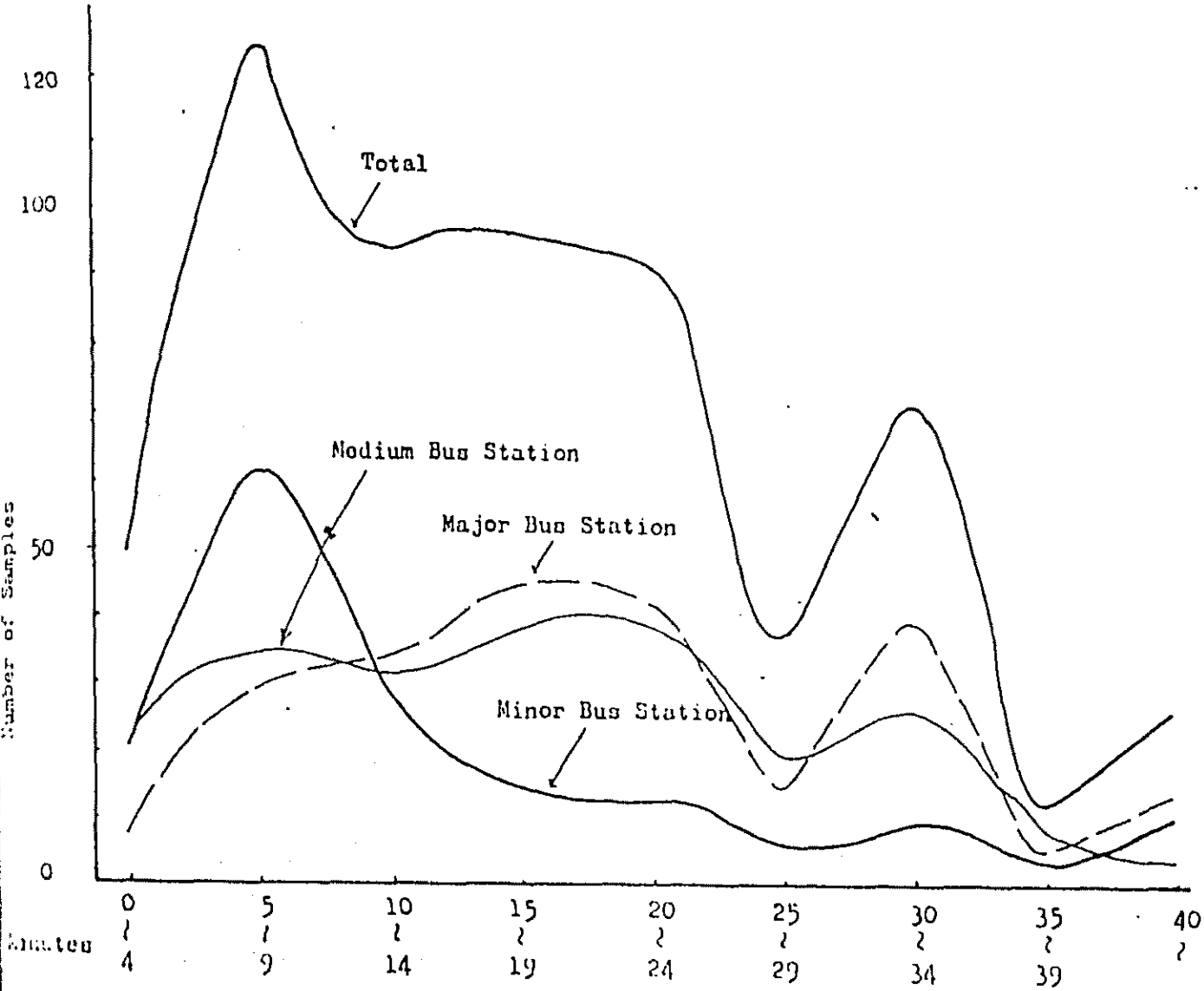
——— Medium Bus Station

_____ Minor Bus Station



The following figure shows the distribution of the time-taken by bus passengers to reach bus stations.

Fig.1.23
Time taken to Bus Station



4.5 Frequency of using bus

70% of passengers use the bus more than once a day, 12% use it once or twice a week, 10% use it other than the above times and only 6% use it once a day.

Table 1.23

Frequency of using Bus

Station	More than once/day	Once/ day	Once for every 2 days	Once or twice/ week	Others
A1	80	3	2	6	3
A2	52	4	0	10	8
A3	24	9	2	4	4
Sub-total	156	21	4	20	15
%	72.2	9.7	1.9	9.3	6.9
B1	29	1	2	11	6
B2	58	1	0	13	3
B3	21	2	0	2	2
B4	12	1	0	5	7
B5	29	0	0	0	1
Sub-total	149	5	2	31	19
%	72.3	2.5	1.0	15.0	9.2
C1	9	1	0	4	11
C2	12	0	2	12	4
C3	20	0	0	0	0
C4	16	1	0	0	3
C5	21	2	0	1	6
C6	24	4	3	0	0
Sub-total	102	8	5	17	24
%	65.4	5.1	3.2	10.9	15.4
Total	407	34	11	68	58
%	70.4	5.9	1.9	11.8	10.0

5. Present Problems and Improvement Required

5.1 General

As regards bus transport in the Study Area, it can be recognized from the analysis of present conditions described here in before that the bus transport plays a significant role for public transport on land.

There seems to be slight difference between the present situation in Penang Island and that in Province Wellesley.

In Penang Island, the bus service seems to be relatively adequate in the present stage, although there are some minor problems to be solved. For example, almost the whole of the urbanized areas are covered by existing bus network as shown in the network coverage. And also the time period in which the bus operates, i.e from 6.00 am. to 1.00 am., coincides with people's activities.

Although there are no decisive disadvantages, since the total number of passengers has decreased since 1976. This is mainly because of the growing popularity of individual motorized vehicles such as motor cars and motor-cycles.

Whereas in Province Wellesley, bus users have increased constantly and further extention of the bus network is desired especially in the southern part.

The following aspects in detail are considered as existing problems of bus transport.

5.2 Problems regarding running conditions

Almost all the bus companies indicated that the delay and the irregularity of their schedule are caused by road congestion. In fact, the bus running speed is relatively low compared to cars, although it has not yet to reach the stage when buses are forced to run at an extremely low speed.

In future, with the increase in traffic volume, the congestion will be worse due to difficulties in widening roads and the construction of new roads.

It follows that the improvement of road conditions is the best solution in attaining the smooth operation of buses.

(A) Road-side parking

The present bus routes have a carriage-way of about 8 m - 9 m, but almost all the main sections are too narrow due to parking on the road-side.

All buses travel along the left side of the lane as they have to stop at bus-stops. Thus, when there is parking by the road-side, buses are forced to weave. This causes interruption to the traffic flow along such sections which also slows down running speed.

(B) Motorcycle and trishaw

Furthermore, motorcycles and trishaws are usually running two or three abreast along the roads due to parking by the road-side. They always interrupt the bus flow forcing them to slow down.

(C) Specific intersections

The difficuty for a large volume of traffic to negotiate roundabouts at the same time leads to traffic congestion. It is easier to control traffic flow at such intersections by using traffic signals in order to increase traffic capacity.

5.3 Irregularity of bus operations

At present, bus operations usually do not follow their own time schedule. The operate without following their time schedule is a serious problems which reduces the bus frequency.

No effort is made to follow the time schedule. There are no time-tables set up at bus-stops. The bus either comes too early or too late, thus the bus frequency is not constant. Since there is a lack of information regarding bus schedules at bus-stops, the passenger has to wait for an unnecessarily long time at the bus-stop.

This means poor reliability of bus transport which should be improved with urgency.

The causes seem to be as follows:

1. The frequent breakdown of buses.
2. Lack of control of the operation of the time-table at the terminals.
3. No system of following the time schedule.

5.4 Bus fleets

In order to maintain regular frequency of services and increase services, it is necessary to introduce more buses in the study area.

During the morning and evening peak hours, most of the buses are fully loaded due to heavy demand exceeding their capacities. The load factor is more than 100% during peak hours and 40% during off-peak hours. This high load factor is due to the small capacity of each bus taking in only 43 to 48 passengers. Therefore it is expected that the capacity of each bus fleet be increased by introducing standee type buses which have larger standing space.

Most bus companies use many old buses such that almost 1/3 of the total bus fleets is over 7 years old, and these buses breakdown during scheduled trips. In order to maintain frequent services and have effective operations it is necessary to introduce new buses as well as improve the maintenance system.

Besides, for greater convenience some improvements of bus fleets should be done, such as the lowering of bus floors, equip double doors for boarding/alighting, and airconditioners.

5.5 Bus facilities

The City Council Bus Terminal and the Private Bus Terminal are located separately and are not within walking distance of each other. This impedes the effective utilization of the urban and regional buses.

Regarding Bus Terminals, the following problems have been noted.

- Inadequate waiting space.
- Narrow and dark terminals.
- Lack of information on time schedule, bus routes, and bus fares.

Regarding Bus-Stops, the problems are:

- No bus-stop signs
- No information on time schedules, the bus routes and the bus fares.
- No lights
- No bus bays
- No shelter and waiting facilities.

BUS COMPANY INTERVIEW

URBAN TRANSPORT STUDY

IN GEORGTOWN, BUTTERWORTH AND BUKIT MERTAJAM

1. Introduction

In response to the request made by the Government of Malaysia, for technical cooporation in conducting the Urban Transport Study in Greater Metropolitan Areas of Georgetown, Butterworth and Bukit Mertajam in Peneng, the Government of Japan agreed to offer the services of team of Japanese experts to undertake the Study and the transfer of knowledge.

The Japanese survey team of Urban Transport Study in Greater Metropolitan Areas of Georgetown, Butterworth and Bukit Mertajam has already began the Survey of Vehicle Owner Interview (Origin-Destination Survey), related other surveys and analyses from June in 1979.

2. Aim of survey

The aim of this survey of bus transport, one of the Public Transport section of that Urban Transport Study in Penang, is to review and establish the exsisting conditions, to identify the present problems, to analyze the date and to recomend about public transport development.

3. Survey Contents

The Urban Transport Study team has to collect, detail review and analyze the data of bus transport, such as;

- Existing condition of bus transport (ex. Network, vehicle, facilities, etc.)
- Existing system of bus fares
- Present management state of bus companies
- Present problems of bus transport
- Future prospects and plans

In so doing, we request to supply information / data and briefing your opinions concerning the following points.

A 1. Please supply data and materials as follows.

a) Map of bus routes.
b) Location map of bus-stops.
c) Location map of bus-terminals.
d) Number of passengers of each routes.
(1970-1978, see the format-1)
e) Operating distances of each routes.
f) The time schedule of each routes at origin places.
g) Number of bus-vehicles in your company.
(See the format-2.)
h) Fare-system
g)Taxation system for bus-company and governmental subsidy.

format-1 Total passenger in 1970-78

	1970	1971	1972	1973	1974	1975	1976	1977	1978
TOTAL PASSENGER									
INTRA CITY ROUTE IN [illegible]									
INTER CITY ROUTE (REGIONAL BUS)									

Number of passengers transported on each routes

	ORIGEN	DISTINATION	OPERATING DISTANCE	YEAR 1977	YEAR 1978
ROUTE - 1					
- - 2					
- - 3					
- - 4					
- - 5					
- - 6					
- - 7					
- - 8					
- - 9					
- - 10					
- - 11					
- - 12					
- - 13					
- - 14					
- - 15					
TOTAL					

format-2 Number of bus-vehicles in your company

TYPE OF SERVICE	TYPE OF BUS	CAPACITY OF BUS	YEARS OF BUS 1-2	3-4	5-6	7-10	11 years and
SCHEDULED BUS SERVICE FOR GENERAL PASSENGER	SMALL-VAN OR COACH						
	MIN-BUS						
	LARGE-BUS						
FACTORY BUS OR CHARTERED BY COMPANY	SMALL-VAN OR COACH						
	MIN-BUS						
	LARGE-BUS						
SCHOOL BUS	SMALL-VAN OR COACH						
	MIN-BUS						
	LARGE-BUS						
SIGHT-SEEING BUS	SMALL-VAN OR COACH						
	MIN-BUS						
	LARGE-BUS						
OTHERS	SMALL-VAN OR COACH						
	MIN-BUS						
	LARGE-BUS						
TOTAL	SMALL-VAN OR COACH						
	MIN-BUS						
	LARGE-BUS						

( ); Number of buses equiped with air-condtion

B 1. Number of employee of your company. (1976,77,78)
- 1-1. Bus driver
- 1-2. Bus conducter
- 1-3. Engineer for bus maintenance
- 1-4. Administrative worker
- 1-5. Business worker
- 1-6. Other employee
- 1-7. total employee

2. Operation cost per kilometer. (1976,77,78)
- 2-1. Fuels and oils cost per kilometer
- 2-2. Repair and maintenance cost per kilometer or per bus-vehicle
- 2-3. Tax per bus-vehicle
- 2-4. Insurance cost per bus-vehicle
- 2-5. Other cost per kilometer or per bus-vehicle

3. Annual salaries and wages per woker. (1976,77,78)
- 3-1 Salaries per driver
- 3-2 Salaries per conducter
- 3-3 Salaties per engineer
- 3-4 Salaries per manager
- 3-5 Salaries per business woker

4. Purchase price of a bus-vehicle. (1976,77,78)

5. Depreciation system
- 5-1. The term of depreciation for bus-vehicle
- 5-2. Depreciation rate of bus-vehicle
- 5-3. The term of depreciation for facilities (bus-stop, bus-terminal etc)
- 5-4. Depreciation rate of facilities

6. Repayment system
   - 6-1. Method of repayment
   - 6-2. Interest of long-term loan
   - 6-3. Interest of short-term debt

7. Taxation system
   - 7-1. Tax for bus-vehicle
   - 7-2. Tax for company
   - 7-3. Real estate tax (Municipal property tax)
   - 7-4. Business tax

8. Pull up following blank column

	1976	1977	1978	REMARKS
1 GROSS REVENUE				
1-1 FARE INCOME				
1-2 INCOME EXCEPT FARE TAKING				
2 GROSS EXPENDITURE				
2-1 PERSONNEL EXPENSES (SALARIES AND WAGES)				
2-2 ADMINISTRATIVE EXPENSES				
2-3 FUELS AND OILS EXPENSE				
2-4 REPAIR EXPENSES				
2-5 TAX OF BUS-VECHICLES				
2-6 PREMIUM OF INSURANCE				
2-7 OTHERS				
3 DEPRECIATION				
3-1 VEHICLES				
3-2 FACILITIES				
4 INTERREST				
4-1 LONG-TERM LOAN				
4-2 SHORT-TERM DEBT				

The cash-flow table

	OWNED CAPITAL	DEBT	REVENUE	TOTAL	OPERATION AND MANAGEMENT COST	INTEREST COST	AMORTIZATION	PAYMENT	TAX	TOTAL	DEPRECIATION
1976											
1977											
1978											
REMARKS											

C What kind of comment do you have concerning the following items ?

1/ Bus route and network

1-1. What are the problems faced in the present-day bus transport in terms of public transport ?

1-2. Will traffic congestion have an adverse effect on the reasonable bus service level ?

1-3. Do you have any specific problems along the bus routes ?

1-4. At what location of the road network do problems often occur at present ?

1-5. Do you have any idea of realignment in the present bus network ?

1-6. Will there be any problem to set up new bus routes or change the routes ?
What have you been experienced in those cases in the past ?
ex. - adjustment other company routes
- personnel transposition
- arrangement bus location
- bus terminal
- road condition etc.

1-7. Will there be any new bus-route-plan in the near future ?
And is there any bus routes to be abolished ?
(And is there any plan to abolish the bus route ?)

1-8. Where do you think the location of a new bus-terminal will be necessary ?

1-9. Is there any plan for the bus to cross the channel by ferry in the near furture ?

1-10. Will there be any bus-routes set up for cross-channel-buses on the Penang Linkage ?

1-10. What do you think about transformation of traffic pattern as a result of Penang Linkage construction ?
What will that construction has an effect on bus-passenge-wage ?

2/ Bus-operation

2-1. What is the number of intra-city bus in your company ?

2-2. And what is the number of long-distance bus (regional bus) in your company ?

2-3. What is the problems associated with the latter ?

2-4. How does the charter-bus (factory-bus) system operate ?

ex. a) bus-driver
b) operating hour
c) fare (whose account)
d) monthly charter rate etc.

2-5. What is the bus operating hours ?
Is ther any necessity to start bus running earlier in the morning ?
And to prolong the last bus to late hour in the evening ?

2-6. Have you any plan to extend the bus operating hour ?
Is there any problem for the bus-personal to return home after working in that case ?

3/ Bus fare system

3-1. I would like a briefing concerning the bus fare system or please supply date of outline.

3-2. Do you think the present system is good ?

3-3. Do you think it's much better to adopt flat-fare system or to adopt a fare system based on length of journey ?

3-4. Should it be more simplified ?

3-5. Do you adopt the coupon-ticket system ?
And also do you use such a commuting-pass (season tickets) system ?.

3-6. Is the coupon-ticket of good for all bus-routes in your company ?

3-7. Do all the bus companies use the same common coupon - ticket ?

3-8. Will there be any problems if you adopt such systems (coupon and pass system) ?

3-9. Do you consider to provide more discount for children, people, student and physical handcap ?

3-10. How do you operat concerning to collect the fare / ticket in bus ?

4/ Bus management

4-1. What kind of problems do you find in the management side of your company ?

4-2. Is there any deficit bus routes ?

4-3. Is there any governmental subsidy for your company management ?

4-4. What is the content of that subsidy system ?

4-5. Do you want to suspend the deficit routes ?

4-6. Are you considering the realignment of those dificit bus routes with other related routes ?

4-7. What is the rate of increase in the cost of manpower ?

4-8. What is the bus load factor of passenger at the peak and off-peak hours ?

5/ Bus-policy measure

5-1. What is the measetere nesessary to increase the number of bus user ?

ex. -to promote relainblity
-to assure regularity by means of bus-priority lane
-to improve the bus stop
-to install air conditioned buses
-to revise the bus fare system ?

5-2. What any kind of comment do you have about the introduction of traffic restriction and bus priority schemes ?

5-3. Are there any locations where you want to set up the bus-lane ?

5-4. Do you have any idea of adopting a new transport system ? (ex. mini-bus)

5-5. What are the main reasons ?

5-6. Are there any necessary points for improvement in traveling comfort concerning bus-vihicle ?
(ex. new bus design and equipment)

5-7. What is the road do you want to set up the bus priority-lane in Georgetown ?
And why do you think so ?

Part 2 TAXI

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LIST OF TABLES AND FIGURES

1. Introduction

The taxi is an important mode of public transport especially in urban areas. It provides for movement of people of both intra-regional and inter-regional nature.

The taxi has various characteristics. It has more flexibility than the bus and provides a door-to-door service. This is specially important for people who have goods or luggage to carry. The taxi also gives quicker and more convenient service. There are few or no stops on the way and travelling speed is generally faster than that of a bus. Taxis do not follow any fixed route although they may sometimes operate within a certain area only. However for long distance taxis, they do follow certain fixed routes although small charges for deviations are made on the direction of the user. The taxi provides an addition advantage in that an intending passenger is able to call a taxi just by using the phone. For all the conveniences provided, inevitally the fare of the taxi is much higher than that of a bus especially for short distances on a mile to mile comparison.

Although there are only a few taxis comparatively in the study area, nevertheless it should be given as much consideration particularly in planning the future public transport facilities. It is an important means of transport for short distance, for example in the city itself. Presently, such services are provided largely by the trishaw. In the future when trishaws are fewer in number, the taxi will possibly be in greater demand. Taxis are also used largely by tourists who wish to travel about the city. In long distance travel, the taxi is also an important mode particularly for places which are not served efficiently by a good bus or rail network.

A detailed study of the taxi is needed in order to study the characteristics of taxis in the study area, to identify problems and thereby to evaluate the existing system.

2. Sources of data and survey

Data for the analysis was obtained from the following surveys and sources :-

1) O-D survey of taxis, carried out in June 1979 by the Study Team
2) Short additional interview survey, carried out in November 1979 by the Study Team.
3) Taxi Assocciation, Penang.
4) RIMV

O-D Survey.

The purpose of the survey was to gain detailed information as to the characteristic of the taxi and the movement. Questions asked included details of driver, vehicle, trip length and time, passenger numbers, origin and destinations including the times and other related facts.
(Details of questionnaire is in Appendix A)

3 Number of Taxis

In 1979, the number of taxis registered in the state of Penang was 474. The number in the study area consists of 350 on Penang Island and 124 on Province Wellesley. The vehicle ratio per 1000 Population was found to be 0.50 for the whole study area and 0.68 for the island and 0.29 for Province Wellesley Area. As a comparison to other places the ratio is comparatively small.

Area	Population	No. of Taxis	No. of Taxis/1000pop.
SA (Island)	513.3 1,000	350	0.68
SA (Province Wellesly)	433.3	124	0.29
Penang State	946.6	474	0.50
Singapore	2.0mil	1400	0.70
Kuala Lumpur			

Table 2.1 No. of Taxis

4. Characteristics of taxi trips

4.1 Trip Length (distance)

Trip length (Km)	Province Wellesley no.	%	Island no.	%	Total no.	%
0 - 5	1	0.2	94	10.5	95	7.1
6 - 10	58	13.3	282	31.5	340	25.6
11 - 15	78	17.9	218	24.4	296	22.3
16 - 20	31	7.1	97	10.9	128	9.6
21 - 25	33	7.6	85	9.5	118	8.9
26 - 30	34	7.8	69	7.7	103	7.7
31 - 80	144	33.0	47	5.3	191	14.4
81 - 120	33	7.6	2	0.2	35	2.6
Over 120	24	5.5	0	0.0	24	1.8
Total	436	100	894	100	1330	100

Table 2.2 Trip length of taxis, 1979

Source: O-D Survey of Taxi, 1979

The trips made on Penang Island are relatively shorter than those on Province Wellesley. On the Island, trips more than 20 km. in length make up only 22.7% of the total trips here but on Province Wellesley trips more than 20 km. make up 61.5% of total trips here. This shows clearly that on Province Wellesley taxis are used for long distance trips and are less often used for short distance trips. The nature of the development on Province Wellesley in more dispersed from the town and there is no large city which requires taxis for transporting people from one part to another like in George Town. Taxis here are generally used for travel from one town to another. Some taxis even travel as far as Ipoh or Kuala Lumpur which is about 120 miles and 250 miles from Butterworth respectively.

4.2 Trip Length (Time)

Trip time is much shorter for Penang Island being largely about less than 30 minutes only. For Province Wellesley it is much longer and is about 60 minutes.

These figures indicate the nature of the trips. Those on the island are mainly short distance trips whereas those on Province Wellesley are long distance trips.

Trip time is probably affected by the degree of congestion on the roads. In Penang Island there is greater congestion so trip times tend to be longer as speed becomes slower. This further shows that the nature of trips on the island is quite different from that of Province Wellesley. Although the average trip time is double that of the island, trip distance is more than double.

Trip time (min)	Province Wellesley	Island	Total
0–10	1	94	95
11–20	44	232	276
21–30	92	268	360
31–40	31	97	128
41–50	33	45	118
51–60	34	69	103
61–120	144	47	191
121–180	33	2	35
180 over	24	0	24
Total	436	894	1330

Table 2.3

Trip time for taxis, 1979

Source: O-D Survey for taxis, 1979

4.3 Trip Generating Time

Table 2.4 shows that there are two main peak periods for taxis both on the island and on Province Wellesley. The peak hour period is from 10 a.m to 11 a.m and from 3 p.m to 4 p.m. The volume during 12 to 1 is quite low compared to there peaks. The peak for the island is more distinct than in Province Wellesley.

The taxi trip-generation peak hours do not seem to coincide with the general traffic peak hours which consist of the 8–9 morning peak and 4–5 evening peak. The reason could be due to the fact that users of taxis are not usually people going to work but more so for occasional trips like shopping and social trips. Also, more taxi trips can be made when there is less congestion on the roads. Thus the taxi peak hour does not coincide with the general traffic peak which follows the working hours of officers.

Trip Generating Time	Province Wellesley	Penang Island	Total
5 – 6 a.m.	6	3	9 (0.7)
6 – 7	7	24	31 (2.4)
7 – 8	33	48	81 (6.2)
8 – 9	31	67	98 (7.4)
9 – 10	30	79	109 (8.3)
10 – 11	36	97	133 (10.1)
11 – 12	29	68	97 (7.4)
12 – 1 p.m.	18	62	80 (6.1)
1 – 2	38	77	115 (8.7)
2 – 3	36	85	121 (9.2)
3 – 4	40	76	116 (8.8)
4 – 5	37	69	106 (8.1)
5 – 6	38	57	95 (7.2)
6 – 7	22	38	60 (4.6)
7 – 8	11	15	26 (2.0)
8 – 9	5	18	23 (1.7)
9 – 10	2	11	13 (1.0)
10 – 11	0	3	3 (0.2)
	419	897	1316 (100)

Table 2.4

Hourly Variation of taxi trips generated, 1979

Source: O-D Survey of Taxis, 1979.

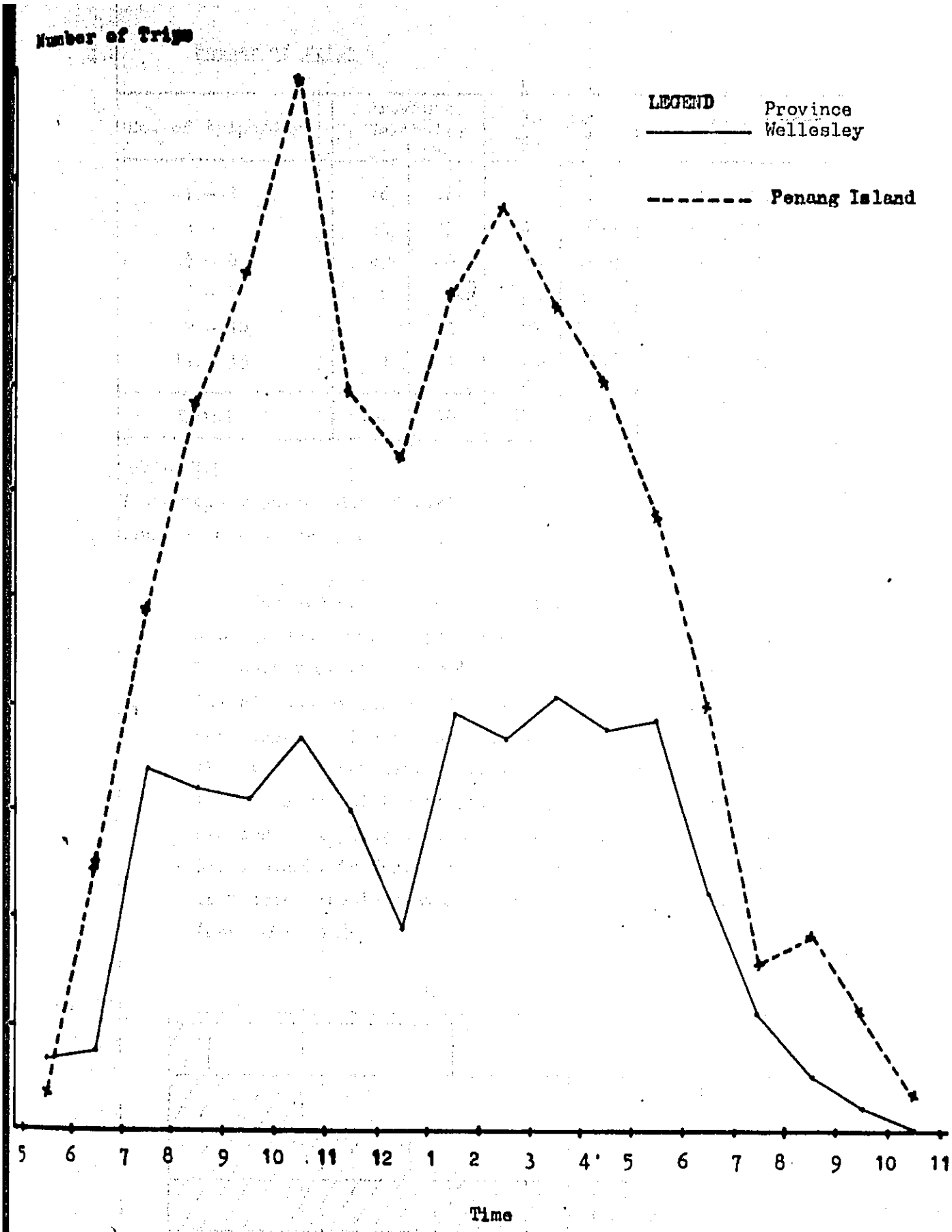


Fig. 2.1
Hourly Variation of Taxi Trips Generated
Source : O-D Survey of Taxi, 1979.

4.4 Number of Trips

No. of trips/day	Province Wellesley no.	%	Island no.	%	Total no.	%
1 - 2	18	18	3	2.4	21	9.3
3 - 4	43	43	10	8.0	53	23.6
5 - 6	29	29	18	14.4	47	20.9
7 - 8	6	6	40	32.0	46	20.4
9 - 10	3	3	27	21.6	30	13.3
11 - 15	1	1	27	21.6	28	12.5
Total	100	100	125	100	225	100

Table: 2.5
Number of trips per day of taxis, 1979.
Source: O - D Survey of Taxi, 1979.

The number of trips made each day is relatively small. The average number of trips per day is only 6.8 in the study area. The number of trips per day is however much larger on Penang Island than Province Wellesley. On Penang Island, 75% of taxis make more than 6 trips per day but on Province Wellesley only 10% make more than 6 trips per day. This big difference is very much related to the nature of the trips. Trips made on the Butterworth side are generally long distance trips whereas those on Penang Island, partioularly in George Town itself, are short distance trips that serve people travelling from one part of the city to another. (see table 2.2)

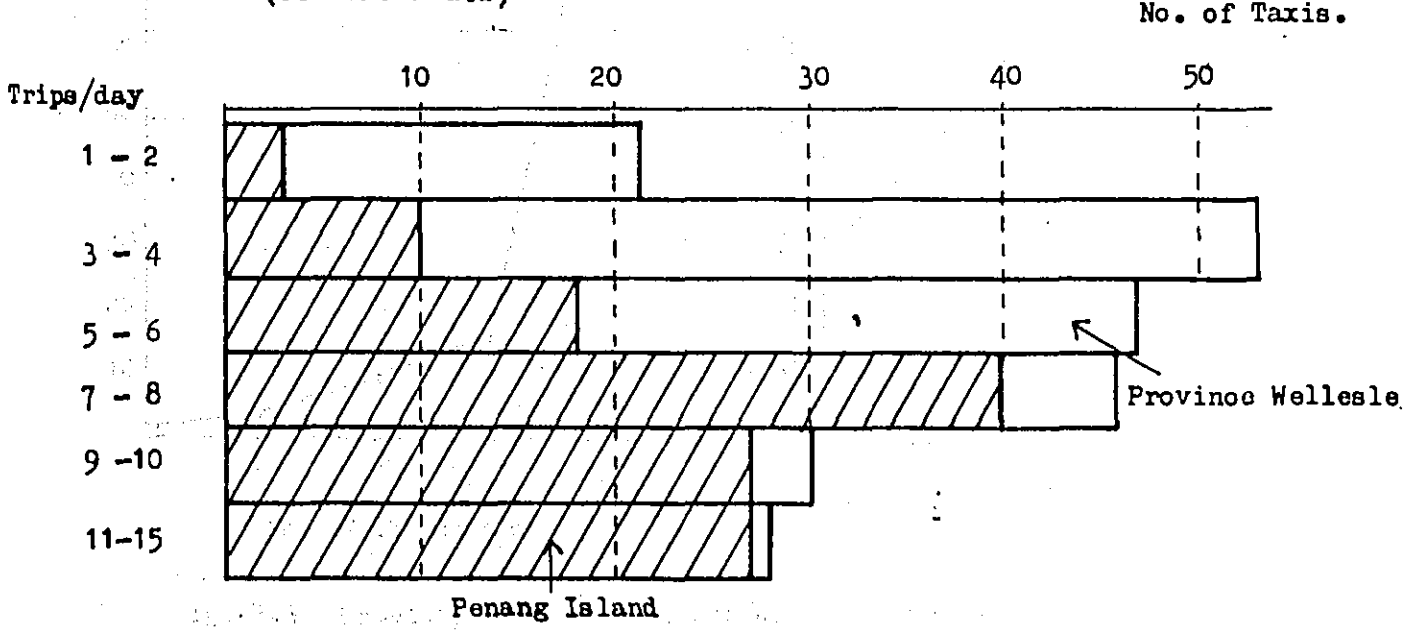


Fig.2.2 No. of Trips

4.5 **Number of Passengers**

No. of Passengers	Province Wellesley		Penang Island		Total	
	no.	%	no.	%	no.	%
0	9	2.1	251	29.9	260	20.4
1	10	2.3	177	21.1	187	14.8
2	24	5.5	178	21.2	202	15.8
3	26	6.0	101	12.2	127	10.0
4	367	84.1	131	15.6	498	39.0
Total	436	100	838	100	1274	100

Table: 2.6

No. of passengers/trip for taxis in Penang, 1979.

Source: OD Survey for Taxis, 1979.

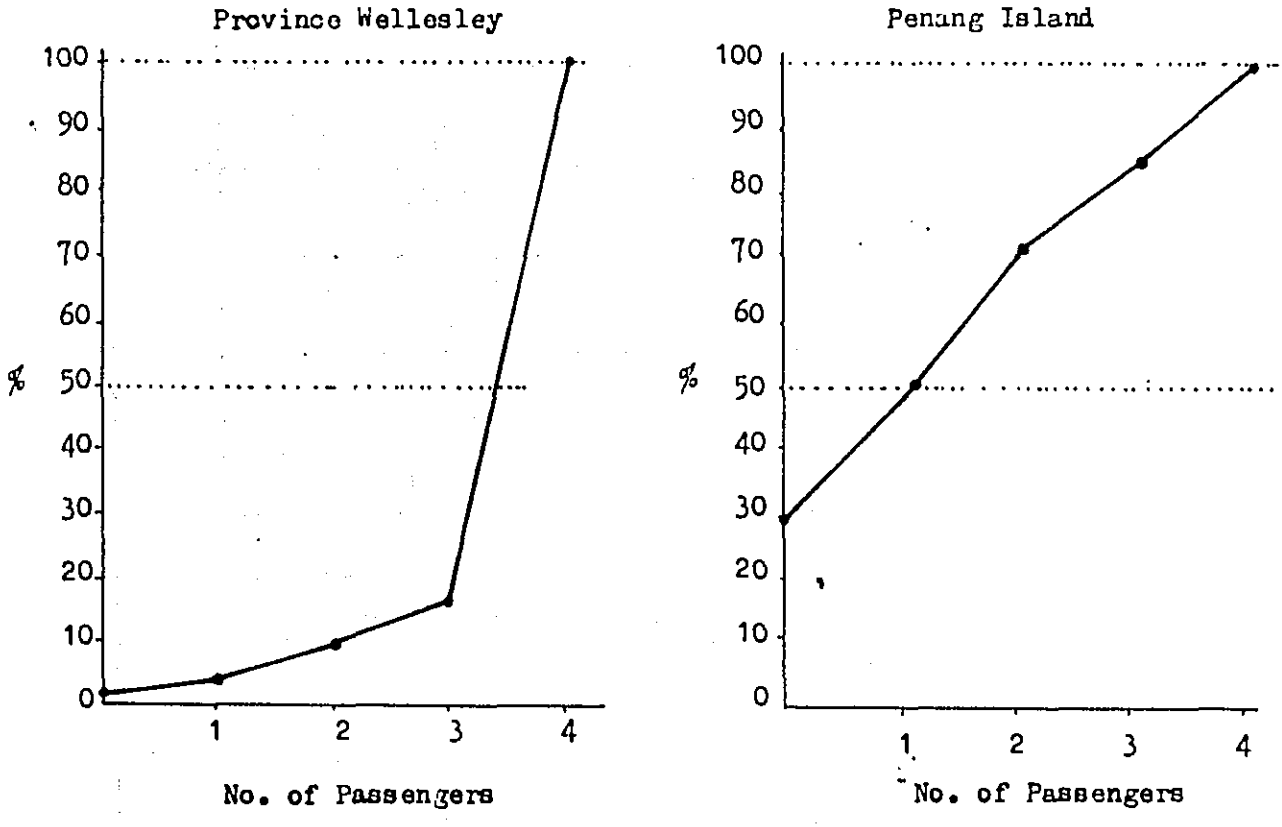


Fig. 2.3 Cumulative Composition of No. of Passengers.

The taxi has a maximum passenger capacity of 4. On Province Wellesley, 84.1% of the trips have full capacity in terms of passengers. This high figure is related to the trips being long distance in nature. In such cases, taxi drivers usually wait until they have 4 passengers before starting a trip.

On the island, the reverse occurs. 84.4% of the trips have less than 4 passengers with a rather significant proportion of 29.9% having no passengers. This is due to the short-distance nature of the trips. Taxi drivers are not so insistent on collecting enough persons to utilise the full capacity of the taxis. Distances being shorter and the number of trips more, it is not worthwhile waiting for four passengers.

The average number of passengers per trips was calculated for Penang Island and Province Wellesley. Multiplying by the average number of trips per day, the average number pf passengers carried by each taxi was obtained. The total passengers carried by all the taxis was then further obtained.

The total number of passengers for taxis each day is 4,683 for Penang Island and 1,815 for Province Wellesley, making a total of 6,498 passengers for Penang State.

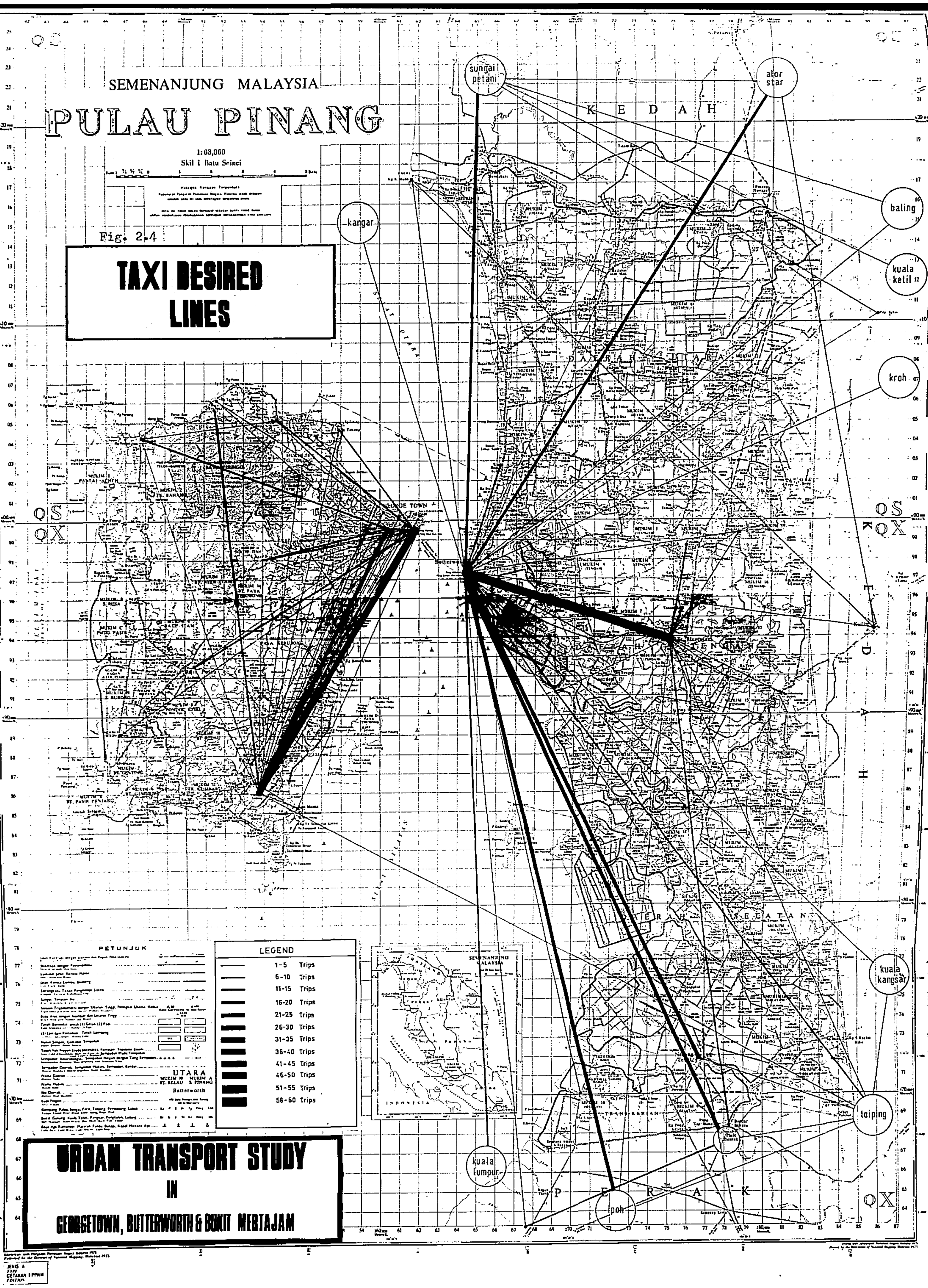
	Penang Island	Province Wellesley
Average no. of Passengers per trip	1.62	3.46
Average number of trips per day	8.26	4.23
Average no. of Passengers per day.	13.38	14.64
Total no. of taxis	350	124
Total passengers carried per day	4,683	1,815

Table: 2.7

Total passengers carried by taxi per day, 1979

4.6 Trip Distribution

According to the OD survey carried out in 1979 by the Study Team, there are 2723 trips of internal movement and 1991 trips of external movement. And the desired line is illustrated in the following figure.



SEMENANJUNG MALAYSIA
PULAU PINANG
1:63,360
Skil 1 Batu Seinci
Fig. 2.4
TAXI DESIRED LINES
sungai petani
alor star
KEDAH
kangar
baling
kuala ketil
kroh
GEORGE TOWN
Butterworth
SELAT UTARA
kuala kangsar
taiping
kuala lumpur
poh
PERAK
PETUNJUK
LEGEND
1-5 Trips
6-10 Trips
11-15 Trips
16-20 Trips
21-25 Trips
26-30 Trips
31-35 Trips
36-40 Trips
41-45 Trips
46-50 Trips
51-55 Trips
56-60 Trips
UTARA
SEMENANJUNG MALAYSIA
INDONESIA
URBAN TRANSPORT STUDY
IN
GEORGETOWN, BUTTERWORTH & BUKIT MERTAJAM

5 Fare System

The type of fare varies between long distance and short-distance trips. For long dixtance trips, there is a fixed sum for each person whereas for short-distance ones, in general the fixed fare applies to any number of passengers. For example, a person going from a certain destination to another would pay the same as that for two persons so long as they have the same origin and destination. For more than two passengers however they may charge a small extra fare per trip.

For short-distance travel in Penang Island, the meter charge is 60 cents for the 1st mile and 20 cents for any additional half mile. The fare system started from 1975 before which it was only 40 cents for the 1st mile.

The meter fare is usually not practised in Penang and taxi drivers can charge upt to three times the meter reading.

6 Ownership and Operating System

6.1 Type of Ownership

Type of driver	Province Wellesley		Island		Total	%
	no.	%	no.	%		
Owner-driver	19	19.6	10	8.8	29	13.7
Non-owner driver	78	77.4	105	91.2	183	86.3
Total	97	100	114	100	212	100.0

Table 2.8 Characteristic of Taxi Drivers, 1979

Source: O-D Survey of Taxi

Table 2.8 shows that majority of the taxi operators are not owners of the taxis (86.3%). Only 13.7% owners operate their own taxi. This is probably related to the fact that a taxi is considerably a heavy investment and not within the capability of ordinary operators to possess. A further problem is the difficulty of getting a licence. A large number of operators claimed that they have worked for at least 10 years but are still unsuccessful in obtaining a licence.

Form of ownership	Province Wellesley		Island		Total	%
Individual	35	36.2	33	28.7	68	32.1
Company	42	43.3	54	47.0	96	45.3
Others	20	20.6	28	24.3	48	22.6
Total	97	100	115	100	212	100

Table 2.9 Form of ownership of Taxis, 1979
Source: O-D Survey of Taxis

A considerable number of taxis are individually owned 32.1%) out of this 13.7% are operators themselves. This leave a remaining 18.4% of owner who do not operate their own taxis. They have either rented out the taxis to operators or have hired drivers as employees. A large proportion (45.3%) are company owned. This includes a few companies which owns a large fleet of taxis and hire it out to operators on a daily or monthly basis.

In general, the ownership structure is similar for both Province Wellesley and Penang Island. However, there is a slight increase of company owned taxis in Penang Island. This is so because there are a few large companies like the Jade Auto Company which provides a good fleet serving George Town and its suburbs. Taxis on the island in general cater for short distance travel and for such a service formation of companies providing services through phone calls in more popular.

6.2 Period of Ownership

Period (years)	Province Wellesley		Penang Island		Total	
	no.	%	no.	%	no.	%
1 - 4	34	35.1	63	54.9	97	45.8
5 - 9	21	21.6	34	29.6	55	25.9
10 - 15	19	19.6	10	11.5	29	13.7
15 over	23	23.7	8	7.0	31	14.6
Total	97	100	115	100	212	100

Table: 2.10
Period of ownership of taxis, 1979.
Source: O-D Survey of taxis.

54.9% of the taxis in Penang Island are less than 5 years old, compared to 35.1% in Province Wellesley. As for those between 5 and 9 years old, again the percentage in Penang Island is higher than in Province Wellesley. This gives a figure of 85.5% for Penang Island and 56.7% only for Province Wellesley for taxi vehic less than 10 years of age. The number of vehicles older than 15 years is comparatively higher in Province Wellesley. (23.7% against 7%).

The figures thus indicate that the taxis in Penang Island are generally much newer than those in Province Wellesley. The existence of the older taxis in Province Wellesley area is perhaps not so crucial a problem when compared to Penang Island and George Town in particular. The existence of older taxis which have a high tendency for breakdowns would be one reason to reduce efficiency of traffic flow in a busy CBD area. Pollution wise older taxis present a problem too in terms of a higher carbon monoxide emission.

6.3 Type of Operating System

As noted earlier a small percentage (13.7%) of the individual owners operate their own taxis. However the majority are owned by companies or individuals who either rent out the taxis to operators or employ their own taxi drivers. In the former case, a fixed sum is paid by the operator usually on a monthly basis.

The operator then works as his own employer and his earnings depend on the number of trips he makes each day. In the latter case employees are paid a fixed salary and earnings all go to the company. The drivers compared to the former case have much less incentive in terms of personal earnings. However an additional bonus incentive may be given for years when profits are good.

6.4 Number of days of operation

Usage of Vehicle (days/week)	Province Wellesley		Penang Island		Total	
	no.	%	no.	%	no.	%
1 - 2	0	0	0	0	0	0
3 - 4	0	0	1	0.9	1	0.5
5 - 6	10	10.3	6	5.2	16	7.5
7	87	89.7	108	93.9	195	920
Total	97	100	115	100	212	100

Table 2.11
Usage of taxis in days.

The taxis are generally operated on all days of the week. 92% are operated 7 days a week 99% are used five or more days a week.

This indicates that the most vehicles are utilised on all days and the drivers also have a seven-day working week.

7 Socio-Economic Aspects of Taxi Drivers

In order to arrive at a better understanding of the socio-economic aspects of taxi drivers a study was made to obtain the actual earnings of taxi drivers.

7.1 Employment Status

The taxi operators can be divided into 3 types:-

1) owner-drivers
2) drivers who rent their taxis.
3) drivers who are employed by taxi companies.

Owner drivers form only a small proportion of 13.7%. It was not possible to find out the proportion of drivers who rented their taxis but an estimate indicated that it forms the major proportion being about 60%. Drivers who are employed by taxi companies form the remaining part.

7.2 Income

A study was made to estimate the real income of the large portion of taxi drivers, ie. those who are self-employed but rent their taxis.

The average earnings was found to be $34 for a day. The breakdown can be seen in the table below.
The average rental cost of the taxi was $20 per day or $600 per month. However some taxis were charged as high as $26 a day. Older taxis on the other hand are cheaper and are as low as $15 a day. (See table 2.13)

Earnings/day	No.	%
Below - $30	1	3.5
$31 - $35	17	58.6
$36 - $40	7	24.1
$41 - $45	4	13.8
Total	29	100

Mean = $34

Table 2.12

Income per day of taxis operators who rent their taxis, 1979

Source: Additional taxi interview, 1979 by study team.

Rental Fee/day	No	%
$15 - $17	3	10.3
$18 - $20	12	41.4
$21 - $23	13	44.8
$24 - $26	1	3.5
Total	29	100

Mean = $20

Table: 2.13

Rental per day of taxi vehicles rented 1979.

Source: Additional taxi interview, 1979, by study team.

The average distance travelled each day by taxis on Penang Island was estimated to be 123 km. (Based on the average trip length multiplied by the average number of trips).

Operating Cost (Only fuel cost is paid by the drivers.)

Average cost of fuel per km = 4.89 cents. *

∴ Total cost per day for Penang Island = 4.89 x 123 = $6.01 cts.

* Figure calculated by the study team

Real Income

The average real income was obtained by deducting the average rental and operating cost from the average earnings. The average income per month was found to be $224 for taxi drivers in Penang Island.

Average Income for taxi drivers in Penang Island =
Average earning - average rental - average operating cost =
34 - 20 - 6.01 = $7.99 ≈ $8.00
Average income per month = $224

Those who oporate their own taxis will earn slightly higher as they do not have to rent the taxis. It is difficult to estimate their real income but after deducting the capital interest, depreciation cost and other operating and maintenance cost it is found to be about 20% higher than those who rent their taxis.

As for those who are employed their salaries will range from $180 to $250 per month, depending on the taxi company.

8 PROBLEMS

8.1 Problems Faced by Taxi Drivers

As indicated by the survey, only 13.7% of drivers are owners of the vehicles. This low figure is due partly to the lack of finance but this is not the main problem. It is often possible to get a loan from a finance company or to buy a vehicle through hire-purchase. The income of the taxi drivers being on the average of $224 a month would mean some savings possible for a down payment. The more crucial problem lies in getting the taxi license. A brief general interview with some taxi drivers indicated that a few number of them have worked for many years but have failed to obtain any license of their own. The result is that they are forced to rent their vehicles even at fairly high prices. A further problem connected with the high rental is that many taxi drivers are forced to work seven days a week in order to obtain sufficient customers to sustain the high rental rates, leaving a reasonable income for themselves.

On the average the number of trips per day appears to be comparatively small when compared to other metropolitan areas. The few number of trips particularly when the trips are short-distance makes the earnings small. This is perhaps one reason that forces the taxi drivers to charge more than the fare recorded by the taxi meter. Taxi drivers also face the problem of not being able to find customers easily and customers on the other hand have difficulty in getting taxis. This leads to the questioning of the efficiency of the taxi organisation as a whole.

Many taxi drivers feel restricted in their movement particularly in picking up passengers from certain busy shopping areas like Penang Road. As such they are limited to work only at hotels and at the ferry and airport terminals.

8.2 Problem faced by the Users

The problem of the uncertainty of the taxi fare and the lack of trust in taxi drivers has reduced a large number of potential users. The fare is often in reality much higher than the meter record which follows the standard approved rates. It can be as high as twice or three times. To make the problem worse, it seems to be a common agreement among all taxi drivers not to charge the meter rates and this leaves a user with little choice than to pay the sum asked for.

Although the taxi is supposed to provide good dial-a-ride services, it is not utilised fully as the charges for such services are often rather high. Few people thus utilise this service except for some tourists.

Taxis do not seem to operate much in certain areas. This makes it difficult for any intending user living in such areas. The dial-a-ride service is expensive and therefore the user is forced to either wait longer for a taxi or to take other modes of public transport.

The user often faces a problem of diffioulty in getting taxis as the number is insufficiant to serve the population with only 5 taxis to serve 10,000 people. Some areas are almost completely not served by taxis. The areas served are mainly the hotels and ferry and airport terminals.

Many of the problems faced by the user is related to the lack of taxis. The small number of taxis makes it unable to serve the needs of short-distance travel. This type of travel is becoming of increasing importance in metropolitan area like that of the eastern part of Penang Island where there is great dispersal of residential and industrial development.

8.3 Problems In General

Some of the problems faced by the taxi drivers are related to those faced by the users. It can be seen as a 2-way problem. Users do not have faith in the taxi fares and as a result there are few customers and trips each day. The taxi drivers have to increase fares to keep up with the rentals of the taxis or maintenance. This in turn will reduce customers even further. If efficiency of the taxi service is increased, with an increase in the number of taxis, more people will be attracted to its use and the earnings of the taxi operators will increase, resulting in their being able to follow the meter and yet able to keep up with the high rental and maintenance cost.

In general, taxis are not the cause of congestion in the city area because of the few number of taxis. Parking and stopping of taxis are not significant problems unlike other metropolitan areas like Kuala Lumpur. The environmental impact of taxis is also not more outstanding than that of other modes of transport.

9 Conclusion and Recommendations

The taxi has so far been only useful in serving long distance travel and in providing transport between the airport, ferry terminals and hotels. As a means of short-distance travel in the city the trishaw is far more functional. However, with the dispersal of development and the growth in size of the metropolitan areas, the trishaw becomes not feasible and the taxi is expected to play a far more important role that the present.

The operation of taxis can be either through big companies or individual proprietorship. The operation through big companies has the advantage of being more efficient in management and control. Users are thus more assured of a uniform quality of service. However in view of the present structure with the dominance of individual proprietorship it is necessary to consider this type of operation as well. In fact individual proprietorship would be in line with the aims of the New Economic Policy. There would be a more efficient redistribution of income in that the earnings would not go into the hands of the capitalists who will most likely be the ones to own large companies. At the same time, Bumiputra participation can be incorporated.

For private proprietorships to be successful, an agency or co-operative will have to be set up. This agency will be responsible for aiding individual taxi operators in many aspects and make loans whsnever needed. It can be set up along the same line as the NTUC COMFORT taxi co-operative set up in Singapore. This co-operative gives loans to operators to help them own vehicles on an instalment basis. A driver could get a vehicle on his successful application after which he would pay his initial deposit and weekly instalments. These payments would also include repayment of loan, road tax, insurance, administrative costs and even the Employees Provi-

dent Fund contribution. This provides a stable source of income and at the same time gives social security to the taxi operators. With an initial loan from the government a large number of people can be helped and the fleet increased which is one of the main requirements of improving the taxi service to users. At the same time the problem of the rental of licences to others is minimised as there can be stricter control. The agency formed can be a semigovernment body which would give the authorities some control.

The formation of a co-operative would definitely be advantageous to the operators in helping them solve problems of finance and reduce costs of maintenance significantly. The present problem of a high rental will not exist anymore and this will enable the taxi operators to be able to keep to the meter charges and at the same time not have their income reduced.

In conclusion we can say that the main problem that has to be solved is to increase the number of taxis and to improve much stricter rules on the adherence to the meter. More taxi stands should be provided for the convenience of users and some order must be made in picking up passengers without hindering the normal traffic flow. Besides, to increase the number of taxis, taxi operators should be encouraged and helped in owning their own vehicles.

APPENDIX A Sample of Taxi O-D Survey Questionnaire

TAXI INTERVIEW QUESTIONNAIRE

STATE OF PENANG

ZONE NO.

SHEET NO.

(1) OWNER'S NAME:

(2) ADDRESS:

(3) DRIVER'S NAME

(4) ADDRESS:

(5) NUMBER OF OCCUPANTS

(6) DRIVER'S AGE
- ☐ Below 19
- ☐ 20 — 29
- ☐ 30 — 39
- ☐ 40 — 49
- ☐ 50 —

(7) VEHICLE REGISTERED NO.:

(8) USAGE OF VEHICLE PER WEEK
- ☐ 1 — 2 days
- ☐ 3 — 4 days
- ☐ 5 — 6 days
- ☐ all days

(9) REASON FOR NO MOVEMENT:

(10) DATE OF TRIP:

(11) PERIOD OF OWNERSHIP
- ☐ 1 — 4 YRS.
- ☐ 5 — 9 YRS.
- ☐ 10 — 15 YRS.
- ☐ 15 YRS. AND ABOVE

(12) FORM OF OWNERSHIP
- ☐ INDIVIDUAL
- ☐ PRIVATE COMPANY
- ☐ COOPERATIVE

(13) AVERAGE MILEAGE TAKEN PER DAY
- ☐ 10 — 29 MLS
- ☐ 30 — 49 MLS
- ☐ 50 — 69 MLS
- ☐ 70 — 89 MLS
- ☐ 90 — 99 MLS
- ☐ 100 MLS —

(14) NO. OF TRIP MADE PER DAY (AVERAGE)

(15) NAME OF TAXI STATION:

INSTRUCTION:

PLEASE TICK ✓ IN THE APPROPRIATE ☐ GIVEN AND WRITE DOWN NECESSARY INFORMATION AND ALSO INDICATE NOS IN THE APPROPRIATE COLUMN FOR THE REMAINDER QUESTIONS.

TRIP NO.	(16) ORIGIN (Name and Address)	(17) DEPARTURE Time	(18) DESTINATION (Name and Address)	(19) ARRIVAL Time	(20) DROPPING POINTS 1	2	3	4	(21) NO. OF PASSENGERS
1		AM / PM		AM / PM					
2		AM / PM		AM / PM					
3		AM / PM		AM / PM					
4		AM / PM		AM / PM					
5		AM / PM		AM / PM					
6		AM / PM		AM / PM					
7		AM / PM		AM / PM					

PLEASE TURN OVER

Part 3 TRISHAW

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LIST OF TABLES

0. INTRODUCTION

Although the trishaw is fast disappearing in most Malaysian towns, the continued existence in George Town is still pronounced. This could be indicative of the viability of this mode of transport, despite the many disadvantages it faces.

A study of the trishawmen is important for various reasons. Firstly, when found in large numbers as in Penang, it can be a cause of serious traffic problems. Secondly, they may represent a poverty group that needs government aid to upgrade and improve the efficiency of the trishaw which is their means of livelihood. Lastly, they do have a role to play in providing a means of public transport.

An analysis of the socio-economic characteristic and working conditions would lead to a better understanding of the system itself. The problems faced can then be identified and the existing system evaluated asses whether it still serves as an efficient and popular means of transport.

This study is based on statistics and other information obtained from the report, "A socio-economic study of Trishawmen in Pulau Pinang", carried out in December, 1978 by the Socio-Economic Research Unit of the Prime Minister's Department.

1. NUMBER OF TRISHAWS

Based on the 1974 data supplied by the Statistics Department, the total number of licensed trishaws was 11,497 for West Malaysia and 2,491 for Penang. By 1977 this number had been reduced to 2,375. In George Town the number at the end at 1977 was 1,467. In addition it was estimated that about 1,000 trishawmen were operating without any license. This brings the figure to about 2,400.

2. SOCIAL ECONOMIC ASPECTS

2.1 The racial composition embraces all three main races. However, the percentage of Chinese trishawmen is slightly lower than that of the whole population and the percentage of Indian trishawmen is higher.

Table 3.1

Composition of trishawmen and male population by race

RACE	PERCENTAGE OF TRISHAWMEN	PERCENTAGE OF MALE POPULATION
MALAY	32.5	30.1
CHINESE	44.2	55.4
INDIAN	22.7	12.7
OTHERS	0.6	1.8

The Chinese are found in all age groups but the Indians and Malays are mainly in the 31 to 40 age group. There are no Indians or Malays under 20 years of age and no Indians over 60 years.

Table 3.2

Age and Race Structure of Trishawmen

Age \ Race	Malays	Chinese	Indian	Others	Total	%
Less than 20	0	1	0	0	1	0.6
21 - 30	14	16	14	0	44	29.3
31 - 40	18	30	11	1	60	40.0
41 - 50	10	11	8	0	29	19.3
51 - 60	7	3	2	0	12	8.0
More than 60	1	3	0	0	4	2.8
	50	68	35	1	150	100

2.2 Most trishawmen (61%) have to support children below 18 years of age. Out of this, 45% are schooling.

Table 3.3

Household Size of Trishawmen

Household Size	Percentage %
1 - 2	29.9
3 - 4	20.8
5 - 6	27.9
7 - 8	14.9
9 - 10	6.5

The average household size is 4. This is lower than the average size of urban household (5.4). This is because they are many who are not married (27.9%). The number of large households is also significant, 21% with more than 6 members.

2.2 The educational level is low and 12.3% are illiterate. However the younger group are more highly educated. A large proportion does have some form of primary school education (73.4%) but only 34.4% completed it. Those with secondary education are a minority. (12.9%).

This shows that there is a lack of education among many trishawmen. Due to this limited educational level, employment opportunity is obviously limited too.

Table 3.4

Educational Level of Trishawmen

Source: Socio-economic Study of Trishawmen in Pulau Pinang, 1978.

LEVEL	PERCENTAGE
Illiterate	12.3
Primary Education not completed	39
Primary Education completed	34.4
Secondary Education not completed	12.3
Secondary Education completed	0.6
Religious Schools	1.3

2.4 A study of the origin of the trishawmen will help to understand some of the migration forces and the background of the trishawmen.

It can be seen that majority are local people from Penang Island itself. It shows that trishaw peddling originated with the people of the island and has remained largely the monopoly of Penangites. Older ones come from foreign countries, some 30 years ago.

Table 3.5

Place of origin of trishawmen in Penang, 1978

PLACE OF ORIGIN	PERCENTAGE
Penang Island	69.5
Province Wellesley	5.2
Other states of West Malaysia	19.5
Other countries, India, China etc.	5.8

2.5 By far, the most important reason for migration to Penang among the trishawmen was to seek employment or to seek employment with higher income.

Table 3.6

Reasons for migration of trishawmen

Reasons for migration	Percentage
To seek employment	58.1
To increase income	17.6
To follow parents / relative	14.9
Desire to move to new place	8.1
Social conflicts	1.4

2.6 The trishawmen had occupations that varied greatly. The most common was labourers (52.5%) and 62.2% of these were temporary workers. The next common one was hawkers. Generally they were employed formerly only in low skill and low income job.

The present income is higher when compared to the past income Formerly 72% were earning less than $150 but now only 39.6% do so.

Table 3.7

Comparison of Past and Present Income of Trishawmen

Income Group in M$	Past Income		Present Income	
	Percentage	Comulative %	Percentage	Cumulative %
Less than $50	8.3	8.3	0	0
51 - 100	25.6	33.9	8.4	8.4
101 - 150	38.1	72.0	31.2	39.6
151 - 200	16.7	88.7	33.1	72.7
201 - 250	3.0	91.7	18.8	91.5
251 - 300	5.3	97.0	6.5	98.0
More than 300	3.0	100	2.0	100.0

2.7 The present income level as shown in Table 2.7 is still considerably low. Based on the poverty level of $250 per household of five more than 48% are poor. Working members of the family, wife or children do help sometimes to contribute to the income. However most trishawmen have to support children below 18 years of age (61%) and a large proportion of the children are schooling.

Household expenditure depends on the needs. Average households spend about 53.4% on food. Another large item is the children's education. Because of the low income many of them cannot afford to spend any part of their income on other necessities likes health, entertainment etc.

Only 18 respondents out of 154 have any savings. This further indicates the low income level. Reasons for saving are usually for the children's education or to provide security in old age or to purchase a house. In the case of assets only 13.4% have some means of transport and it is mainly bicycles.

3 WORKING CONDITIONS AND RELATED PROBLEMS

3.1 The large majority of the trishawmen work 6-7 days a week irrespective of the time of the year or whether it is during peak, normal or slack times. In peak periods however more than 95% work 6 or 7 days a week. (See Table 3.8)

Table 2.9 shows that the length of waiting period for most of them is between ½ - 1 hour during normal times, 0 - ½ hour during peak times and 1 - 3 hours during slack times.

A significant number (34.4% during normal) have to wait between 1 - 2 hours. The long length of time that these trishawmen have to wait is probably one of the reasons for their low income. They have limited number of trips per day because much time is spent waiting for passengers.

* (please see next page).

Table 3.8

Number of working days by type of week

No. of working days per week	Peak	Normal	Slack
Less than 3	0	0	4
3	0	1	3
4	1	2	3
5	6	7	13
6	28	38	27
7	119	106	102
	154	154	152

Table 3.9

Trishawmen's waiting hours during different times of the day.

Waiting Time/hrs \ Working hours	Day	Night	Day & Night	Total	%
0 - ½	11	0	59	70	45.5
½ - 1	9	0	50	59	38.3
1 - 2	2	0	12	14	9.1
2 - 3	4	0	4	8	5.2
3 - 4	0	0	0	0	0
4 - 5	0	0	0	0	0
5 - 6	0	0	3	3	2
Total	26	0	128	154	100

Note: There is a further lack of customers due to competition from unlicensed trishawmen and other modes of transport.

3.2 The majority (77%) do not own their trishaws. They are rented on a daily or monthly basis. The most important reason is that they are not able to purchase them. This is further strengthened by the fact that majority of them have little or no savings. A trishaw costs $650 to $750 and this represents a small fortune to them. Other reasons include the fair rental rates or the lack of the trishaw license. In addition cost of maintenance is much higher for owner operators. Maintenance cost constitute about 20.1% of their monthly income.

3.3 The most frequently mentioned problems relate to the very low income, difficulty in getting customers and the practice of customers to haggle over fares. The problem of low income is given 1st ranking by 66.3% of them, while the difficulty of getting customers is given 2nd ranking by 47.3%. Other problems mentioned includes the competitions with other forms of public transport and competition with unlicensed tirshaws. There is also some difficulty of finding proper parking stands.

The problems identified shows that there is in general a lack of customers or that there are too many trishaws competing. The difficulty of getting customers is linked with problems of increase in private transport and dispersal of population away from the C.B.D.

Table 3.10

Work related problems of trishawmen

Problems \ Rank	1	2	3	4	Total	
Low Income	75	29	9	0	113	(25.5%)
Difficulty in finding customers	38	53	12	9	112	(25.2%)
High rentals	2	1	1	3	7	(1.6%)
Bargaining with customers	13	23	37	7	80	(18.0%)
Competition with illegal trishaws	3	8	11	10	32	(4.2%)
Competition with other public transport	8	10	16	17	51	(11.5%)
Difficulty to obtain parking stands	6	5	9	18	38	(8.6%)
Cost of maintenance	1	0	2	2	5	(1.1%)
Others	5	1	0	0	6	(1.4%)
Total	151	130	97	66	444	(100%)

3.4 With respect to the level of satisfaction with current income and occupation 48.7% are satisfied, whereas 39.6% and 40.6% are dissatistied with income and occupation respectively. As for future prospects, only 18.1% are satistied. But ommitting the large number who do not know the answer, the percentage of unsatisfied trishawmen is 81.8%. This indicates the insecurity concerning future prospects. Reasons given were varied and partly related to the problem of competition from mini-buses and lack of assistance from the state. Old age was also one fear coupled with the lack of other employment opportunities.

Table 3.11

Level of satisfaction of trishawmen

	Satisfied	Not satisfied	Don't know
Income	48.7%	36.6%	11.7%
Occupation	48.7%	40.6%	11.0%
Future Prospects	18.1%	48.7%	33.1%

3.5 The majority (63%) wishes to change their occupation while 30.5% have no desire to do so, and 6.5% is uncertain. This is probably related to the feelings of insecurity faced by the large proportion of them (81.8%). For these who wanted to change their occupations they preferred business oriented jobs (29.3%), factory jobs (25.8%) and agricultural jobs (12%). Business is most frequently mentioned as the first rank followed by factory jobs. Others mentioned the desire to work as labourers or watchmen. The majority (66%) who wished to change their occupation is between ages 21-40, 34% is between ages 41-60. Irrespective of age, more so for the younger ones, they wanted to improve their socio-economic status. Since the majority is below 40, it would be worthwhile for them to consider alternative jobs that require some training.

Table 3.12

Type and rank of occupation desired by trishawmen

(%)

Occupation \ Rank	1	2	3	4	Total
Business	63.3 32	30.6 32.6	2.0 5.9	4.1 0	29.3
Factory work	58.1 25	34.9 32.0	7.0 17.7	0 28.6	25.8
Agricultural activities	30.0 6.2	25.0 10.9	35.0 41.2	10.0 28.6	12.0
Land scheme	31.3 5.2	25.0 8.7	25.0 23.5	18.8 42.9	9.6
Labourer	68.8 11.3	25 8.7	6.2 5.9	0 0	9.6
Watchmen	71.4 5.2	14.3 2.2	14.3 5.9	0 0	4.2
Others	87.5 14.4	12.5 4.4	0 0	0 0	9.6
Total %	58.1	27.5	10.2	4.2	100

Note: The figures in the table show the composition by columns and rows.

3.6 The majority (57.1%) is not aware of government aids and programmes. These who are aware generally identify it as book loans, low cost-housing, family planning, and welfare assistance. Other facilities like scholarships, land schemes, credit facilities like are not well known.

On the whole, most of the them are not well informed about the details of government aids. A fair number wishes to change their occupation to the agricultural field but yet they are ignorant of schemes like rubber planting.

The aids and programmes in which the majority of those who applied have succeeded are scholarship (66.7%), text-book loan (93.8%) and family planning (86.5%) 1 out of 3 succeeded in obtaining credit facilities for business purposes but only 3 out of 40 for low-cost housing.

Participation in formal organisations is lacking. Only 13.6% are members of the Trishawmen's Association, 10.4% and 6% of any political party members of some clans, majority (72.7%) is not members of any associations. The data indicates that most of them have little or no interest in formally organized political and social activities.

In general there is a lack of information regarding government aids and programmes. This is partly due to the lack of participation in formally organised political and social activities.

4. USER'S VIEWPOINTS OF TRISHAWS

A sample of 110 passengers were interviewed in order to obtain their views on the use of the trishaw. The results were used in analysing the usefulness of the trishaw. However, it must be emphasized that this analysis which is based on the users is not by itself a complete evaluation, as many of the users have used the trishaw as a mode of transport for a long time and thus they may have some prejudiced opinions of banning the trishaws. Furthermore at present, without any other alternative mode of public transport for short-distance travel it is inevitable that many will give their support to the trishaw.

4.1 Majority of the customers (72.9%) are local residents. Foreign visitors form about 21.5% and local Malaysian visitors about 5.6%. Those serving visitors are concentrated in Penang Road and the Jetty terminal.

Table 3.13

Category of customers

Customers	Percentage
Local residents	72.9
Local visitor	5.6
Foreign visitor	21.5

The local residents are made up of the following in order of importance:-

1) Housewives - 17.9%
2) Clerical and sales workers - 11.5%
3) Businessmen - 10.3%
4) Unemployed - 10.3%
5) Professional - 5.1%

4.2 Table 3.14 shows that 51.3% of the local users do not have any form of transportation while 36.3% do not have anyone in their family owning any mode of transportation. Most of those who own transportation own only bicycles (25.6%).

All these indicate that the trishaw are often those who have no private means of transport other than the bicycle. The percentage of those whose family own either a car or a motor-cycle is small.

Table 3.14

Types of transportation owned by local trishaw users

Types	Own		Family		Total %
Car	10.3	27.5	26.3	72.4	18.4
Motor-cycle	10.3	32	21.3	68	15.8
Bicycle	25.6	60.6	16.3	89.4	20.9
Tricycle	2.7	100	0	0	1.3
Nil	51.3	58.0	36.3	42.0	43.7
Total	49.4		50.6		100

Note: The figures in the table show the composition by columns and rows.

4.3 The majority of the local users (60.3%) use the trishaw about 1-4 times a month while a significant number (14.1%) use more than 16 times a month. The percentage of users who use the trishaw more than 9 times a month is 27%. (See Table 3.15)

Many foreign visitors (43.4%) use trishaws either frequently or very frequently. The inference is that the trishaw is a fairly popular mode with the tourists.

Although the frequency of use by local residents is considerably high it should be kept in mind that this is so because the trishaw is popularly used only by certain groups of people. There is a fairly large proportion of people who do not use the trishaw at all (The sample does not consider those who do not use the trishaw at all).

Reasons for not using the trishaw seems be many. For those who live further away, the trishawmen are generally unwilling to serve them or the cost may be too high. There are also other reasons such as young girls and women not wishing to be seen in trishaws alone due to certain social stigmas, leaving only the older women and young children as the major users.

Table 3.15

Frequency of usage of trishaws

Times per month	Percentage %
1 - 4	60.3
5 - 8	12.8
9 - 12	10.3
13 - 16	2.6
More than 16	14.1
	100

4.4 The question of banning the trishaw in Penang was put forward to the users. Majority (80.4%) revealed that they were not in favour of banning trishaws. Majority of local and foreign visitors (80.8% and 87.0% respectively) are not in favour of banning it. Only 10.3% are in favour of banning it. It is significant to note that although a lot of complaints have been made against trishaws, only a small proportion of the users are in favour of banning it.

Table 3.16

User's views towards banning of trishaws

Users \ View towards banning	Yes	No	Don't know	Total %
Local user	6.4 45.5	80.8 73.3	12.8 100	72.9
Local visitor	50 27.3	500 3.5	0 0	5.6
Foreign visitor	13.0 27.3	87.0 23.3	0 0	21.5

Note: The figures in the table show the composition by columns and rows.

4.5 The most frequent reason given in support of banning trishaws is that they are causes of traffic jam (42.1%). Other reason include the unsafe nature (36.8%) and slow speed (21.1 %).

All these who ranked 'cause of more traffic jam' placed it as the most important. (100%). It seems that traffic congestion appears to be the main reason.

Table 3.17

Reasons for banning trishaw by rank

Reasons \ Rank	1	2	3	Total
Causes more jam	100 72.7	0 0	0 0	42.1
Unsafe	42.9 27.3	42.9 60.0	14.3 33.3	36.8
Slow	0 0	50.0 40.0	50.0 66.7	21.1
Total	57.9	26.3	15.8	100

4.6 The reasons given against banning the trishaw were mainly that it was convenient (38.4%) and easier to obtain (33.3%) and the majority of those who gave convenience as the reason ranked highest. Another reason is that it is quickier because trishaws are more easily available. Other reasons mentioned are that it is cheaper (8.5%) and safer (6.2%).

Table 3.18

Reasons for using trishaw by rank

Reasons \ Rank	1	2	3	4	Total %
ore convenient	69.1 56.6	22.1 25.9	7.4 20.0	1.5 9.1	38.4
asier to obtain	42.4 301	49.2 50.0	6.8 16.0	1.7 9.1	33.3
uicker	22.7 60.0	18.2 6.9	45.5 40.0	23.6 27.3	12.4
heaper	33.3 6	40.0 10.3	20.0 12.0	6.7 9.1	8.5
afer	0 0	27.3 5.2	27.3 12.0	45.5 45.5	6.2
thers	50 1.2	50 1.7	0 0	0 0	1.1
otal	46.9	32.8	14.1	6.2	100

Note: The figures given in the table are the composition by columns and rows.

4.7 The statistics indicate that the users are mostly not in favour of banning trishaws in Penang. They are considered convenient means of transport that is easy to obtain. To ban trishaws, a good alternative means will have to be found that is able to provide the same land of service at similar cost.

A survey of non-users would have been useful in determining the amount of support by non-users or infrequent users. Although no formal survey was carried out, some brief interviews indicated that a large proportion of non-users especially motorists are against the use of the trishaw for reasons like causing obstructions on the road and resulting in traffic congestion.

There is also the complaint that trishawmen do not observe the Highway Code and are often seen breaking obvious rules, even to the extent of moving along a traffic lane in the opposing direction.

5. CHARACTERISTIC OF TRISHAW TRIPS

The trishaw is not a motorised vehicle and its travel speed is extremely slow compared to other motorised vehicles. In general it is also slower than a bicycle due to the heavier weight. Travel time is usually between 10 to 20 minutes depending on the distance and the particular roads travelled.

5.2 Travel distance is relatively short and is usually used only within the C.B.D. itself although in some higher density residential areas, trishaws do operate carrying passengers from the house to the bus-stop or market. Estimates indicate that travel distances are usually about 1 mile and do not exceed 2 miles. Travel of about ½ to 3/4 mile is also found especially among the older people who are unable to walk this distance.

5.3 The fares charged vary among different trishawmen and it is a common practice to bargain over the fare. However, bargaining is only limited to local residents. Foreign tourists who do not bargain are often charged much higher. The usual charge for a local resident is about 80 cents for a mile. For foreigners it varies between $1.00 and $1.50.

5.4 Occupancy rate is usually one but two occupants are also common especially for tourists who are not alone. Occasionally it comes up to three, with one adult and two children. The trishaw seat is however too small for three adults. A sample count 37 trishaws carrying passengers indicates that the mean occupany rate is 1.35.

5.5 The average number of trips made per day by each trishaw-men was estimated from the data available as follows:-

Mean income = $163.00

Average number of working days per month = 28

Average income per trip = $1.00

$$\text{Number of trips per day} = \frac{163}{28 \times 1} = 5.82$$

The relative small number of trips is mainly due to the fact that waiting time or time spent looking for customers takes up a large part of the time. If an average waiting time is one hour, it takes about 6 hours waiting for customers. The total trip time takes less than 2 hours, being only about 1/3 of the total working time or less.

5.6 The number of passengers carried can be obtained from the occupancy rate and the average number of trips.

Average number of passengers per day = 1.35 x 5.82

= 7.86

The total number of passengers carried each day is summed up in table 3.19.

Table 3.19

No. of passengers carried per day (end of 1977)

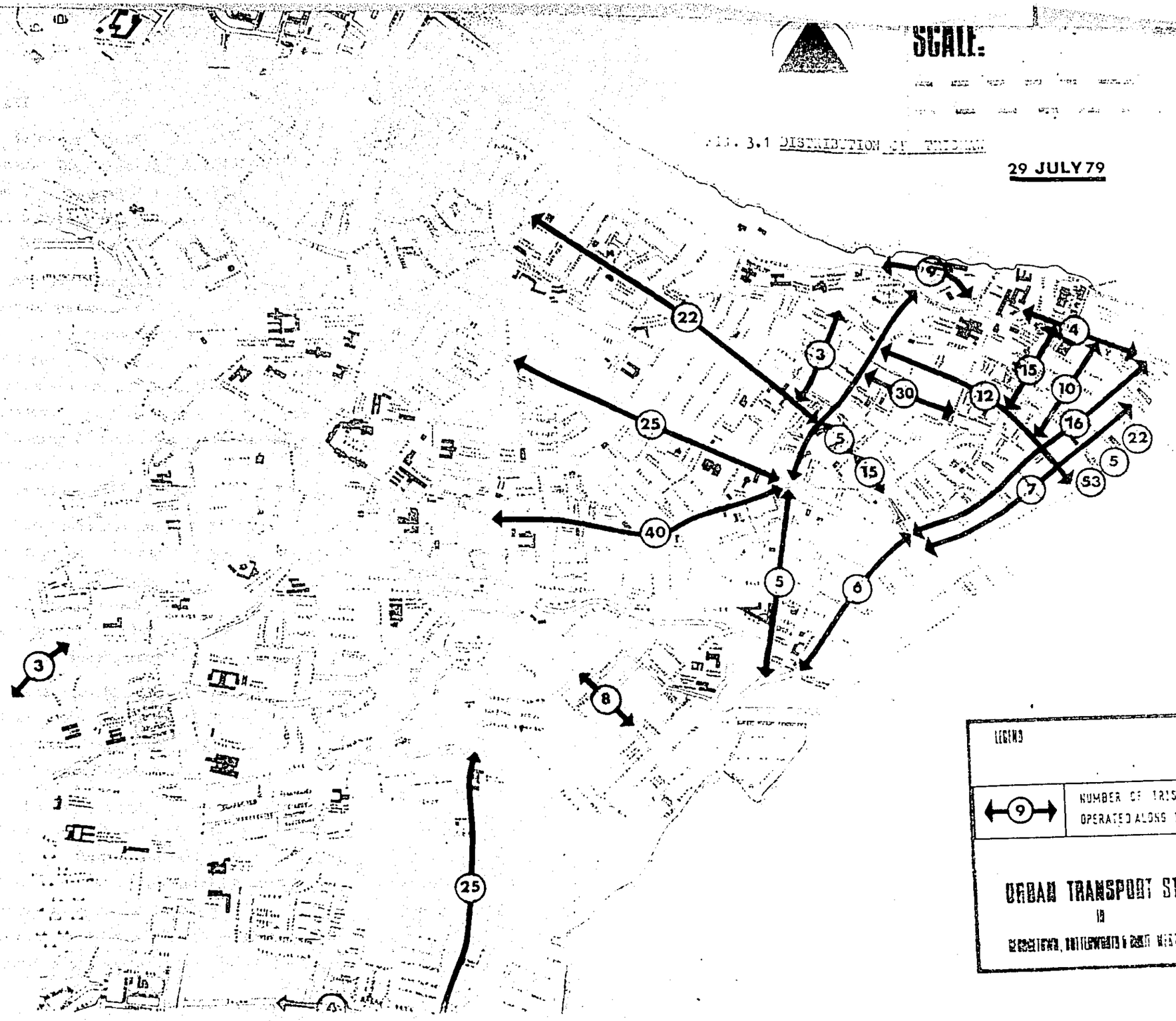
Place	No. of passengers each day
Penang State (licensed trishaw only)	18,670
George Town (licensed trishaw only)	11,530
George Town (licensed and non-licensed)	18,860

5.7 The results of our survey indicates the distribution of trishaws in George Town.

SCALE:

FIG. 3.1 DISTRIBUTION OF TRISHAWS

29 JULY 79



LEGEND

(9) NUMBER OF TRISHAWS OPERATED ALONG THE ROA

URBAN TRANSPORT STUDY

IN

6 SUMMARY

6.1 Majority (80.4%) of users support the continuation of the trishaw. They consider the trishaw as a convenient and easy means of transport for short distances. From the tourist's point of view, the trishaw is one of the attractions of the city and most are also not in favour of banning the trishaw.

Another important issue to be considered is the large number of passengers using the trishaw at present. In George Town itself, together with the non-licensed trishaws, about 19,000 passengers are carried every day. This is a large figure and stresses the importance of the trishaw as a mode of public transport. Any change in public transport policies involving the banning or reduction of trishaws must consider these 19,000 or so users who must be given good alternative modes that provide similar level of service as the trishaw.

6.2 For those who support the banning of trishaw, traffic congestion is generally given as the main reason. The trishaw is not the only reason for traffic congestion on our roads and much of the problems can be attributed also to the other vehicles on the road. To overcome this problem proper control and traffic management schemes must be introduced and enforced.

Some possibilities include the confinement of trishaws to certain areas only with strict parking rules. Special lanes may also be created and pedestrian precincts planned with access of trishaws allowed.

The improvement of the trishaw itself is also important. It is at present a fairly inefficient and primitive means in that it is slow moving and energy consuming (ie. manual energy). Perhaps motorizing the trishaws could improve the efficiency by increasing speed and number of trips possible. This would mean dispersal to a wider area of operation is possible and inevitably all these will lead to a higher income of trishawmen.

6.3 The study of the socio-economic background of the trishawmen shows that in general the trishawmen are of low educational level with little skills. This results in the difficulty of getting alternative employment offering income that is comparative to their present earnings and flexible working hours of their present occupation. The trishawmen have low social status too and a large proportion have taken up the job due to a lack of choice in other types of higher status occupations. The study indicated that 63% of trishawmen would like to change their occupation if given the opportunity of an alternative job. This figure shows their eager willingness to change which has some important implications. It would indicate that any policy to abolish trishaw partially or totally can be done so long as these trishawmen are given good alternative jobs.

One of the main problems faced by the trishawmen is that of insecurity. 81% have indicated the insecurity of the future as one of the main problems. This is related to the fear of loss of customers due to competition from other trishawmen, especially unlicensed ones. But the main competition would be from the taxis and mini-buses. At present, regulations prevent taxis from picking up customers from certain areas like Penang Road in order to protect the interest of the trishawmen. If such rules were removed and more taxis and mini-buses introduced, it is likely that the trishawmen would not be able to cope with the competition and would thereby lose their means of a livelihood.

At present the income of the trishawmen is already low and many have to struggle hard for a living. The introduction of new modes of public transport like the mini-bus will inevitably lower their income further. To leave these trishawmen to find their own means of alternative jobs would lead to much dissatisfaction and social problems as they have low educational level and are unable to find jobs by themselves. Therefore, any changes in policy that will affect the trishawmen should have provisions for the future for those pushed out of their jobs.

Many have indicated the wish to become businessmen. Some aid in the form of credit would be useful here. Others wishing to have factory jobs can be given some kind of training and provided with factory jobs in the new industrial development areas. As for these wishing to participate in agricultural activities they can join land schemes and other agrioultural schemes.

7 PERSPECTIVE

1) At present, now registration of trishaw licenses has been suspended. What policy shall the government take regarding the trishaw services?

In the light of the present economical perspective, the government is expected to continue to promote more industrial development, the following situation is likely to occur in future; one is full employment situation and the other is actual income increase.

With these economical circumstances, it is likely that some trishawmen will leave their jobs in preference for others with better salary. These changes is most likely for the younger trishawmen. Those in the older age group will most probably continue their role as trishaw pedlar. From the urban form and traffio point of view a heavier traffio situation is expected in future. Urban aotivities will expand to the suburbs. On the basis of these, the demand of trishaw will slightly decrease. For example, trishaws are seldom found in Kuala Lumpur. In the capital city, like Bangkok and Manila, tricycle is only seen as a feeder service. Considering the above, even if the present governmental policy is continued the trishaw is expected to decrease more rapidly than before. The team, therefore, supports the present governmental policy.

2) The team however feels that the trishaw should basically be reduced in their number. In order to achieve this polioy more effectively, additional measures should be taken.

a) At present, it is estimated that there exist some illegal trishawmen. These illegal trishaw operation should be terminated.

b) Trishaw traffic should be restricted to travel on limited arterial roads in a certain areas. In such areas some roads should be prohibited from trishaws the whole day, and some should be restricted on hourly basis during the peak hour, from 7 to 9 in the morning and 4.30 to 6.30 in the afternoon.

c) Taxis should be encouraged to serve short distance trips.

Part 4 RAILWAY

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1 Introduction

The Malayan Railway is a metre gauge, single track system of 1035 route miles and 1340 track miles. In the past and until the 1940s the Malayan Railway was the most important means of transport. In recent years however, it has witnessed a steady erosion in its importance. Its use is now mainly limited to long-distance travel only.

The Malayan Railways like other railway systems, is a large scale producer of transport services and presumably possess cost advantages over road transport in the movement of dense flows of passengers and goods over fairly long distances. However, in the small land area of West Malaysia, most passenger movements and commodity flows are essentially shorter-haul in nature and not sufficiently dense. Furthermore, changes in transport technology and in the supply and demand conditions of transport have eroded most of its monopolistic powers.

With the government policies to disperse industries and development, an extensive road network becomes more suited to the needs than railways with limited coverage. For short distance travel, the railway becomes almost impractical.

2 Network

The Malayan Railways provides services for the whole of Peninsular Malaysia. The railway network consists of three main routes:

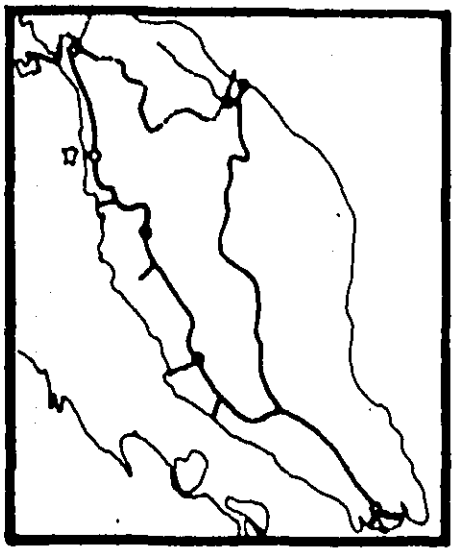
* Padang Besar - the north end - to Kuala Lumpur, via Alor Star, Bukit Mertajam and Ipoh.
* Kuala Lumpur to Johor Bahru, via Seremban.
* Pasir Mas to Gemas, which is connected to the main line.

The total length of the route is 1,643.62 km. (1,021.3 miles).

In Penang state there are 8 stations Butterworth, Bukit Tengah, Bukit Mertajam, Simpang Ampat, Nibong Tebal, Penanti, Tasek Glugor and Pinang Tunggal as illustrated in the figure.

FIG. 4.1

RAILWAY ROUTE MAP IN PENANG STATE



Pinang Tunggal

Tasek Gelugor

George Town

Penang Hill Railway

Penanti

Butterworth

Bukit Tengah

Bukit Mertajam

Simpang Ampat

Nibong Tebal

3 Service Frequency

During normal periods of the year, there are four services for passengers, two during the day and the other two during the night. This includes one express service, known as the Express Rakyat.

The frequency for all types of trains is shown in Table 4.2. The frequency is relatively low when compared to its facility grade. This low frequency of service makes the railway not suitable as a means of short-distance travel.

Table 4.1 Time-table

BUTTERWORTH - KUALA LUMPUR - BUTTERWORTH											
0830	0900	1315	2025	2200	b.	Butterworth	t.	1644	2107	2120	0505	0641
-	0917	1331	2042	2217	t.	B. Mertajam	t.	1624	2049	-	0440	0608
0955	1044	1454	2237	2356	t.	Taiping	t.	1457	1924	1950	0252	0431
-	1131	1545	2327	0046	t.	K. Kangsar	t.	1412	1840	-	0203	0341
1122	1233	1643	0030	0150	t.	Ipoh	b.	1314	1740	1823	0050	0235
1131	1243	1648	0045	0220	b.	Ipoh	t.	1304	1734	1814	0025	0213
-	1259	1704	0104	0239	t.	Batu Gajah	t.	1236	1715	-	0006	0154
1208	1327	1729	0148	0309	t.	Kampar	t.	1206	1648	1736	2337	0123
1222	1343	1755	0207	0330	t.	T. Road	t.	1148	1629	1720	2314	0101
-	1500	1907	0329	0451	t.	T. Malim	t.	1035	1516	-	2155	2342
1452	1654	2102	0520	0641	t.	Kuala Lumpur	b.	0900	1320	1500	2010	2200

* Ahad sahaja/Sunday only

Sabtu sahaja/Saturday only

TABLE 4.2

MALAYAN RAILWAY - TRAIN DENSITY ON THE MALAYAN RAILWAY SYSTEM

1974 AND 1975

	Passenger Trains				Mixed Trains				Goods - Train				Total				Daily Total Both ways		Average Daily Tonnage in goods trains
	DN of Trains		AN of Unit per day		AN of Trains		AN of Units per day		DN of Trains		AN of Units per day		DN of Trains		AN of Units per day		Daily No. of Trains	Average No. of Units per day	
	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB			
PADANG BESAR-B'WORTH:																			
P. Besar-A. Star	2	2	36	36	1	1	20	21	2	2	63	67	5	5	119	124	10	243	2,328
A. Star-Penanti	2	2	36	36	1	1	20	21	2	2	63	69	5	5	119	126	10	243	2,469
Penanti-B'worth	2	2	36	36	1	1	20	21	2	2	70	67	5	5	126	124	10	250	2,360
BUTTERWORTH-K. LUMPUR:																			
B'worth -Prai	3	3	119	121	-	-	-	-	-	-	-	-	3	3	119	121	6	240	-
Prai-S. Ampat	3	3	119	121	-	-	-	-	3	3	129	154	6	6	248	275	12	523	1,184
S. Ampat-Sg. Siput ..	3	3	119	121	-	-	-	-	8	8	129	154	6	6	248	275	12	523	1,184
Sg. Siput-Ipoh	3	3	119	121	-	-	-	-	8	8	282	300	11	11	401	421	22	822	750
Ipoh-Sungkai	3	3	119	121	-	-	-	-	9	9	346	316	12	11	465	437	23	902	887
Sungkai-Serendah	3	3	119	121	-	-	-	-	7	6	312	284	10	9	431	405	19	836	1,106
Serendah-K. Lumpur ..	3	3	119	121	-	-	-	-	8	7	340	310	11	10	459	431	21	890	1,012

Source: Year Book of Transport Statistics.

4 Passenger Traffic

4.1 Total Passengers

The trend of the volume of passengers making use of the railway services in recent ten years is shown in the table below.

The most notioeable feature is the overwhelming importance of third olass travel. (92% in 1967 and 87% in 1975). This shows that the railway service is significant to the middle and low income group. On the passenger-mile measure that of the third class is significantly less about 75% only). This is explained by the fact that the third olass journey is relatively a shorter trip.

But the average third class trip length is increasing quite rapidly which seems to indicate the railways is gradually pushed out of the short-haul market altogether.

The total passenger volume from 1969 to 1975 (except 1971) has shown a steady increase of 2 to 10% per annum while the passenger mileage an even higher rate of 11.9%

Table 4.3
Passengers by Railway
1967 - 1975, Malayan Railways

	Number of Passengers (thousand)				Passenger Miles (million)			
	Class I	II	III	Total	Class I	II	III	Total
1967	46	348	4,916	5,310	11.5	72.1	263.0	346.6
1968	42	340	4,993	5,375	9.8	70.4	268.6	348.8
1969	40	309	4,753	5,102	9.2	62.3	262.3	333.7
1970	41	369	4,765	5,175	10.2	74.2	300.9	385.3
1971	38	402	4,561	5,001	9.0	81.5	311.4	401.9
1972	42	476	4,975	5,493	9.7	93.9	349.6	451.5
1973	42	545	5,081	5,668	9.5	106.2	380.0	495.6
1974	50	632	5,066	5,967	11.8	134.5	441.1	586.9
1975	55	727	5,288	6,070	na.	na.	na.	na.

Source : Year Book of Transport Statistics.

4.2 Passengers at each station

With regard to the total number of passengers boarding and alighting each station in Penang, only the data from Butterworth and Bukit Mertajam stations are obtained as shown in the tables.

It can be seen that 1978 shows a significant increase in the number of passengers alighting from trains at Butterworth. This indicates that there is an increase in the use of the service for people in the study area (about 50% increase for total trips).

Table 4.4

NUMBER OF PASSENGERS BOARDING TRAINS AND ALIGHTING FROM TRAINS 1970 - 1978.

STATION: BUTTERWORTH

YEAR	BOARDING	ALIGHTING	TOTAL
1970	260,308	195,840	456,148
1971	291,042	200,612	491,654
1972	313,391	216,047	529,438
1973	322,161	248,263	570,424
1974	338,030	325,654	663,684
1975	347,771	253,692	601,463
1976	299,268	290,124	508,392
1977	338,219	190,451	528,670
1978	343,194	851,175	1,194,369

STATION: BUKIT MERTAJAM

YEAR	BOARDING	ALIGHTING	TOTAL
1970	101,309	113,547	214,856
1971	97,186	109,210	206,396
1972	100,808	101,396	202,204
1973	99,259	72,872	171,131
1974	72,133	47,361	119,494
1975	59,355	47,808	107,163
1976	59,875	37,621	97,496
1977	55,800	36,609	92,409
1978	54,490	26,903	81,393

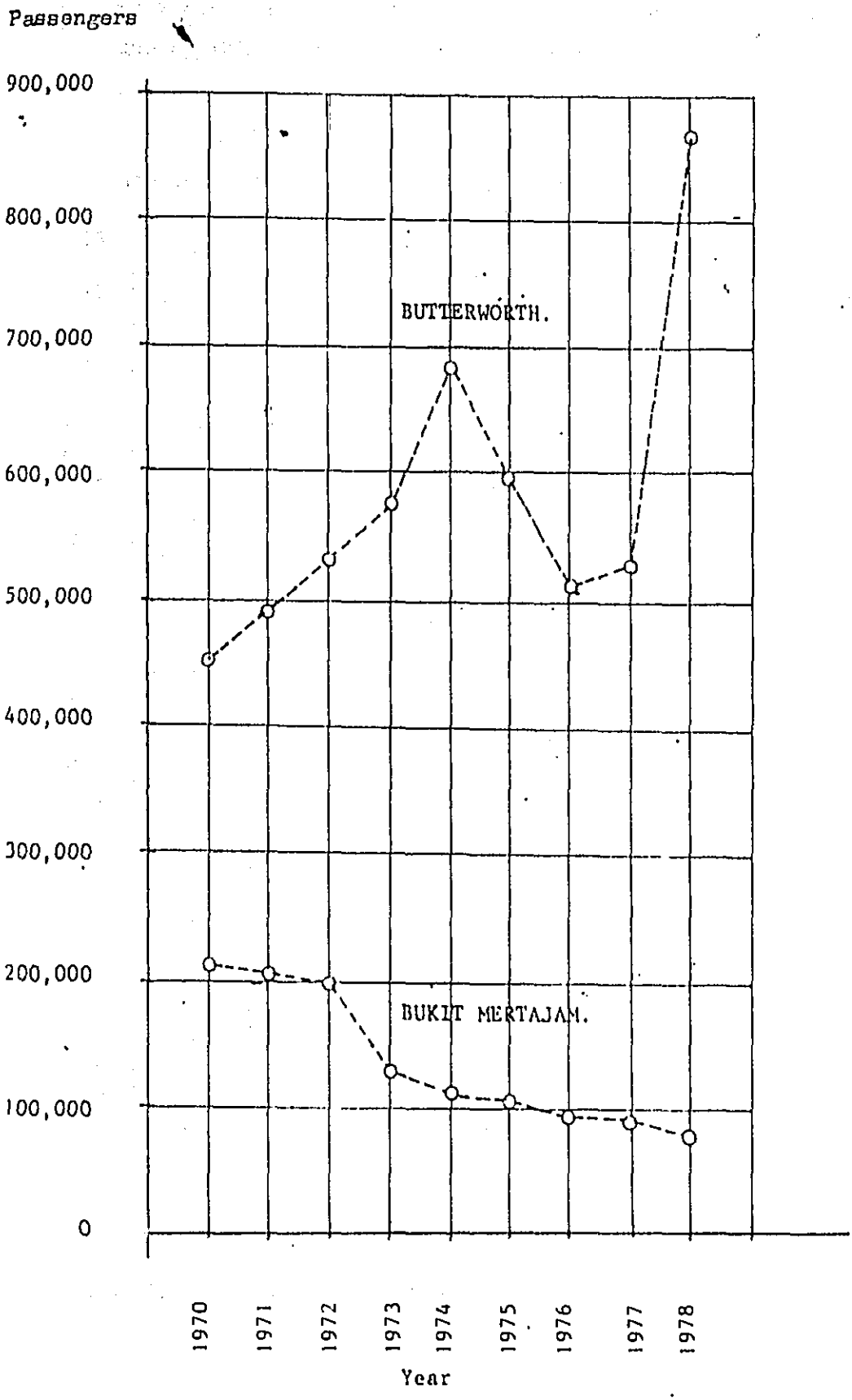


Fig. 4.2 Number of Passengers (Yearly)

4.3 Monthly variation of passenger volume

The monthly variation of railway passengers shows a distinct peak over the end of the year. This is due to the long school holidays during this period and also to the attractions of Penang Island at this time of the year.

Two other small peaks occour in February due to the Chinese New Year and April due to the school term holiday.

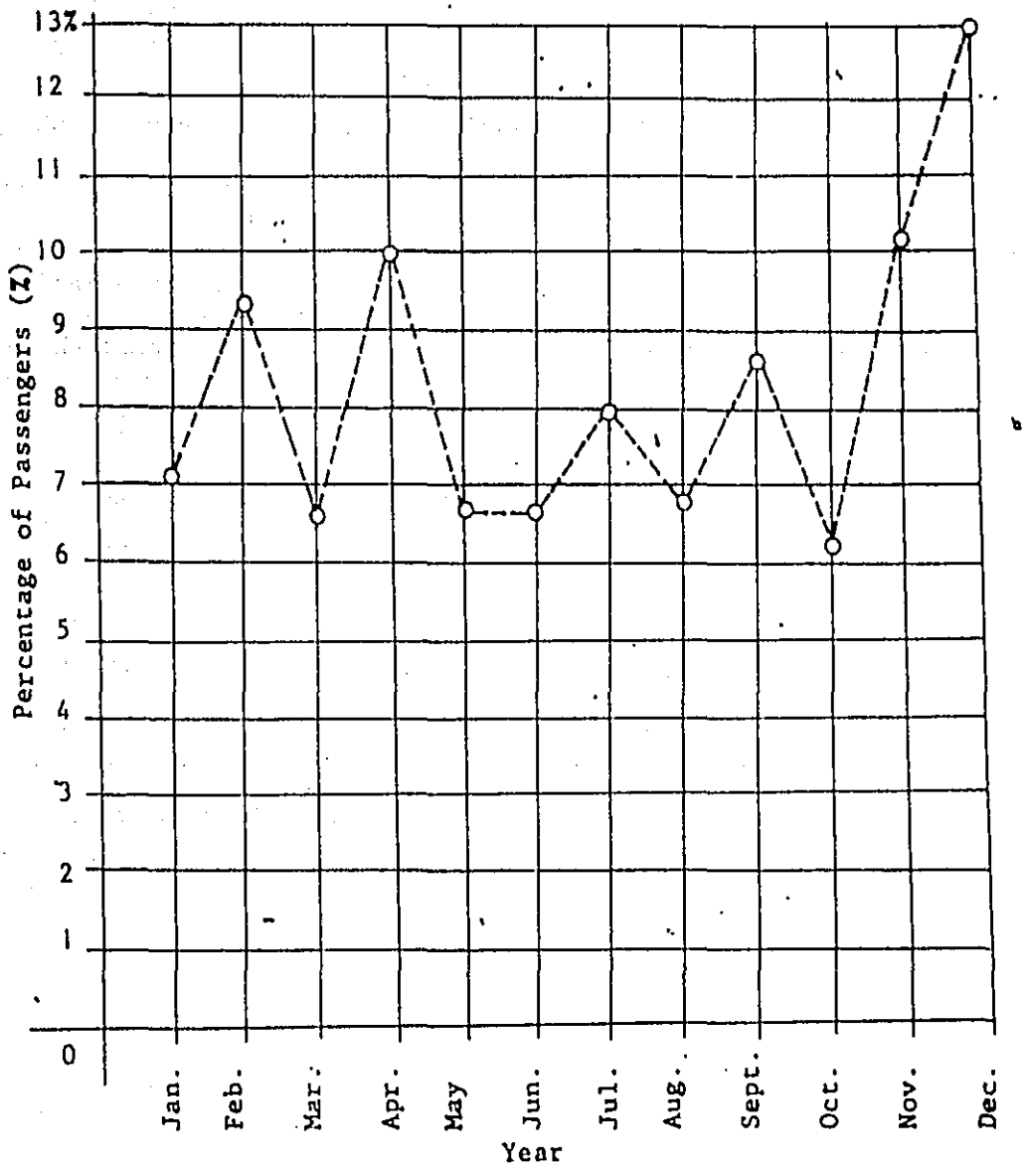


Fig. 4.3 : Monthly Variation of Passengers (1978) at Butterworth.

4.4 Short distance trips

As far short distance trips between Butterworth and Bukit Mertajam, the number of passengers per day is very small, being only 34 in 1977 and 23 in 1978.

This emphasises the point mentioned earlier that the railway is unimportant as a means of short-distance travel.

Table 4.5

No. of passengers between B'worth and B. Mertajam.

	1977			1978		
	Butterworth to B. Mertajam	B.M. to B'worth	total	Butterworth to B. Mertajam	B.M. to B'worth	total
Class I	2	-	2	5	-	5
Class II	726	127	853	762	20	782
Class III	7,899	3,730	11,629	5,697	1,997	7,694
Total	8,627 (24)	3,857 (11)	12,484 (34)	6,464 (18)	2,017 (6)	8,841 (23)

Source : Malayan Railways

( ) Indicates No. per day

5

Freight Traffic

The Malayan Railway plays a significantly important role for freight transport. The total tonnage of commodities carried in the past years has been almost constant within the range of 3,000 to 4,000 thousand tons a year.

Freight traffic comprise of hundreds of commodities but mineral ores and food make up over 50% of the total tonnage. (refer Table 4.6) The total commodity tonnage handled by Penang stations make up approximately 20% of that in the whole of West Malaysia.

Data regarding the containers forwarded from the Butterworth container yard as in Table 4.9 shows a steady increase from 1974 onwards. The main destination of these containers is Ipoh.

Freight transport is in general only important for longer distances. For short distances, it is usually more convenient to use the road which provides a direct link between origins and destinations. Although in the past most industries grew up near the railway line, due to dispersal programmes this no longer holds.

Table 4.6

MALAYAN RAILWAY - FREIGHT TRAFFIC BY COMMODITY

TONS (thousand)

	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Total	3,387	3,694	3,621	3,688	3,633	3,328	3,454	3,416	3,250	3,417
Machinery								40	72	34
Beer and Cigarettes								92	100	95
Building Materials								175	202	84
Chemicals								229	218	162
Empties								30	34	45
Food								208	201	209
Household Equipment								20	18	19
Military Stores								11	13	14
Rice, Bran and Paddy								141	136	76
Total General Merchandise								946	994	738
Petroleum and Mineral Oils								626	667	668
Cement and Clinker								661	624	1,140
Other Oils (Vegetable and Animal)								60	56	68
Timber and Logs								467	334	309
Livestock								1	1	1
Tin and Tin Ore								62	62	55
Rubber and Latex								244	198	217
Iron Ore								191	183	120
Other Ores								121	105	82
Other Commodities								35	26	19

Table 4.7

COMMODITIES BY RAILWAY IN PENANG*

1976 - 1978, Malayan Railway

	Forwarded from Penang	Received at Penang	Total
1976	214,275	303,079	517,354
1977	260,358	395,174	655,532 (27%)
1978	304,464	443,690	748,154 (14%)
Commodities (1987)			
Machinery	2,217	1,523	3,740
Beer & Tobacco	41	17,462	17,503
Building Materials	65,031	1,974	67,005
Chemical	2,073	28,348	30,421
Empties	9,628	2,577	12,205
Food	87,606	116,431	204,037
Household	12,400	13,884	26,284
Military Store	20	1,121	1,141
Petrol	63,780	3,291	67,071
Other Oils	417	2,212	2,629
Rice & Padi	55,016	-	55,016
Timber	-	12,556	12,556
Cement & Clinker	39	36,076	36,115
Live stock	-	28	28
Tin & Tin Ore	1,456	53,695	55,151
Rubber	4,547	11,553	161,000
Latex	183	-	183
Iron Ore	-	26,550	26,550
Other Ores	-	112,607	112,607
Other Commodities	10	1,802	1,812
Total	304,464	443,690	748,154

* Penang, Butterworth, Prai Goods, B. Tengah & Bukit Mertajam.

Source: Data from head quarters of Malayan Railways.

Table 4.8

Tonnage of Cargo Handled at Each Station

1970 - 1978, Butterworth, Prai and Bukit Mertajam

	Butterworth		Prai		Bukit Mertajam	
	Forwarded	Received	Forwardod	Received	Forwarded	Received
70	30,294	76,331	134,146	198,789	5,563	2,082
71	19,933	55,064	111,671	193,494	3,906	1,772
72	23,945	61,210	145,303	190,876	4,032	1,871
73	46,986	89,653	158,512	194,192	5,409	1,824
74	78,482	72,493	164,941	143,228	5,461	1,776
75	48,310	64,806	149,672	136,325	2,249	1,107
76	55,164	85,577	151,854	127,505	1,695	2,087
77	71,367	121,139	180,970	176,568	2,560	12,578
78	82,715	152,609	213,870	173,248	2,029	33,029

Source : Malayan Railways

Table 4.9

No. of Containers forwarded from Penang Port.

	Loading	Empty	Total
1974	35	99	134
1975	344	15	359
1976	739	116	855
1977	545	300	845
1978	896	556	1,452
1979*	780	134	914

* from Jan. to Jun.

Source : Malayan Railways

6 Pricing of Railway Services

The framework for pricing is found in the Tariff Book where freight rates per ton-mile and passenger-mile charges are set out.

The actual passenger rates strictly adhere to the rates in the Tariff Book but with respect to freight traffic, a large percentage is charged at 'special rates'.

The revenue for passengers traffic collected from Penang is shown in Table 4.10 .

In 1978, average fare is $44 for Class I, $21 for class II and $12 for class III.

The fare system of Malayan Railways depends on the distance travelled by each class, and the average trip length is relatively long approximately 370 Kms. (230 miles)

Table 4.10
No. of Passengers and Revenue from Penang
(Penang, B'worth, B. Tengah, B. Mertajam)

	1976		1977		1978	
	No. 1,000	$	No. 1,000	$	No. 1,000	$
lass I	8,150	434	6,665	351	7,126	314
lass II	91,590	1,943	98,730	2,015	116,058	2,418
lass III	275,364	2,678	299,029	3,558	271,831	3,219

Source : Malayan Railways

A study of the financial aspect of the Malayan Railways shows that the costs of haulage have increased markedly in the recent years and with no increase in the fare, financial losses are incurred.

This aspect has important implications on the future of the railway. Whenever possible the services should be provided only if the direct cost can be collected, except where on social grounds, subsidy is justified.

Table 4.11

Cost-Price Comparison for Passenger Traffic

(¢)

Year	Direct Cost Per Passenger-Mile	Total Cost Per Passenger-Mile	Fare Per Passenger-Mile		
			1st Class	2nd Class	3rd Class
1965	2.8	5.4	14.7	7.1	4.7
1968	2.9	5.7	14.7	7.1	4.7
1971	3.3	6.7	14.7	7.1	4.7
1974	3.9	7.6	14.7	7.1	4.7

Table 4.12

Cost-Price Comparison for Freight Traffic

(¢)

	1965	1968	1971	1974
Direct Cost Per Ton-Mile	3.8	4.0	4.7	5.3
Total Cost Per Ton-Mile	7.3	7.7	9.0	10.3
Revenue Per Ton-Mile				
- All Freight	6.5	5.5	5.4	6.8
- Bulk Freight	4.8	4.7	4.7	4.6
- Non-Bulk Freight	9.3	7.3	7.3	10.9

Sources:
1. General Transport Survey, 1968, Annex C, Chapter XV, pp. C195-C213 and Table C-XV.5.
2. Malayan Railways, Annual Reports, 1965 and 1968.
3. Year Book of Transport Statistics, 1973.

Note: Cost figures have been adjusted for differences in cost of production between 1966 and the other years.

Part 5 BAS KILANG

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1. Introduction

'Bas Kilang' is the Malay equivalent for 'Factory Bus'.

Two types of factory bus surveys were carried out.

1. Factory bus company survey
2. Factory survey

The aim of the first survey is to collect information on the characteristic of factory bus operation and movements. The random sample is taken from the registration cards at RIMV. The sample rate is 26% in the Study Area.

In the second type of survey, interview of factories which has been providing factory bus services to their employees was carried out. This survey aimed at understanding the reason for the use of the factory bus, especially from the management's point of view. About 20 samples were selected from the main factories in Bayan Lepas and Prai industrial estate.

Bas Kilang services became popular in Penang following the growth of industries in the area. With the large concentration of factory workers, factory bus services were introduced to solve the transport problems of workers to and from work.

Unlike the ordinary bus services which cater for the general public, providing regular services throughout the day, the factory buses are solely to cater for the workers from the specific factories and operate during the specific hour, hence they are able to provide more efficient services to the workers.

The reasons why factory buses are introduced seems to be as follows:-

* Industrial estates are usually located at newly developed area away from the town, where ordinary bus service are not very adequate in terms of coverage.
  Another very important reason for using bas kilang is that the demand for transport occurs at certain peak hours and the demand occurs at too large a quantity beyond the capacity of the existing ordinary public bus services to handle.
* Besides, from the view point of the employers, the transport service is important not only as a guarantee of manpower but also as one of the factory's welfare measures for the employees.

2. Survey

This survey consists of the interviewing of factory bus companies and factories. The aim of the factory bus company interview is to collect information on the characteristics of factory bus operations and movements. The random sample is taken from the registration cards at RIMV. The sample rate is 26% in the study area, that means 83 subjects were collected.

The factory interview was carried out at factories which have been using factory buses for their employees. This survey aimed at understanding the reason for the use of the factory bus, especially from the management's point of view. About 20 samples were selected from the main factories in Bayan Lepas and the Prai Industrial Estate.

These results obtained are described in the Appendix and the main results are summarized in the following sections.

3. Existing Condition

3.1 Number of Buses

The following figure illustrates the past trend of bas kilang operated on the basis of 'factory manager interview survey' conducted by the team.

The data of the 16 factories survey shows that there is only one bas kilang in 1971. However, the number of bas kilang is over 160 buses in 1975 and over 320 buses in 1979. The annual growth rate of bas kilang during 1975-9179 is approximately 19%.

Fig. 5.1
Trend of Bus Kilang in Operation

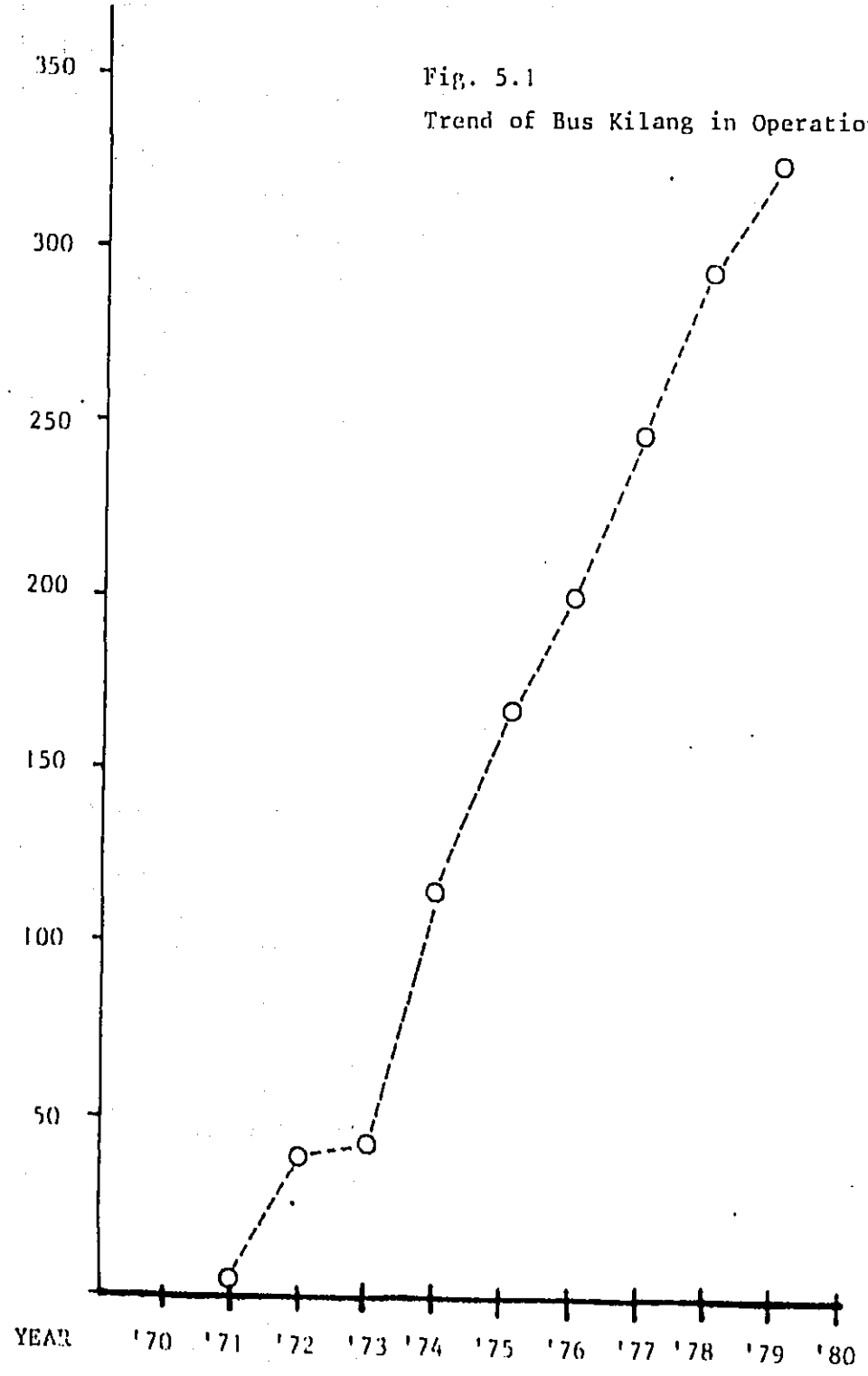


Table 5.1

Total Registered Bas Kilang and Passengers in Penang

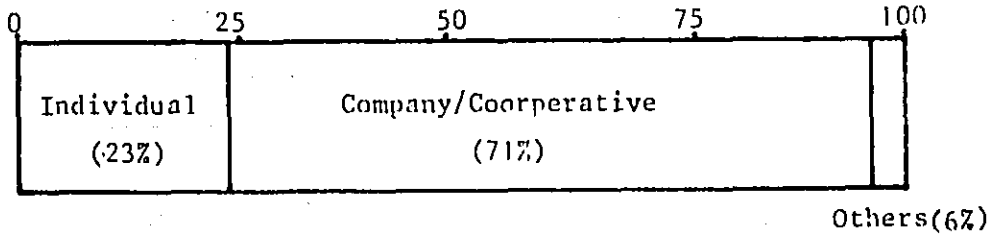
	Total Registered Passengers	Total Registered Bus	Average Passengers Per Bus
Penang Island	5,706	201	28
Province Wellesley	3,977	122	32
Total	9,683	323	30

3.2 Organization

The existing bas kilang services are all private enterprises. Unlike the bus companies, which are operated by a few large bus companies, the bas kilang services are operated by numerous small private bas kilang companies. There are a total of 323 registered factory buses in Penang, of which 201 are registered in Penang Island and 122 in Province Wellesley, and of which 23% of the operators are individual owners, 71% are partnership or companies.

Fig. 5.2

Type of Ownership



These operations are under control of RIMV and number of vehicles & passengers should be registered to the authority.

3.3 Charter System

Bas kilang companies usually operates on contract system with the factory management either on a yearly or monthly basis. Different charter rates are levied on different routes depending on the trip distance. The operating cost of bas kilang such as driver's wages, fuel, maintenance cost and road tax, insurance etc. are covered under the agreed charter rate.

Bas kilang charter routes are usually planned by the factory authority according to the worker's place of stay. On each round trip, the bas kilang is identified by the factory name and it only picks up passengers to and from that particular factory. There is no merging of workers from different factories in each trip.

Unlike the ordinary bus which allows certain number of standing passengers, no standing passengers are allowed in the factory bus. Secondly, since the bus routes ara planned according to the worker's place of stay, it is able to provide direct service to every passenger and thus the service level for the passenger is considerably high.

The charter rate for bas kilang services varies according to the distance of the trip. The rates also varies slightly from one operator to another. The rate for a to and fro trip from Bayan Lepas factory to George Town is around 25 dollars.

The transport cost for each worker ranges from $11.30¢ per worker per month to $72.00 per worker per month. The average cost per worker is about $19.50¢ per person in Penang Island and $26.00 in Province Wellesley. This rate is still comparatively cheaper than the bus fare by ordinary bus.

3.4 Utilisation of Bas Kilang

Type of Vehicles

The bas kilang vehicles consist of a 43-47 seater van or a 30 or below seater usually referred to as the mini bus.

According to the RIMV registration, Province Wellesley has a larger number of large buses while majority of the buses in Penang are the smaller 30 seaters.

Age of Vehicles

Although the actual age of vehicles are not known, from observation and the period of ownership, most bas kilang are relatively new. The period of ownership is mostly between 3 to 4 years.

Usage of Vehicles

In general bas kilang are intensively utilised, 65% of the buses are used everyday and 35% are used 6 days in a week. On the whole Penang Island has a higher rate of utilisation than Province Wellesley. 78% of the vehicles in Penang Island are utilised everyday compared to 62% in Privince Wellesley.

Bas Kilang Users

Most of the bas kilang users are production operators as they constitute the largest number of employees in a factory. They are the low income wage earners getting a salary of about 150 dollars a month- thus most of them cannot afford to own any transport.

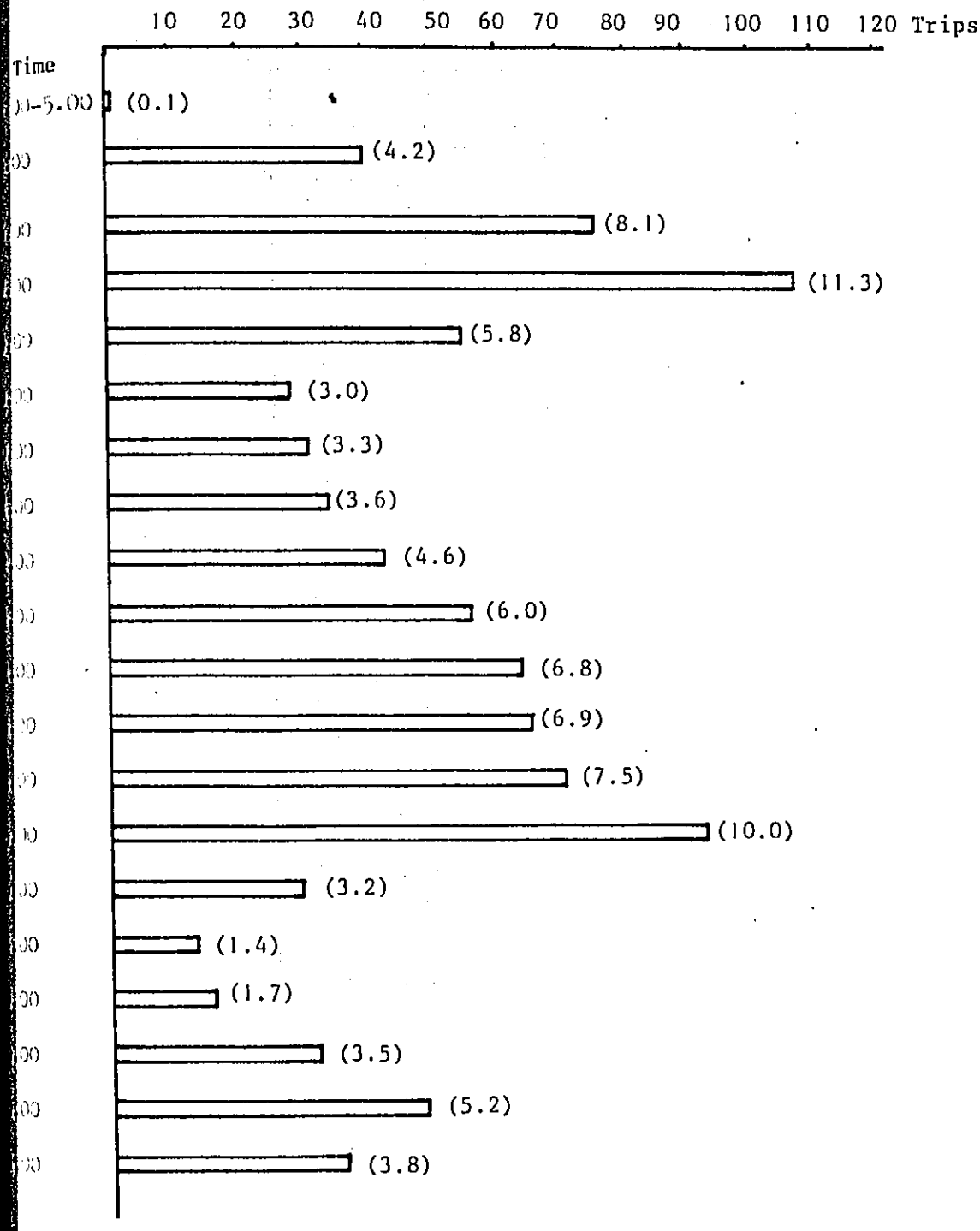
The factories usually either provide transport service free of charge to the workers or they subsidise on the cost of operation and only charge the workers partially, normally about 5 to 10 dollars a month. Although most of the bas kilang users are the production workers, most of the factories actually open the service to all categories of staff.

3.5 Trip Characteristic

Time of Operation

Bas kilang operates according to factory shift hour. Factories normally have work shift ranging from one shift to four shifts. The usual shift hours are 6.30 am. - 3 pm. ; 8.30 am. - 5.00 pm.: 3 pm. - 11.00 pm. and 11 pm. - 7 am. The daily bas kilang trips usually start around 6.00 am. and the last trip is made around 11pm. The usual peak hour for bas kilang are 6 am. - 8.00 am., 2 pm. - 4 pm. and 4 pm. 6 pm. The highest trip frequency occurs between 7.00 am. - 8.00 am. and 5 pm. - 6 pm. (as shown in the following figure and table).

Fig. 5.3 Hourly Fluctuations in Trip Generation



Note: Figures in parentheses indicates percentage.

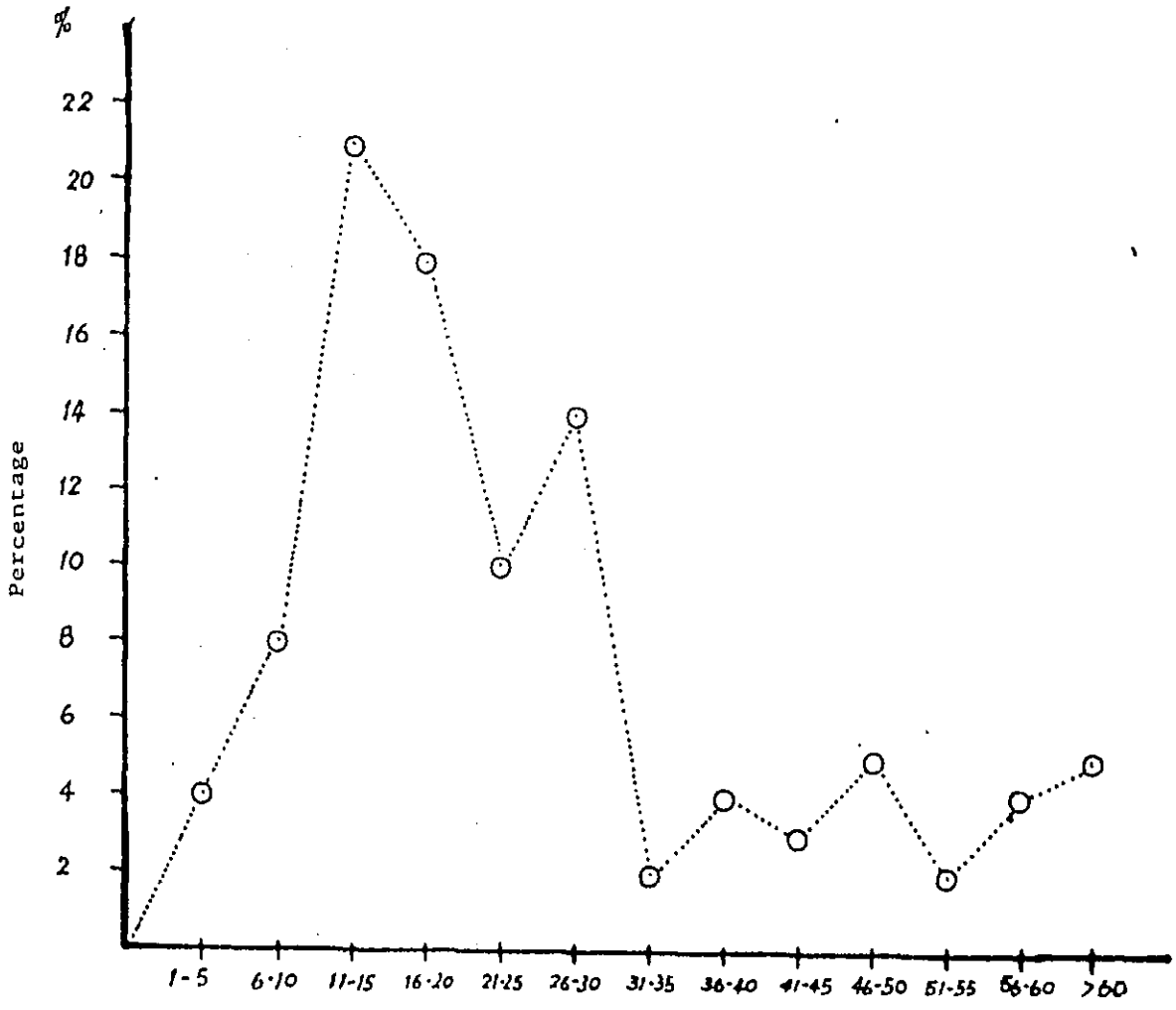
Trip Length

Trip duration is the time taken for a complete trip, from origin to destination, most trips take about 10 minutes to 30 minutes. The average trip duration is 26 minutes.

Table 5.2 Trip Time

Trip - time	Trip	%
A) 0 Mins.	0	0
B) 1 - 5	38	4
C) 6 - 10	71	8
D) 11 - 15	200	21
E) 16 - 20	165	18
F) 21 - 25	93	10
G) 26 - 30	136	14
H) 31 - 35	23	2
I) 36 - 40	34	4
J) 41 - 45	28	3
K) 46 - 50	48	5
L) 51 - 55	18	2
M) 56 - 60	37	4
N) 60 over	47	5
Total	938	(100)

Fig. 5.4 Trip Length (time)



The above represents the time taken for one complete one way trip either from the starting point of the journey to the factory or from waiting point at the factory to the last point along the route. The 1-5 minutes trip duration is accounted by the commuting trip made by bus driver, e.g. from his home to the factory or from factory to his home.

Passengers per Trip

Bas kilang carry 41 to 45 passengers per trip, but almost equal number of times, the bus is empty. This is due to the number of trips made when the driver is returning home. The average number of passengers per trip is 25.

According to the 1979 O-D survey, the number of passengers transported by bas kilang are 65 thousand workers per day.

Table 5.3 Number of Passengers

No. of Passengers	Trip made	%
A) 0	231	(24)
B) 1 - 5	74	(8)
C) 6 - 10	93	(10)
D) 11 - 15	53	(6)
E) 16 - 20	65	(7)
F) 21 - 25	35	(4)
G) 26 - 30	76	(8)
H) 31 - 35	24	(2)
I) 36 - 40	30	(3)
J) 41 - 45	246	(24)
K) 46 - 50	14	(2)
L) 50 over	0	(0)
Total	941	(100)

Number of Trips and Trip Distance

The number of trips made by an average bas kilang driver is about 10 trips a day, and the average mileage travel by a driver per day is more than 50 miles. In general factory buses in Province Wellesley travel a longer distance than those in Penang Island due to the dispersed nature of settlement.

Table 5.4 Average Mileage per Day

(No. of Buses)

Mileage	Penang Island		Province Wellesley		Total	
A) 0 - 9	0	(0)	0	(0)	0	(0)
B) 10 - 19	1	(55)	1	(1)	2	(2)
C) 20 - 29	2	(11)	7	(11)	9	(11)
D) 30 - 39	1	(55)	3	(5)	4	(5)
E) 40 - 49	2	(11)	2	(3)	4	(5)
F) 50 over	12	(67)	52	(80)	64	(77)
Total	18	(100)	65	(100)	83	(100)

Table 5.5 Number of Trips Made per Day

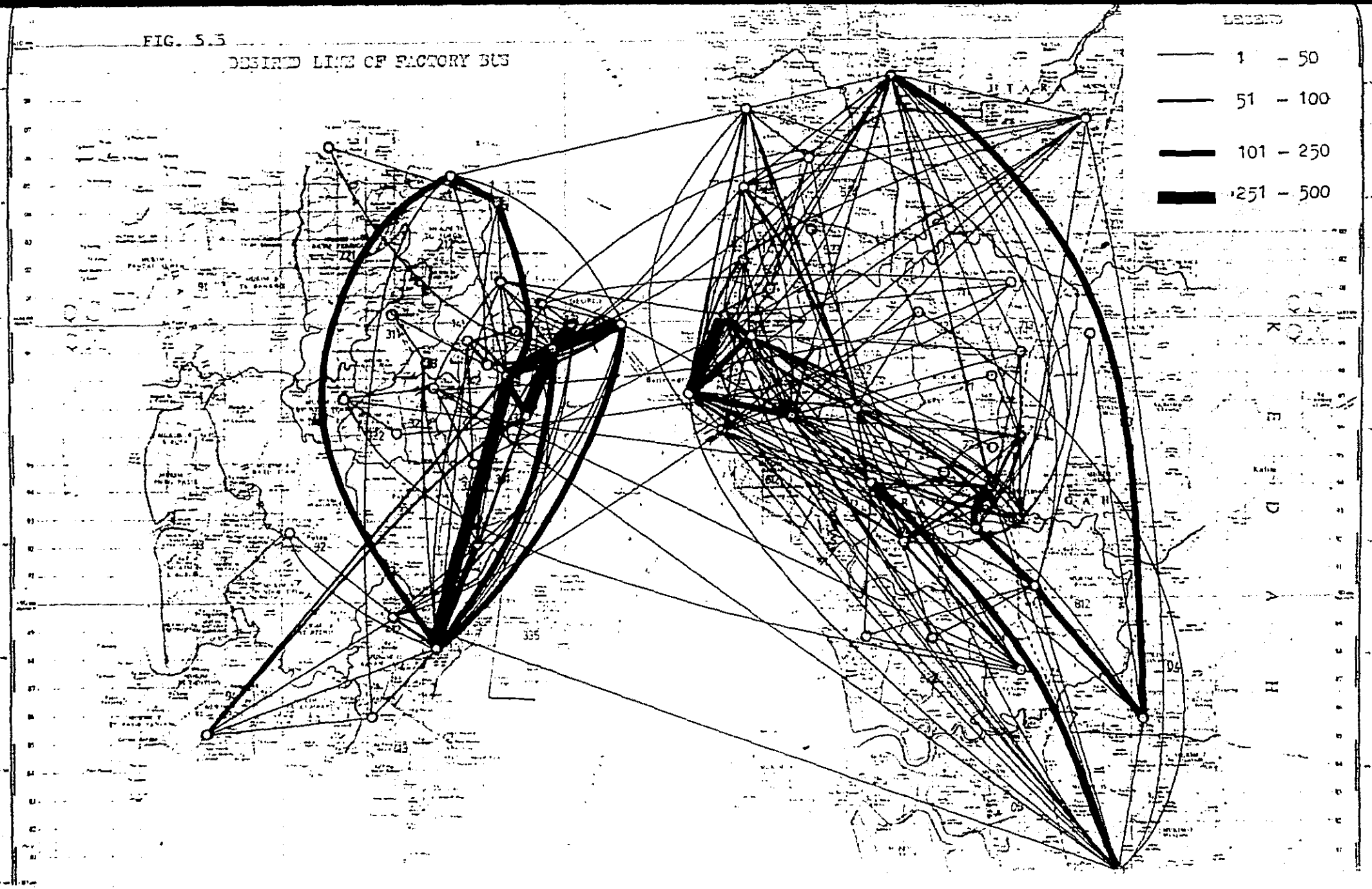
Trip made	No. of Buses	%
A) 1 Trip	1	(1)
B) 2	2	(2)
C) 3	1	(1)
D) 4	12	(15)
E) 5	2	(2)
F) 6	5	(6)
G) 7	2	(2)
H) 8	12	(15)
I) 9	2	(2)
J) 10	7	(9)
K) 11 - 15	22	(27)
L) 16 - 20	5	(6)
M) 20 over	10	(12)
Total	83	(100)

Distribution of Factory Bus Trips

The origin/destination point of the factory buses surveyed is analysed and the result is illustrated in Fig. 55 and 5.6. Most of the O-D occurs between George Town City and Bayan Lepas industrial area on Penang Island. In Province Wellesley, the pattern is more disperse, the highest frequency of O-D points is between the jetty, Mak Mandin, and Prai Industrial areas where there is a frequency of 250 of 500 O-D trips per day.

FIG. 5.5

DESIRED LINE OF FACTORY BUS



Factory Bus Route

Factory bus routes overlap with the ordinary bus routes mostly along the main road. However, they also penetrate into some of the residential area not covered by the ordinary bus route, providing an almost door-to-door service to the workers. The factory bus routes are however not very rigid; they have a flexibility to change according to the demand of the factories.

In Province Wellesley, the factory bus covers as far north as Kepala Batas town, Tasek Kachang Puri and as far South as Nibong Tebal. The route with the highest frequency of factory bus trip is the route between Mak Mandin industrial estate and the Prai Industrial Complex. These routes have over 60 factory bus trips daily. The routes with the second highest factory bus trips are routes between Permatang Pauh, Simpang Empat and Bukit Mertajam and Kampong Bubok.

On the Penang Island side, Sg. Nibong - Glugor road has the highest number of factory bus trip of around 50 - 60 trips daily. The highest number of trips are made to George Town area, followed by Tanjong Tokong and Tanjong Bungah area. (Refer to factory bus route map; The factory bus route map only represents a sample of the factory bus survey).

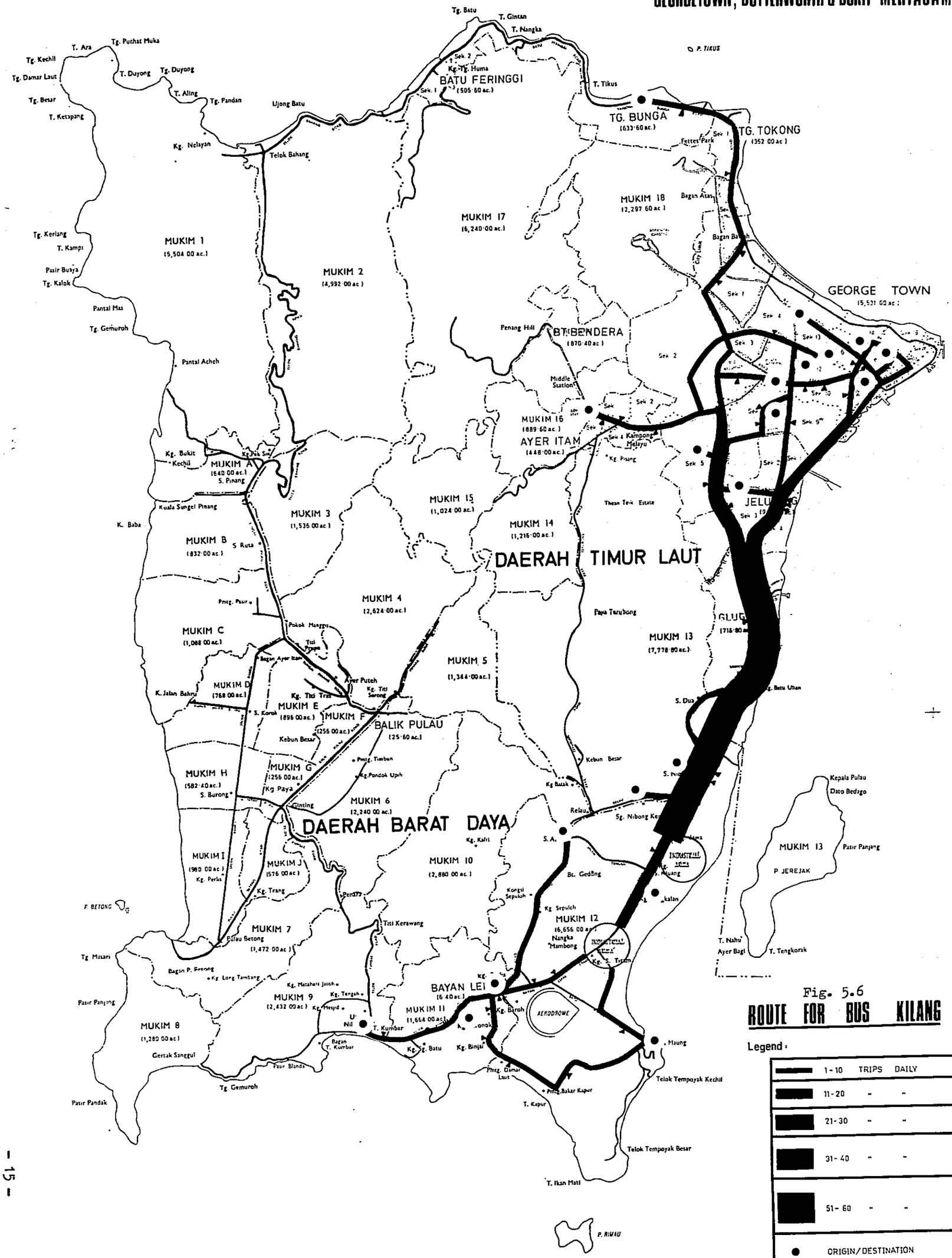


Fig. 5.6

ROUTE FOR BUS KILANG

Legend :

1 - 10 TRIPS DAILY	
11 - 20 " "	
21 - 30 " "	
31 - 40 " "	
51 - 60 " "	
●	ORIGIN/DESTINATION
▶	COLLECTION/DROPPING POINT

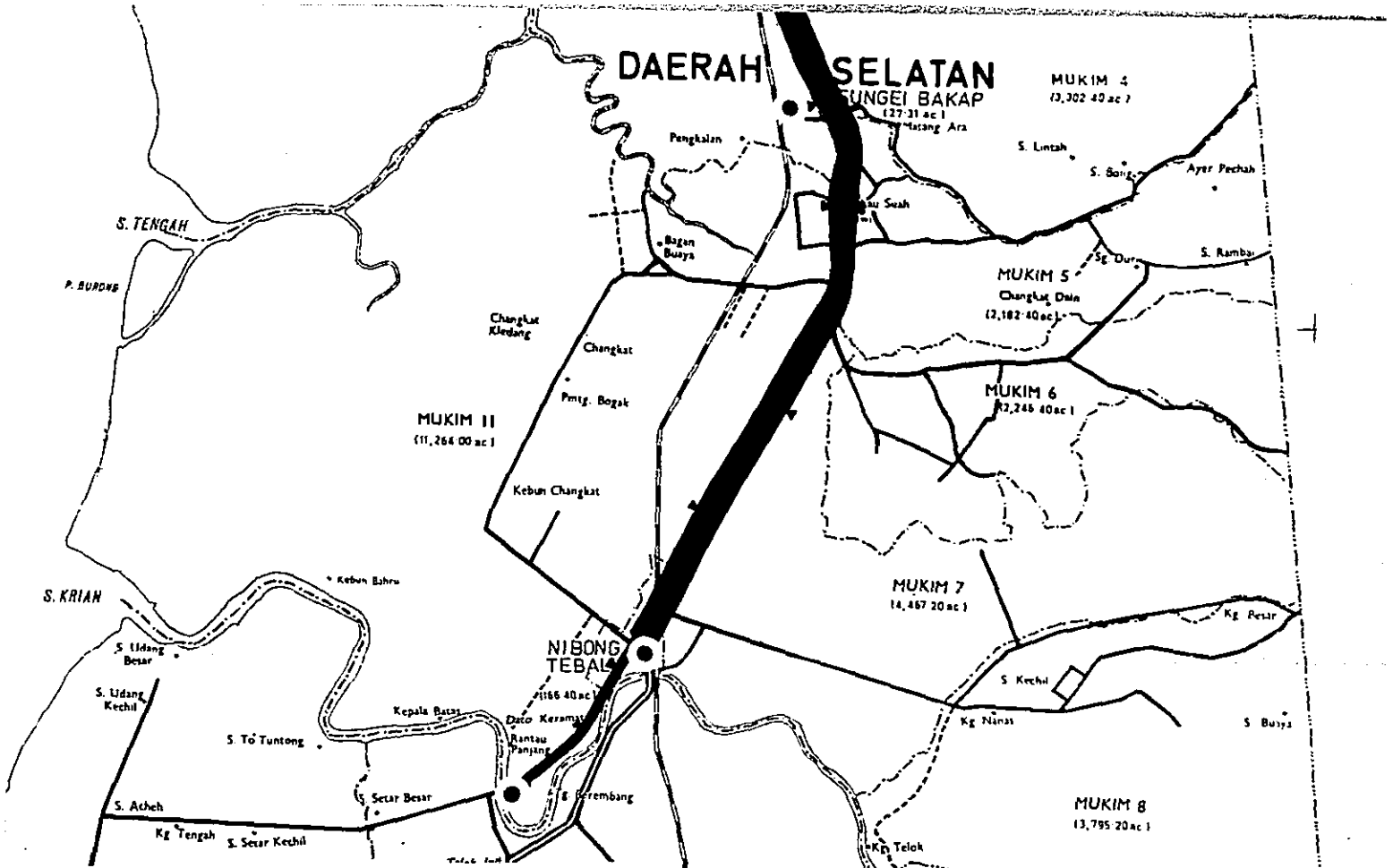
HAK KERAJAAN ADALAH TERPELIHARA
TIDAK BOLEH DIKELUARKAN DITIRU ATAU
DISALIN PETA JADUAN UKUR ATAU APA
APA BAHAGIAN DARIPADANYA DENGAN APA
CARA JUAPUN MELAINKAN DENGAN
KEBENARAN KETUA PENGARAH UKUR

Fig. 5.7

ROUTE FOR BUS XILANG

Legend

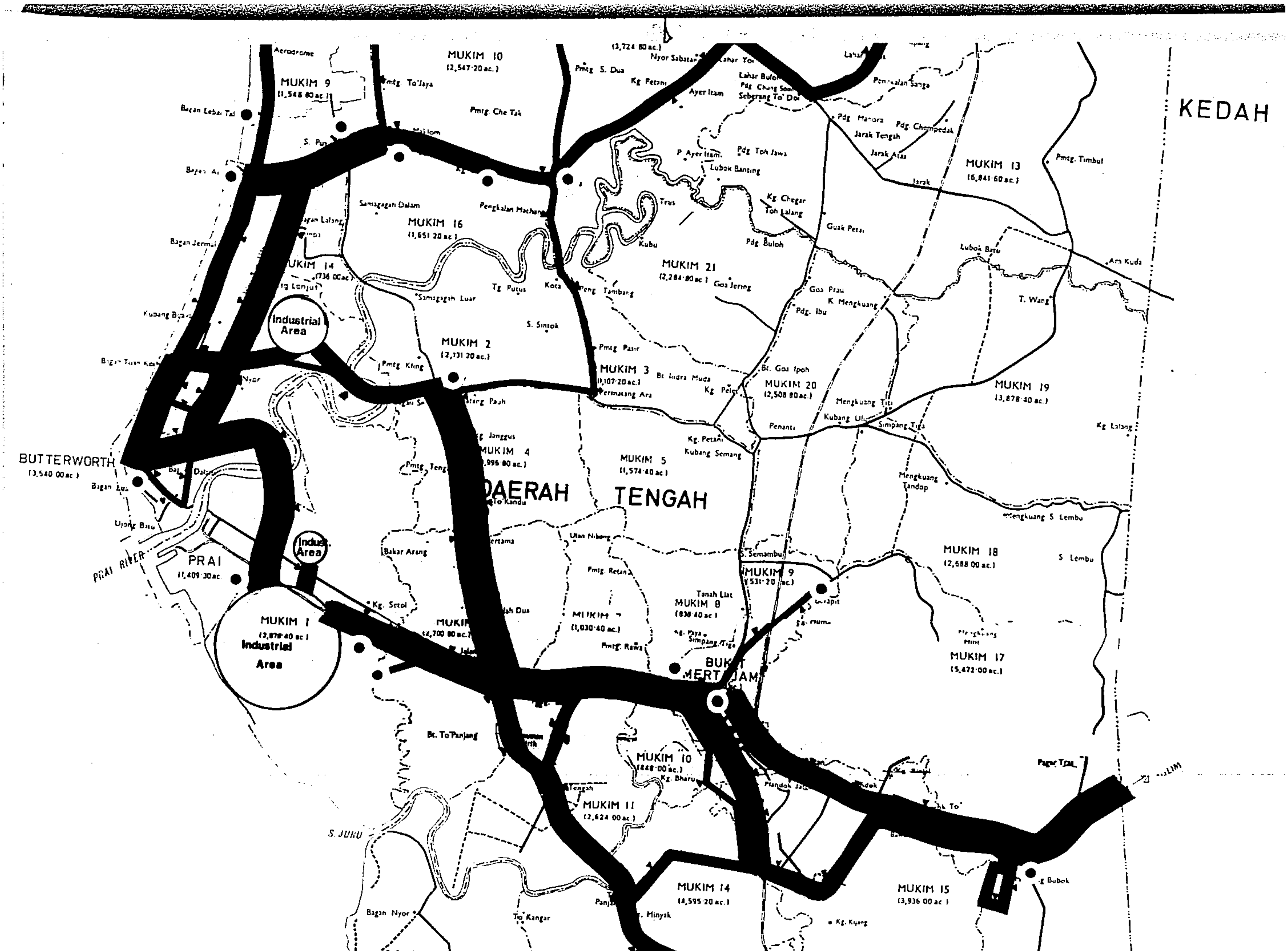
- 1-10 trips daily
- 11-20 " "
- 21-30 " "
- 31-40 " "
- 41-50 " "
- 51-60 " "
- 61 trips and above
- Origin/destination
- Collection/dropping point

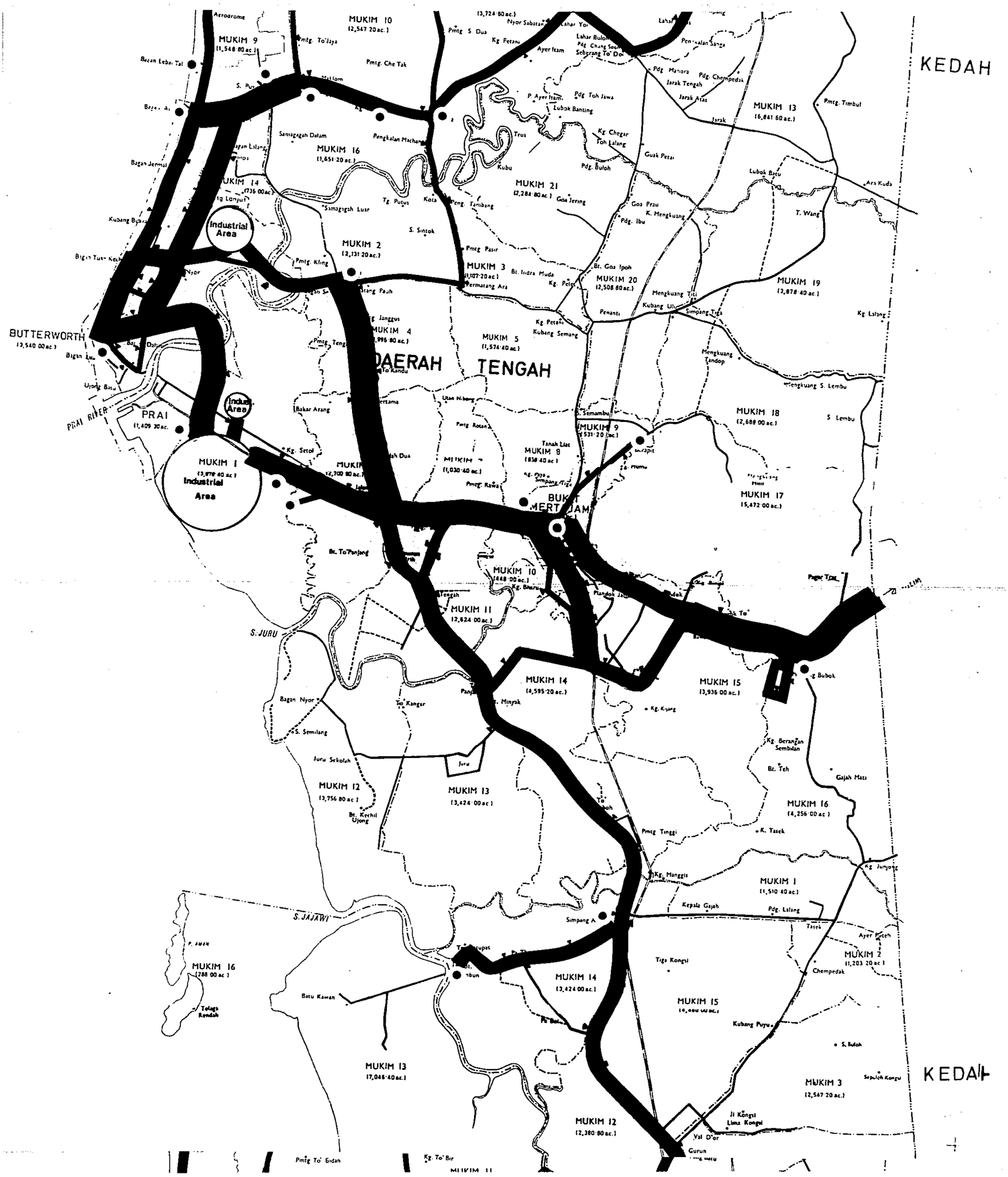


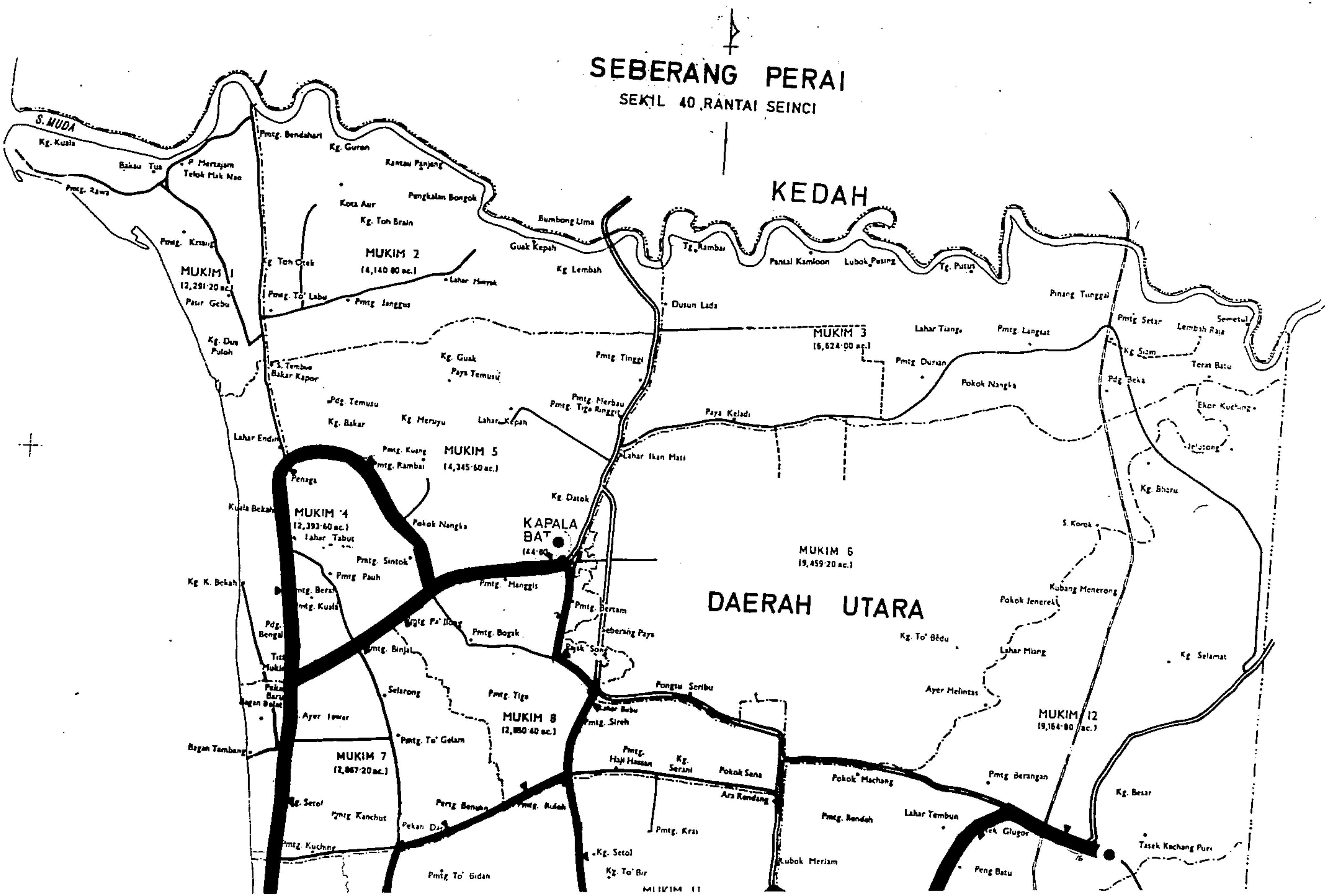
URBAN TRANSPORT STUDY

IN

GEORGETOWN, BUTTERWORTH & BUKIT MERTAJAM


KEDAH
DAERAH TENGAH
BUTTERWORTH
PRAI
PRAI RIVER
BUKIT MERTAJAM
Industrial Area
MUKIM 1
MUKIM 2
MUKIM 3
MUKIM 4
MUKIM 5
MUKIM 8
MUKIM 9
MUKIM 10
MUKIM 11
MUKIM 12
MUKIM 13
MUKIM 14
MUKIM 15
MUKIM 16
MUKIM 17
MUKIM 18
MUKIM 19
MUKIM 20
MUKIM 21
S. JURU
S. JAJAWI


KEDAH
MUKIM 10
(2,547·20 ac.)
MUKIM 9
(1,548·80 ac.)
MUKIM 16
(1,651·20 ac.)
MUKIM 14
MUKIM 21
(2,284·80 ac.)
MUKIM 13
(6,841·60 ac.)
MUKIM 2
(2,131·20 ac.)
MUKIM 3
(1,107·20 ac.)
MUKIM 20
(2,508·80 ac.)
MUKIM 19
(3,878·40 ac.)
MUKIM 4
MUKIM 5
(1,574·40 ac.)
DAERAH TENGAH
BUTTERWORTH
(3,540·00 ac.)
PRAI
(1,409·30 ac.)
PRAI RIVER
Industrial Area
MUKIM 1
(3,878·40 ac.)
MUKIM 18
(2,688·00 ac.)
MUKIM 9
(1,531·20 ac.)
MUKIM 8
(838·40 ac.)
MUKIM 17
(5,472·00 ac.)
BUKIT MERTAJAM
MUKIM 10
(448·00 ac.)
MUKIM 11
(2,624·00 ac.)
S. JURU
MUKIM 14
(4,595·20 ac.)
MUKIM 15
(3,936·00 ac.)
MUKIM 12
(3,756·80 ac.)
MUKIM 13
(3,424·00 ac.)
MUKIM 16
(4,256·00 ac.)
MUKIM 1
(1,510·40 ac.)
S. JAJAWI
MUKIM 16
(288·00 ac.)
MUKIM 14
(3,424·00 ac.)
MUKIM 2
(1,203·20 ac.)
MUKIM 15
MUKIM 13
(7,046·40 ac.)
MUKIM 12
(2,380·80 ac.)
MUKIM 3
(2,547·20 ac.)
KEDAH


SEBERANG PERAI
SEKIL 40 RANTAI SEINCI
KEDAH
DAERAH UTARA
KAPALA BAT
S. MUDA
MUKIM 1
(2,291·20 ac.)
MUKIM 2
(4,140·80 ac.)
MUKIM 3
(6,624·00 ac.)
MUKIM 4
(2,393·60 ac.)
MUKIM 5
(4,345·60 ac.)
MUKIM 6
(9,459·20 ac.)
MUKIM 7
(2,867·20 ac.)
MUKIM 8
(2,850·40 ac.)
MUKIM 12
(9,164·80 ac.)
Kg. Kuala
Bakau Tua
P. Mertajam
Telok Mak Nae
Pmtg. Rawa
Pmtg. Krsang
Pasir Gebu
Kg. Dua Puloh
Pmtg. Bendahari
Kg. Guren
Rantau Panjang
Kota Aur
Pengkalan Bongok
Kg. Ton Brain
Kg. Toh Otek
Pmtg. To' Labu
Pmtg. Janggus
Bumbong Lima
Guak Kepah
Kg. Lembah
Tg. Rambai
Pantai Kamloon
Lubok Pusing
Tg. Putus
Dusun Lada
Pinang Tunggal
Pmtg. Setar
Lembah Raja
Semetul
Lahar Tiang
Pmtg. Langsat
Kg. Siam
Terat Batu
Pmtg. Durian
Pokok Nangka
Pdg. Beka
Ekor Kuching
Jelutong
Kg. Bharu
S. Korok
Kg. Guak
Paya Temusu
Pmtg. Tinggi
S. Tembus
Bakar Kapor
Pdg. Temusu
Kg. Bakar
Kg. Meruyu
Lahar Kepan
Pmtg. Merbau
Pmtg. Tiga Ringgit
Paya Keladi
Lahar Ikan Mati
Lahar Endin
Pmtg. Kuang
Pmtg. Rambai
Penaga
Kuala Bekah
Kg. Datok
Lahar Tabut
Pokok Nangka
Pmtg. Sintok
Pmtg. Pauh
Kg. K. Bekah
Pmtg. Kuala
Pmtg. Manggis
Pmtg. Bertam
Sebrang Paya
Pmtg. Bogak
Pdg. Bengal
Pmtg. Binjal
Selarong
Pmtg. Tiga
Pongsu Seribu
Lahar Bubu
Pmtg. Sireh
Bagan Tambang
Ayer Iewar
Pmtg. To' Gelam
Pmtg. Haji Hassan
Kg. Serani
Pokok Sena
Ara Rendang
Kg. Setol
Pmtg. Kanchut
Pekan Darat
Pmtg. Kuching
Pmtg. To' Bidan
Kg. To' Bir
Pmtg. Krai
Lubok Meriam
Kg. To' Bedu
Ayer Melintas
Lahar Miang
Pokok Jenereh
Kubang Menerong
Kg. Selamat
Pokok Machang
Pmtg. Rendah
Lahar Tembun
Pmtg. Berangan
Kg. Besar
Tasek Kachang Puri
Peng Batu

3.6 Reasons Why Factories Employ Bas Kilang Services

Bas kilang is now a very important means of transport for the factory workers. After 1970 there was a sharp increase in the operation of bas kilang in Penang. Almost 90% of all factory workers utilise bas kilang for transportation to and from work.

The reasons for the popularity of bas kilang to the factories are apparent. The existing public bus system is inefficient and also not designed to meet the demand of the workers. With the large exodus of factory workers from the factories after work, the existing available bus fleet in the ordinary bus companies is inefficient to absorb the workers. Thus, without factory bus services, the workers may have to wait for a long time before they can manage to board a bus. Besides that, workers working during night shift may find it inconvenient to travel during the late hour when ordinary public buses are not operating. Since the factories require a large number of workers to work in their production line, they have to obtain labour force from a wider area. The transport problem will be a great hindrance to factories in obtaining sufficient labour force. Thus, factory transport is an incentive to attract labour force.

The concentration of labour force in the factories enable relatively cheap operation of bas kilang services. Thus, instead of providing transport allowance to the workers, it is cheaper for the factories to provide bas kilang services. Other reasons for the factory authorities in engaging bas kilang service is to ensure that workers arrive on time for work and to ensure their safety during the journey to and from work, especially for the night shift workers. The existing labour law also requires the factory management to provide transport for female workers working during night shift.

Since the factories are the direct employer of bas kilang services, the continuity of bas kilang operation depends largely on the decision of the factory manager. All factory managers interviewed have intentions to continue the provision of bas kilang services to their workers.

4. Merits and Problems

4.1 Merits of Existing Factory Bus Services

Despite the various problems the existing factory bus services have many merits over the public bus services.

The existing factory bus services provide a higher level of service in comparison to the ordinary bus. This is due to a few characteristics of present factory bus services.

1) The factory bus provide a direct, almost door to door service to the workers.
2) The waiting time for the worker is much shorter due to a prearranged time schedule plan to meet the factory worker's demand.
3) The charges are collected on a monthly basis from the factories thus simplifying the effort of collecting fares during every trip.
4) Due to the above system of fare collection, no conductor is required and thus the operation cost is cut down.
5) There is more flexibility in changing the factory bus route to meet with any change in demand, since the factory bus services cater for a smaller group of people compared to the ordinary bus services.
6) If these users commute by their own vehicles such as bicycles, motor-cycles and cars, heavier congestion will occur around the industrial area.

4.2 Problems

Some problems associated with existing bas kilang system are as follows:-

1) The existing 'bas kilang' identifies to their own individual factory. As long as the passengers are from different factories, although they may be living in the same location, separate buses or separate bus trips are required irrespective of the number of passengers. This results in a lot of overlapping of routes by different buses operating for different companies which is a form of wastage of resources.
2) The above factor helps to add to the large number of factory bus trips during peak hours contributing to the already high traffic volume along the main trunk road.

3) The frequent stopping of passengers along the road to drop or pick up passengers often hold up traffic along the way.

4) At present the rules governing 'bas kilang' services do not allow any standing passenger. Although this avoids overcrowding in a bus and provides a higher level of services in terms of comfort to the passengers, it can sometimes means that 'bas kilang' becomes competitive against the ordinary bus service and invades its share along some routes.

5. Future Perspective

* The Malaysian Government is encouraging the development of industries in Penang. With the expansion of industrial development in Penang, the demand for factory bus services will definitely increase.

* The many merits of factory bus services and results of the survey which shows a high level of utilisation of factory bus and the popularity it gains from the factories, implies a very great likelihood in the continuation of the operation of present bas kilang services.

* The increase in the number of factory workers will give rise to problems due to the high volume of factory bus trips. Thus a more systematic organisation in the routes should be worked out to cut down the unnecessary trips.

* An association or a body should be set up to plan out the factory bus routes more systematically. All factories which wish to contract such service can register the membership of their workers, addresses and work shifts to the body which can plan out the bus route and trips accordingly and efficiently to minimise the number of trips and buses required.

* Such a system may involve a slight modification in the system of fare charges to the factory, but it would definitely reduce the operation costs.

* On the operation part, instead of identifying by factory during every trip, the factory bus may be identified by the routes travelled. A more effective coverage is possible with this system since overlapping of route can be eliminated.

* According to the increasing income of workers, they may desire to use their own vehicles for commuting. Therefore, some induction or compulsion in using 'bas kilang' will be required with the objective of reducing individual traffic.

APPENDIX A

Result of Origin-Destination Survey of Factory Bus

The purpose of this survey is to obtain detailed information on the characteristics of the factory bus operation and the movement of the factory buses.

i) Methodology of Survey

A random sample is taken from the registration cards obtained from RIMV, Pulau Pinang. A total of 83 samples are taken out of the 323 registered factory buses in Penang. This represents a 26% sample of the factory bus in Penang.

ii) Service Characteristic

Form of Ownership

The result of the survey is tabulated and illustrated in charts and tables. Table 1 shows that only 10% of the vehicle owners are the drivers themselves, 90% are hired bus drivers. This is related to the form of ownership as shown in Table A5 where 23% of the operation are individually owned while the other 77% are either company, partnership or other forms of ownership.

Table A.1

Characteristics of Factory Bus Owner

	No. of Buses					
	Penang Island		Province Wellesley		Total (Penang)	
Vehicle owner (same as driver)	4	(22)	4	(6)	8	(10)
Vehicle owner (not the driver)	14	(78)	61	(94)	75	(90)
Total	18	(100)	65	(100)	83	(100)

Table A.2 Usage of Vehicle per week

	No. of Cases					
	Penang Island		Province Wellesley		Total (Penang)	
A 1 - 2 days	0	(0)	0	(0)	0	(0)
B 3 - 4 days	0	(0)	0	(0)	0	(0)
C 5 - 6 days	4	(22)	25	(38)	29	(35)
D Everyday	14	(78)	40	(62)	54	(65)
Total	18	(100)	65	(100)	83	(100)

Note: Percentage are shown in brackets ( ).

Usage of Vehicle

Table A2 indicates the usage of vehicles per week. The utilisation of vehicle is very high. 65% of the vehicles are utilised everyday and 35% are utilised for at least 5 to 6 days a week. The factory buses in Penang has a higher rate of utilisation, 78% are used everyday compared to 62% in Seberang Prai.

Type of Vehicle

Table A3 shows the type of vehicle. Most of the factory buses are the 30-44 seater bus roughly the size of the ordinary bus. 25% are vans and 15% mini buses. In Penang Island, the type of vehicle survey consists of only the bus and van.

Period of Ownership

Table A4 shows that the period of ownership for most vehicles are between 3-4 yrs. More than 80 per cent of the vehicles are not owned for more than 9 yrs.

Table A3. Type of Vehicle

	Number of Vehicle					
	Penang Island		Province Wellesley		Total	
Van	6	(33)	15	(23)	21	(25)
Bus	12	(67)	38	(58)	50	(60)
Minibus	0	(0)	12	(18)	12	(15)
Total	18	(100)	65	(100)	83	(100)

Table A4. Period of Ownership.

(Vehicle)

	Penang Island		Province Wellesley		Total	
1 - 2 years	3	(17)	18	(28)	21	(23)
3 - 4 years	12	(67)	23	(35)	35	(43)
5 - 9 years	1	(5)	20	(31)	21	(25)
10 years over	2	(11)	4	(6)	6	(7)
Total	18	(100)	65	(100)	83	(100)

Table A5. Form of Ownership

	Number of Owners					
	Penang Island		Province Wellesley		Total	
Individual	10	(55)	9	(14)	19	(23)
Company and co-operative	7	(39)	52	(80)	59	(71)
Others	1	(6)	4	(6)	5	(6)
Total	18	(100)	65	(100)	83	(100)

Average Mileage Travel

The average mileage travelled per day by each bus driver is usually more than 50 miles. In general, factory buses in Province Wellesley travels longer distances than in Penang Island due to the dispersed nature of residence.

Trip Pattern

Most drivers make about 12 trips a day. The most usual number of trips made per day is 4, 8 or 12 trips.

Number of Passengers

Tabel A6 shows the pattern of the no. of passengers carried in each trip. Bas kilang usually have 41- 45 passengers per trip. But the number of zero passenger trip is also high, thus the average number of passengers per trip is about 15.

Table A6 Number of passengers

No. of Passengers	Trip made	%
A) 0	231	(24)
B) 1 - 5	74	(8)
C) 6 - 10	93	(10)
D) 11 - 15	53	(6)
E) 16 -20	65	(7)
F) 21 - 25	35	(4)
G) 26 - 30	76	(8)
H) 31 - 35	24	(2)
I) 36 - 40	30	(3)
J) 41 - 45	246	(24)
K) 46 - 50	14	(2)
L) 50 over	0	(0)
Total	940	(100)

Trip Generating Time

Trip generating time is given in Table A7. 6.00 am. to 8.00 am. and 4 - 6 pm. are the peak hours of bas kilang services. 37% of the total trips fall within the above time interval. These hours coincide with the normal traffic peak.

Table A7 Trip Generating Time

(Each Trip's Departure Time)

	Trip	%
A) 4.00 - 5.00 A.M.	1	(0.1)
B) 5.01. - 6.00	40	(4.2)
C) 6.01 - 7.00	76	(8.1)
D) 7.01 - 8.00	107	(11.3)
E) 8.01 - 9.00	55	(5.8)
F) 9.01 - 10.00	28	(3.0)
G) 10.01 - 11.00	31	(3.3)
H) 11.01 - 12.00	34	(3.6)
I) 12.01 - 1.00 P.M.	43	(4.6)
J) 1.01 - 2.00	57	(6.0)
K) 2.01 - 3.00	64	(6.8)
L) 3.01 - 4.00	65	(6.9)
M) 4.01 - 5.00	71	(7.5)
N) 5.01 - 6.00	94	(10.0)
O) 6.01 - 7.00	30	(3.2)
P) 7.01 - 8.00	13	(1.4)
Q) 8.01 - 9.00	16	(1.7)
R) 9.01 - 10.00	33	(3.5)
S) 10.01 - 11.00	49	(5.2)
T) 11.01 - 12.00	36	(3.8)
Total	943	(100)

O-D Survey Sheet

FACTORY BUS INTERVIEW QUESTIONNAIRE

STATE OF PENANG

ZONE NO

SHEET NO

1 OWNER'S NAME

2 ADDRESS

3 DRIVER'S NAME

4 ADDRESS

5 MALE / FEMALE

6 NO OF OCCUPANTS

7 AGE

8 VEHICLE REGISTERED NO

9 USAGE OF VEHICLE PER WEEK

10 REASON FOR NO MOVEMENT

11 TYPE OF VEHICLE

12 PERIOD OF OWNERSHIP

13 FORM OF OWNERSHIP

14 AVERAGE MILEAGE TAKEN PER DAY

15 NO OF TRIPS MADE PER DAY _____

16 DATE OF TRIP

NAME OF INTERVIEWER

TRIP NO	17 ORIGIN (Name & Address)	18 DEPARTURE TIME	19 DESTINATION (Name & Address)	20 ARRIVAL TIME	21 COLLECTION DROPPING AREA				22 NO OF PASSENGERS
1		(AM)		(AM)	1	2	3	4	
		(PM)		(PM)	5	6	7	8	
2		(AM)		(AM)	1	2	3	4	
		(PM)		(PM)	5	6	7	8	
3		(AM)		(AM)	1	2	3	4	
		(PM)		(PM)	5	6	7	8	
4		(AM)		(AM)	1	2	3	4	
		(PM)		(PM)	5	6	7	8	

INSTRUCTIONS

1 Please tick appropriately as in the [ ] given for respective questions

2 Indicate and record necessary information for the remainder questions

Appendix B

Factory Management Interview

i) Purpose of the Survey

In order to assess the continuity of bas kilang services in Penang, some factories in Penang Island and Seberang Prai were contacted, and a questionaire interview was carried out.

The purpose of the survey is to enable us to understand better the operation system of the factory bus in Penang, to assess the utilisation of bas kilang, the trend of bas kilang operation and to obtain the opinion of the employer (factory authority) regarding the services of bas kilang and their intention in continuing the bus services.

ii) Methodology

A sample of 20 factories were chosen and questionaires (See following sample) were mailed to the respective factories in Penang Island and Butterworth. A 80% response was obtained, 20% of the result were received through mail and the other 60% were collected through personal interviews with the personnel manager or other officers incharge.

iii) Results of Survey

The results of factory management survey is tabulated and illustrated in the following charts and diagrams. Table B1 summarises part of the results of the questionaire interview. Table B2 gives the imformation of the 9 factories A to I in Penang Island, and factories J to P represents the 7 factories interviewed in Province Wellesley. The information on number of employees, number using the factory bus percentage of utilization, operating bus capacity and the average transport cost per workers in each factories is shown under column 2 to 6 respectively.

Utilization of Bas Kilang

There is a total of 20,804 workers in the 16 factories surveyed. A total of 18,360 workers are utilising the factory bus services provided by the factory management which represent 88% of the total factory workers.

Fig. B1 illustrates the number of employees using bas kilang in Penang. The largest factory among those survey has a total of 3,300 workers utilising the factory bus which is 88% of the total factory workers In Penang Island, the per centage of utilization of factory buses touchas 100% in some cases.

In general, a higher percentage of workers in Penang Island is utilising factory bus than factories in Seberang Prai. (91% in Penang Island compared to 81% in Seberang Prai).

Capacity of Bas Kilang

The capacity of the operating buses is shown in the following table. The types of operating factory buses can be classified into small bus, having 11 to 25 seats, medium bus having 30 to 33 seats and large bus, having 43 to 47 seats. There are a total of 301 operating buses, in the total sample. 78% of the bas kilang are the 30 seater buses. The other 19% are the large bus and only 3% are small buses.

Table B.1 Summary of the results

Factories	Shift hours	No. of Employees	No. using Bas kilang	Percentage of utilisation	Operating Bus		Cost per worker
					Capacity	No.	
A	7 am. - 3 pm.	1250	1100				
	3 pm. -11 pm.	1250	1100		43	2	n.a.
	11 pm. -6.45 am.	1250	1100		30	35	
Sub Total		3750	3300	88%		37	
B	8.30 am. - 4.30 pm.	1660	1650		30	49	18.80 per mth.
					43	5	0.60 per day
Sub Total		1660	1650	99%		54	
C	7.30 am. - 3.30 pm.	670	670				
	3.30 pm. - 11.00 pm.	670	670		47	6	11.30 per mth.
	11.00 pm. - 7.00 am.	240	240		30	54	40¢ per day
Sub Total		1580	1580	100%		60	
D	7.30 am. - 4.45 pm.	1500	1050		30	17	
	6.30 am. - 3 pm.	200	200				22.00 per mth.
	3.00 pm. - 10.30 pm.	200	200		45	10	70¢ per day
Sub Total		1900	1450	76%		27	
E	6.30 am. - 2.30 pm.	350	350		31	19	
	2.30 pm. - 10.20 pm.	350	350				n.a.
	10.30 pm. - 6.30 am.	350	350		(5)	3	
	8.30 am. - 4.30 pm.	210	200				
Sub Total		1260	1250	99%		22	

F	6.30 am. - 2.30 pm. 8.30 am. - 4.30 pm. 2.30 pm. - 10.30 pm. 10.30 pm. - 6.30 am.	320 350 320 320	300 335 300 300		24 30 45	1 13 1	n.a.
Sub Total		1310	1235	94%		15	
G	8.00 am. - 4.30 pm. 6.30 am. - 3.00 pm. 3.00 pm. - 10.30 pm.	196 514 429	138 514 429		n.a.	n.a.	27.00 per mth. 90¢ per day.
Sub Total		1139	1081	95%			
H	7.00 am. - 3.00 pm. 3.00 pm. - 11.00 pm. 11.00 pm. - 7.00 am.	500 300 200	440 300 200		44 30	5 9	19.80 per mth. 70¢ per day.
Sub Total		1000	900	90%		14	
I	8.15 am. - 5.30 pm.	920	781		30	27	18.30 per mth. = 60¢ per day
Sub Total		920	781	85%		27	
Penang Island		14,519	13,227	91%			19.53 per mth. 65¢ per day
J	(8 shifts)	2,800	2,363	84%	43	16	n.a.
K	8.30 am. - 4.30 pm. 7.00 am. - 3.00 pm. 3.00 pm. - 11.00 pm. 11.00 pm. - 7.00 am.	420 420 420 420	240 400 400 400		33	11	22.70 = 80¢
Sub Total		1,680	1,400	86%		11	

L	7.00 am. - 3.00 pm. 8.30 am. - 4.30 pm. 3.00 pm. - 11.00 pm. 11.00 pm. - 7.00 pm.	150 250 150	120 200 120		18	2	n.a.
Sub Total		700	560	80%		7	
M	8.30 am. - 4.30 pm. 3.00 pm. - 11.00 pm. 11.00 pm. - 7.00 pm.	184 130 94	133 130 94		43 16	3 3	
Sub Total		408	357	88%			
N	7.00 am. - 3.00 pm. 9.00 pm. - 5.00 pm. 3.00 pm. - 11.00 pm. 11.00 pm. - 7.00 am.	150 90 140 140	90 65 85 85		43 30	3 1	
Sub Total		520	325	63%			
O	8.30 am. - 5.00 pm.	94	44		44	1	32.50 1.00/=
Sub Total		94	44	47%	44	1	
P	6.30 am. - 2.45 pm. 2.45 pm. 11.00 pm.	47 36	27 17		11	2	22.70 per mth. = 80¢ per day
Sub Total		83	44	53%			
Seberang Prai		6,285	5,133	81%			26/= per mth.
Grand Total		20,804	18,360	88%			90¢ per day

Fig. B.1

Bas Kilang Utilisation in the factories

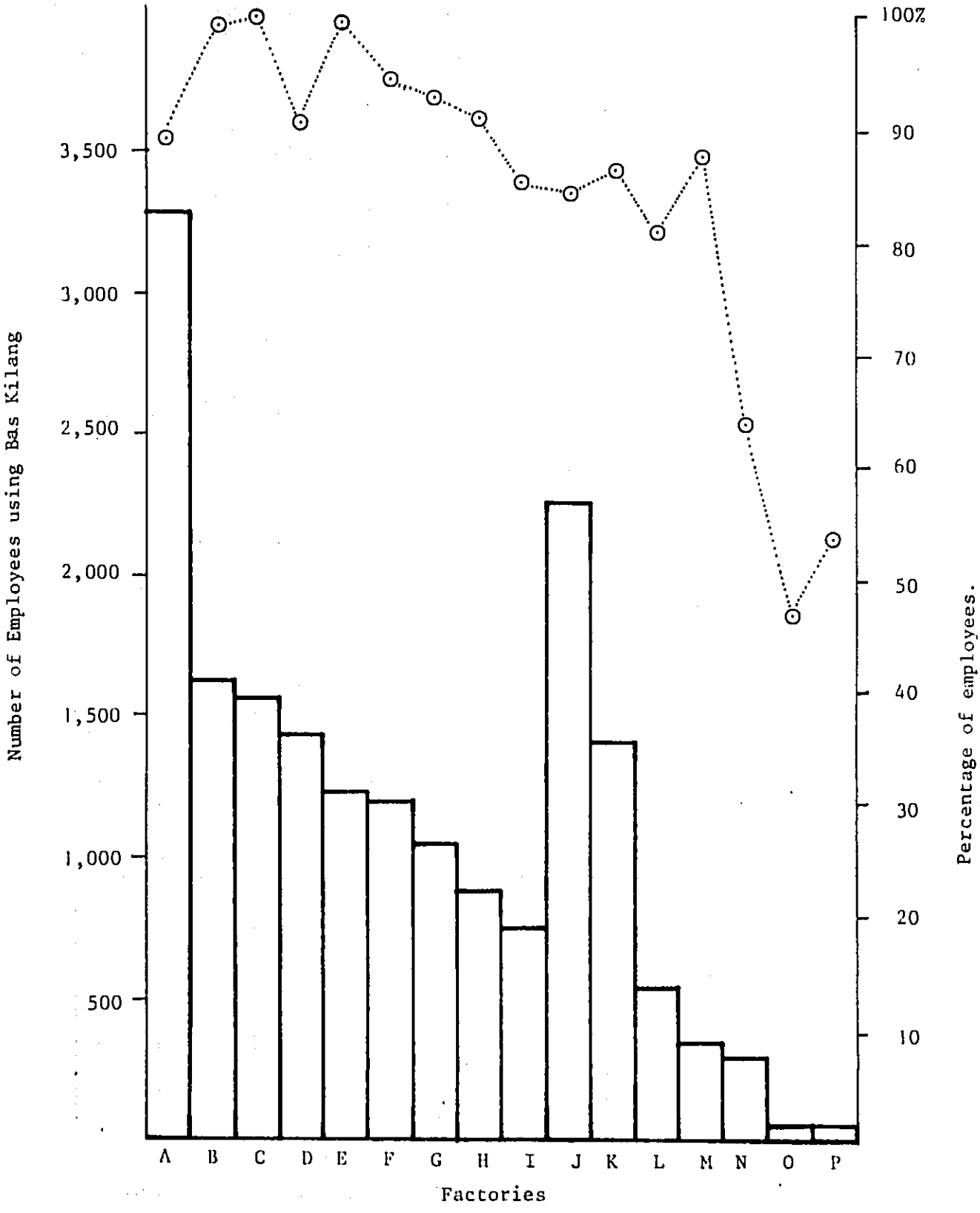


Table B.2

Capacity of Operating Bus

Bus Capacity	Number of Buses Operating	Composition %
11 - 24	9	3
30 - 33	236	78
43 - 47	56	19
Total	301	100

Source: Factories Interview.

Table B.3 No. of Bas Kilang Operating in Each Factory

YEAR / FACTORY	70	71	72	73	74	75	76	77	78	79
A			30	30	30	30	30	30[a]	37	37
B					50	50	50	52	54	54
C				4	8	14	22	25	38	60
D					6	8	14	8	23	27
E						20[b]	20	20[b]	26	26
F					2	5	15	15	15	15
G								19	19	19
H					2	10	12	12	14	15
I								25	27	27
J			4	4	4	8	8	11	11	11
K					5	6	7	7	7	7
L						4	6	6	6	6
M						1	1	2	3	3
N							1	1	1	1
O		1	1	1	1	1	2	2	2	2
TOTAL		1	35	39	108	157	188	235	283	310

a. Estimated figure.

b. Estimated figure.

Trend of Operations

The trend of bas kilang operations is computed based on the results. The bas kilang services started around 1970 and increased steadily from 1971 to 1979.

Charter system

Bas kilang services is often operated under Charter system. The charter rates varies depending on the distance of the trips. An average trip from Bayan Lepas factory to George Town may be around $25/= per trip. The total transport cost of each factory employee is estimated and the transport cost per worker is obtained. The transport cost for each worker ranged from $11.30 per worker per month to about $27/= per worker per month. The average cost per worker is about $10.50/ per person per month which is about 65 cents per day in Penang Island and the average in Seberang Prai is about $26/ per month or 90 cents per day. The cost per worker is still very much cheaper than the transport cost for the worker if they have to utilise public buses. The bus fare for a one way trip from Bayan Lepas to George Town, Yellow bus terminal is 65 cents and a to-and-fro bus ticket for the same trip is one dollar. The transport cost by bas kilang is almost half the amount of the same trip using the ordinary public bus.

Table B4 shows the number of factories which chartered bas kilang services and the number of factories which bought their own factory bus. In most cases, the factories charter services from bas kilang companies. Only very few factories have their own buses, and although some factories have a few factory buses of their own, they usually supplement the services by chartering from bas kilang company.

Table B.4

Type of Bas Kilang in Use

	Penang Island	Province Wellesley	Total
Factory owned buses	1	6	7
Factory Chartered buses	9	3	12
	10	9	19

Purpose of Using Bas Kilang

Most of the factories are located in the suburbs where public transport services is quite poor. The main intention to employ bas kilang services is to provide transportation for the factory workers. Since factories require a large number of workers in their production line, it is necessary to provide workers with the means of trnasport in order to ensure a sufficient labour force.

Another intention is to ensure workers ge to work on time which is also very important for the operation of factories.

Table B.5

Purpose of using factory bus	Penang Island	Province Wellesley	Total
a. In order to get labour force from a wider area.	6	4	10
b. To give extra incentive as a means to attract labour force	6	5	11
c. To solve employee's transport problem	7	6	13
d. Get workers to work on time	2	1	3
e. As a fringe benefit	4	2	6

Table B6

	Penang Island	Province Wellesley	Total
Factory charge the employee partially	3	0	3
Factory provide free transport service	6	7	13

80% of the factories do not charge their workers for the factory bus transport. Only 20% of them charge the workers a small amount which is about five dollars a month per workers.

The Bus Kilang User

(Table B7 and B8) Most of the factories normally do not limit the factory bus services to only certain categories of employees, but majority of the workers taking the factory bus are the production operators as they constitute the largest number in any factory and are usually those earning a low income.

Table B7

	Penang Island	Province Wellesley	Total
Bus service for all employees	7	5	12
Bus services for production workers only	2	1	3
Bus services for office staff only		1	1

Table B8

Type of workers generally using factory bus	Penang Island	Province Wellesley	Total
All employee	5	3	8
Production workers	4	3	7
Clerical staff (office staff)		1	1

Factory manager's intention to continue bas kilang services.

All the factories indicated their intention to continue the operation of factory bus service. However, most of them do not have any definite idea of how many more buses to add to their fleet as that will depend entirely on their labour force expansion but most of the factory managers are of the opinion that charter service is much more economical than to operate or acquire their own factory bus.

Table B9

Manager's intention to expand operation	Penang Island	Province Wellesley	Total
To continue factory bus services	9	7	16
Discontinue factory bus services	0	0	0

iv) Conclusion

The results of the survey shows that the service level of bas kilang at present is very high compared to the scheduled bus. The merits of bas kilang over the scheduled bus can be summarised as follows:-

1. The bas kilang provide a direct, almost door-to-door service to the workers.
2. The waiting time for the workers is much shorter, due to a common collection or dropping point - the factories.
3. The operation system is simpler compared to scheduled buses as fare charges are collected on a monthly basis. There is also more flexibility in changing of routes etc. as it involves only the factory management side and factory bus operators.

Since the continuity of factory bus services is largely the factory management's decision and most factory managers are in favour of the factory bus system, there is a very great possibility of the continuation of the present factory bus system.

FACTORY BUS QUESTIONAIRE. (Sample Sheet)

- For the factory management.

1. Details of factory operations bus usage.

a) How many shifts are there and what are the working hours for each shift?

No: of shifts	Hours

B) How many employees work in each shift and how many use the factory bus in each shift?

Shift No. of employees	1	2	3
Total number of employees in each shift.			
Number using bus in each shift			

2. Details of bus fleet.

a) When did you start the bus system? .....

.....

b) How many operating buses were there in each year?

	1970	1971	1972	1973	1974	1975	1976	1977	1978
Total number of operating buses									

c) What are the types of buses that you have and the number of each type and their capacity?

Type Capacity	Number in operation

d) Are the buses bought by the factory? .....

If so, what is the price of each type of bus?

.....

.....

e) Are the bus rented from other companies? .....

If so, what is the rental rate? (per month or per mile)

.....

.....

3. Purpose of using the factory bus.

a) What is your purpose in using the factory bus?

- in order to get labour force from a wider area?
- to give extra incentive as a means of attracting labour force?
- to solve problems of night shifts when these are no other buses?

Please give any other reasons that are applicable to you.

.....

.....

.....

4. Fare charges.

a) Does your factory charge your employee for the bus service? .....

If, yes, how is the charge system?

- according to distance @ $..... per mile.
- a fixed base of $..... a month.

b) Does the factory subsidise on the operation of the factory buses?

If yes, what is the subsidy per annum? .....

5. Demand and Expansion.

a) Is your bus service only for certain categories of your employee?

.....

If so, which category is eligible for the service?

.....

b) Which category of employees generally use the bus system at present?

.....

c) Is the demand of the bus service exceeding the capacity of the system? .....

d) Does the management intend to continue using the factory bus within the next 5 years? .....

e) Is there any intention of the management to expand the fleet?

.....

If yes, by how many and when?

.....

.....

.....

Any further comments:-

.....

.....

.....

.....

.....

.....

.....

Part 6 BAS SEKOLAH

CONTENTS

LIST OF TABLES AND FIGURES

1 Introduction

There are mainly two types of school bus services. One is operated by the public bus companies and the other one is operated by mainly private individuals. The first type of school bus services offered by bus companies follows the same system as that of the ordinary bus. They usually follow the ordinary bus route except that they operate only during peak hours of school trips and are only exclusively for school children.

The above school bus services does not provide door to door service. They pick up school children from the bus stops. The above has already been discussed under public bus services. Here, we will refer to the second type of school bus services.

The present school bus services known as 'Bas Sekolah' in Bahasa Malaysia is under the control of the RIMV to which all licensed operators have to be registered with . There are a total of 145 licensed operators in Penang.

1.1 Types of Survey

A sample of 24 school bus operators were selected from registration cards obtained from RIMV (Registration and Inspection of Motor Vehicle). Home interviews were carried out on these school bus operators to obtain information on the characteristic of school bus operations.

This sample represents 16% of the total registered school bus operators in Penang. (a sample of the questionnaire is attached in the Appendix.)

2 Existing School Bus Services

2.1 School Bus Fleet

There are a total of 486 registered school buses under 145 operators in Penang. Of which 323 buses are registered in Penang Island and 163 in Province Wellesley.

(The details are given in Table 6.1 and illustrated in Fig. 6.1) Fig. 6.1 shows that bas sekolah system is more popular in Penang Island than Province Wellesley although both have nearly equal numbers of school going population. The strength of the bus fleet in Province Wellesley is only half that of Penang Island.

The number of buses and passengers registered is shown in the following table:

Table 6.1

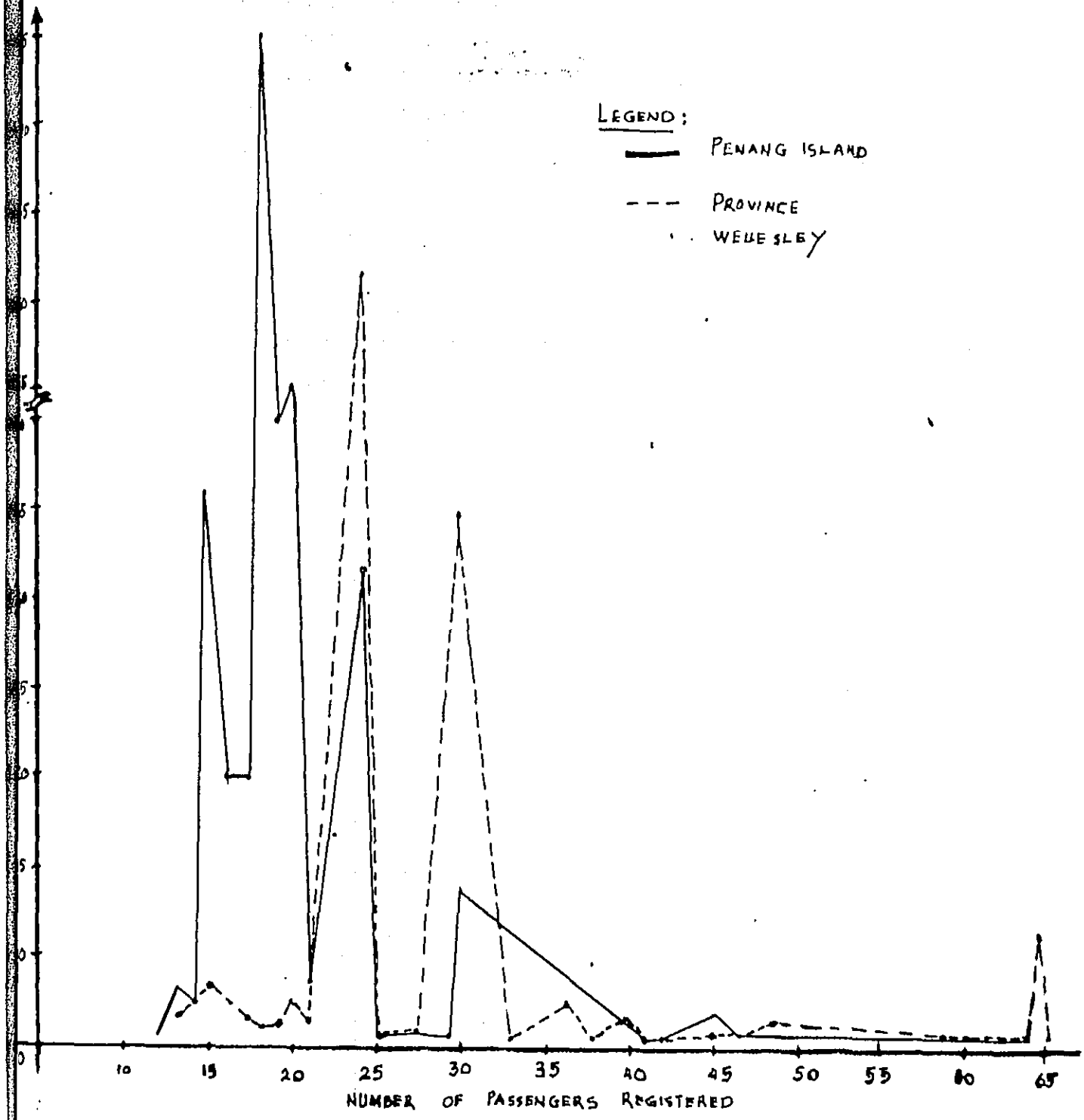
Number of registered school bus

NO. OF PASSENGERS REGISTERED	NUMBER OF BUS		
	PENANG ISLAND	PROVINCE WELLESLEY	TOTAL
10 - 14	12	3	15
15 - 19	191	16	207
20 - 24	96	71	167
25 - 29	4	3	7
30 - 34	14	36	50
35 - 39	-	9	9
40 - 44	2	3	5
45 - 49	4	6	10
50 - 54	-	-	-
55 - 59	-	1	1
60 - 64	0	14	14
65 - 69	-	1	1
TOTAL	323	163	486

SOURCE : RIMV

The registered passengers here may not be the actual passengers. These usually indicate the number of seats of the registered school bus.

Fig 6.1 NUMBER OF PASSENGERS REGISTERED



The distribution of registered passengers shows that in Province Wellesley larger capacity buses are used compared to Penang Island.

2.2 System of Operation

School bus operates between the residential area and the schools. The map shows an example of a route covered by a school bus operator. A school bus operator picks up school children from their home, and delivers them to the school. It always operates during school trip peak hour. An operator may cover a number of schools in one round trip*.

School bus services operate on a private arrangement between the parents of the school children and the bus operator or the drivers. (They usually obtain their passengers informally through friends or neighbours). The charges is usually collected on a monthly basis. The fare usually depends on the route, it may not be directly related to the actual distance.

* a round trip here refers to a to and fro trip.

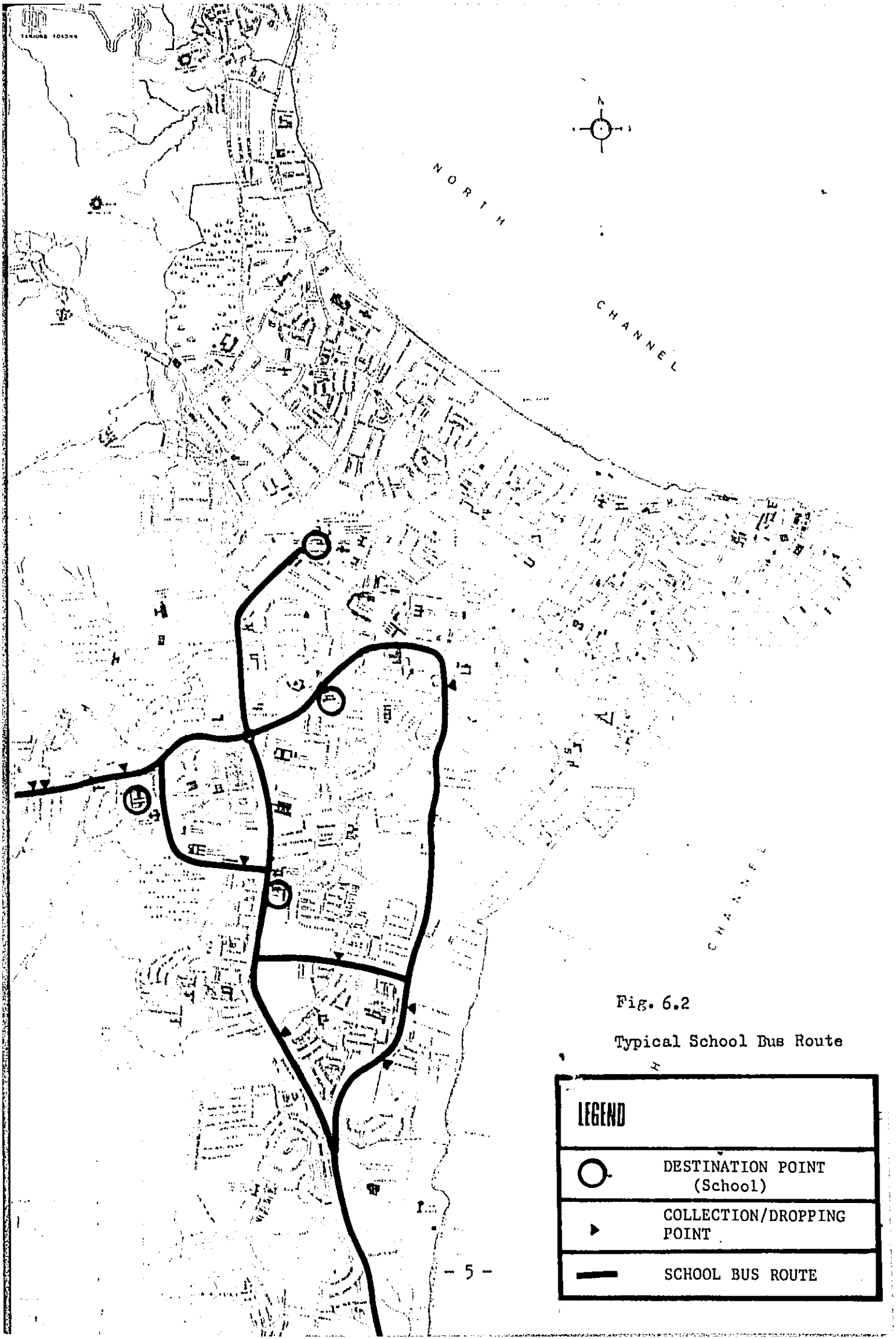


Fig. 6.2

Typical School Bus Route

2.3 Characteristic of Operators

Form of Ownership

Most of the school bus operators are small individual operators. 74% of the school bus owners are the drivers themselves. 26% either hire drivers or rent out their vehicles to other operators.

Table 6.2 Form of Ownership -1

	Number of persons	Composition (Percentage)
Owner same as driver	17	74
Owner not the driver	6	26

Unlike the factory bus operators, where majority of the operators are company or partnership owned, in the case of school bus, 96% are individual operators, only 4% is company owned.

Table 6.3 Form of Ownership -2

Form of ownership	Number of persons	Composition (Percentage)
Individual	23	96
Company	1	4
Total	24	100

Source : School Bus Interview

Period of Ownership

School bus operation has a longer history in Penang than the bus kilang operation. About 35% of the school bus owners have owned the vehicle for at least ten years. 26% has owned for five to nine years and another 26% for three to four years. Only 13% of the owners has less than three years of ownership.

Table 6.4

Period of Ownership

PERIOD OF OWNERSHIP	NUMBER OF BUS
a. 1 - 2 years	3 (13)
b. 3 - 4 years	6 (26)
c. 5 - 9 years	6 (26)
d. 10 years	8 (35)
Total	23 (100)

Type and usage of vehicles

The type of vehicle used for school bus operations consist of 52% bus, 39% mini bus and 9% van.

Table 6.5

Type of Vehicles

TYPE OF VEHICLE	NUMBER (%)
a. Van	2 (9)
b. Bus	12 (52)
c. Mini Bus	9 (39)
d. Others	0 (0)

School bus services usually operate only during school days. About 84% of the drivers operate for 5 to 6 days a week, as most schools follow a five day week from Monday to Friday. Some schools also have classes on Saturday and occasionally school children go back to school on Saturday for extra classes or other activities.

Table 6.6

Usage of Vehicle per Week

USAGE OF VEHICLE PER WEEK	NO. OF BUS (%)
a. 1 - 2 days	0 (0)
b. 3 - 4 days	1 (5)
c. 5 - 6 days	19 (84)
d. everyday	2 (10)

2.4 Trip Characteristic

Time of Operations

The time of operation of school bus services follow the school hours. In Penang Island most schools operate on two sessions. The morning session starting from 7.30 am. to 1 pm. and afternoon session usually 1.15 pm. to 6.30 pm. However, there is a slight variation in school hours between primary school and secondary school. The hour of operation of school bus services is shown in Fig. 6.3.

There are three periods of operation from 5.30 pm. to 9.30 am. This morning session has its peak hour at 7.00 to 7.30 am. which coincides with the morning school going peak hours. The noon peak hour is at about 11.30 to 12.00 pm. The evening peak hour falls at 5.30 to 6.00 pm.

Number of Trips

The distribution of number of trips per bus per day is shown in Table 6.7 and Fig. 6.4. Most of the operators make between 4 to 8 trips a day. The average number of trips per bus per day is six.

Fig. 6.3

School Bus Operating Hours.

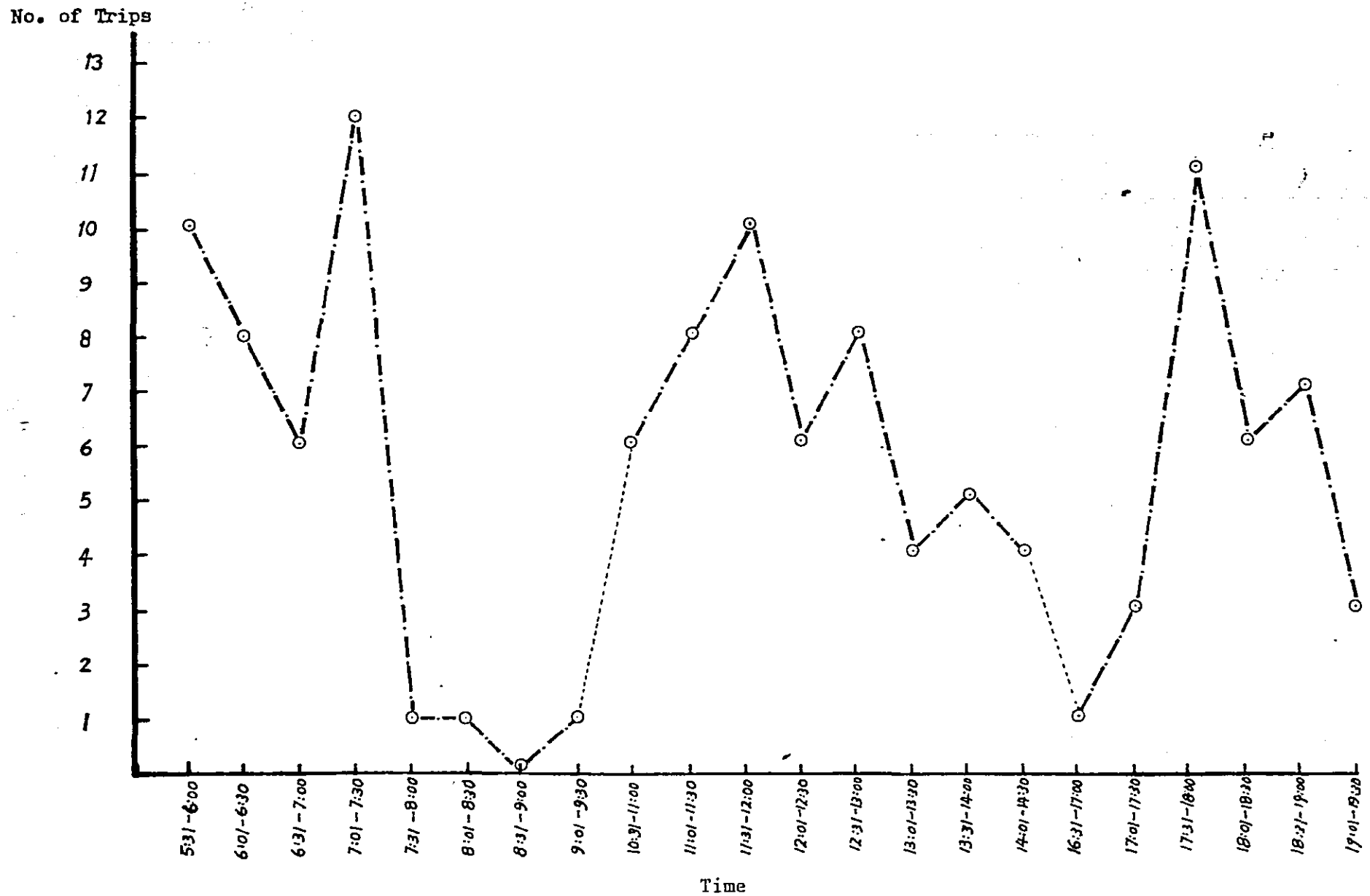


Table 6.7

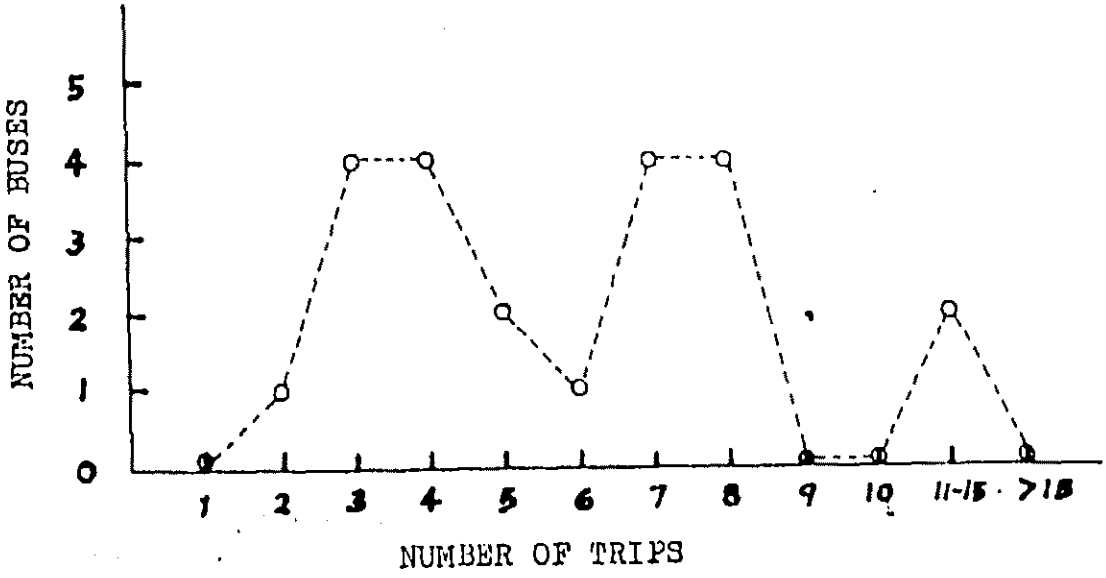
No. of Trips per Day

NO. OF TRIPS	No. of Buses
1	0
2	1
3	4
4	4
5	2
6	1
7	4
8	4
9	0
10	0
11-15	2
Total	22

Fig. 6.4

DISTRIBUTION OF SCHOOL BUS TRIPS

(AVERAGE 6 TRIPS PER DAY)



Trip Duration

The duration of each trip varies greatly, but almost all the trip falls within the range from 5 minutes to two hour. The average trip time is about 43 minutes per trip, with majority of the times falling between half an hour and more than an hour.

The actual trip time will depend on the number of collection and dropping points, the distance of routes etc.

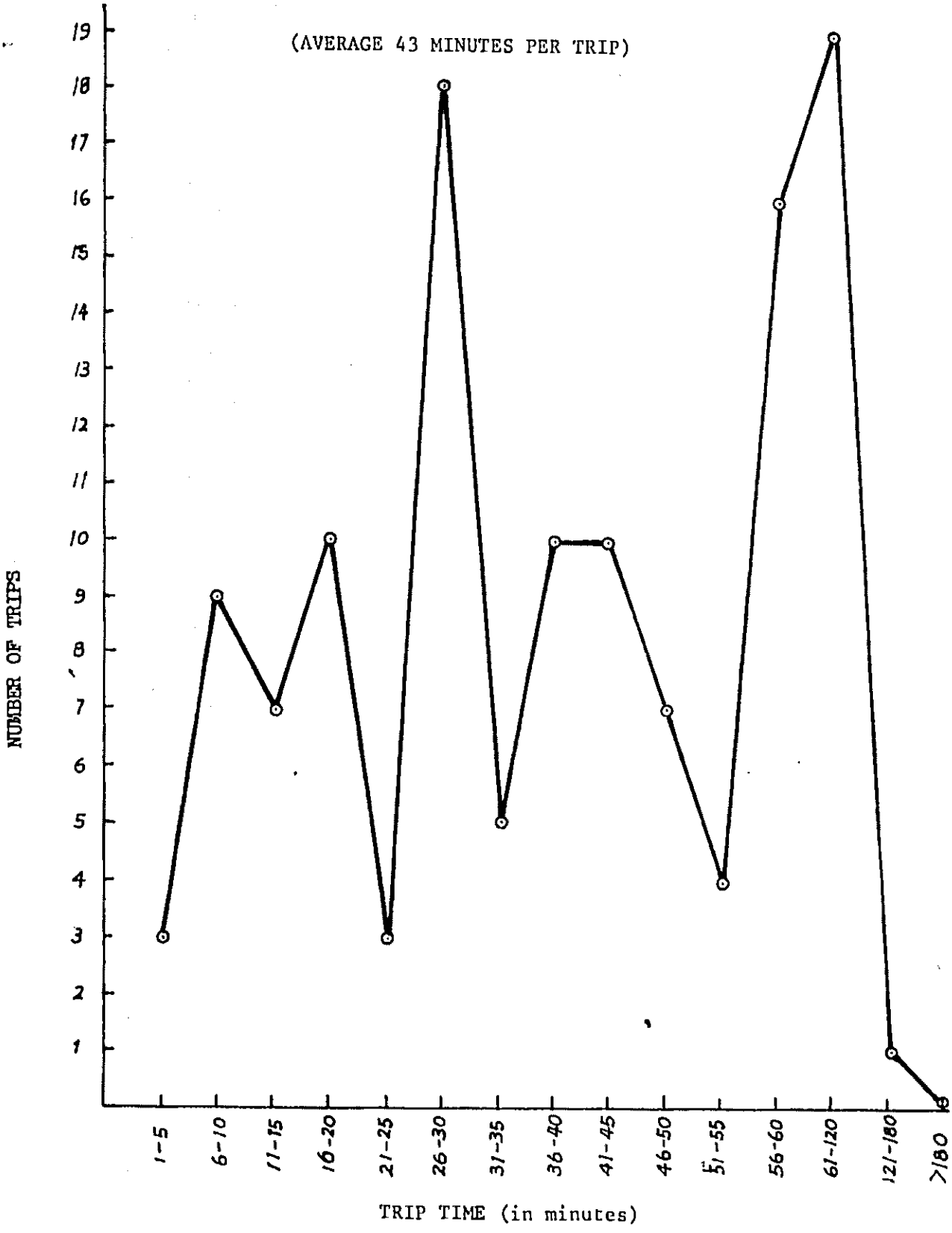
Table 6.8

Trip Time

TRIP TIME	No. of Trips (%)
a. 1 - 5 min.	3 (25)
b. 6 - 10	9 (7)
c. 11 - 15	7 (6)
d. 16 - 20	10 (8)
e. 21 - 25	3 (25)
f. 26 - 30	18 (15)
g. 31 - 35	5 (4)
h. 36 - 40	10 (8)
i. 41 - 45	10 (8)
j. 46 - 50	7 (6)
k. 51 - 55	4 (3)
l. 56 - 60	16 (13)
m. 61 - 120	19 (16)
n. 121 - 180	1 (1)
o. 181 over	0 (0)

One trip represents one way trip from starting point to the destination.

Fig. 6.5 Trip Duration



Trip Length

Mileage travel per bus per day is shown in the following table. Most of the school buses travel for more than 50 miles a day. The average distance per school bus is about 47 miles a day.

Table 6.9
Trip Length

Average Mileage	Number of Bus
0 - 9	2
10 - 19	0
20 - 29	2
30 - 39	1
40 - 49	3
50 over	16

Analysis of the O-D shows that most of the trips in Penang Island are short distance trips, while the trips in Province Wellesley are longer due to the vastly dispersed location of schools and more sparse residential density. However compared to the trip duration which is an average of 43 minutes, the long duration is usually due to the waiting time at every pick up point.

Number of Passengers

The frequency distribution of passengers carried is shown in Table 6.10. Most of the time the number of passengers carried falls within 16 to 20 children. The average number of passengers per trip is 15 persons.

This is closely related to the number of passengers registered in Penang Island. The largest number of operators have about 15 to 20 registered passengers per bus. However, in Province Wellesley, the highest number of passengers are within the range of 20 to 25. This is consistant with the observation that larger size buses are utilised in Province Wellesley whereas smaller buses are utilised in Penang Island.

Table 6.10

Number of Passengers per Trip

Passengers	No. of Trips	%
a. 0	35	-
b. 1 - 5	1	(1)
c. 6 - 10	3	(4)
d. 11 - 15	10	(14)
e. 16 - 20	21	(29)
f. 21 - 25	16	(22)
g. 26 - 30	11	(15)
h. 31 - 35	1	(1)
i. 36 - 40	6	(8)
j. 41 - 45	2	(3)
k. 46 - 50	0	(0)
1. 50 Over	1	(1)

Volume of school bus trip.

The origin and destination of school bus trips in Penang Island and Province Wellesley is illustrated in Fig. 6.6.

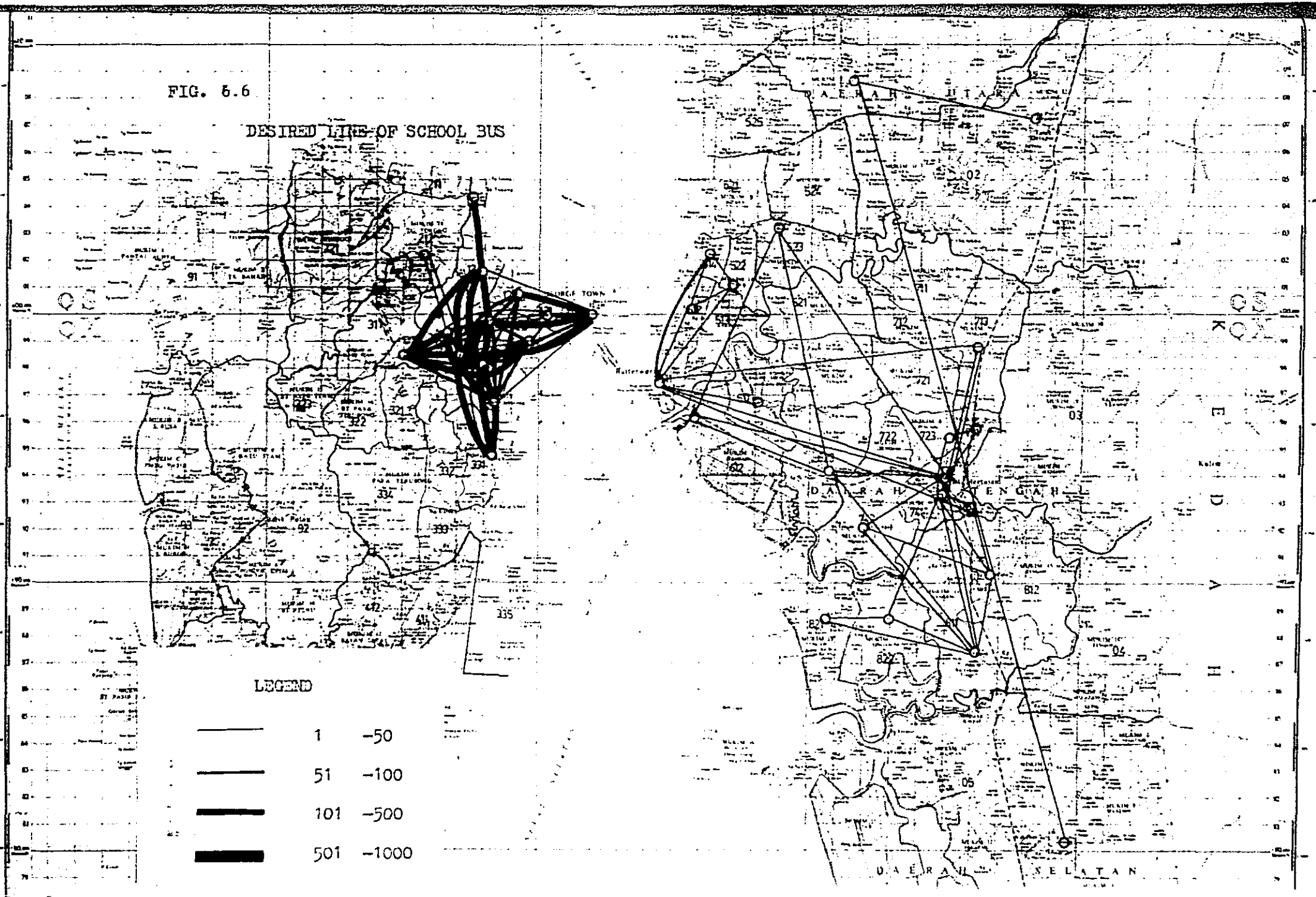
In Penang Island, school bus services operate mainly within the town area. The volume of trips is fairly high, usually ranging from 100 to 500 trips per day. This is mainly due to the fact that schools are concentrated within the George Town City.

On Province Wellesley side, the distribution of trips is more dispersed and the volume of trips is also less. The volume of trips between each origin, destination ranges from one to 50 trips daily.

In Penang Island, the school bus services operate mainly within the town area. The total volume of trips is roughly 1930 trips per day and number of school children carried is approximately 29,000 per day. On the Province Wellesley side, the desired line of trips is more dispersed and the volume of trips is also less. The total volume of trips in Province Wellesley is approximately 980 trips per day and the number of school children using school buses is about 15,000 persons per day.

FIG. 6.6

DESIRED LINE OF SCHOOL BUS



2.5 School Bus Route

Fig. 6.7 and Fig. 6.8 show the actual oporation route of school buses. The number of trips along each routes varies from one to 25 trips daily. Due to the concentration of schools around Green Lane this area experiences the heaviest volume of school bus trips. The stretch of road along Green Lane, starting from Batu Lanoang junction to Batu Lanoang Lane, experiences a school bus traffic of 21 to 25 trips daily, while the other stretch of Green Lane, and its adjoining roads experience around 11 to 15 trips per day.

The school bus services have a high percentage of coverage within the town area. Other parts of the island are not served by school bus services due to the more dispersed settlement pattern, scattered location of schools, which makes it uneconomical to operate school bus services. Other reasons may be due to the low income level of population.

On Provinoe Wellesley side, school bus services are limited compared to Penang Island. The routes covered by school bus services are along Bagan Ajam, Jalan Bagan Luar, Jalan Prai, Jalan Kulim to Machang Bubok. In the north the routes cover areas along Permatang Tinggi and Kepala Batas town to Tasek Glugor. The highest coverage are around the Butterworth town area.

Fig. 6.9 shows the location of schools in George Town; there seems a significant relationship between the location of schools and service routes.

MAP OF
THE CITY OF GEORGE TOWN
PENANG

scale. 5 inches to 1 mile

Fig. 6.7

SCHOOL BUS ROUTE

NORTH CHANNEL

SOUTH CHANNEL

LEGEND			
	1–5 TRIPS DAILY		21-25 TRIPS DAILY
	6–10 TRIPS DAILY	◀	COLLECTION/DROPING
	11–15 TRIPS DAILY	•	ORIGIN
	16–20 TRIPS DAILY	◐	ORIGIN DESTINATION
		○	DESTINATION

URBAN TRANSPORT STUDY
IN
GEORGETOWN, BUTTERWORTH & BUKIT MERTAJAM

Fig. 6.8

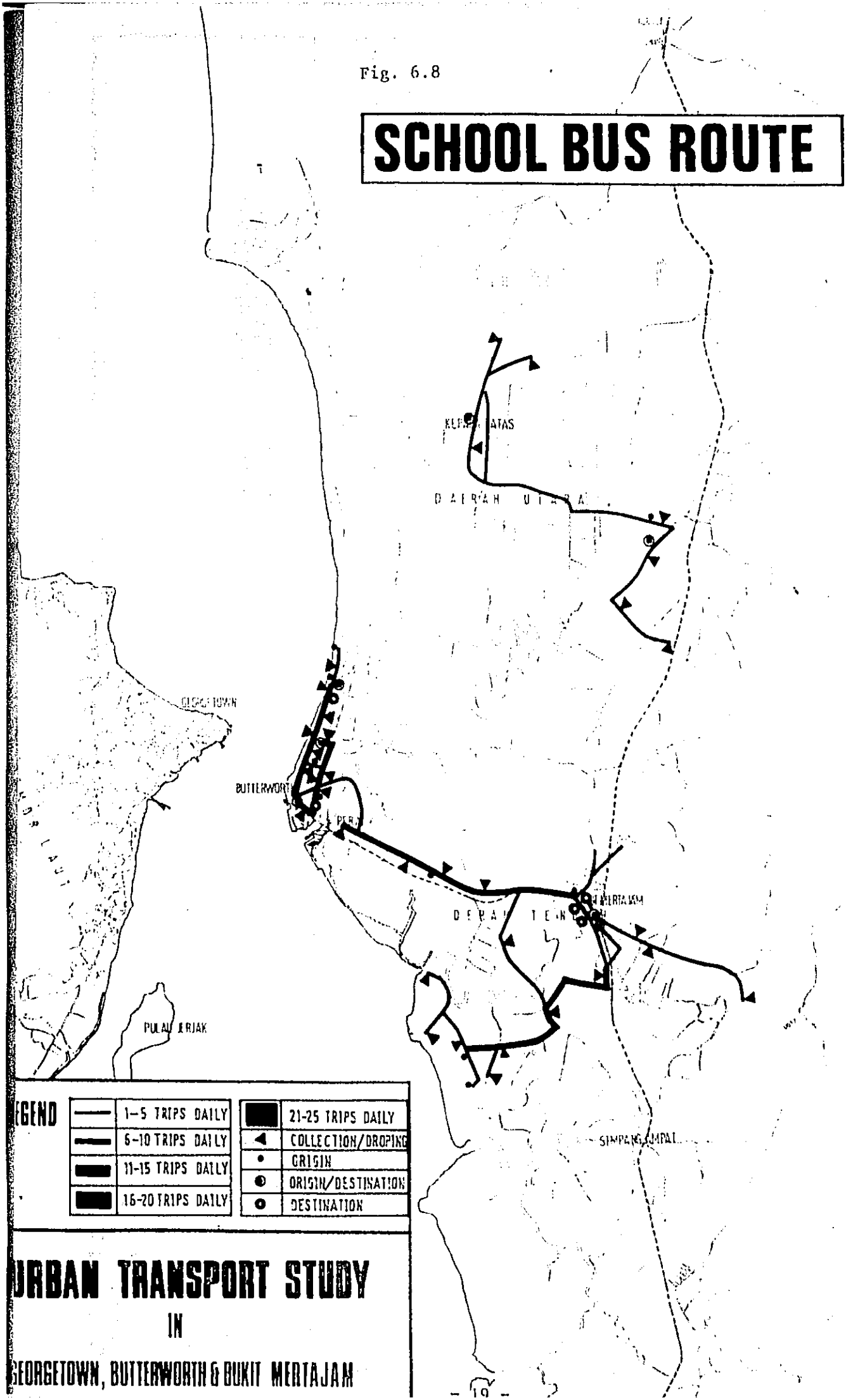

SCHOOL BUS ROUTE
KUBANG BATAS
DAERAH UTARA
GEORGETOWN
BUTTERWORTH
PERAI
DAERAH TENGAH
BUKIT MERTAJAM
PULAU ARJAK
SIMPANG AMPAT
LEGEND
1-5 TRIPS DAILY
6-10 TRIPS DAILY
11-15 TRIPS DAILY
16-20 TRIPS DAILY
21-25 TRIPS DAILY
COLLECTION/DROPING
ORIGIN
ORIGIN/DESTINATION
DESTINATION
URBAN TRANSPORT STUDY
IN
GEORGETOWN, BUTTERWORTH & BUKIT MERTAJAM

Fig. 6.9

SCHOOL LOCATION MAP

SEKIL: 5 INCI PADA 1 BATU

N

NORTH CHANNEL

SOUTH CHANNEL

TANJONG TOKONG

TANJONG BUNGAH

PULAU TIKUS

LEGEND

- High School
- Primary School

URBAN TRANSPORT STUDY

IN

GEORGTOWN, BUTTERWORTH AND BUKIT MERTAJAM

3 Problems of Existing Services

1) Since school bus operators collect their passengers from door to door, and the passengers may be going to different schools located in different directions, the journey time to school for each passenger is thus longer than travel time by car and in certain cases, even longer than by public buses.

2) In order to deliver the children in time for school, the school bus operators have to start much earlier and some children have to go earlier than necessary. The situation is usually worse during the return journey, since the children from different schools or even same school have different dismissal times, thus the waiting time for the school bus user is usually longer.

3) There is usually lack of proper waiting space for school buses, thus school buses are seen to wait on the road side of the main road, or infront of the main gate of schools. This often hampers traffic movement along the road especially when the dismissal times of school children coincide with traffic peak hours.

4 Perspectives for Future

There are two main concerns of parents of school bus users. One is to see to the safety of their children during their journey to and from school. The second reason for engaging the use of the school bus is mainly for convenience since school buses provide door to door service to the school children. With regard to these two expectations of parents, the present school bus operators are able to provide a rather satisfactory means of transport for their children.

However, one point to note is that school bus services referred here are private enterprises and mainly profit oriented, thus although the charges are reasonable, they are definitely higher than transport cost by public buses. Hence the services are usually utilised by children from middle or upper income families. Children from the lower income families usually travel by bicycles, foot or public buses.

Nevertheless, the fact that school bus service have a rather long history in Malaysia indicates a demand for such services. And since the number of school bus operators and number of buses are increasing every year, this indicates that the demand and profit is great enough to attract people into this enterprise or profession.

With the society becoming more affluent and the increase in number of school going population the demand for school bus services will definitely increase.

Although school bus services serve mainly a certain sector of the population especially in the past ten years there is tendency towards a greater utilisation of these services recently.

School bus services play an important role in reducing private vehicles on the road. Compared to taxis and private vehicles, school bus services are still comparatively cheap. It should therefore continue its operations in future.

A guide line should be formulated to guide the operations of these services.

APPENDIX

Sample of Interview Questionnaire